ENVIRONMENTAL CARRYING CAPACITY VS ECONOMIC PRIORITY: HARD CHOICES IN DECISION-MAKING OF TOURISM DEVELOPMENT

M. Mahbub Alam
Marine Fisheries Academy (Bangladesh)

M. Niamul Naser
University of Dhaka (Bangladesh)

Abstract: As a consequence of demands for hard currency and foreign exchange, development of newly tourist resorts are now given priority in Bangladesh. This opportunity attracts many investors and entrepreneurs. As a result, some islands and sea coasts with vulnerable ecosystems are being underused into tourist resorts development. Most of the expansion were done without or having very little environmental attention. In addition, multipurpose coastal uses in the same areas added more adverse effect to the system. This complex situation is conflicting with the theme of sustainable tourism. The present article deals with the "concept of priority" to determine environmental carrying capacity in vulnerable ecosystem's to achieve sustainable tourism development assisting environmental preservation. We suggest, conservation of the nature should be the first motto for sustainable tourism development. This strategy will provide long-term preservation of biodiversity for economic growth in countries like Bangladesh, where great opportunity is underutilized or mismanaged.

Keywords: environment, carrying capacity, tourist resorts, Bangladesh

Introduction

At present, tourism is an important source of income for many countries and its demand is increasing day by day. The increasing interest of tourists in sea beaches or marina's stimulated for establishing newly tourist resorts in many coastal nations. Perhaps, coastal and marine environments are very important in providing space and opportunities for leisure, contemplation and physical activities. In the context of conservation and sustainable development of coastal zone, tourism and recreation are key factors (Kenchington, 1993).

Like many coastal nations, development of tourist resorts are now given priority in Bangladesh. This speculative strategy is to open the window of opportunities especially in the private sector to develop some newly resorts area. To support and encourage the investors, road communications and other tourism infrastructure development were done in many part of the country. This in turn attracts tourist on one hand and unknown damages to natural habitat on the other hand. In fact, these succeeding development expansion was done without or little environmental attention. It is now accepted that tourism have both beneficial and detrimental impacts on coastal and marine environment depending on planning and management magnitude. Conservation oriented development planning may convey the beneficiary effects to the country.

According to Stewart (1993, p. 202) marine conservation regimes manifest in biosphere reserves. In addition, other forms of management tools also available to govern both tourism development and resource conservation. This regime combines the management of people and resources in the coastal territory and nearshore marine environments, and their components. No doubt, tourism stimulates investment as a source of employment, provides a means of earning foreign exchange. It also requires the adoption of a comprehensive development policy. Development decisions that commits in environmental attention rather than political interest may preserve landscapes, seascapes, biosphere and national heritage site of the country. Considering these issues, this article deals with developing in coastal and marine tourism with suggestion for strategic planning as a "concept of priority" in Bangladesh. This in turn will provide long-term preservation of biodiversity since these are the valued ecosystem components in a tourist resort area.

Importance of Carrying Capacity

Carrying capacity is an ecological term which means the potential number of animals of a particular species supported in an unit area. However, the term in a more current and general sense as the amount of recognized resource value that an ecosystem can supply. The major concerns of the environmental carrying capacity in tourist resort development planning is to preserve the optimum environmental quality of the area. Its aim is to preserve ecological and genetic biodiversity of native and endangered species, to ensure health safety for tourist in the system and as well as to protect large scale natural disasters. A policy with the appropriate ecosystem management rule (i.e., storage components of ecosystems are of extreme value and should always be fully protected) might be support the continuous tourists interest and also support the native population survival in natural disasters. UNEP (1984) reported that increasing trend of tourists is about 5% in worldwide. Considering this increasing trend the projected tourist number of present will be double after 20 years. For that, it requires more facilities in coastal and marine areas, and also need to offer more user conflicts. Furthermore, the coastal habitats are generally
affected by large boundary currents, gyres and eddies. Thus it is essentially more task for implementation of developmental planning policy to support significant changes in valued ecosystem components in future. In reality it is difficult to determine the accurate environmental carrying capacity in a coastal boundary or marine area since both the environmental systems are some how more or less dynamic in nature. Some strategic evaluation of any significant criteria may consider for the initial purpose during the project planning. For instance, evaluation of total microbial pollution of that area may be useful since in most cases this types of pollution is created by human activities. Thus assessment in a newly proposed area may comparable with the interrelationships between the native and tourist population, and then existing facilities in valued ecosystem components and future development plan. On the basis of calculated thresholds, the future development planning in coastal and marine tourism will provide long term economic goal.

Development Priority Dilemma

During last decade coastal and marine tourism is expanding rapidly in developing countries, as a result all recreational unit interact with their economic activities. Perhaps such expansions are now in priority because of better scope for economic growth, creation of jobs, earnings of foreign exchange and improve relationships with other international communities. Most of the cases, in general, development priority is projected in short-term multi-sectoral economic goal as a result policy implies without or less environmental consideration. For instance, development of aquaculture units may interfere with recreational uses of same water areas, or, industrial developments displaced spawning grounds of native fishes, even, toxic materials poisoning to commercially important fishes and, in long-term, that area will become more complex to the resource managers.

In Bangladesh, some of these development policy may complicate the environment. Most of the shrimp hatcheries and nurseries of the country is situated along the Cox’s Bazar sea beach area which is conflicting with its recreational facilities. “Himchari National Park,” the most attractive site of Cox’s Bazar coast is also close to some hatcheries, which is now suffering from environmental degradation and become one of the most vulnerable natural ecosystem (Pernetta, 1993).

Saint Martin’s Island is the only coral island of Bangladesh. At present various coral types are endangered due to over exploitation of resources resulting, mass habitat loss of natural coral by the both local and tourist. Most of the people of the island are fishermen and completely depends on sea resources. A couple of families are coral collectors and supplies to the tourist market of the country. Coral boulders are also use to obtain calcium. The selling of olive Ridley turtle and green turtle eggs in the local market is evident (ESCAP, 1988). It should be noted that green turtle is now one of the an endangered turtle of the world. In the recent years, some newly established fish drying industries at St. Martin’s Island are responsible for air pollution offering off-order to the environment. These factor are also contributing large-scale organic pollution through discarding offal’s directly into the sea shore. This activities clearly conflict with tourism and are detrimental to the coral reefs, since the growth rate of corals are drooping considerably in the St. Martin’s Island vicinity.

Patanga and Fauzdarhat sea beach of Chittagong has been considered as polluted due to the port activities, ship breaking and discharge of several nearby industries (UNEP, 1986). The renovation program of Patanga sea beach is conducted without essential measures for improving water quality in the area as the Karnafuli River estuary received all the untreated industrial loads from upstream (ESCAP, 1988). The Fauzdarhat sea beach remains abundant due to Vatinary-Kumirsha ship breaking activities which create noise, air and oil pollution in the area. One of the recent development step is the construction of Cox’s Bazar-Teknaf highway through the coast line to facilitate easy tourist passages and communication through the coast line. This policy might affect some valued ecosystem components in that region including the “Himchari National Park.” The present situation in some of the coastal region is summarized in Table 1.

It is clear that all the above development policies implies a quick economic interest rather than long-term environmental benefit. This types of policy is conflicting with sustainable sectional development in an Integrated Coastal Zone Management Program. The development policy in coastal and marine tourism should be harmonized to the other sectional process including the natural environment.

The country has some good and well-classified legislative framework especially in wild life conservation and pollution control. But the applicability of these regulatory framework is now under questions. The continuous environmental degradation of Saint Martin’s Island, Chittagong-Cox’s Bazar sea coast and Karnafuli River estuary and also illegal marine and coastal wildlife killing indicating the inefficiency of administrative capability. The long chain bureaucratic process is always delayed to act in emergency stages, which is at present an important barrier. The appropriate regulatory framework for environmental preservation, the most important components is lacking in the present tourism objectives.
Concept of Priority

There is no doubt that every country wish to have continuous sustainable economic growth. Like other economic sectors coastal and marine tourism is now considered as a rising industrial activities in many countries including Bangladesh. Every coastal nations are more concerned about their maximum utility of coastal resource exploration including tourist sector development. Development in the tourist sector is essential for sustainable economic growth, but it should contain less environmental temptation. Conservation of nature should be the foremost priority, then the economic goal from the system. These strategy may ensure long-term economic benefit and will provide higher environmental sustainability.

Considering these, the first essential step in a tourist development program is to identify the values ecosystem components (i.e., landscape, seascape, wildlife, migratory birds, coastal forest, etc.) as a part of project development planning. Because these components possess the highest aesthetic values and more attraction to the tourists. Moreover, these information will help in evaluating the probable environmental degradation and quantifying the value of loss from the conversion or development. When predicted aesthetic value loss is relatively higher then economic gain from tourism, habitat restoration program within the resort areas should adopt to mitigate of the probable loss. The adoption of such strategic steps may accept the project for implementation. Finally, dual development plan, i.e., sustainable environment and tourism, will possible by adopting co-management policy. Members from government representative, private tourist organization, interested public group (i.e., natural scientist, economist, sociologist, anthropologist, environmental engineer, etc.) and responsible local community members may help in avoiding long-chain bureaucratic process through sharing ideas and responsibilities in the decision making process.

Conclusion

Environmental friendly tourism practice plays the key role in an integrated coastal zone management program. Development of tourism and environment at the same time will save many resources for a tourism growing country. Attempts in conserving the natural environment should be the moral practice for utilizing a significant ecosystem component and a sustainable tourism practice. This will ensure long-term economic benefit from tourism and will improve environmental carrying capacity. Thus management initiatives require practically applicable organizational and legislative framework. And no doubt policies must reflect the national, social, economic and environmental interest rather than political commitment.

Regarding these the following recommendations may help in the development of policies to avoid any catastrophic environmental loss in Bangladesh.

Recommendations:

- Immediate adoption of environmental friendly appropriate regulatory instrument and management institution.
- Immediate stopping of fish-processing activities around St. Martin’s Island.
- Complete ban on coral and other vulnerable resource harvesting, gathering, processing, and selling from St. Martin’s Island.
- Immediate declaration of St. Martin’s Island as a Marine Protected Area and adopt as an environmental-friendly tourist spot.
- Immediate declaration of the Nijum Dwip, Shapori Dwip, and other marine bird gathering islands as “Marine Bird Sanctuary.”
- Urgent program for habitat restoration at “Himchari National Park” of Cox’s Bazar, the coastal wet-lands and islands around Teknaf coast, and Moheshkhali, Kutubdia, Swandip, Hati, Rangabali Islands.
- Immediate actions for water quality monitoring program from all estuaries to estimate types of industrial activities and other source of wastewaters.
- Immediate measures for conserving existing natural beauties, valued ecosystem components and natural habitats around the coastal areas of the country.
- Urgent program for maintaining optimum human population at St. Martin’s Island and other sensitive coastal regions.

References


Table 1. Present Situation in Some Significant Coastal Areas of Bangladesh (after Pernetta (1993) and several field investigation done by the authors)

<table>
<thead>
<tr>
<th>Significant Coastal Area</th>
<th>Natural Environmental Components</th>
<th>Present Use</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saint Martin's Island</td>
<td>Wintering ground for wild fowl; nesting site of sea turtle; 13 genera of corals; several million years old &quot;Coquina bed;&quot; various types of biodiversity.</td>
<td>Fishing and resource gathering; fish drying; agriculture; tourism.</td>
<td>Environmental quality extremely deteriorate due to complex multi-uses and indiscriminate resource exploitation.</td>
</tr>
<tr>
<td>Cox's Bazar Beach</td>
<td>Himechari National Park and its pristine wildness with numerous wild life and natural waterfalls.</td>
<td>Tourism; fishing; aquaculture unit; refugee slums; etc.</td>
<td>Any road communication facilities through this coastal belt will destroy the park since this area is already lost its pristine value.</td>
</tr>
<tr>
<td>Nijum Dwip</td>
<td>Habitat of migratory marine birds; mud flats wetlands; sandy and muddy beaches.</td>
<td>Fishing; fish drying; scattered tourist visit.</td>
<td>Declaration as a bird sanctuary seeks top priority.</td>
</tr>
<tr>
<td>Naf Estuary Islands</td>
<td>Shahpoor dwip: tidal mud flats and migratory birds; Jaliar dwip mangrove block; several coastal intertidal mangrove vegetation's and wild life; Muchoni &amp; Whykeong important mullet fishery nursery ground.</td>
<td>Fishing; fish drying unit; aquaculture; tourism.</td>
<td>Jaliar dwip mangrove block and other several mangrove vegetation is already cleared for aquaculture development. Shah poor dwip urgently needs to declare as a bird sanctuary.</td>
</tr>
</tbody>
</table>
TOOLS AND PROCESSES TO FACILITATE DECISION MAKING FOR THE FLORIDA KEYS NATIONAL MARINE SANCTUARY MANAGEMENT PLAN: A CASE STUDY OF COMMON PROPERTY RESOURCE MANAGEMENT

Maureen Stancik
Massachusetts Institute of Technology (United States)

Abstract: There are no structured methodologies for making coastal environmental decisions, and the public participation that is required by U.S. law occurs in an ad hoc manner. Subsequently, most decisions made for coastal common property resources do not reflect societal preferences, and the outcomes do not provide efficient allocations. Combining economics and decision theory will help to first to determine, then to achieve the necessary conditions for making "good" coastal environmental decisions and improve the outcomes. To determine how to make "good" decisions, the factors that typically complicate coastal decisions are first identified. Then "good" environmental decisions are defined; conditions similar to those used for a well-functioning market system are adopted, i.e., (1) the stakeholders must be well-informed, (2) the stakeholders' preferences must be included, and (3) flexible and adaptable decisions must be achieved. This research then identifies families of analytical tools that can help overcome the complicating factors.

Motivation for the Work

Coastal areas typically possess resources of great economic and intrinsic value. The marine ecosystem surrounding the United States' Florida Keys is no exception; the coral reefs, fisheries, estuaries, sandy beaches, etc., support the majority of the Keys' economy. Outdoor recreation and tourism support about half of all employment in the Keys (Ehler, 1994). Tourism expenditures in the Keys was calculated at $800+M/year in 1989 and growing (Kearney and Centaur Report, 1990). The commercial fishing business, also supported by the marine ecosystem, is worth $5 million per year in the Keys (Dewar, 1994). The importance of the marine ecosystem is even greater when one realizes that there are no major industries in the Keys other than tourism and commercial fisheries; without these, the entire socio-economic structure would collapse (Ehler, 1994).

Like many common property resources, the Florida Keys' marine ecosystem has suffered from the Tragedy of the Commons (Hardin, 1968). Over a number of decades, the degradation and death of marine resources has become prevalent. Coral reefs have died, the Florida Bay has been likened to "the dark side of the moon" and fish stocks have disappeared (Dewar, 1994). As a result, the number of Florida Keys residents concerned with the problems grew. Many saw the need to manage their marine resources for sustainable use. They called for government intervention, realizing the laissez-faire market system would not properly manage these common property resources.

Concerned citizens became involved, writing to their congressmen and forming special interest groups; the political fervor grew until it caught the attention of US Senators. In 1990, the Senate passed the Florida Keys National Marine Sanctuary (FKNMS) Act, mandating that a 2200 sq. nautical mile area surrounding the Florida Keys be designated a NOAA National Marine Sanctuary. (This is the only NOAA sanctuary designated by the U.S. Senate; all others have been designated by NOAA). The Act required that a management plan be created to ensure that the Keys' marine resources would be used and conserved. Many Keys' residents felt the first battle had been won; there was local, state and federal recognition that the marine resources needed to be managed for sustainable use.

The second battle, creating a successful management plan, was more difficult. The focus of this research is to make the creation of similar management plans easier. While many of the Keys' citizens are now satisfied with the draft FKNMS Management Plan, the decision making process itself was long and arduous. The FKNMS Management Plan took 5+ years to create and even longer to pass into law. (As of summer 1996, the plan is still in review, currently in the Federal Office of Management and Budget.) While the plan was being created and waits for the Federal government, the marine resources have continued to degrade. As Alson
Fahrrer, an Advisory Council member and Chairperson of the AC’s Zoning Committee, said, “I’ve been very frustrated with the pace. If this were a business proposition, it would have taken no more than 18 months” (Fahrrer, 1994).

There was and is a strong need to focus and streamline the decision-making process. Making decisions about how to allocate common property resources should utilize the latest applicable research and theories—research concerning management of privately held resources, Economics and Decision Making Theory. The purpose of this research has been to determine which processes, tools, techniques, theories, etc. would be most beneficial to public sector decision making for common property resources.

Complications—Why is it Difficult to Make Decisions for Common Property Resources?

One can site many reasons why making decisions for the public sector is more complicated than for the private sector. After reviewing over seven decisions made for coastal common property resources, it was found that many of the reasons could be distilled into three main types. These complicating factors are:

- many people with multiple values
- difficulties in incorporating all the relevant information from multiple disciplines, and
- high levels of uncertainty

Many People with Multiple Values

With most environmental decisions, many people influence and are influenced by the laws and regulations concerning the area. Typically, there are 1) multiple government agencies who have jurisdiction in the designated area and 2) a great number of individual citizens who affect and are affected by the designated area. Because of this, it is becoming the norm to legally mandate that both private individuals and multiple government agencies be involved in environmental decisions. This was the case for the FKNMS. The Act mandated that “the Secretary of Commerce, (through NOAA) in consultation with appropriate Federal, State and local government authorities and with the Advisory Council established under section 208, shall develop a Comprehensive Management Plan and implementing regulations to achieve the policy and purpose of the Act.”

The decision to create the FKNMS Management Plan included nearly 20 government agencies and citizen’s advisory council including representatives from over 20 different interests groups. In addition, Florida state required that many of the meetings be open to the general public and that public participation be elicited. Hundreds of meetings took place in an effort to include the comments, thoughts and values of all those affected. The large number of people involved, while necessary and beneficial to creating a widely accepted plan, increased the number of judgments, preferences and interests that had to be included. This complicated the decision making process. Unfortunately, the methods used to incorporate the many interests were relatively unsophisticated.

Poor Management of the Information from Multiple Disciplines

In all complex environmental decisions, it is a substantial challenge to record, organize and incorporate the vast amount of information relevant to the decision for a number of reasons.

1. Large amounts of information. The sheer volume of information that is relevant for the average environmental decisions makes it difficult to consider it all simultaneously. While humans are good at determining and intuiting the relationship among different data, we are less adept at juggling many pieces of data at once. Many decision makers have moved to using computer aided decision making tools to manage and simultaneously consider great volumes of information, a task for which computers are well-suited. These decision making tools/programs are created using the humans’ reasoning and logic, the computer program then enables the great volumes of data to be considered concurrently, executing the programmer’s logic and keeping records.

2. Criteria from multiple disciplines, requiring expertise from many areas. Most environmental decisions, including the FKNMS Management Plan, require knowledge from a broad range of topics e.g., marine biology, zoology, hydrodynamics, chemistry, coastal construction, economics, marine policy, etc. There is no one field of expertise that can alone determine how best to manage the marine resources. Combining many fields of expertise is necessary, and requires that the information be organized, showing the linkages among the many variables. Structuring and showing interconnections in the information is necessary, so that all experts (and average citizens) can understand how each part fits into the whole. To the greatest extent possible, many people need to understand the whole problem, so they can contribute their knowledge; they need to understand the current or state-of-the-art knowledge so they can determine how their additional knowledge can be utilized within the overall decision and/or how their values can be incorporated.

3. Interdependencies among the variables, including dynamic and cyclical. With environmental decisions and ecological processes, there are many cause and effect links. For example, pesticides used on land effect many marine
organisms; increased ocean temperatures effect coral as well as other marine life. Some linkages are cyclical and dynamic as well (e.g., turbid water causes marine plants to die, which causes greater turbidity and more death). Researchers are constantly discovering new linkages. What is most helpful is to organize all the information that is known in a manner that indicates the linkages, including those that are cyclical and dynamic interdependencies among the variables, such as human actions, natural phenomenon and marine biology, need to be made obvious since it is more enlightening to see cause and effect, rather than read long lists of data with no interdependencies specified.

4. **Multiple criteria that cannot accurately be reduced to monetary terms.** In environmental decisions, some resources can be represented in monetary values, but for many resources, it is difficult and even impossible to determine an equivalent dollar value. For example, what is the value of clean air, clean water, wetlands, oil-free coastal waters, etc.? If all criteria could be reduced to an widely agreed upon dollar value, then all resources could be compared and combined using these dollar equivalents. It would be easy to combine large amounts of information, because there would be a common denominator; all criteria could be simplified into one dollar value. Unfortunately, that is not possible with environmental decisions. It is, though, still necessary to consolidate and combine the many variables, values and judgments so that actions can be taken concerning the resources.

In all complex environmental decisions, the information needs to be well managed, so that 1) large amounts of information can be included; 2) information from many disciplines can be understood by many people and incorporated into the bigger picture; 3) the linkages among the many pieces of information are made obvious; and 4) multiple criteria with dissimilar scalar units can be compared.

**Uncertainty**

There are complicating factors that can be described as various types of uncertainty.

1. **Uncertainty about cause and effect.** Natural processes and living systems are complex, and as stated before, therefore are many inter-linkages. Unfortunately, their are uncertainties about many of the linkages and within many of the subsystems. There may be uncertainty as to the timing, intensity and frequency of events which effect the ecosystem (such as hurricanes and rainfall). There may also be uncertainty as to how certain parts of a subsystem interact (how do toxins affect coral reefs), and there may be uncertainty as to what variables even affect an ecosystem (i.e., scientists probably have not yet identified all the factors that affect the health of coral reefs). The most advanced research can not predict with 100% certainty the causes and effects of most events in an ecosystem. We can not, though, wait until there is perfect information before making decisions; decisions must be made using the most relevant knowledge currently available, even when there is uncertainty.

2. **Various ways to consider the time frame of the project.** There is often uncertainty as to the most appropriate time frame for making a decision. When environmental decisions are made, the decision makers must decide whether to consider a time frame of 10 years, 20 years, 50 years or infinity. For example, for renourishing a beach, the cost benefit analysis might be made using a 20-year time frame for the buildings and tourism economics, but the sediments may affect marine species such as sea turtles for 50, 100 or more years. It is often difficult for the decisions makers to determine what is an appropriate time frame, contributing to the uncertainty and lack of consensus in the decision making.

3. **Various ways to consider the geographical scope of the project.** With environmental decisions, there is often uncertainty in determining the appropriate geographical area within which to measure the effects of a decision. The air and water in an area are fluid and travel outside the region. Since no one fully understands all the biological, chemical and physical processes that occur within the defined geographic "boundaries" of the affected ecosystem, no one can be sure that effects do not spill over into other geographic regions. (For example, the FKNMS is 2800 sq. nautical miles, but the FKNMS Management Plan is likely to affect marine life in the entire Caribbean Sea. In turn, the FKNMS is affected by events on land and in the surrounding water body, such as rainfall, pollution, etc.) When making environmental decisions, there is uncertainty as to what geographical scope is appropriate.

4. **One-time decisions with high stakes.** Not only does managing environmental resources typically means making decisions under uncertainty, but often one or more of the possible outcomes could be disastrous. Many environmental decisions are not reversible; the decision can not be made many times over, allowing the decision maker to learn from mistakes or be satisfied with the statistical average of the many outcomes. (While the FKNMS Management Plan will be revised every four years, much of the decisions made in the first version will affect the marine ecosystem for many years. For example, irreversible outcomes may be the extinction of certain marine species). Often environmental decisions affect resources that are one-of-a-kind. If a poor decision is made, it may result in the depletion of an irreplaceable resource, or it may require tens of hundreds of years to replace the resource (as is the case with many fish stocks and coral reefs).
As discussed above, there are many factors which complicate environmental decision-making. There is uncertainty inherent in the relevant variables and in the decision scope; there is a great deal of information and many people’s values and judgments that must be included. To make a good decision, it is necessary to distinguish between disagreements concerning the facts vs. differences in values and judgments. If only discussion and debate are employed in making the decision, the distinction between fact and judgments becomes more difficult as the number of factors to consider increases and as the number of people involved in the decision grows. For complicated environmental decisions, more than just discussion and debate need to be employed. Determining what the best decision making processes and tools to use is not insignificant, though.

Decision-Making Processes and Families of Tools

Studying Decision Theory, it becomes evident that one must first define what it meant by a ‘good’ decision. One then must realize their are both decision making processes and tools that must be optimized to make a ‘good’ decision.

Determining What Makes a ‘Good’ Decision

To use a commonly agreed upon definition of a ‘good’ decision, the definition of an efficient allocation from economic theory was used. The four necessary conditions for an efficient allocation in the Market System were reviewed. They are:
1. Privately owned input and output factors;
2. Perfect information (no uncertainty);
3. Producers and consumers who are all price takers (i.e., no monopolies or oligopolies); and
4. No barriers to entry.

These criteria were scrutinized and to the extent possible, applied to decisions for allocating common property resources. They had to, of course, be altered slightly to be applicable.

1. ‘Privately owned input and output factors’—

Common property resources by definition do not have privately owned input or output factors. The important part of this criteria is that private ownership enables one party to take control of the resource, to make decisions and take actions upon it. With common property resources, decisions and actions must be made by many people; the decision process must enable multiple decision makers.

2. ‘Perfect information’—There can never be 100% certainty in environmental decisions. Having well informed stakeholders / decision makers gets close to perfect information, though.

3. and 4. ‘Producers and consumers who are price takers’ and ‘no barriers to entry.’ These are replaced by ‘Preferences of all stakeholders are reflected,’ since they essentially mean that there should be no forces which exclude any interested parties from partaking in the allocation decision (see Stancik, 1995 for more details).

Decision-Making Processes

Research concerning Decision Theory was reviewed, and the necessary steps for creating a ‘good’ decision (generically) were borrowed. This was to ensure that the tools chosen for environmental decisions could be used within the generally agreed upon steps of good decision-making. These steps are:

1. Define the Problem, Overall Goal and Objectives;
2. Formulate criteria and detailed variables that affect the problem and goal;
3. Formulate Choices;
4. Execute Sensitivity Analysis;
5. Choose an Option; and
6. Implement


The tools and techniques chosen to assist environmental decision making should be used within the generic steps of good decision making to ensure that the best possible decision be made.

Families of Tools

There are many methods for allocating resources, whether they be resources which are privately held or common property. Some of these methods are classified as market-based techniques, some as legislative methods and some as decision making tools. To determine which are most appropriate and helpful for creating the best environmental decision, each family should be reviewed, as well as examples of tools within each family. The tools should be scrutinized to determine if the can help accomplish the six steps described above, and if they can help overcome the complicating factors described earlier. The families of tools reviewed are as follows:

Market-based methods include:
- Laissez-Faire and
- Dollar-based methods—Maximized Net Present Value

Regulatory and judicial methods include:
- Command and control
- Judicial actions (i.e., property rules, liability laws)
- Reporting mandates and public pressure
- Financial incentives (i.e., tradable permits, taxes)

Methods from Decision Making Theory include:
- Operation Research Tools
- Multi-Criteria Decision Making (MCDM) and Multi-Objective Decision Making tools
- Multi-Attribute Utility Theory
- MCDMs to structure and manage the information
- MCDMs to accommodate uncertainty
- Decisions Support Systems (Hwang et al., 1987)

It is assumed that the reader is familiar with the Market-based techniques, Regulatory and Judicial methods, and Operation Research Tools; for brevity, descriptions will not be provided here. It is also assumed that the reader will be less familiar with Multi-Criteria Decision-Making tools; these are described briefly below.

Multi-Criteria Decision-Making (MCDM)

MCDM has emerged as a philosophy that integrates common sense with empirical, quantitative, normative, descriptive and value-judgment-based analysis. It is a philosophy supported by advanced systems concepts (i.e., data management procedures, modeling methodologies, optimization and simulation techniques and decision-making approaches) that are grounded in both the arts and sciences for the ultimate purpose of improving the decision making process (Haimes, 1984).

Multiple Attribute Utility Theory are decision-making tools that can elicit and combine many people's values and preferences, then summarize them into one chosen alternative. Examples would include Voting, Weighted Preference Methods, the Analytic Hierarchy Process and Conjunctive/Disjunctive Methods.

MCDMs that help manage and structure information can be used with many decision makers and multiple criteria, but do not focus on preferences. Instead, this MCDMs focus on eliciting and recording knowledge, organizing and managing large amounts of information. Examples would be brainstorming, cognitive maps such as Causal Loop Diagrams, and simulations models such as Systems Dynamics.

MCDMs designed to accommodate uncertainty also do not focus on eliciting preferences, but again focus instead on eliciting and recording knowledge. They differ from the MCDMs described above in that they can incorporate uncertainty inherent in the physical and economic aspects of the ecosystems. Examples would be Decision Trees and Influence Diagrams or simulations models which can incorporate statistical uncertainty, such as Demos.

The criteria for choosing the most applicable, helpful tool(s), was to determine which could overcome the many complicating factors inherent in environmental decision-making. Analyzing in detail the applicability of many tools, it was found that 1) some could not be used because they were incompatible with one or more of the complicating factors. 2) Other tools held more promise; some tools could overcome some of the complicating factors, and were still usable if the unresolved complicating factors remained. Unfortunately, no one tool was found that could overcome all the complicating factors. Below is a condensed version of the applicability of many tools.

Market-based systems, regulatory and judicial methods can not be used alone to improve decision making for common property resources for the following reasons.

Market Based System
- Laissez-Faire: insufficient due to the 'Tragedy of the Commons'
- Dollar-based methods/Maximized Net Present Value: insufficient since many criteria can not be accurately reduced to a monetary equivalent

Regulatory and Judicial Methods
- Command and control: insufficient since it enables only one decision making body
- Judicial actions (i.e., property or liability laws): helpful, but typically post insult, not preventing
- Reporting mandates and public pressure: helpful, but rarely adequate alone
- Financial incentives (i.e., tradable permits, taxes): helpful, but not applicable for all common property resources

Multi-Criteria Decision Making Tools

It was found that many of the Multi-Criteria Decision-Making tools could be used in combination with other tools. All MCDMs can overcome the complicating factor of inadequate information management by incorporating multiple criteria and variables, non-monetized variables, and variables from a broad range of disciplines. In addition, all MCDMs are designed to be used with many people. MCDMs also allow market based methods such as monetary cost/benefit analysis to be included within MCDM tools, since any variable, monetary or not, can be incorporated. MCDMs can be used in conjunction with various regulatory methods. It was found that by using a number of MCDMs together, and in a specified order (so as to achieve the recommended process), most of the complicating factors could be overcome.
Using Multi-Criteria Decision-Making tools for the FKNMS Management Plan

This section will discuss the tools found to be most helpful for the creation of the FKNMS Management Plan.

Analytical Hierarchy Process

A Multi-Attribute Utility Theory tool, was used first and found beneficial in eliciting the participants' initial concerns (Saaty, 1990). The tool showed how the values and judgments identified by the Advisory Council were linked. It also began to show the degree of consensus that existed, as well as the depth of conviction, for some values vs. others. Recording the criteria in a hierarchical manner made it easy for many people to review and add to the concerns identified.

Causal Loop Diagrams

CLDs were used and found to be helpful in first eliciting and organizing the relevant variables for many of the sub-decisions made. The CLDs were relatively easy to create and understand. The participants used them to educate themselves on what was already known and documented. The CLDs were also helpful when each user tried to determine how their knowledge was applicable and relevant. The CLDs made it easy to identify and record the many relevant variables as well as the interdependencies of the variables.

Systems Dynamics (Forrester, 1969)

A simulation model was found to be incredibly helpful for eliciting and organizing detailed information, but it could only be used for small pieces of the entire decision. Although it could only be completed for a very small part of the ecosystem, it was powerful in that the simple process of attempting to quantify all the linkages forced the best available information to be drawn out and incorporated. Equally important, the Systems Dynamics model also enabled likely outcomes of various actions to be forecasted for small parts of the ecosystem.

DEMOS (Morgan and Hentron, 1990)

A simulation model which incorporates uncertainty, was then used to understand the degree of uncertainty in the forecasts made by the Systems Dynamics model. Quantifying the uncertainty of the interdependencies between variables again helped to elicit the best information. The use of DEMOS was illuminating in that it indicated the degree of sensitivity in the various outcomes.

The Analytical Hierarchy Process

This was used again at the end of the decision making process. The other tools were first used to educate the stakeholders about all known relevant information, and likely outcomes. After they became well informed, AHP was then helpful in eliciting final preferences from the stakeholders.

One commonality among all the tools is that they are all pictorially based, which increases their usefulness in educating many people. Using the tools in the prescribed order above also enables the optimal decision-making process to be followed.

Conclusions

Creating management plans similar to that made for the FKNMS can be assisted by using certain families of MCDMs in combination with market based and regulatory techniques. The first step in this research was to determine what are typical hindrances in making good and efficient environmental decisions. The next steps required reviewing many disciplines currently used to allocate resources, then determine which would be the most useful for environmental decisions. It is predicted that using the prescribed methodology stated above had been used, the FKNMS Management Plan would have been made in less than half the time. In addition, other benefits would be numerous, including:

- eliciting the best available detailed knowledge from many sources
- forecasting likely future scenarios
- transferring this information to many people
- eliciting detailed preferences
- combining preferences of many people into actions and plans
- recording the decision making process, so it is well-documented, easy to review and defend.

References


Haines. 1984. Opening remarks as chairman of the sixth international MCDM conference.


Stancik. 1995. Tools and Processes that facilitate Coastal Environmental Decisions which reflect societal preferences. MIT


ENDNOTES

1 These included the Exxon Valdez, Boston Harbor, San Francisco Bay, Miami Beach, Chesapeake Bay, Manatee County, and the Florida Keys.

2 There are many reasons for the increasing interest in MCDMs:

First and most importantly, is the increasing recognition that most decision problems are inherently multi-objective...The reason for the multi-objective nature of these problems is simply that the outcomes associated with the decisions are multi-dimensional...A second, but related, reason for the increasing interest in MCDMs is the recognition of numerous stakeholders in many problems...Finally, a third reason for increasing interest in MCDMs is the enormous improvement over the last 15 years in the speed storage, and feasibility of computing facilities (Evans, 1989).
Origins of the Coral Reef Initiative

The Coral Reef Initiative began as a U.S. Department of State initiative in late 1993. It was formally announced at the U.N. Conference on Sustainable Development in Small Island Developing States in May, 1994. Following that meeting, the American Flag Pacific Island governments of American Samoa, Commonwealth of the Northern Mariana Islands, Guam and Hawai’i began developing their own Coral Reef Initiative as a grass-roots effort tailored to the needs of each jurisdiction. This was formalized at a meeting convened by the Pacific Basin Development Council in December 1994 involving representatives of the four island governments, non-governmental organizations, and Federal agencies.

In Hawai’i, just prior to the American Flag Pacific Island Coral Reef Initiative Management meeting, coral reef scientists met at the East-West Center in November 1994 to discuss marine and coastal biodiversity. The same month, the Sierra Club Legal Defense Fund and other environmental groups organized a workshop for non-government agencies on Community Involvement in the Management and Protection of Coral Reef Ecosystems. These meetings served to increase interest in improving the management of coral reef ecosystems in Hawai’i and the rest of the Pacific region. They also provided the volunteer organizers of the Hawai’i Coral Reef Initiative with some momentum to begin to develop a truly grass-roots effort.

Initial Assessment

Early in 1995, the Hawai’i Coastal Zone Management Program asked Dave Raney of the Sierra Club, Mike Hamnett of the Social Science Research Institute, Peter Rappa of the University of Hawaii Sea Grant Program, and Susan Miller, a local environmental consultant, to help facilitate further development of the Hawai’i Coral Reef Initiative on a volunteer basis. In May 1995, this volunteer group organized a coral reef ecosystem assessment and monitoring workshop at the University of Hawai’i. Over 30 people from the academic community, the ocean recreation industry, state and county government agencies, environmental groups, and dive groups attended. Workshop participants concluded that a preliminary assessment of the state of coral reefs in Hawai’i was needed. They also agreed that a preliminary assessment could be done using volunteers.

Community Initiatives

The Hawai’i CRI “volunteer coordinators,” as the group referred to themselves, recognized in early 1995 that despite the initial optimism, they should not depend on
federal funding for a Hawai‘i Coral Reef Initiative. They also felt that because state and federal budgets were being cut, a volunteer-based Coral Reef Initiative might become a model for other resource management efforts.

The Hawai‘i Coastal Zone Management Program provided grants totaling $13,500 for logistical support for the Hawai‘i Coral Reef Initiative. With donated time and travel funds provided under the grants, community meetings were held at the University of Hawai‘i at Hilo and at the UH Cooperative Extension Service offices at Kaimuki in Kona. Participants at both meetings included commercial fishermen, ocean recreation industry employees and business owners, recreational divers, members of Hawai‘ian and environmental groups, UH faculty and students and citizens concerned about the state of the coral reef ecosystems in Hawai‘i. The CRI volunteer coordinators gave participants some background on the Coral Reef Initiative. Participants discussed the need for an initial assessment and a brainstorm session was facilitated on what people in the community could do to develop their own coral reef initiative.

Participants at the Hilo and Kona workshops talked about activities they had initiated to protect coral reef ecosystems. A presentation was made by Brian Tissot of UH Hilo on the Quantitative Underwater Ecological Survey Technique (QUEST) program being sponsored by the UH Marine Options Program on the Big Islands. Participants at both meetings suggested a wide range of activities they felt should be part of a Hawai‘i Coral Reef Initiative. They expressed concern about coral reef areas being threatened off of Kaupulehu, on the west coast of Hawai‘i. Participants talked about coalitions between Hawaiian groups concerned about the ocean and coastal environment being formed to protect coastal ecosystems. They also felt that there was a tremendous amount of knowledge among native Hawai‘ians about coral reef ecosystems that needs to be documented. Participants felt that people with traditional rights to ocean resources should be involved in managing those resources, and that community-based planning should be an integral part of the Coral Reef Initiative.

Approach to Initial Coral Reef Assessment

In June 1995, a meeting of scientists was convened to talk about options for conducting the initial assessment. Jim Maragos of East-West Center presented information on the Hawai‘i Environmental Risk Ranking (HERR). Project methodology, and participants agreed that this was a simple and workable approach.

The HERR methodology, for those who are not familiar with it, ranks ecosystems in terms of their cultural, economic, recreational, and biological value. It also ranks a series of “stressors” or threats to those ecosystems. These include nutrients/oxygen demand, earth moving/development, erosion/sedimentation, water diversion/channelization of streams and rivers, heat/thermal pollution, and human activity. These “stressors” are ranked in terms of their severity and frequency as threats to the ecosystems being evaluated by the HERR project.

Hawai‘i Coral Reef Working Group

On October 3, 1995 the Coastal Zone Management Program convened a meeting of the state’s Coral Reef Initiative working group to discuss the status of the Hawai‘i Coral Reef Initiative. Claire Cappelle of the CZM Program, June Harrigan-Lum of the Environmental Planning Office of Department of Health, Francis Oishi of the Division of Aquatic Resources at the Department of Land and Natural Resources, Jim Maragos of the East-West Center, and the volunteer coordinators discussed the status of the HERR project, work on the CRI assessment methodology, and the loss of Federal funding for the CRI for 1996. Jim Maragos and June Harrigan-Lum informed the group that the HERR project will be scaled back to focus initially on the island of Oahu. The group agreed that work on the CRI assessment should proceed with the plan for state-wide coverage.

The group also agreed that there was considerable interest in developing an education component for the Coral Reef Initiative, and Claire Cappelle agreed to contact people who might be interested in taking the lead on education.

Although Federal funding for the CRI had been cut, the working group agreed work on the initial assessment should move ahead. Considerable community interest had been generated, and, as one participant stated, the Hawai‘i Coral Reef Initiative can serve as a model for improving resource management without Federal funding. “We’re going to have to learn to do things like the Coral Reef Initiative without grant funds because there aren’t going to be any in the future.”

Coral Reef Assessment Methodology Developed, Refined and Used

Chris Evans and Dave Raney developed a prototype CRI assessment methodology that could be used with focus groups for the initial assessment. The methodology developed was compatible with the HERR methodology but better met the anticipated needs of the Coral Reef Initiative, resource managers, and communities. The volunteer coordinators met to review the modified methodology, and further refinements were made.
A series of focus group meetings were planned to test the initial assessment of the state of coral reef ecosystems in Hawai‘i. The volunteer coordinator at UH Hilo, Brian Tissot, organized a meeting with UH Hilo faculty on November 3, 1995, to review and discuss the methodology. Brian also organized a community meeting in Hilo on November 4. Some modifications were made in the approach for the community meeting, and the six participants in that meeting identified coral reef sites on the Big Island; evaluated their biological, recreational, cultural, and economic importance; and identified and ranked perceived threats to coral reef ecosystems at those sites. The results of the community meeting were put into a database developed by David Raney who took charge of database development. A report of that meeting was written and distributed to workshop participants.

The assessment instrument that evolved included questions about the location of the coral reef ecosystem site; the person providing the information including the source of their knowledge about the site; the cultural, economic, recreational, and biological value of the site and their “certainty” about their judgment about the site; and information about defining characteristics, changes they have observed, and what makes the site particularly important. For coral reef scientists, an list of stressors was adapted from the Hawai‘i Environmental Risk Ranking project was developed. This expanded list included specific human activities known to cause damage including: alien or introduced species, toxic chemical pollution; erosion and sedimentation; fishing and gathering; boat grounding, anchor and diver damage; human waste and garbage; aquarium and shell collecting; human overuse/crowding; natural catastrophes; and dynamite fishing and other use of explosives. For the community workshops, the stressors matrix was not used. Rather, a list of perceived threats suggested by Hilo workshop participants was used. Threats included over-fishing, over-gathering anchor damage, boat fuel spills, turtle harassment, sedimentation, nearby construction, cesspools, pesticides, garbage and others.

UH Manoa faculty and staff including Peter Rappa, Mike Hamnett, Cindy Hunter, and Rick Grigg and Dave Raney of the Sierra Club and Chris Evans of Bay Pacific Consulting organized a workshop for coral reef scientists to assess the state of the reefs on the island of Oahu on December 2, 1995. A total of 15 coral reef scientists from UH Manoa, National Marine Fisheries Service, Hawai‘i Pacific University, Acores, and U.S. Geological Survey took part in the workshop. The methodology was discussed and participants used the Hawai‘i Coral Reef Iatitative Assessment (for scientists) forms to assess the state of the reefs about which they had knowledge. This was followed by a group assessment, using the Coral Reef Atlas map segments, of the state of the reefs. The results of both the individual assessments and the group assessment have been edited and a draft report of that meeting has been completed. The data gathered is now being put into a database.

In early February 1996, Sarah Peck, the UH Sea Grant Extension Agent assigned to Kona, organized a community assessment workshop to build on the information gathered about the Kona coast at the Hilo workshops. Dave Raney and Mike Hamnett presented information on the history of the Hawai‘i CRI and facilitated the assessment session using the methodology refined at Hilo. Brian Tissot made a presentation on coral reef ecosystems and how they function. Participants provided information on the status of coral reef ecosystems with which they were familiar and identified additional sources of information including logs kept by commercial dive operators.

A community orientation workshop and a coral reef assessment workshop were held on Maui on March 30 and 31, 1996. They were organized by Hannah Bernard of Hui Moana. A total of 30 people attended the orientation workshop which included presentations by Dave Raney and Mike Hamnett. The coral reef assessment workshop included 16 people from the ocean recreation industry, environmental groups, Maui Community College, and the general public. Assessment forms (for community groups) were completed at the assessment workshop and have been put into the database.

A community orientation workshop was held on Kauai on April 18 organized by Don Heacock of the Division of Aquatic Resources of the State Department of Land and Natural Resources. Chris Evans and Peter Rappa gave an overview of Hawai‘i CRI and the assessment methodology. A total of six people participated in that workshop and follow-up meetings were discussed.

A follow-up assessment workshop organized by Hannah Bernard was held in Koke‘e, Kauai on May 10, 1996. This workshop drew about 30 people, most of whom did not attend the earlier workshops. Participants included commercial and recreational divers and dive tour operators, members of environmental groups, and individuals concerned with the future of coral reef ecosystems in Hawai‘i. In addition to working on the initial assessment during the workshop, Athline Clark of the Department of Business, Economic Development and Tourism (DBEDT) made a presentation on the day-use mooring buoy program organized by DBEDT and The Ocean Recreation Council of Hawai‘i through the Malama Kai Foundation.

Preliminary Results of the Initial Assessment

Data gathered during the assessment workshop on the status of coral reef ecosystems in Hawai‘i is still be put into
the database developed by Dave Raney. A considerable amount of information about coral reef ecosystem "sites" has been gathered for the more heavily used and studied areas on Oahu, Maui, and on the west coast of the Big Island. As one would expect, the sites rated the most "important" (biologically, economically, recreationally, and culturally) are the sites for which there are the most data. On Oahu, these include Kaneohe Bay, Hanauma Bay, Shark's Cove, Makaha, and Puupukea. On the Big Island, Kealakekua Bay, Puako, and off of the old Kona Airport. On Maui, sites for which a lot of information was gathered include Molokini, "five graves," Honolua Bay, Olowalu (Coral Gardens), Ahihi, La Perouse Bay, and several other sites on the West Coast.

The scientists meeting on Oahu generated the greatest amount of information from people who have done systematic studies of coral reef ecosystems. The value of using the workshop approach was that it was possible to get a consensus among individual scientists with a range of experience on the status of specific sites. Because of their scientific training and background, many of the participants were able to relay not only information about the status of reef sites but also talk about coastal processes that have contributed to the health or degradation of specific areas. One interesting outcome of the Oahu scientists workshop was that there were several areas on the island that were biologically important because of their biodiversity that did not appear to be threatened by human activity. These areas generally ranked low in terms of their economic and recreational value because they were relatively inaccessible.

The community meetings on Maui and Hawai'i also included coral reef scientists that were able to make the same kind of contribution. They also included recreational divers and commercial dive operators that had a tremendous amount of knowledge of specific sites. In Kona, one dive operator had visited several dive sites near the old Kona airport for over ten years. She and her crew kept detailed logs of each site, and several sites were visited on at least a weekly basis for over a decade. Log sheets included information on individual eels and crabs as well as general changes in the sites as a result of storms and other "unknown" causes. Other dive operators described changes along the entire Kona coast they had observed and documented including crown-of-thorns starfish infestations, a file fish population explosion along the entire coast during one year, and the death of one variety of sea urchin. Several of the dive operators said they did not understand what caused changes they had observed, but they had documented the observed changes in log books.

Participants in the community meetings identified "threats" to specific coral reef ecosystems with which they were familiar. These included anchor damage, "over use," over fishing, "people walking on live coral," "poaching" in marine life conservation districts, polluted runoff from cesspools, and others. While the measurable impact of many of these threats may require study to prove they are causing degradation, others, like anchor damage, are clearly observable and the dive operators themselves have taken steps to prevent further damage to live corals.

It is going to require several months to input data gathered in the course of both the scientists workshops and the community workshops. Even without any systematic analysis of the data, it seems clear that the assessment has resulted in a list of "hot spots" or areas considered important by scientists and ocean users that are potentially threatened by human activity. Some of these areas have been monitored by government, university scientists, and non-governmental organizations (NGO) scientists for many years. Others are areas that should be monitored as the Hawai'i Coral Reef Initiative is further developed.

Other Results of the Workshops and Initial Assessment

Participants in the community and scientist workshops have shared information about the tremendous number of activities currently going on that contribute to the goals of the coral reef initiative. These include educational programs for children through public and private schools including elementary school classes taught by high school students in the Kona area of the Big Islands; public awareness and educational programs conducted by commercial snorkel and dive operators; exhibits on coral reef habitats done by Bishop Museum and the Waikiki Aquarium; speaker programs and World Wide Web sites on coral reef habitats at the University of Hawaii's at Hilo; training programs on surveying and monitoring coral reef habitats like QUEST; formal monitoring activities by government, university, and NGO scientists including efforts at Departament of Land and Natural Resources, the Hawai'i Institute of Marine Biology, the Pacific Whale Foundation, and the University of Hawai'i at Hilo; less formal monitoring done by recreational divers and commercial dive operators; coordination of testimony on dredging projects and shoreline development on the west coast of Hawai'i; the day-use mooring buoy program; the Malama Bay Commission studies of water quality and marine ecosystems on the South Shore of Oahu; and coral reefs being developed by Sierra Club and the Hawai'i Humpback Whale Sanctuary program.

As already indicated, a number of new activities beyond the initial coral reef assessment were suggested by workshop participants. Many of the suggestions were for public education/public awareness activities. Because of the range of activities identified by workshop participants, the Coastal Zone Management Program asked Ms. Carol Shea to develop a database on coral reef habitat education programs and materials. A survey instrument was
developed and has been mailed to an initial list of individuals and organizations. The first of the returned survey forms was received at the Pacific Basin Development Council on June 19th. At this point, the plan is to continue distributing survey forms and insuring that they are returned through the month of August and publishing the database in September or October.

One other outgrowth of the assessment and community workshops is that Brian Tissot at the University of Hawai‘i at Hilo has taken the initiative to apply for funding for a web server for the Hawai‘i Coral Reef Initiative. The core group has been discussing options for linking up everyone involved in the activities discussed in this paper and to allow people access to the information gathered in the course of the initial assessment. A newsletter has been produced and the new information gathered during workshops needs to get out to people in the network. The coral reef assessment and education databases can be printed and published, and additional data can be gathered and incorporated. However, the technology of the internet seems ideal for what the volunteers involved Hawai‘i Coral Reef Initiative want to accomplish.
THE ECONOMIC VALUE OF U.S. BEACHES

James R. Houston
Coastal Engineering Research Center, U.S. Army Engineer Waterways Experiment Station (United States)

Abstract: The paper discusses the value of beaches to the U.S. national economy. Few realize that travel and tourism is already America’s largest industry, employer, creator of new jobs, and earner of foreign exchange. Although computers, information highways, and other high-tech industries grab the news, travel and tourism has been providing the economic growth, jobs, and foreign exchange that makes the U.S. increasingly competitive in a world economy.

Beaches are key to U.S. tourism, since they are the leading tourist destination with historical sites and parks being second most popular and other destination choices minor by comparison. Coastal states receive about 85 percent of U.S. tourist-related revenues largely because of the tremendous popularity of beaches. For example, a single beach, Miami Beach, has more annual tourist visits than combined visits to Yellowstone, the Grand Canyon, and Yosemite National Parks.

Many countries recognize travel and tourism’s importance to economic growth and international competitiveness. Examples are given of countries spending far more than the U.S. on beaches, including a massive program in Spain to restore existing beaches and develop completely new ones.

The return on investment of beach restoration is discussed with Miami Beach as an example. Tourist beach visits at Miami Beach almost tripled over five years following beach restoration. Annual spending just by foreign tourists at Miami Beach is 700 times the restoration’s capitalized cost. Federal taxes from these foreign tourists at Miami Beach are more than the U.S. spends nationally on shore protection and restoration.

Keywords: beaches, tourism, beach restoration

Introduction

Travel and tourism are becoming an increasingly important industry in the modern world economy. Few realize that the travel and tourism segment is already America’s largest industry, employer, creator of new jobs, and earner of foreign exchange. Although computers, information highways, and other high-tech industries grab the news, travel and tourism has been providing the economic growth, jobs, and foreign exchange making the U.S. increasingly competitive in a world economy. Since beaches are the number one tourist destination in the U.S., they play a key role in U.S. travel and tourism.

Largest Industry

Travel and tourism is the largest industry in the U.S. and world with world-wide revenues of $2.9 trillion (Miller, 1993). It is a huge industry with the U.S. being the only country with a Gross National Product exceeding world-wide travel and tourism revenues. Travel and tourism contributes $746 billion to America’s Gross Domestic Product (GDP) (Wall Street Journal, 1995). This is over 10% of U.S. output and makes travel and tourism the second largest contributor to GDP just behind combined wholesale and retail trade (Wall Street Journal, 1995) (or the largest contributor with wholesale and retail trade separated).

Travel and tourism also produces significant tax revenues to all levels of government with annual revenues of $58 billion (Borcover, 1995). Foreign tourism alone produces annual U.S. tax revenues of about $7.5 billion (U.S. Travel and Tourism Administration 1995a). The majority of these tax revenues (about 53% or $4 billion) go to the Federal Government (U.S. Travel and Tourism Administration, 1994). Local Governments that provide most tourist-support infrastructure receive only 14.3% of the tax revenue from foreign tourists (U.S. Travel and Tourism Administration, 1994).

Travel and tourism is by far America’s largest employer, employing 14.4 million people (Wall Street Journal, 1995). In contrast, all U.S. manufacturing industries from IBM to General Motors to Intel employ only 18 million people (World Almanac, 1994). In addition, travel and tourism employment is increasing rapidly, whereas manufacturing employment is declining. In 1994, tourism-related jobs increased by 343,000 (Business Week, 1994). This has more than compensated for an average annual decline in the U.S. over the past decade of 200,000 manufacturing jobs due to increases in manufacturing productivity.

The rapid increase in travel and tourism jobs and decline in traditional manufacturing is largely unrecognized by local and state governments in the U.S. that still compete to attract manufacturing jobs. Their efforts often target high-technology industries that are reducing employment as rapidly as other manufacturing industries. Even Florida, with remarkable competitive advantages in travel and tourism, concentrates on attracting high-technology industries. Part of this benign neglect of travel and tourism may be due to perceptions that this industry has low-wage jobs. However, per-capita wages for travel and tourism jobs in the U.S. average $34,300, slightly ahead of average U.S. industry wages (Wall Street Journal, 1995). Switzerland provides a good example of high wages in tourism, since it depends on tourism more than any developed country yet has one of the world’s highest per-capita incomes.
The waning importance of manufacturing and increasing economic importance of travel and tourism is illustrated by the steel industry. In the early 1960s, a dispute between the Kennedy Administration and steel industry over price increases contributed to the economy sliding into recession. Today the relative decline in economic importance of the steel industry makes a similar event unlikely. Instead, news of drive-by shootings of foreign tourists in the U.S. is likely to have greater economic impact than steel-price increases, since spending by foreign tourists supports about ten times more jobs than the steel industry (World Almanac, 1994; Business Week, 1994).

Beaches Key to U.S. Tourism

Beaches are the key element of U.S. tourism, since they are the leading tourist destination with historical sites and parks being the second most popular and other destination choices minor by comparison (USA Today, 1993). Coastal states receive about 85% of tourist-related revenues in the U.S., largely because beaches are tremendously popular (World Almanac, 1994). Foreign tourists are even more attracted to U.S. coastal states with over 90% of foreign-tourist spending in coastal states (U.S. Travel and Tourism Administration, 1994). Although there are many interior attractions in the U.S. from Yellowstone to the Grand Canyon and from Las Vegas to Branson, Missouri; the popularity of beaches dominates tourism. For example, a single beach location, Miami Beach, reported more tourist visits (21 million) than were made to any U.S. National Park Service property (Wiegell, 1992; World Almanac, 1994). Miami Beach has more tourist visits than twice the combined number of tourist visits to Yellowstone (2.6 million), the Grand Canyon (4.0 million), and Yosemite (3.3 million) (World Almanac, 1994). Miami Beach alone had more than a third the number of recreation visits made to all U.S. Bureau of Land Management public lands (270 million acres) (World Almanac, 1994). There are likely more recreation visits to beaches than to lands of the National Park Service and Bureau of Land Management combined. Beaches are America’s playground and economic heartland with beach tourism contributing about $170 billion annually to the economy (Houston, 1995). Beach erosion is the number one concern about beaches that Americans have who visit beaches (Hall and Stamer, 1995).

World-wide Competition Facing U.S.

The importance of travel and tourism’s importance to world economies, employment, and international competitiveness has not been lost on America’s economic competitors. For example, Germany and Japan have outspent the U.S. in infrastructure investment for decades including spending freely to maintain their beaches as infrastructure investments (Houston, 1995). For example, Germany has spent about $3.3 billion over 40 years on shore protection and restoration with most spending in recent decades on beach nourishment (Kelleat, 1992). This is about five times corresponding U.S. expenditures over the same period and about 25 to 50 times a greater share of GDP (Houston, 1995). These expenditures were made to protect a coastline less than 5% the length of the U.S. coast. Japan’s budget for shore protection and restoration has topped $1.5 billion in a single year (Marine Facilities Panel, 1991). This is more spent on shore protection and restoration in a single year than the U.S. has spent in over 40 years (U.S. Army Corps Engineers, 1994). Spain with its extensive beaches is a major U.S.
competitors in attracting international tourism, especially beach tourism. Spain is conducting a 5-year program to both restore its eroded beaches and build completely new beaches. This Spanish beach restoration program is spending more in five years from 1993 to 1998 than the U.S. has spent on beach restoration over the past 40 years (Ministerio de Obras Publicas y Transportes, 1993). Spain also is the world’s leading advertiser for international tourists, spending ten times as much as the U.S. (Washington Post, 1995). The U.S. ranks 31st in the world in advertising to attract international tourists (Washington Post, 1995).

Over the past four decades the U.S. has spent only $15 million annually on shore protection and restoration ($34 million in 1993 dollars) (U.S. Army Corps of Engineers, 1994). This compares with annual U.S. subsidies of $61 million for mohair wool (mohair value of $13 million), $134 million for wool ($53 million value), and $199 million for rice production in a single state (Houston, 1995). U.S. spending on beach restoration has been less than 0.1% of U.S. spending for crop subsidies or foreign aid.

Economic Return of Beach Nourishment

Beach nourishment at Miami Beach is a good example of the economic benefits of beach restoration. Miami Beach had virtually no beach by the mid-1970s due to erosion. As a result facilities were run down, and Miami Beach was not the place to visit. Beach nourishment in the late 1970s rejuvenated Miami Beach and opened its beach to the public. Beach attendance, based on lifeguard counts and aerial surveys, increased from 8 million in 1978 to 21 million in 1983 (Wiegol, 1992). Miami Beach now has over two million foreign visitors who spend more than $2 billion annually (Cobb, 1992). Annual foreign revenue alone is about 40 times the $52 million cost of this beach-nourishment project that has lasted over 15 years (Houston, 1995). The capitalized project cost is about $3 million per year just over its current life. With foreign revenues of $2 billion a year at Miami Beach, every $1 invested annually to nourish the beach returns $700 annually in foreign exchange. This compares with a return of little more than $1 in agricultural-trade surplus for each $1 of crop subsidy (World Almanac, 1994). If the Miami Beach experience of a $700 return in foreign exchange for every $1 invested in beach renourishment were successfully repeated through beach restorations around the U.S., an investment of less than 1% of the annual crop subsidy or foreign-aid spending would wipe out most of the U.S. trade deficit of over $100 billion.

It is instructive to compare annual federal tax revenues of $7.5 billion just from foreign tourists with expenditures on beach infrastructure (beach nourishment) needed to attract foreign tourists. From 1950-1993 the federal government
and its cost-sharing partners spent an average of $15 million (or $34 million in 1993 dollars) annually on beach nourishment (U.S. Army Corps of Engineers, 1994). The Federal Government share of these expenditures was about $10 million annually (or $22 million in 1993 dollars). Therefore, the federal government annually receives tax revenues from foreign tourists ($7.5 billion) that are about 180 times its expenditures (1993 dollars) restoring the Nation’s beaches. Of course, tax revenues from domestic tourists far exceed the $7.5 billion from foreign tourists.

The greatest tax revenues from foreign tourists are collected in Florida with annual revenues of $1.43 billion (U.S. Travel and Tourism Administration, 1994). The federal government receives about $754 million of these revenues with local governments receiving only $98 million (U.S. Travel and Tourist Administration, 1994). Annual Federal tax revenues just from foreign tourists visiting Florida have been about 75 times annual Federal spending on beach nourishment in Florida. Federal tax revenues from foreign tourists visiting Miami Beach, Florida, are over $130 million a year, or about 65 times the Federal share of the capitalized annual cost of the Miami Beach beach-nourishment project (Houston, 1995; U.S. Travel and Tourist Administration, 1994). In fact, the Federal Government receives about six times as much tax revenue annually from foreign-tourist spending at Miami Beach than it spends to restore the entire Nation’s beaches! Clearly, the Federal Government is receiving a huge return on its beach-nourishment investment just from foreign-tourist taxes and not including taxes from domestic tourists nor reduction of storm damage and resulting emergency-relief spending.

U.S. Beginning to Lose Lead

Abundant natural attractions, including the world’s most extensive beaches, make the U.S. attractive to tourists. However, there is a world economy in tourism that gives consumers ample choices and produces stiff world-wide competition for tourists. If beaches in Florida and other states become run down, German tourists can choose Spanish beaches. If Hawaiian and Californian beaches decline, Japanese tourists can choose Australia’s Gold Coast beaches. This world-wide competition is well recognized outside the U.S. For example, Australia has established a cabinet-level tourism minister to aid competition for foreign tourists (Carroll, 1992). Canada recently launched a $99 million ad campaign to attract tourists. In contrast, the U.S. spends just $16.3 million advertising tourism to its international tourist markets (Sharp, 1995).

There are signs that the U.S. is starting to lose in the international competition for tourists. The stiff competition for international tourists has resulted in a
steady decline in the 1990s in the U.S. market share of world tourism receipts, and this decline is expected to continue for the remainder of the decade (U.S. Travel and Tourism Administration, 1995a). In just the past two years the U.S. has lost 16% of its market share of international tourists. If the U.S. had simply maintained its share of two years ago, 170,000 more Americans would be employed today (U.S. Travel and Tourism Administration, 1995b).

Conclusions

With travel and tourism being the largest industry, employer, and foreign-revenue earner in the U.S. and beaches the leading tourist destination, beach tourism plays a pivotal role in the U.S. economy. However, few Americans realize that beaches are a key driver of America's economy and its competition in a world economy. Foreign tourism clearly provides significant national benefits since it provides the Nation's largest trade surplus. Foreign tourism is one of the fastest growing industries in the U.S. and world. However, it is very competitive, and the U.S. lead in attracting foreign tourism has been eroding. With over 90% of foreign-tourist spending concentrated in coastal states and with beaches the leading U.S. tourist destination, the state of America's beaches is key to maintaining the U.S. share of international tourism. Local, state, and the federal governments receive far more in tax revenues than they spend maintaining and restoring the nation's beaches. Without a paradigm shift in attitudes toward the economic significance of travel and tourism and necessary infrastructure investment to maintain and restore beaches, the U.S. will relinquish a dominant world-wide lead in its most important industry.

Acknowledgments

The author wishes to acknowledge the Office, Chief of Engineers, U.S. Army Corps of Engineers, for authorizing publication of this paper.

References


ZONING STRATEGIES IN CORAL REEF MANAGEMENT

Donna J. Lee
University of Florida (United States)

Abstract: Zoning offers an effective means for managing coral reef ecosystems for multiple conflicting tourism uses. This paper describes various zoning strategies, discusses the direct costs and potential benefits from zoning, and mentions lessons learned in early experiences of coral reef zoning.

Keywords: coral reef management, zoning, economics, multiple uses, conservation, preservation

In managing a reef ecosystem for public use, traditional economic culture would dictate taxing each use at a rate equal to the cost imposed on society in terms of reef degradation, crowding, and general imposition on other uses. The reduction in use as a result of the tax would improve reef conditions so as to increase the total value of the reef for all uses. In reality, institutional, political, and physical barriers make implementation of an optimal tax policy highly impractical. Taxes are costly to implement and difficult to enforce. Furthermore, determining the “correct” tax to charge would be problematic at best. This paper describes some alternative policies, then demonstrates how zoning strategies can be applied to ameliorate some of the losses from overuse and conflicts in use.

Second-best Strategies

An alternative to individual use taxes is a flat tax. A flat tax is simpler to collect and, if high enough, will reduce crowding and overuse problems. Its disadvantage is that it fails to target the most imposing uses and therefore would likely exclude more uses than a more discriminating, individual tax. An alternative to taxation is eliminating one or more of the most degrading uses, coral harvesting for example. In popular diving areas, coral harvesting and fishing have been disallowed to help maintain natural ecosystem populations and species diversity. In less restrictive areas, fishing is allowed, but catch rates are limited or gear restrictions are imposed. In large managed areas with conflicting activities such as nature diving and fishing, zoning is used to separate diverse activities. Zoning allows areas to be managed for multiple uses. In this way, conflicts are reduced and overall use value is higher.

Benefits and Costs of Conservation Zoning

Zones can be used to separate competing uses and reduce conflicts between uses. With zoning, preservation and conservation areas can be designated to reduce or eliminate primary sources of stress. Preservation and conservation zones in coral reef ecosystems offer a number of direct benefits:

2. Scientific baseline for research.
3. Source of increased biomass to help restock coral and fish populations.
4. Source of biological diversity providing a genetic bank for non-preservation areas.
5. Reliable means of protecting unique habitats, threatened ecosystems, and endangered species.

In developing an effective zoning management plan, a full accounting of costs is requisite and should include the following:

1. The loss from displaced uses.
2. Outlays for maintenance and enforcement.
3. Expenditures for data collection to monitor zoning effectiveness.

Zoning Cores and Buffers

Consider a pristine area of the reef to be protected as a preservation area and designate it the core. To protect the core at its boundaries, a buffer with compatible uses (such as nature snorkeling and diving) will surround the core. With cores and buffers, a zoning management plan will require simultaneous determination of the following variables:

1. Number of core zones.
2. Location and size of each core.
3. Uses allowed in each core.
4. Location and size of the buffer zones.
5. Uses allowed in each buffer.

Multiple core zones have the advantage of reducing the risk of loss from a natural disaster or unforeseen event. Multiple cores may also help to reduce public opposition to zones by achieving similar results with multiple small cores versus a single large core and by providing spatial separation between multiple conflicting uses.

Basic zoning management can be improved with more sophisticated strategies. Dynamic cores, for example, are zones that change location with natural migration patterns of animals or ocean currents. Malleable cores are zones that change size, shape, or use, as new scientific information becomes available or as economic circumstances change. The zoning strategies described here are illustrated in Figures 1 through 6.
Problems and Recommendations

Managers may encounter the following problems in the process of implementing and enforcing conservation zones as part of an overall reef management strategy:
1. Public opposition from displaced groups.
2. Maintaining and enforcing zones at the borders.
3. Poaching and other illegal uses within the zones.

To alleviate some of the problems of zone management, the following guidelines are recommended:
1. Develop a zoning plan that is as simple as possible.
2. Define zones that are consistent with ongoing activities and existing regulations.
3. Use buffers to alleviate pressure at borders of the core.
4. Clearly delineate zones using geographical features where possible.

References

ECONOMIC IMPACTS OF CRUISE TOURISM IN AUSTRALIA

Larry Dwyer
University of Western Sydney (Australia)

Peter Forsyth
University of New England (Australia)

Abstract: Recognising the potential of cruise shipping, the Australian government set aside funding in its 1993–94 budget to examine how to develop Australia as a more attractive and competitive cruising destination. The resulting report, a National Cruise Shipping Strategy, examines the nation's current position in the world cruise market, the opportunities that exist to increase market share and the impediments to growth.

Using a framework of analysis developed by the authors, this paper provides some tentative estimates of the economic impact of cruise tourism in Australia. The direct expenditure impact of cruising includes passenger expenditures during the cruise and on tours, meals and shopping in Australia as well as some pre- and post-cruise air travel and accommodation. Operator expenditure on ship stores, food and beverages, water, fuel and maintenance can also be substantial. Governments and port authorities also receive revenue through the range of federal, state and territory taxes and port charges applying to the passage of vessels in Australian waters. Two examples are provided to illustrate the potential benefit to Australia from growth in cruise tourism. The first example involves a pure coastal cruise with two visits to stopover ports and one to a home port. The second example involves an eleven-day cruise in international waters departing from Sydney with stopovers in Vila and Suva.

One finding of the paper is that cruise tourists are higher yield tourists; spending, on average, much higher amounts per day than other categories of international tourists. Another is that home-porting cruise ships in Australia, with a marketing emphasis on fly-cruise packages for inbound tourists, has the greatest potential for generating large expenditure inflows to the nation. The economic impacts will, however, be reduced to the extent that foreign visitors simply switch from a land-based Australian holiday to cruise tourism and where Australian residents take a cruise rather than a domestic holiday.

While the empirical rely on Australian data, the theoretical issues discussed in the paper are of generic importance. The framework developed by the authors can be employed by researchers and policy makers to develop greater understanding of the economic impact of cruise tourism.

Keywords: cruise tourism, economic impacts, Australia

Introduction

Cruise tourism is one of the major growth areas of world tourism. Recognising its potential significance to Australia, the federal government set aside funding in its 1993–94 budget to examine how to develop the nation as a more attractive and competitive cruising destination. The resulting report, a National Cruise Shipping Strategy, examines Australia's current position in the world cruise market, the opportunities that exist to increase market share and the impediments to growth (Commonwealth Department of Tourism, 1995).

The paper will proceed as follows: firstly, it will identify the types of economic impacts resulting from cruise tourism, distinguishing between categories of expenditure associated with this market, and identifying those impacts which are primarily relevant to a stopover or home port area and those which are broader or national in scope. Secondly, it provides estimates of expenditure injected into Australia for two types of cruises—a purely coastal cruise in Australian waters with two visits to a stopover port and one to a home port, and an eleven-day cruise in international waters departing Sydney with stopovers in Vila and Suva. Because of leakages due to foreign ownership and foreign sourcing of inputs, the average expenditure per passenger per cruise injected into the Australian economy is twice as great for the coastal compared to the international cruise. In both cases, injected expenditure is greater when cruise tourists include an add-on, pre or post cruise holiday in Australia. In the final section of the paper there is a discussion of some policy implications of the findings. Three issues are addressed, all of which relate to the marketing of Australia as a cruise destination. These are: cost/price reductions resulting from more efficient delivery of services, new product development, and promotion of cruise tourism. The discussion highlights the possibility that a proportion of the increased demand for cruise tourism to Australia may be at the expense of growth in existing tourism markets and thus reduce the net foreign exchange earnings to the nation from this newly emerging market. The discussion draws out the implications for further research in the area of cruise tourism.

Economic Impact of Cruise Tourism in Australia

Regional & National Impacts of Cruise Tourism Expenditure

Cruise tourism expenditure has direct, indirect and induced effects on the economy and regions within. The direct effect is on suppliers who sell goods and services directly to tourists or cruise operators. Tourist expenditure is received as revenue by food and beverage suppliers, fuel suppliers, hotels, restaurants, tour and transport companies, shops, entertainment venues, etc. In the process of satisfying tourist demand value added
accrues to the employees as wages, to the owners as profits, or to the government as tax revenue (thus constituting a source of development financing). Indirect effects result from 'flow on' when direct suppliers purchase inputs from other firms which in turn purchase inputs from other firms and so on. The induced effects arise when the recipients of the direct and indirect expenditure—firms and their employees—spend their increased incomes which in turn sets off a process of successive rounds of purchases by supplying industries and further induced consumption. These effects are often analysed using multipliers derived from input-output models, but increasingly, the advantages of using computable general equilibrium models are being recognised (Dwyer & Forsyth, 1993 and 1994).

Cruise tourism expenditure can conveniently be divided into passenger purchases and operator purchases. It is assumed that the operator is a foreign company reflecting the reality of the cruise ship sector of Australian tourism. Thus, only expenditure on goods and services sourced in Australia is relevant to assessing the economic significance of cruise tourism to the nation.

The main categories of cruise tourism expenditure, with a comment on the primacy of regional or national impact appears in Table 1.

Passenger expenditure includes that incurred as part of the cruise (port visit expenditure) and also that which is associated with making the cruise. Thus it includes air fares to/from Australia—some of this expenditure, though not all, will be paid to Australian-owned airlines. There is also internal travel within Australia—this is mainly done by air, though not exclusively. Australian-owned airlines will obtain a share of international air fares paid by people joining cruises. Most of this expenditure will be effectively dispersed throughout the economy—only a small proportion of it, associated with servicing international flights, will be spent at the regional level—a base port will have flights in and out, and some expenditure will be incurred on supporting these. Some add-on expenditure is essential for the cruise; for example accommodation in port before the cruise begins. The regional share of add-on expenditure will be significant, since there will be an unavoidable minimum that must be incurred in association with the cruise (local transport, accommodation before/after the cruise). The proportion will depend on how much add-on expenditure the cruise generates—if it is significant, the proportion is likely to be low, as tourists take the opportunity to visit other regions. In a sense, this expenditure can be regarded as being 'generated' by the cruise, and it is unlikely to have been made, at least to the same extent, if the cruise had not taken place. Cruise passengers also make direct expenditures, on excursions, attractions and shopping while on the cruise.

Cruise operators make a range of expenditures. They pay charges associated with the use of the port. These include state government charges, which are levied to cover the cost of navigational services. There are charges levied by the port authority, and these will include charges for the terminal used. Towing charges will be paid to private operators for services provided, as will stevedoring charges. Port charges, towing and stevedoring will be mainly for services that are supplied in the region and thus the expenditure will be incurred within the region. The operator will purchase goods and services to provision the vessel. These will include stores and provisioning, fuel, and services to enable ship operation, such as waste disposal and electricity.

There will be some local component due to the services in actually supplying the fuel. Where the vessel is provided with stores, etc. there will be both local and national expenditure. Services purchased (e.g., waste disposal, electricity) are likely to come mainly from the region. While some fuel may be produced within a region, most of it will not be. Even if the local firms were paid for fuel, they will pass on most of their receipts to others outside.

Two forms of crew expenditure will result in expenditure on goods and services in Australia. The first of these is hiring Australian crew, all of the cost of this will be expenditure “in Australia.” In addition, the operator will hire foreign crew—only what they spend in port will be expenditure in Australia. Typically only a small proportion of the total crew will be Australian.

Expenditure associated with the employment of Australian crew is likely to be national, though there may be a bias towards the region. People who obtain employment on cruise vessels are likely to live in home ports and spend their incomes there. Expenditure by foreign crew is likely to be mainly on goods and services produced in the region of the port. Apart from these expenditures, the operator will make expenditures on ship maintenance. Ship maintenance is likely to be regional, and marketing/business expenses are likely to have regional and national components.

The cruise operator will also have business expenditures in Australia—these will include costs of operating an office, and also some marketing expenditure in Australia. (It would be necessary to exclude any costs of marketing cruises elsewhere in the world—e.g., Cunard markets cruises in Alaska as well as Australia within Australia).

Finally, taxes may be levied on cruise operators. These include income taxes—some operators will be exempt, due to the operations of tax agreements and the nature of their cruises. There may be customs duties payable, and departure taxes will
Table 1: Cruise Expenditure and Regional and National Effect (Source: Forsyth & Dwyer 1995 pt13; Commonwealth Department of Tourism 1995 Table 3.)

<table>
<thead>
<tr>
<th>Type of Expenditure</th>
<th>Item Purchases</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PASSENGER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airfares to/from Australia</td>
<td>-</td>
<td>national</td>
</tr>
<tr>
<td>Internal travel</td>
<td>road, rail, air</td>
<td>national; significant regional share</td>
</tr>
<tr>
<td>Add-on expenditure</td>
<td>accommodation, meals</td>
<td>national; significant regional share</td>
</tr>
<tr>
<td>(before and after cruise)</td>
<td>excursions, shopping</td>
<td></td>
</tr>
<tr>
<td>Port expenditure</td>
<td>meals, excursions and travel, shopping</td>
<td>mainly port region</td>
</tr>
<tr>
<td><strong>OPERATOR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port expenditure</td>
<td>State Government</td>
<td>regional and State</td>
</tr>
<tr>
<td></td>
<td>port charges</td>
<td>regional</td>
</tr>
<tr>
<td></td>
<td>towage</td>
<td>regional</td>
</tr>
<tr>
<td></td>
<td>stevedoring</td>
<td>regional</td>
</tr>
<tr>
<td>Provedoring</td>
<td>bunkering</td>
<td>national, small regional</td>
</tr>
<tr>
<td></td>
<td>stores</td>
<td>regional and national</td>
</tr>
<tr>
<td></td>
<td>services (waste disposal, water)</td>
<td>regional</td>
</tr>
<tr>
<td>Crewing</td>
<td>Australian crew</td>
<td>national, significant regional</td>
</tr>
<tr>
<td></td>
<td>port expenditure by foreign crew</td>
<td>regional</td>
</tr>
<tr>
<td>Ship maintenance</td>
<td>-</td>
<td>regional</td>
</tr>
<tr>
<td>Marketing in Australia</td>
<td>-</td>
<td>national and regional</td>
</tr>
<tr>
<td>Taxes</td>
<td>income tax, customs duty and</td>
<td>national</td>
</tr>
<tr>
<td></td>
<td>departure tax</td>
<td></td>
</tr>
</tbody>
</table>
be levied. It should be noted that apart from direct taxes on cruises, there will be indirect taxes. These would include fuel taxes, and it is possible that state government charges would include a tax element. To the extent that the charges are for navigational facilities, and these are in the region, expenditure will come back to the region. Most taxes however, are likely to mainly go outside the region. Most of the taxes will be collected by the Commonwealth, and to a lesser extent, state governments. There may be a flow back of some taxes; for example taxes such as departure taxes which are charged for services performed.

Cruise Tourism Expenditure Patterns

There is very little empirical information available on which to estimate the economic impacts of cruise tourism to Australia. Cruises differ considerably amongst themselves and there is no ‘typical’ cruise. Such data that do exist are in a form which does not easily translate into the framework as exhibited above. Thus the following results must be regarded as tentative and be treated with caution.

Table 2 provides estimates of expenditure within Australia for two types of cruises. The coastal cruise is a six-day cruise in Australian waters with a Sydney-Brisbane-Townsville-Cairns itinerary. The costs associated with the Sydney and Cairns visits are averaged over two cruises, since these are turnaround ports. Thus this cruise is taken as a three visit cruise, with two visits to stopover ports, and one to a home port.

Assuming all passengers are foreigners, the coastal cruise is estimated to inject $755,867 of foreign exchange into Australia per cruise. Passenger and Crew expenditure injection is approximately $239,000. The bulk of ship operating costs is for proving out, followed by port charges, fuel and taxes. Taking all expenditure into account the average expenditure within Australia generated by the cruise is $825 per passenger.

With respect to the International Cruise, only expenditure in the home port (Sydney) is relevant to assessing its economic impact on Australia. The international cruise is estimated to inject only $367,600 expenditure per visit. Passenger and crew expenditure injection is approximately $172,000 while ship operating costs total approximately $195,000.

While total fuel and proving out costs to the ship owner would be greater than for the coastal cruise, given the longer journey involved, there is no liability for fuel excise or direct taxes for international cruises. As a result, and because of the lower port charges away from Australia, the ship operating costs for the international cruise are substantially lower than for the coastal cruise.

On the same assumptions that all passengers on the international cruise are foreigners the average foreign exchange injection into Australia is $401 per passenger per cruise. This is less than half of the corresponding figure for coastal cruising.

Additional Cruise Generated Expenditure

Additional economic impacts would result from expenditure of cruise passengers who combine their cruise, with other tourism in Australia. To the extent that such ‘add-on’ expenditure would not have occurred without the cruise it may be considered as cruise associated expenditure.

Estimates of expenditure in Australia for different types of cruise passenger appear in Table 3. Included in these estimates are passenger expenditure, crew expenditure in Australia, ship operating expenditure in Australia and ‘add-on’ holiday expenditure. For the ‘add-on’ component it is assumed that average daily expenditure equals the average for all holiday visitors to Australia. This was $95 per day in 1994 (Bureau of Tourism Research, 1995).

In terms of aggregate expenditure per international visitor the largest injection of foreign exchange comes from those tourists who fly to Australia and undertake a six-day coastal cruise with a seven-day add-on. However, these visitors spend the lowest amount per day, on average. Conversely, those visitors who fly to Australia and undertake an 11-day foreign cruise spend the least amount in aggregate ($401) but the largest amount per day ($401). For each type of cruise tourism passenger, however, the average expenditure per day exceeds the estimated $79 per day for all visitors to Australia (Bureau of Tourism Research, 1995). Compared with other international visitors to Australia, cruise tourism results in more direct expenditure per visitor day (Commonwealth Department of Tourism, 1995).

Marketing Australia as a Tourism Destination

The above results have a bearing on policy to maximise the economic significance of cruise tourism to Australia. A number of specific policy recommendations appear in the National Cruise Shipping Strategy covering areas such as the operating environment, non-port facilities, the regulatory environment, the natural environment and issues concerning the marketing of Australia as a cruise tourism destination (Commonwealth of Australia, 1995). The underlying premise on which the National Cruise Shipping Strategy is based is that there is significant potential for Australia to further develop as a cruising destination and that there are enormous benefits for all stakeholders in doing so (Commonwealth of Australia, 1995). There are however a number of issues which need
### Table 2: Estimated Expenditure within Australia: Coastal vs International Cruises

<table>
<thead>
<tr>
<th></th>
<th>Coastal Cruise</th>
<th>Foreign Cruise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expenditure per Cruise ($)</td>
<td>Expenditure per Cruise ($)</td>
</tr>
<tr>
<td></td>
<td>Home Port &amp; Stopovers</td>
<td>Home Port (Sydney) only</td>
</tr>
<tr>
<td>1. Passenger &amp; Crew Expenditure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger Expenditure¹</td>
<td>475,404</td>
<td>158,468</td>
</tr>
<tr>
<td>Crew Expenditure¹</td>
<td>41,220</td>
<td>13,470</td>
</tr>
<tr>
<td>Sub-Total</td>
<td>$516,624</td>
<td>$172,208</td>
</tr>
<tr>
<td>2. Ship Operating Costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel²</td>
<td>50,510</td>
<td>50,000</td>
</tr>
<tr>
<td>Port Charges³</td>
<td>55,403</td>
<td>29,303</td>
</tr>
<tr>
<td>Service Costs⁺</td>
<td>92,344</td>
<td>115,820</td>
</tr>
<tr>
<td>- water</td>
<td>1,130</td>
<td>297</td>
</tr>
<tr>
<td>- garbage</td>
<td>4,474</td>
<td>492</td>
</tr>
<tr>
<td>- agency</td>
<td>10,500</td>
<td>5,031</td>
</tr>
<tr>
<td>- provisioning</td>
<td>76,240</td>
<td>110,000</td>
</tr>
<tr>
<td>Sub-Total</td>
<td>$239,243</td>
<td>$195,125</td>
</tr>
<tr>
<td>3. Total</td>
<td>$755,867</td>
<td>$367,333</td>
</tr>
<tr>
<td>Average Expenditure/passenger/cruise</td>
<td>825</td>
<td>401</td>
</tr>
</tbody>
</table>

**Notes:**

1. Passenger & Crew Expenditure:
   - Assumes 916 passengers (i.e. full capacity) and 304 crew.
   - Average expenditure per port per passenger $173 and average expenditure per port per crew member $45 (Rams Corporation 1995).
2. Fuel Costs (TCS 1994 schedule 2):
   - Coastal Cruise estimated $50,510
   - International Cruise estimated $69,424 total expenditure on fuel $50,000 of which is purchased in Sydney.
3. Port Charges (TCS 1994 schedule 2):
   - Coastal Cruises estimated $55,403 port charges (total for Sydney, Brisbane, Townsville & Cairns).
   - International Cruise estimated $29,303 covers Sydney only.
4. Servicing Costs:
   - Coastal Cruise: estimates of water, garbage, agency, provisioning costs based on TCS 1994 schedule 2.
   - International Cruise: one third of water & garbage costs allocated to home port of Sydney.
   - All agency costs represent home port expenditure.
   - Provisioning purchases estimated at $131,440 (TCS 1994 schedule 2). Most provisioning purchased in home port and estimated to be $110,000.
5. Tax:
   - Coastal Cruise: estimated company taxes paid to Federal and State governments. (TCS 1994 schedule 2).
   - International Cruise: Foreign cruise operator does not pay direct taxes and fuel is not taxed.

### Table 3: Expenditure in Australia by Passenger Type

<table>
<thead>
<tr>
<th>Types of Passenger</th>
<th>Estimated Expenditure Per Passenger ($)</th>
<th>Per Passenger Day in Australia ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Stopover Passenger on International Cruise</td>
<td>206.00</td>
<td>206.00</td>
</tr>
<tr>
<td>2. Fly/Cruise Passenger on Coastal (Australia only) Cruise</td>
<td>825.00</td>
<td>137.50</td>
</tr>
<tr>
<td>3. Fly/Cruise Passenger on Coastal Cruise with 7 day add-on</td>
<td>1,399.00</td>
<td>107.60</td>
</tr>
<tr>
<td>4. Fly/Cruise Passenger on International Cruise</td>
<td>401.00</td>
<td>401.00</td>
</tr>
<tr>
<td>5. Fly/Cruise Passenger on International Cruise with 7 day add-on</td>
<td>1,866.00</td>
<td>133.90</td>
</tr>
</tbody>
</table>

**Notes:**

1. Assumes one day stopover.
2. As per Table 2 for 6 day cruise.
3. As per Table 2, $825 for 6-day cruise plus 7-day add-on at $95 per day.
4. As per Table 2 for 11 day cruise with only one day in home port, Sydney.
5. As per Table 2, $401 for one day in home port, Sydney, plus 7 day add-on at $95 per day.
careful consideration in the quest to market Australia as a cruise ship destination. These issues will now be addressed in the context of three broad strategies to increase expenditure in Australia from cruise tourism. These strategies involve cost/price reductions resulting from more efficient delivery of services, new product development and promotion of cruise tourism.

Cost/Price Reductions

The National Strategy recommends actions to reduce costs of delivering cruise tourism services through, inter alia, the development of nationally consistent policies in relation to the application of regulations; innovative approaches and efficient pricing of port services; improved terminal facilities; improved passenger border clearance arrangements; easing constraints on operators obtaining voyage permits (Commonwealth Department of Tourism, 1995). Increased efficiencies in cruise tourism operations can result in cost savings which can be passed on to some extent, to passengers in the form of lower fares.

Lower fares may generate additional demand for cruise tourism from both foreigners as well as Australian residents. To the extent that some proportion of foreign visitors substitute a cruise holiday for a land-based holiday in Australia, the nation will receive less expenditure than otherwise. The expenditure gains to Australia from the additional demand for cruise tourism encompass only the visitation to Australia that would not otherwise have occurred.

While lower fares may generate increased foreign visitation associated with cruise tourism it may also generate additional demand by Australian residents. Where more domestic tourists take Australian based cruises, there will be an impact on domestic expenditures and foreign exchange. To the extent that domestic tourists substitute from foreign trips, there will be a net gain or loss in expenditures, dependent on how much such tourists would have spent. Foreign exchange effects will normally be positive; the saving in holiday costs will reduce foreign exchange expenditures, but the net foreign component of the cruise cost (cruise price less amount spent per person in Australia) will be a foreign expenditure. Because of this latter amount, the net impact is likely to be a net gain in domestic expenditure. When the domestic tourist substitues from domestic expenditure, whether on tourism or other goods and services, there will be a reduction in terms of domestic expenditure, and a foreign exchange loss.

The impact on total expenditure within Australia depends critically on the extent to which encouraging cruises, by lowering price, results in a shift from shore-based to cruise holidays. Since the proportion of expenditure on Australian goods and services of a cruise holiday is small the chances of shifts from shore to cruise holidays outweighing, in expenditure terms, the expenditure gains from additional foreign cruise passengers, are quite high. A significant proportion of the cost of the cruise is for foreign supplied goods and services. Over 70% of the cost of the cruise is for fixed operating costs (including crew and capital costs). Virtually none of these would be on goods and services supplied by the Australian economy. Even for a cruise that did not travel outside Australian waters, less than 30% of the total costs are likely to represent expenditure in Australia. Most cruises visit one or two foreign ports—the Australian component of a typical cruise's expenditure is likely to be between 10% and 20% (Forsyth and Dwyer, 1995). In short, even successful attempts to encourage the growth of the cruise shipping tourism sector could well result in a reduction in expenditure and benefits for Australia. Clearly it is important to know more about the extent cruises are a substitute for shore-based holidays.

New Product Development

New product development to broaden cruise appeal includes development of creature and diverse itineraries that encompass a variety of ports and anchorages, packaging cruise and land options, development of quality shore excursions and add on tours.

New cruise tourism products can be developed within the context of marketing other forms of 'special interest' tourism with high growth rates. These could include ecotourism whereby visitors seek educative nature based experiences, 'adventure cruising' with potential for use of sailing ships and development of expedition style itineraries, development of cruise-trek-safari type packages and development of meetings and incentives cruises (Commonwealth Department of Tourism, 1995).

If the quality of cruises is improved, there will be more cruise passengers. Governments can improve the quality through providing better facilities (e.g., terminals for ports lacking adequate facilities), more tourism infrastructure in port cities and improved navigation facilities such as channels. These will have a cost. Their effects will be similar to those of price reductions. It will, however, be even more difficult to obtain information on sensitivity of cruise passenger numbers to quality variables than to price.

Promotion of Cruise Tourism

Overseas promotion may encourage foreign visitors to take Australian cruises. Some of these visitors would have taken non-cruise trips to Australia. Thus the impact on expenditure and benefits will be less than the net additional receipts of the cruise visitors would indicate. To the extent that visitors are switching from other Australian visits, there will be a reduction
in spending in Australia which must be deducted. If the Australian component of a cruise visit’s expenditure is much less than that of a non-cruise visit, there could even be a net reduction in overall expenditure in Australia and consequent benefits.

The National Cruise Shipping Strategy acknowledging this problem, recommends targeting of international tourists who would not otherwise visit Australia. The difficulty here, of course, is to determine which market niches will involve minimal ‘switching effects.’ A market which may meet this criteria may be that of experienced cruise tourists seeking new destinations. In any case, opportunities to increase levels of pre- and post-cruise touring should be continually explored (Commonwealth of Australia, 1995)

Conclusions

While data are insufficient to make a precise assessment of the current contribution of the cruise shipping sector, the development of Australia’s cruise shipping industry has the potential to add an important product to the range of tourism opportunities in Australia.

The paper has sought, firstly, to categorise the main components of cruise tourism expenditure, distinguishing carefully between expenditure of passengers, crew and operators. It then proceeded to discuss the extent to which the expenditure components impacted primarily on the region of the home or stopover port or had a broader, national impact. The discussion provides potentially useful information to the different stakeholders in the evolving cruise tourism industry, particularly regarding expected (private or social) returns on investment.

Given the paucity of information with which to estimate the net foreign exchange earnings from cruise tourism in Australia, expenditure estimates were made for two types of cruises—a coastal cruise and an international cruise. Assuming that all the passengers are foreign, the coastal cruise yields average injected passenger expenditure of $825, compared to $401 for the international cruise. Additional expenditure per passenger will result if pre or post cruise add-on holidays are taken. Compared with other international visitors to Australia, cruise tourism generates substantially greater foreign exchange earnings per visitor day.

The policy implications of the results were explored in the context of the marketing of Australian cruise tourism so as to maximise the foreign exchange earnings from this market. Pace reductions resulting from greater efficiencies in the delivery of services, new product development and promotion of cruise tourism can all result in increased growth of cruise tourism in Australia. To the extent that a proportion of foreign visitors simply ‘switch’ from a land–based holiday in Australia to a cruise tourism holiday aggregate foreign exchange earnings from tourism will be reduced. To the extent also that Australian resident switch from a domestically-based holiday to a cruise tourism holiday, less of their expenditure will be retained by Australian industry. Such ‘switching’ possibilities must be taken into account in estimating expected net foreign exchange earnings from marketing Australia as a cruise tourism destination. While the potential economic significance of an expansion of cruise tourism in Australia does appear to be high, more research on the extent of possible switched expenditure needs to be undertaken.

References


ENDNOTES

1 The issues addressed in this paper arose from the author’s contribution to the development of a National Cruise Shipping Strategy on behalf of the Australian Department of Tourism. Permission from the Department of Tourism to publish this material is gratefully acknowledged.