Guide to Good Practices for Sustainable Tourism in Marine-Coastal Ecosystems

Lodging Businesses

Rainforest Alliance

Conservation International

Global Environment Facility

PNUMA

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CI believes that the Earth's natural heritage must be maintained if future generations are to thrive spiritually, culturally, and economically. Our mission is to conserve the Earth's living heritage, our global biodiversity, and to demonstrate that human societies are able to live harmoniously with nature.

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Credits

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Foreword

Coastal-marine environments are some of the most biologically diverse areas on Earth, harboring many of the world's plant and animal species and providing important ecological services such as climate regulation. They are also home to hundreds of millions of people who live in or near coastal-marine areas, and the pressure to develop these areas, particularly in developing countries, is intense.

The beauty and "wildness" of coastal-marine areas are highly attractive to the growing nature-based tourism sector, and capitalizing on this attraction is one way to contribute to the conservation of these valuable ecosystems. Appropriately managed tourism can be an important way to provide sustainable economic development and employment in these areas while still conserving their natural value. Yet, poorly planned or implemented tours to coastal-marine environments can also have a significant negative impact. The operational and managerial decisions of tour operators and other tourism professionals in coastal-marine areas areas will have an important effect on whether tourism can be a sustainable form of economic development in these ecosystems.

This Guide to Good Practice was developed through a collaborative process by the United Nations Environment Programme, Rainforest Alliance, Conservation International and our partners with support from the Global Environmental Facility. It is meant to be a key resource for operators and purchasers of coastal-marine-based tours who care about sustainable tourism development and understand that sustainability is the only way forward. The Guide was created for accommodation services that recognize that their rights and expectations should go hand-by-hand with their responsibilities and obligations. It will be an important resource for hoteliers to assess their own business activities, in order to identify areas of good performance and areas where they can take action to improve sustainability.

We invite you to read this guide and to work with us in promoting sustainable tourism development that benefits the coastal-marine areas, its people and your business.

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Foto: Jason Neuerburg

Presentation

The conservation of the biodiversity in places with great tourism appeal is a challenge that businessmen of this sector face in all regions of the world, especially in fragile ecosystems and in areas adjacent to natural protected zones.

The implementation of environmental and social best management practices allows for the protection of the integrity of ecosystems and local cultures; it increases the viability of tourism companies by providing financial stability, quality employment as well as encouragement in the development of the local communities. The communities can enjoy healthy ambiences in preserving ecosystems and the natural and cultural resources for present and future generations.

Additionally, tourists are expressing greater preference to products and services that demonstrate socio-environmental commitment. Improving performance in the environmental and social areas allows tourism companies to gain not only recognition and credibility, but to establish relations adapted to the communities and ecosystems where they operate.

This guide presents detailed information about the marine coastal ecosystem and the environmental resources most used by tourism activity in the above-mentioned ecosystem. It analyzes the potential problems of tourism activity and recommends best management practices to improve company management. The implementation of these best practices allows businessmen to minimize the negative impacts on the environment and communities while maximizing the benefits of tourism activity in the natural and social environments discussed.

The development of this guide was accomplished based on a broad consultation process. The technical material prepared was submitted to key actors for consultation (small and medium-sized companies, tour operators, academic institutions and non- governmental organizations) through advisory workshops in Ecuador and Belize. It was also submitted before a technical committee of international experts so that they could evaluate the technical content and relevance of these materials.

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The use of this guide allows the tourism entrepreneurs to acknowledge the main characteristics of the ecosystems where their businesses operate and to design and improve their own management plans through the application of best management practices.

Introduction

Why Have We Prepared This Guide?

Up until the eighties, oceans were seen by many as an unlimited resource that could feed the world's growing population. It was also seen as a system where household and industrial waste could be dumped. While the last few years have witnessed a major change in this view, human action pressure on oceans is still extraordinary, seriously affecting all marine and coastal ecosystems. These actions include ocean transport, commercial fishing, oil production, recreation, and tourism, among others. Ground-based activities, such as agriculture, industry, deforestation, mining, and urban development, also entail serious impacts because many of their solid, chemical, and organic waste eventually affect all marine and coastal ecosystems in the planet.

The lodging industry may have direct impacts on marine and coastal ecosystems, on account of beach or mangrove swamp modifications to build facilities, and indirect impacts, such as restaurant demand for seafood from fishing companies that use unsustainable practices.

This guide makes it possible to understand and value some of the most important components of marine-coastal biodiversity, including such ecosystems as beaches, coral reefs, and mangrove swamps, as well as some of the very popular wildlife groups, particularly marine turtles and mammals, i.e., cetaceans, manatees, and sea lions. It also shows lodging industry impacts on these resources and provides a series of best practices to prevent or minimize said impacts.

Whom Is It For?

This reference document is a must for hoteliers, tourism and real estate investors, hotel managers, and people in charge of the different hotel divisions. Its principles are applicable to both large beach hotels and lodges, and even to businesses providing lodging services on vessels. It will also be extremely useful to professionals advising lodging businesses, such as architects, landscapists, builders, tourist product developers, environmental interpreters, and suppliers of goods and services.

How Is It Used?

Information has been organized in twelve chapters. The first chapter, entitled "Tourism, Biodiversity, and Conservation", provides a general framework in understanding each of these issues, as well as their relevance in the tourism development context, particularly the lodging industry. The following components are highlighted:

- Biodiversity
- Conservation
- Biodiversity and Spacial Planning
- Biodiversity and Environmental Impact

While these and other issues covered below may sound quite familiar to tourist businesspeople with operations within or very close to natural areas, the relationship does not seem to be that obvious and outright to people in other sectors. Nevertheless, even if your company is very far away from a wilderness area, whether or not it is protected, knowing these issues is a priority because natural and cultural resources found in our Latin American countries are undoubtedly the basis for a blooming tourist industry, often touted as the best development alternative, particularly for rural communities.

The second chapter, "Marine-Coastal Ecosystems", aims at sharing information on the most important tourist resources connected to oceans and coasts, in order to awaken curiosity about and appreciation for them. It is worth mentioning this chapter is not intended to be exhaustive but rather, as mentioned, to furnish information on some of the resources commonly present in these ecosystems. It includes the following components:

- The Ocean
- The Beach
- The Mangrove Swamp
- The Coral Reef
- Marine Mammals
- Marine Turtles

The following ten chapters deal with environmental management processes in lodging businesses. Every chapter identifies the problem associated with the relevant environmental process, justifies the reasons why a lodging business should become interested in the subject, suggests possible actions to prevent or abate problems, and recommends some additional sources of information available to interested parties for reference. These chapters are:

- Lodging Infrastructure Construction
- Energy Management
- Water Management and Use
- Wastewater Management
- Solid Waste Management
- Chemical and Hazardous Waste
- Water and Land Transportation
- Product Suppliers
- Marine-Coastal Ecosystem Conservation
- Biodiversity Conservation

What Are The Benefits?

Many benefits derive from implementing recommendations provided by this guide. The most important include:

Protecting and conserving biodiversity.

- Maintaining natural cycles in marine-coastal ecosystems and their influence on global processes.
- Preserving the destination attractions that prompted tourists to visit them in the first place.
- Achieving efficiency and savings in business operating activities.
- Maintaining destination quality and competitiveness.

Tourism, Biodiversity, and Conservation

Photo: Dale Moris

Biodiversity

"Biodiversity" is a very broad concept including everything related to diversity of life, both wildlife and domesticated species, at three different levels:

- **Ecosystems:** The different communities of living beings, and their relationships to each other and to their environment. They also include the different environments created by human beings, such as agricultural and cattle-raising landscapes. Some examples are: tropical rainforests, coral reefs, mangrove swamps, and moorlands.
- **Species:** All forms of life existing in the planet; they may live on land, water, air, or underground. Some examples of species are humpback whales (*Megaptera novaeangliae*), the mountain almond or surá tree (*Terminalia oblonga*), and the Galapagos penguin (*Spheniscus mendiculus*).
- **Genes:** The tiny structures responsible for heredity that enable different species expressions, intraspecific diversity, and the particular traits each individual may pass on to its offspring. For instance, a collared peccary (Pecari tajacu) population in Belize can exhibit genetic variations, compared to other population of the same species living in Ecuador.

Conservation

It is worth mentioning that, contrary to popular belief, conservation is not just limited to a "no take" of biodiversity, but is a much more dynamic concept. It is a process aimed at meeting both society and biodiversity needs. It encompasses a wide range of uses of nature, going from preservation to sustainable production of goods and services of renowned social value, such as food and drug production, construction materials production, water production, erosion control, biological diversity preservation, scenic beauty maintenance, and many others.

The Global Biodiversity Strategy (1992) defines conservation as managing humankind's use of the biosphere, so as to generate the largest sustainable benefits for current generations, while preserving their possibilities of meeting the needs and aspirations of future generations. The Strategy also explains that conservation includes natural environment preservation, maintenance, sustainable use, restoration, and enhancement. Furthermore, it consists of preserving

cultural diversity, this being to a large extent the result of different interrelationships between human beings and their natural environment. Consequently, it has the potential of providing various choices for biodiversity conservation and flexible use that may be applied to different contexts. The Strategy also establishes that biodiversity conservation requires specific efforts in three areas:

- **Saving:** Seeking to prevent biological diversity disappearance or decline, in order to keep all current and potential options open in meeting social, economic, and environmental needs of the different sectors of society, as well as the needs of nature itself. Efforts to save biodiversity include the establishment of protected wilderness areas, closed fishing or hunting seasons during breeding periods, botanical garden creation, seed collections, and others.
- **Knowing:** Aimed at creating knowledge of biodiversity at all levels, identifying its components and understanding its functioning, as well as current and potential sustainable uses, in response to the needs of different sectors in society, integrating both modern and traditional knowledge. It also provides opportunities to identify new strategies for keeping biological diversity in the long term.
- **Using:** It is meant to enhance biodiversity value to society through using it sustainably to meet human needs, thus promoting an awareness of its importance and support to achieve long-term maintenance. The use can be direct, i.e., when we consume a forest fruit, or indirect, as when we point out a toucan to a tourist.

Biodiversity and Marine and Land Planning

Marine and land use planning is an enforceable set of regulations on territorial utilization defining potential uses for the various areas of a marine or terrestrial territory. It typically involves having a clear conception of sustainable development policies and objectives, regarding environmental, social, and economic issues in society. Additionally, it sets standards that are binding to all stakeholders. The agency in charge of implementing the plan is usually the local government, in coordination with all sectors involved. Moreover, it is developed with wide involvement of social and institutional stakeholders present in the area.

Comprehensive space planning in communities and tourist destinations may be an important instrument to support existing biodiversity conservation, as well as abating current impacts on it. The lodging industry can greatly benefit from this process, since it contributes to long-term preservation of landscape and biological attractions underlying tourist activities, and to maintaining destination quality, competitiveness, and positioning.

The land use planning process will vary according to current level of development, and it is meant to help manage it, instead of reverting it. Planning for already developed spaces, for instance, in coastal areas, may have a positive impact on conserving marine coral reefs. It must be a participatory process to gather inputs from the different sectors involved, i.e., residents, businesspeople, investors, and visitors. It should also have technical support from professionals in different fields, such as engineers, architects, landscape architects, biologists, ecologists, and sociologists, among others.

Land use planning should start with a deep knowledge of the area's natural features, such as soil types, topography, geology, hydrology, ecosystems, vegetation, and wildlife. Identifying environmental services provided by natural ecosystems is important, since their maintenance should be sought by the planning process. Human issues should also be taken into account, including demographics, population distribution patterns, recent construction growth rates, customs and life styles, historical and archaeological heritage, current and potential uses of existing biodiversity, and others.

This planning process should also take into consideration both existing and proposed infrastructure and utility issues, such as highways, roads, airports, landing strips, bridges, wharves, mass transit, electric power, drinking water, sewage systems, telephone lines, public lighting, recreational areas, waste collection and disposal systems. A proper balance should be stricken between these developments and existing biodiversity.

The process may end with a series of tools such as a land use plan or a marine or coastal management plan, which are instruments defining actual use possibilities, identifying spaces for the different socioeconomic development activities, biological diversity conservation, and maintenance of its environmental services, and harmonizing the various identified uses. Additionally, it sets standards that are binding to all stakeholders. The agency in charge of implementing the plan is usually the local government, in coordination with all sectors involved.

Marine space planning involves identifying the distribution of underwater ecosystems such as coral reefs or seagrass beds. Other aspects to consider are key species such as marine turtles, cetaceans and others. Information should be generated about feeding areas, nursing, migratory routes, currents, distance from the coast, sources of impact and others. This can used to identify fragile areas, define protected and management categories, and regulations for activities such as tourism, commercial and sport fishing and transportation,

Municipal governments do not always have the capacity to monitor if defined standards and requirements within land and marine use plans and urbanization plans have been fulfilled during the implementation. This lack of control may be due to the lack of financial resources and personnel and because of corruption at the local level. Coastal urbanization is especially attractive from an economic point of view and it might used for money washing. Therefore it would be very important to have an effective –neutral and financially independent– monitoring and evaluation system regarding the implementation of land use plans. Since land use planning is a long-term issue (10 – 20 years), it would be very important to have regular revisions of the land use plans (every 4 – 5 years) and to evaluate if the objectives and planned measures are still in line with biodiversity conservation objectives and the development /demand of the (tourism)

market. Long term monitoring and evaluation may provide useful information to contribute to the adaptation of the plans to changing realities and to the mitigation of negative impacts on biodiversity.

The lodging industry may significantly contribute to land and marine use plan development, implementation and monitoring, providing inputs on available natural attractions, identifying underlying environmental services, complying with standards set by the plan, and embracing sustainable tourism best practices targeted on minimizing negative impacts on biodiversity.

Biodiversity and Environmental Impact

An environmental impact assessment, EIA, is an analysis of the likely consequences of a specific public or private project on environmental health, species wellbeing, integrity of ecosystems, and quality of their environmental services. EIAs can be applied to quite diverse projects, such as infrastructure developments (i.e., building a road or a bridge), construction of tourist facilities (i.e., a hotel or a visitor center), and even a tourist service (i.e., a tour through a tropical forest or a coral reef).

EIAs make it possible to anticipate potential negative environmental effects prior to project implementation, which, in turn, results in the adoption of measures to eliminate or minimize said impacts. An EIA must be a technical, objective, and interdisciplinary work enabling project managers to make decisions on project environmental feasibility.

In many countries, environmental impact assessments are mandatory and a requirement to get relevant project construction permits. An environmental impact assessment is a major planning and decision-making tool for lodging businesses, since it helps identify their potential environmental and biodiversity negative effects, and take corrective actions to eliminate or minimize them.

Developing a lodging operation in harmony with environmental conditions not only contributes to a healthy environment, but also can support biodiversity conservation and environmental services. In addition, it can support business competitiveness from a company perspective.

According to a project's different stages, an EIA can also be undertaken in several stages, in order to identify potential environmental impacts at each stage and propose desirable alternatives. Tailoring the project implementation and operation plan in response to identified problems is also possible. This can be positive, from a project cost perspective, since making radical design changes, choosing a different proposal, or abandoning the project altogether becomes very costly at a later stage.

Lodging business impacts on biodiversity can occur during both construction and operation stages. A monitoring of biodiversity impacts brought about by tourist activities, in general, and by the lodging industry, in particular, can identify both negative effects requiring mitigation measures and positive impacts through time, as well as their causes. Impacts may affect both abiotic systems (i.e., lifeless structures, such as soil, water, air) and/or biotic systems (living beings, i.e., animals, plants, bacteria, and fungi).

Tourist infrastructure development may have a direct or an indirect impact on abiotic systems, which, in turn, may have affect biological diversity. Opening roads and trails, for instance, can divide an ecosystem and separate natural populations. Preserving soils before and after building infrastructure is important, as well preventing any erosion that may have a negative environmental and biodiversity impact.

Lodging operations demand a lot of drinking water, the largest consumers being such areas as laundry, gardens, kitchens, bathrooms, and swimming pools. When water is limited there may be a competition for its use between hotel facilities and wildlife. Other impacts may come from water pollution affecting individuals, populations, species, and ecosystems. An excess of nutrients in water, for example, may endanger coral reefs.

Tourist developments can also impact biotic systems, disturbing the flora in an area, deforesting, isolating populations, and polluting soils and water, among other things. Similarly, wildlife can be affected through interfer-

ences with breeding cycles, nesting grounds, mating and resting areas, corridors for species movements, water and food sources, and others.

Monitoring aims at measuring conditions as time goes by in order to identify and predict both positive and negative changes or impacts. Monitoring is quite useful in identifying the social and environmental impact of tourist activities on their surroundings. Furthermore, it leads to a better decision-making process. Environmental monitoring deals with such issues as energy and water consumption, waste generation and disposal, and effects on biological diversity. Monitoring requires setting objectives concerning management, as well as environmental and biodiversity conditions. Moreover, it requires baseline information and indicators to identify changes. Data should be easy to collect, store, and analyze, and results should be comparable to those obtained through previous or subsequent measures, in order to identify changes over time.

Marine-Coastal Ecosystems

What Are Marine-Coastal Ecosystems?

The ocean is one of the most important tourist attractions in the world. Many tourist destinations are to be found along coasts, and provide such natural environments as sea, beaches, and coral reefs, as well as the opportunity to enjoy watching interesting species, i.e., fish, marine turtles, dolphins, and many others. Tourist industry competitiveness directly relies on conserving oceans and the numerous species living there. Hence, all actions taken by a company to this end will be an excellent investment. Ecosystems most relevant to marine biodiversity and humankind include:

Beaches: The natural geographic area where land and sea meet at the same level. They are the home of many animals, such as birds, crabs and mollusks. Many beaches are marine turtle egg-laying sites.

Mangrove swamps: These are coastal forests adapted to life in high salinity and low water oxygen concentration environments. They border much of tropical coasts and host large numbers of fish, mollusks, and birds.

Estuaries: They are the region of interaction between rivers and oceans, where tide and river flow action blends fresh and saltwater. Consequently, estuaries consist mostlly of briny water. Abundant fertile sediments carried by rivers usually accumulate in estuaries, which usually host birds, reptiles, fish, crabs, shrimp, oysters, mussels, and snails. Many fish captured at sea spend here part of their life cycle.

Seagrass beds: Beds of marine phanerogams (i.e.,*Thalassia testudinum*) are ecosystems hosting a great diversity of organisms on account of their high organic matter production and the variety of substrates that provide shelter, food, and spaces to marine animals, particularly mollusks. This phanerogam contributes to sediment organic contents through rhyzome growth and decay; additionally, it has effects on ocean water chemistry in areas with poor circulation. An estimated 90% or more of the energy provided by *Thalassia* reaches the higher trophic levels via debris. Being also a substrate for a large variety of epiphytic algae, sometimes epiphyte biomass can be equal to *Thalassia* leave biomass. These algae are a source of food for organisms living in *Thalassia* beds. Thalassia beds are important areas for the development of fish and invertebrate juvenile stages, and as sheltering and feeding areas for other marine animals, such as turtles.

Coral reefs: They are colonies of marine organisms formed by the association of an alga and a coral polyp. A great variety of coral algae, sea plants and animals live associated to corals, forming what is known as a whole as coral reefs. These are among the most productive ecosystems in the planet.

Coastal seas: These are the areas around continents and islands with abundant plankton and marine life, and are very important to recreation and tourism, as well as to fishing activities. They are the home of many fish varieties feeding large human populations, such as tuna, sardines, and mackarel. Humpback whales usually give birth in warm coastal seas.

Sargassum communities: *Macrocystis pyrifera*, or giant sargassum, is an important ecological and economic resource. It forms extensive forests or beds that provide habitat, shelter, and food to numerous species with high commercial value, such as abalone, lobster, and sea urchin. Also known as giant kelp, giant bladder kelp, or seaweed, it is a *giant brown* alga inhabiting the *Pacific* coast of *North America* and the the sub-Antarctic waters of *South America*, *South Africa*, and *New Zealand*. It ranges from the intertidal zone to a depth of some 30 meters and may form underwater forests. Its structures are similar to those of true plants. Its greenish-brown "leaves" can grow to more than half a meter long. Along the "stalk" there are small air-filled bladders acting as floaters. *Macrocystis* populations are negatively affected by high temperatures and low nutrient concentrations.

What Are the Main Marine-Coastal Resources Used by Tourism?

This section describes the marine-coastal resources that are more relevant to tourist activities. First, an overall description of the sea and its importance is given, to then focus on three kinds of ecosystems: beaches, mangrove swamps, and coral reefs. These tropical ecosystems provide many benefits to society and are very popular destinations for tourists seeking leisure and recreation, thus generating millions of dollars in revenues. In addition, two major wildlife groups are described: marine mammals (whales, dolphins, sea lions, and manatees) and marine turtles. These two groups were chosen on account of their being part of tourist products in many countries around the world, and also because some of these species are seriously endangered, and turtle and cetacean survival depends on many countries' collective action, given they are worldwide resources that move about in many places.

The Ocean

The ocean is the part of earth surface filled with marine water. Continents and large archipelagos divide it into five parts also known as oceans; Pacific Ocean, Atlantic Ocean, Indian Ocean, Arctic Ocean, and Antarctic Ocean. Oceans cover 71% of earth surface, with the Pacific being the largest one. Although it is generally unknown to us, the sea can be as rich and diverse as terra firma.

While ocean depth is variable, the mean depth is 4 km. The deepest part is in the Marianas Trench, reaching down to 11 km.

The ocean is made up of many ecosystems. Ocean water is in continuous movement due to the influence of solar heat, earth rotation, and tides (in turn influenced by moon gravity). Oceans have a temperate (12ºC to 30ºC) surface water layer reaching a variable depth that ranges from a few tens to 400 or 500 meters, depending on the zone. Under this area water is cold, with temperatures between 5ºC and -1ºC.

Marine currents are like rivers flowing at different speeds, depths, and in different directions, and having a great influence on global climate and marine ecosystems. The Gulf Stream, for instance, carries 50 times as much water per second as all rivers in the planet combined, and its warm waters are the reason why northwestern Europe has a more temperate climate than American continent lands at the same latitude. Streams such as Peru and Benguela currents, the latter in southwestern Africa, produce true marine bonanzas through the upwelling of nutrient-rich waters that create an overabundance of plankton, fish, and marine birds.

Marine and coastal environments combine sand dunes, rocky shores, cliffs, beaches, estuaries, lagoons, wetlands, mangrove swamps, coral reefs, and seaweeds. Underwater landscapes are also extraordinarily diverse, with spectacular geological features, such as huge mountain ranges and deep canyons.

Ocean food chain base is phytoplankton, made up of unicellular algae living off sun energy (i.e., they photosynthesize) and water nutrients. These microorganisms bloom in an ocean surface layer reaching up to 100 meters in depth. In turn, phytoplankton is a source of food for zooplankton, a community of tiny animals, some of them unicellular and other more complex, such as krill, small jellyfish, crabs, and shrimp. Larger creatures, such as fish and baleen whales, feed on both phytoplankton and zooplankton. Other creatures, like tuna, feed on those fish. In turn, they serve as food for sharks and dolphins, among others.

Interesting food relationships also develop in coastal zones. For instance, marine turtles lay their eggs on beaches, where they are consumed by crabs, black vultures, frigate birds, coatis, reptiles, weasels, and house and stray dogs, among others. At the high tide mark, crocodiles also wait patiently for adult marine turtles and hatchlings, which are included in their list of prey.

Just as we find deserts and tropical forests in dry land, biodiversity is also unevenly distributed at sea. In some sectors the ocean floor is covered by large sandy tracts resembling the Sahara Desert and exhibiting low biodiversity. At the other extreme, we find the equivalent of tropical forests, i.e., coral reefs. Finally, there are dark areas in the ocean, which are home to interesting creatures adapted to the

extreme conditions, with some of them even capable of glowing in the dark.

Marine-coastal and island ecosystems are the place where sea and land meet. The most biologically productive areas in oceans are often found mostly in these shallow and sunlit areas where nutrients come from dry land, and currents and winds bring up and move rich sediments from the bottom of the ocean. These waters are the basis of the world's fishing industry. To many species living all or most of their life at sea, i.e., fish, marine turtles, humpback whales, and many more, the marine-coastal strip is essential to their reproduction.

American Pacific and Atlantic tropical shores host very similar wildlife, since dominant species in both shores belong to the same genera. Pacific fauna, however, is exposed to wider temperature and salinity ranges than Atlantic wildlife.

Coastal ecosystems are intertwined through very complex relationships, such as found in mangrove swamps, coastal lagoons, and beach dune systems, acting as containment barriers against erosion and floods.

The marine-coastal zone is home to over half of the earth's population, being one of the most productive areas in the planet. In addition to providing a series of benefits, such as transportation, food, energy, minerals, and recreation, oceans play an essential role as regulators of global climate. The "society-coast-ocean" relationship, however, has been been unequal: in exchange for the benefits we receive, we return pollution, mangrove reduction, wetland drying, sand mining, and overexploitation of resources, among other things.

The Beach

From the scientific point of view, a beach is defined as a geomorphological feature responding to conditions of sediment supply, wave, tide, current and wind action on a time scale ranging from hours to thousands of years and varying from place to place. There are, however, several simpler definitions describing a beach as: a) parts of land that are covered and uncovered by water through tide action, from the highest flood tide to the lowest ebb tide limits every year, or b) the accumulation of non-consolidated sediments (sand, gravel, fine gravel, and pebbles) extending from the the mean ebb tide line to some physiographic change, such as a dune field, or to the point where permanent vegetation is established. That is to say, beaches do not include the portion remaining permanently under water and where wave and sediment transportation processes are most important.

Some of the world's most famous destinations are known for their beaches. Lured by their scenic beauty, tourists come to enjoy the sun, the water, the sand, and the rich biological diversity. The tourist industry, however, often contributes to deteriorating and destructing the natural attractions that initially prompted their development. Tourism competitiveness relies directly on preserving beaches, and large and small species inhabiting or frequenting them. Therefore, all efforts made by a company to this end will be an excellent investment in its business success.

On top of being ideal places to sunbathe and swim, beaches are the result of powerful natural forces, such as waves, marine currents, wind, rivers, and biodiversity, keeping them in a process of constant change. Some Caribbean island beaches, for instance, are fed with sand carried by the wind from as far as the Sahara Desert across the Atlantic. On the other hand, a great deal of the white sand in beaches next to coral reefs comes from ground limestone that has gone through parrot fish digestive system.

Erosion and deposition cycles, where sand is either lost or deposited with material gains, contribute to shaping and positioning beaches. These cycles may be influenced by human activities occurring far away from these ecosystems, for instance, deforestation or massive sand mining from a river bed.

Beaches are a point of junction between land ecosystems, like tropical forests and deserts, and the sea. Hence, both marine wildlife, i.e., turtles, crabs, and snails, can be found together with land wildlife, such as jaguars,

tapirs, and monkeys. In fact, marine turtles coming ashore to lay their eggs are in the menu of jaguars. Many invertebrates living on beaches, like polychaetes, crabs, and mollusks, are major sources of food to other species and also act as controllers of other organism populations. For example, crabs consume and damage turtle eggs, feeding also on hatchlings and thus helping control their population. Based on the different types of materials making up beaches, they can be classified into rocky, muddy, and sandy beaches.

- **Rocky Beaches:** Green, brown, red, and blue-green algae live on rocky beach submerged areas and provide food and protection to plant eaters, such as snails, sea urchins, chitons, and crabs. There are also filterfeeding creatures that live clinging to rocks, such as sponges, sea anemones, corals, and clams, which feed on seaweed fragments, plankton, and organic matter particles carried by waves. There are also mobile filterfeeders, such as crabs, and carnivores, i.e., snails, crabs, and some fish. Further down there are starfish, octopi, and fish living among the rocks. Rocky beach surface is an ideal place for Galapagos sea lions and marine iguanas. They are also used by some bird species for nesting and by some fish species, like needlefish, for spawning. Rocky beaches are also the home of vegetation. For example, on the Central American Pacific coast some species, like the gumbo-limbo tree (*Bursera simaruba*) and the barbed-wire cactus (*Acanthocereus tetragonus*), can be found. Rocky beaches are subject to strong natural pressures, but they are rather tolerant of man-made damages. Nevertheless, pollution and overharvesting of snails, lobsters, and fish result in the loss of major resources and lead to undesirable rocky ecosystem changes.
- **Muddy Beaches:** Muddy beaches are made of fine sediments deposited by rivers flowing into the ocean in their vicinity. Many of their inhabitants are adapted to live buried in the mud, where they feed on particles and small suspended organisms. Other common inhabitants are polychaetes, small mud-burrowing worms that exhibit bright colors, like red, pink, or green. Crabs, lobsters, shrimp, and marine snails can also be found here. Microalgae present on these beaches contribute with important nutrients to marine systems.
- **Sandy Beaches:** Beach sands may exhibit quite different looks, depending on the type of rock originating them. For instance, volcanic sand is black, whereas coral reef sand is usually white. Sandy beaches do not have primary producers, such as algae and phytoplankton, and hence their inhabitants rely on sea nutrients brought by currents and waves, or contributed by land ecosystems. Beach creatures may show a lot of variation in shapes, sizes, and colors. Sandy beaches are less stable than rocky or muddy ones. Consequently, most of their inhabitants, i.e., clams, polychaetes, crabs, pillbugs, and starfish, remain buried in the sand. Some are so tiny that live comfortably in the spaces between grains of sand. On many beaches it is common to find blue land crabs (*Cardisoma crassum*) and hermit crabs (*Coenobita compressus*). Some fish live and depend directly on coastal sandy shoals. Marine turtles are common visitors of many beaches, where they come to lay their eggs. Much of the organic matter they deposit as eggs remains there and helps in natural plant fertilization, which, in turn, contributes to stabilizing the beach and increase protection against storms. Many a bird frequent beaches, including brown pelicans (*Pelecanus occidentalis*), magnificent frigatebirds (*Fregata magnificens*), and several sea gull species (*Larus spp.*). Beaches are key sites during migration of some shorebird species, such as the spotted sandpiper (*Actitis macularia*), the sanderling (*Calidris alba*), and rare species like the American oystercatcher (*Haematopus palliatus*) and the wandering tattler (*Heteroscelus incanus*). On sandy beaches it is possible to find salt- and sand-tolerant plants, such as sea grapes (*Coccoloba uvifera*), cocoplums (*Chrysobalanus icaco*), beach morning glory (*Ipomoea pes-caprae*), and manchineel or beach apple (*Hippomane mancinella*). These plants typically help control erosion.

Beaches provide different environmental services to both people and the environment, particularly recreation, storm protection, utilization of sand, minerals, or rocky materials, as well as shelter, nesting,

feeding, and mating sites for different marine and avian species. Sun and beach tourism is widespread all over the world and is one of the main economic activities developing in coastal areas. Sites where this kind of tourism is being developed are characterized by having great scenic beauty, pleasant climate, and large amounts of sunshine throughout the year. Due to their biological resources and scenic beauty, numerous beaches around the world actually are or are seen as part of protected wilderness areas.

The Mangrove Swamp

A mangrove swamp is an ecosystem essential to marine life, since it provides mating areas, nurseries, and habitats to many of the main crustacean and fish species with commercial value, in addition to being the home of numerous birds, mammals, and reptiles, as well as a migratory bird resting site. Mangrove swamps provide ideal conditions for recreation, adventure, and enjoyment of nature, and they are excellent complements of beaches, reefs, and the ocean. Tourist industry, however, does not always value mangrove swamps in all of their potential and rather contributes to their deterioration. Tourism competitiveness directly relies on preserving such ecosystems as mangrove swamps. Therefore, every effort made by a company to this end will be an excellent investment in its business success.

A mangrove swamp is a group of tree or bush species with adaptations allowing them to colonize flooded areas in contact with saltwater. It is named after trees growing there, popularly known as "mangroves". This category encompasses several species with similar adaptations, although belonging to different families. Some of these adaptations include tolerance to high salinity levels, aerial roots that stabilize trees on soft terrain, floating seeds (plantules) and specialized structures to let oxygen in and carbon dioxide out (lenticels and pneumatophores). A mangrove swamp can be said to live between two worlds, land and sea. A mangrove swamp is one of the most productive wetlands in the planet. Its vegetation provides nutrients to the marine environment and supports a great diversity of life, as well as complex food networks. The intertidal shallow area provides a haven for raising larvae and juveniles of fish, crabs, shrimp, and mollusks. A healthy mangrove swamp is essential to maintaining other marine ecosystems healthy.

There are several types of mangrove swamps: coastal mangrove swamps growing without any freshwater flow from inland, river mouth mangrove swamps, mostly found in river deltas where they get a freshwater flow, and reef mangrove swamps growing on coral reefs that rise above sea level. Mangrove swamp areas located immediately adjacent to canals, lagoons, and river banks are known as the outer zone, which is typically in direct contact with saltwater. On the other hand, the inner zone is farthest removed from saltwater, although it can be periodically or seasonally flooded by tides.

Typically, soils in mangrove swamps have little oxygen, which decreases with depth. These are acidic soils due to calcium shortage and to the interaction between organic matter supplied by roots and leaves, natural seawater salts, iron carried by rivers, and lack of oxygen. Acidic soils make it difficult for organic matter to break down, for nutrients to be absorbed by plants, and for crops to grow properly. Mangrove aerial roots are designed to anchor trees firmly on unstable and nonconsolidated soils. Additionally, during ebb tide they allow for gas exchange with the atmosphere, thus permitting tree oxygenation and survival on oxygen-poor soils.

In order to reproduce in such extreme environments, mangrove trees have developed different strategies. In some species, for instance, fruits do not produce seeds. The embryo germinates and develops inside the fruit, protected against adverse salinity and flooding conditions, producing a plantule that grows attached to the parent tree until, at the right time, it falls and develops into a new tree. Mangroves have managed to live in high salt concentration environments. Some species regulate the amount and type of salts they absorb through salt-excluding filters. On the contrary, other plants have a lower capacity for filtering salts, and thus they absorb them in higher amounts in their systems, but they possess glands to excrete the excess.

Mangrove swamp vegetation combines trees, herbs, lianas, and epiphytes. Most trees in the swamp are mangroves of the *Rhizophora and Avicennia* genera, as well as other species, such as *Pelliciera rhizophorae*, *Mora oleifera*, *Laguncularia racemosa*, *Conocarpus erecta*, *Annona glabra*, and

Phryganocidia phellosperma, among others. Mangrove aerial roots form an intricate mesh used by a lot of fish, mollusks, and crustaceans as mating, haven, and nursery areas. Many of these species are important as human food, Abundant leaves on the floor feed colonies of microorganisms that break them down, as well as bacteria and protozoa or unicellular animals. In turn, these colonies are at the base of complex food networks.

Shrimp reproduce very close to the shore, and the abundant larvae use mangrove roots as nurseries, feeding on forest debris as they develop into juveniles. Then they abandon their mangrove haven and head to the sea to complete their development as adults. Finally, they return to the shore to reproduce and start the cycle again.

Mangrove swamps host a large diversity of resident and migratory birds that, depending of their features and needs, are found in different environments, such as sandy shoals, canal banks, mangrove swamp inner borders, and tree tops. To many of them the main source of food is fish and mollusks. Scarlet macaws (*Ara macao*), frequent visitors of tropical forests during the day, gather in groups of up to 50 individuals to sleep on mangrove trees. In Costa Rica one hummingbird species (*Amazilia boucardi*) is endemic of Pacific mangrove swamps and visits flowers of some mangroves, lianas, and epiphytes in search of nectar. Other species associated with mangrove swamps are the mangrove vireo (*Vireo pallens*), the mangrove warbler (*Dendroica petechia erithachorides*), and the Panama flycatcher (*Myiarchus panamensis*), which live and nest there feeding on spiders, beetles, and grasshoppers. Over 500 bird species have been recorded in Belize mangrove forests.

Some mammals, i.e., the peccary or wild pig, come to shore at low tide. Capuchin monkeys can be seen on mangrove tree tops feeding on leaves. Manatees, crab-eating monkeys, fishing cats, and marine turtles have been seen in Belize. Mangrove swamps are able to successfully regenerate in periods ranging from 15 to 30 years, provided there have been no alterations in regular tide dynamics, there are nearby mangrove forest patches that produce fruit or new plantules, and that these can float on water without any obstacles.

Mangrove swamps have been used since pre-Columbian times. Indigenous people harvested different products from mangroves, some for domestic consumption and other for trading with other communities. The settling of

communities around mangrove swamps was prompted by the possibility of getting salt, mollusks, fish, and crustaceans.

Mangrove forest importance can be seen from two broad perspectives: their functions and their uses, or their ecological and economic importance. Mangrove functions are globally acknowledged, particularly by human communities enjoying direct or indirect benefits from mangrove forests, such as coastline protection, sediment retention, flood buffer, food, and shelter for a large number of economically important aquatic organisms, and wind and wave force abatement, thus decreasing potential storm damages. Other functions consist of protecting and producing biodiversity genetic resources, in addition to providing areas for scientific research development, sequestering large amounts of carbon, and being seen as good evapotranspirators that induce rainfall on the same site or in nearby areas.

Traditional extractive uses in mangrove forests are directly related to products human beings can use for their own consumption or for trade, mostly mangrove and wildlife species. Lumber is mainly used for home construction, wharves, piers, farm fence posts, firewood and coal production as an energy source, and the use of bark as a source of tannins for the leather industry.

Animals associated to a mangrove ecosystem, such as mollusks, crabs, shrimp, and fish, are the main source of protein to human populations inhabiting these areas. Birds, mammals, and other animals are common in mangrove forests, although these organisms are not taken advantage of in most cases, or at least there is no recognized market for them.

Tourism is another productive activitiy developed in mangrove areas. It is known as a non-consumption use, as opposed to the consumption use resulting from poorly planned activities, such as shrimp and fish farming, salt ponds, and tourist infrastructure development, hotels, roads, ports, among others.

This important ecosystem is also one of the most endangered, since it is disappearing at a higher rate than the tropical rainforest without getting much attention from the public. In 2001, worldwide mangrove swamps covered 181,000 km2 in more than 100 countries; an estimated 50% of this was lost in the 50 years prior to this date. In Central America, Some 3,200 km2 were estimated to be left in 1994 on the Pacific coast. The highest mangrove concentration, 1,650 km2, is found on the Panamanian Pacific shoreline. Some Latin American countries do not have legal regulations in place for mangrove conservation, and in other instances existing regulations are not enforced.

The Convention on, Wetlands signed in Ramsar, Iran, in 1971, is an intergovernmental treaty acting as a framework for national action and international cooperation in favor of conserving and rationally using wetlands and their resources. There are currently 154 Contract Parties to the Convention with 1650 wetlands, covering a total area of 149.6 million hectares designated to be included in the Ramsar List of Wetlands of International Importance.

The Coral Reef

Coral reefs are thought to be one of the most exotic destinations in the world. The tourist industry, however, often contributes to deteriorating and destructing them —mostly unwittingly— since land activities may directly or indirectly affect coral reefs located many miles away in the sea. Every effort made by a lodging company to protect reefs contributes to maintaining destination competitiveness and will be an excellent investment in business success.

The coral reef is one of the most complex and colorful tropical ecosystems, rivaling with the rainforest as to species diversity. This ecosystem is home to 25% of all known marine species, including over 4000 fish species, 700 coral species, and thousands of animals and plants. A reef may be likened to a true underwater metropolis, where buildings are made of coral and their thousands of residents come and go performing multiple activities. The numerous hiding places between coral blocks host a large variety of animals, including sponges, worms, mollusks, crustaceans, sea urchins, starfish, sea cucumbers, and fish characterized by their bright and contrasting colors. Plants include brown seaweeds, like sargassum, red algae, green algae, and some flowering plants, such as seagrass beds. Corals are complex structures that are often taken for rocks or plants; although they are actually carnivorous animals related to sea anemones and jellyfish.

Slow, albeit continuous coral growth for thousands of years and the accumulation of fragments and sediments created in the reef account for coral survival, despite rising sea levels. Many modern coral reefs were established less than 15,000 years ago when sea level was 85 meters under current level.

Corals are made up by polyps, which are tiny animals with a soft tube-shaped body with one opening where food comes in and waste comes out. This opening is surrounded by a ring of tentacles used to catch small animals swimming around. Polyps develop a cement-like calcium carbonate exoskeleton that protects their soft and delicate bodies. When polyps die their skeletons are used as the basis for new polyps, which, in turn, build new skeletons on top of the old ones. With time, accumulation of these skeletons forms coral reefs. Polyps live inside skeleton holes, known as corallites. Usually retracted during the day, they spread their tentacles at night to feed on small animals or zooplankton. One single coral branch may be covered by thousands of polyps.

The most special feature of some polyps is their symbiotic relation with unicellular algae, known as zooxanthellae, growing inside them and capable of producing food from sunlight through photosynthesis. Algae share this food with corals, which, in turn, provide nitrogen from their waste. This way, in addition to catching food, corals also have a source of food inside their own bodies. For this reason, corals prefer clear and shallow waters where light penetrates easily. During the day their tentacles remain retracted to get more sunlight. In addition, algae release large amounts of oxygen, remove coral waste, and act on carbon dioxide, which, in contact with seawater forms carbonic acid, a chemical that is lethal to coral skeleton because of its acidity.

There are coral reefs in some hundred countries, mostly between the tropics of Cancer and Capricorn. The Meso-American Barrrier Reef is the second largest in the world, ranging for almost 1000 kilometers from the Yucatan Peninsula in Mexico through Belize and Guatemala coasts to the Bay Islands in Honduras. This area hosts the largest marine biological diversity in the Caribbean. Having the largest continental shelf in all Caribbean islands, Cuba hosts four primary reef systems, including the renowned "Queen Gardens" on the southeastern coast. Australia's crescent-shaped Great Barrier Reef stretches over 2000 kilometers along this island continent northeastern shore, making it the largest coral reef in the world. In order to survive successfully a coral reef requires the following elements:

- **Clear water:** Corals need transparent waters and do not develop well in turbid waters. Sediments and excess plankton may cloud the water and decrease the amount of light reaching coral unicellular algae.
- **Temperature:** Typically, corals live in temperatures ranging from 20 to 32 degrees centigrade.
- **Unpolluted water:** Corals are sensitive to pollution and sediments, therefore requiring clean water.
- **Saltwater:** Corals need saltwater to survive; hence, they are not found in areas where river freshwater flows into the sea.

This rich ecosystem provides important benefits to humans. Their extraordinary beauty attracts tourists and their great productivity provides a wealth of food resources to many coastal communities around the world. It also acts as a natural breakwater protecting shorelines against storm and hurricane impacts, as well as the resulting erosion. Besides, corals have potential medicinal uses.

Marine Mammals

There are several species of mammals adapted to life at sea or on shores. The cetacean group, including whales and dolphins, is the largest one, with 84 different species. Other well-known group is sea lions, with 14 species. The manatee group has four known species in three continents. Cetaceans and manatees are the only marine mammals that live all their life in the water. A general description of these groups and some of their representatives is given below:

Whales and dolphins: Cetaceans have become important to tourism and an increasing number of tours is being offered to watch whales and dolphins. Millions of people travel to watch whales and dolphins in more than sixty countries. Some destinations for cetacean watching are British Columbia in Canada, Baja California in Mexico, Costa Rica, Argentina, and Zanzibar in Africa. Certain destinations have emerged and positioned themselves precisely because of their potential for watching these animals.

Whales and dolphins belong to the order of cetaceans and are the most diverse group of mammals adapted to life at sea. They descend from land mammals that evolved to an entirely aquatic life. Most of current species have been in the planet for twelve millions years, although some, i.e., the spermwhale, have been present for 23 million years.

The same as every mammal, cetaceans breathe air with their lungs, are warm blooded, and nurse their young. They are characterized by an elongated snout and nostrils migrating to the top of the head to become one or two blowholes. The tail is very strong and muscular ending in a fluke used to propel themselves and move under water at speeds of 50 km per hour. Cetaceans produce sounds to communicate with other individuals of the same species, often at long distances.

Cetaceans usually have wide geographical ranges. Some species, such as humpback whales, reproduce in tropical waters and feed in polar zones. River dolphins, however, live in very restricted areas and thus may be very vulnerable to such threats as pollution and habitat transformation. Cetaceans are divided in two large groups: baleen whales (Mysticetes) and toothed cetaceans (Odontocetes).

The baleen whale group includes eleven species that have baleens plates, instead of teeth, hanging from their upper jaw and acting like strainers that retain plankton, small fish, and krill after expelling large quantities of sea water previously sucked in. Another trait is the presence of two breathing orifices, known as blowholes or spiracles. Their throats are characterized by having grooves that expand every time they feed. This group includes:

- **Right whales:** Characterized by a very large head almost one third the body length, as well as an absence of the dorsal fin. There are two species.
- **Finback or rorqual whales:** Encompassing six species. This group includes the blue whale and the famous humpback whale.

Toothed cetaceans, with 73 species, are the most diverse group showing a wide variety of sizes and shapes and including dolphins, porpoises, and toothed whales. The upper part of their skull consists of a structure, known as the "melon", involved in their echolocation and orientation system. They only have one blowhole, with the exception of spermwhales which have two nasal canals that merge into one. They use their teeth to hunt for fish, squid, and others, but they do not chew their prey but swallow them whole. The killer whale or orca (Orcinus orca) also feeds on seals. This group includes:

- **Spermwhale or cachalot:** The largest of the toothed whales, measuring up to 19 meters and weighing up to 70 tons. It dives at depths of 300 meters or more. It is called spermwhale on account of the false belief that it carries semen in its head.
- **Pigmy or dwarf spermwhales:** Although related to the cachalot family, they do not measure more than four meters. They feed mostly on squid and octopi.
- **Beaked whales:** Characterized by a pointed beak-like snout. They have very few teeth and some have only two on the lower jaw. They feed on fish, octopi, and squid, and are preyed upon by orcas.
- **River and estuary dolphins:** They typically have very small eyes as an adaptation to cloudy waters. They include the blind Ganges River dolphin, the Indus River dolphin, the Amazon River dolphin, the Yangstse River Chinese dolphin, and the La Plata River dolphin. The latter actually lives in coastal waters.
- **Dolphins:** Delphinids are a very wide family including ocean dolphins, killer whales, and pilot whales. Most are of small to medium size, 1.5-4.5 meters. With over 9 meters long, the killer whale is a true giant.
- **Porpoises:** They differ from dolphins in their having spade-shaped teeth and blunt heads without typical dolphin beaks.
- **Narwhals and belugas:** They belong to the same Arctic family. The former are characterized by the presence of a long tusk in males, likening them to a marine unicorn. Belugas are entirely white.

Many cetacean species have been hunted to the brink of extinction for their meat, fat (used in producing lamp oil), or *ambergris* (exclusive of spermwhales) used for perfumes. The International Convention for the *Regulation of Whaling* (*ICRW*), in force since *1948*, regulates cetacean exploitation and is managed by the I*nternational Whaling Commission* (*IWC*).

Sea lions: Sea lions belong to the order of pinnipeds and are related to seals and walruses. The sea lion family includes 14 species. They often gather in large groups on rocky or sandy beaches, or on man-made structures, such as breakwaters. Males are usually much larger and heavier than females and establish territories where they keep harems they defend from other males. They feed on fish, crustaceans, octopi, and other invertebrates. Their predators include cougars, sharks, and orcas. In the American continent three of the species represented include:

- **California sea lion:** This sea lion (*Zalophus californianus*) lives along California, Mexico, Galapagos, Ecuador, and Colombia shores. It feeds mainly on fish and mollusks. An adult male may be up to 2.4 meters long and weigh up to 390 kilos. They tend to reproduce on remote islands or coasts, and usually mate from May through June. Gestation period is eleven months. In general, this species is well protected.
- **Galapagos fur seal:** This species (*Arctocephalus galapagoensis*) is endemic to the archipelago. Adult males are 1.5m long and weigh an average of 64 kg. They spend most of their time in water foraging to feed on fish and octopi. Although they were hunted for their fur, today they are protected by Ecuadorian laws.
- **South American sea lion:** This species (*Otaria flavescens, also known as Otaria byronia*), inhabits South American coasts on both oceans, south of Peru on the Pacific, and south of Rio de Janeiro on the Atlantic, as well as the Galapagos Islands. The species was heavily hunted throughout the nineteenth century and first half of the twentieth century, although currently commercial hunting is banned. It inhabits along sandy, stony, and rocky shores and beaches, as well as rocky plateaus over cliffs. Males can reach 2.5 meters and weigh up to 250 -300 kilograms. They feed in groups in shallow waters and follow fishing boats to steal fish caught in nets. It is not a threatened species, although it is protected in most countries.

Manatees: They belong to the order Sirenia and in the American continent are represented by the manatee or sea cow (*Trichechus manatus*), living along Central American east coasts and in the Antilles. They tolerate wide salinity ranges and move freely between fresh and saltwater habitats, being thus found in shallow coastal waters and in lagoons, estuaries, and large rivers. They are lonely creatures, but can also gather in small groups. They are hard to spot, since only the snout comes out of the surface to breathe.

It is a voluminous 3.6m-long aquatic mammal that can weigh from 600 to over 1000 kilograms. A distinctive feature is their paddlelike tail. Like all mammals, manatees breathe air, and hence they must constantly rise to the surface to take a breath. While resting this happens every 20 minutes, but when they are active, they need to take a breath every 3 to 5 minutes. Manatees communicate with each other through a series of voices that sound like clicks and chirps. Manatee reproduction is very slow: their gestation period takes from 12 to 14 months, and the calf depends on its mother for some two years. Sound communication between cow and calf is very strong, which helps them keep in touch. They are herbivorous and their diet includes aquatic plants and seagrass beds.

They are endangered as a consequence of hunting, boat collision accidents, and pesticides. They also get entangled in fishing lines and nets, and swallow fishing hooks and trash. They are slow non-aggressive animals, which makes them easy prey for hunters. Their bodies provide a large amount of meat, so one animal can feed an entire family for a long time. Another problem is habitat loss, since every day a manatee requires eating 50 kilograms of marine plants grown in quiet water environments.

Marine Turtles

Marine turtles live permanently at sea and lay their eggs on land, on beaches. They travel long distances thanks to their sharp sense of orientation. They have inhabited the planet for over 200 million years and have not changed much in all this period of time.

The carapace or top shell is the most distinctive trait of any turtle, providing them with a shield against predators and temperature changes. In almost all species the shell consists of a set of scutes, except for the leatherback, which has instead a tough skin giving it better mobility. Marine turtles have more flexible shell than land turtles and, unlike them, do not have legs but paddlelike flippers to move about easily in the water.

Their good sense of direction allows them to move between faraway sites. The same leatherback turtles laying eggs in Les Hattes, French Guiana, also visit African coasts; others travel between Galapagos and Malaysia. Although how they find their way remains unknown, some theories state they use the stars or the sun, calculate latitude by feeling earth's rotation speed or tilt, or follow a specific smell or taste coming from some river or beach.

Unlike mammals, turtles cannot keep a constant body temperature, and must depend on their environment to get warmer or colder. The sun can overheat a large turtle body, particularly during the strenuous nesting effort. This is why nesting usually occurs at night, although the olive Ridley turtle, the smallest of them all, is able to nest during the day because it can cool down more quickly.

Marine turtles do not possess teeth, but their beak-shaped jaws enable them to cut, bite, or crush their food. Their sense of hearing seems to be quite developed and are able to clearly perceive an approaching fisherman's paddling. While their underwater vision is good, above the water they are near-sighted. Their lungs are very similar to humans'. Turtles can remain submerged for four to five minutes, and emerge to breathe for only two or three seconds. One single explosive exhalation followed by a rapid inhalation is all they need to replenish oxygen. While they can rest or sleep underwater for several hours, their ability to hold their breath is limited at times of stress. This is why they usually drown in a few minutes when caught in fishing nets. Adult turtles must face predators, such as sharks and killer whales at sea, as well as jaguars during their land ventures.

Not all turtles eat the same food. Some prefer coral, others look for aquatic plants, and yet other eat jellyfish, fish, or octopi. Depending on their growth stage, turtles use different feeding areas. Hatchlings live in the sea over kelp, where they eat plankton, small snails, and crustaceans. After years of moving about in currents as juveniles, they come closer to shores and estuaries where they continue their development. According to species, adults move to coral reefs or to submerged grazing areas.

Females nest on tropical and subtropical sandy beaches. Many travel for long distances from their feeding areas to their nesting sites. Males wait for females near the shores, where mating takes place. They hold on to females with the help of long and wide tails, as well as strong claws on their fore flippers. After fertilization, eggs develop for two or three weeks. Then, the female looks for a nest site to lay her eggs, usually on the same beach where she hatched, although some choose new beaches. Nest location is critical to egg and hatchling survival—if too high on the beach, vegetation roots might encroach on it, there would be more predators, and hatchling journey to the sea would be longer; if it is too close to the water it might get flooded under the high tide. Egg laying usually takes place at night to avoid the heat, and at high tide, in order to reach a site where no waves can arrive. Most females nest at least twice during the season, and may remain on the beach for up to several hours. The process can be strenuous, since marine turtles are heavy, slow, and awkward on land. Once the site has been chosen, the female sweeps it with its fore flippers and then digs a pit where she lays from 80 to 120 eggs, depending on the species. Upon finishing, she covers and disguises the nest by compacting the sand with her body weight, and then returns to the sea.

The higher the temperature, the faster the embryos develop. Temperature also determines hatchling sex. Under 28°C (82.4°F) mostly males are hatched, whereas above 30.2°C (86.9°F) females are produced. Hatchlings typically come out at night and immediately race towards the sea, facing such dangers as ants, crabs, coyotes, black vultures, reptiles, coatis, and dogs. Once in the water, their predators are carnivorous fish and birds, such as terns, gulls, and frigate birds. For some three days they vigorously flap their flippers moving away from the beach and heading to their feeding grounds, where they will be more protected.

Marine turtles play a major role in several ecosystems. For instance, much of the organic matter they leave on beaches remains there, thus contributing to beach-stabilizing plant growth and protecting nesting grounds. The hawksbill turtle is like a biological control in coral reefs, since it feeds on sponges that might cover and suffocate the reef. When the green turtle feeds on seagrass beds it contributes to their increased productivity, the way large mammals do it on land. If marine turtles went extinct, the negative impact on marine and coastal ecosystems would be enormous. There are eight marine turtle species, seven of which are found in the Americas:

- **Green Turtle** *(Chelonia mydas)*: The largest of the seven species with hard shells. It lives in the Atlantic, Mediterranean, and Pacific. In the Caribbean its main nesting grounds are in Tortuguero, Costa Rica. Along American Pacific coasts it is replaced by the Pacific green or black turtle. The Galapagos Islands on the eastern Pacific is an important nesting and feeding area, where it visits beaches on Baltra, Santa Cruz, and Isabela islands. In its juvenile stage it feeds on small invertebrates, mollusks, and jellyfish, whereas adults forage on seagrass beds. It has been the most heavily hunted of all sea turtles.
- **Pacific Green Turtle or Black Turtle** *(Chelonia agassizii)*: It tends to be much darker than the green turtle and is found along the Pacific coastline in North and South America, as well as Galapagos, where it nests on Santiago and Floreana islands. Experts believe this archipelago populations spend their entire life there. On the continent the most important nesting beaches are in Michoacan, Mexico, Jiquilisco, El Salvador, and Paracas, Peru. During the nesting season large concentrations of turtles are sometimes seen near the shore. During their first years of life their diet consists of marine invertebrates associated to sargassum. Adults feed on aquatic vegetation.
- **Loggerhead Turtle** *(Caretta caretta)*: Known by its heart-shaped shell and large rounded head. It has the second largest range in the planet, after the green turtle. It is found in the Caribbean Sea and on the coasts of Florida, although it is absent from Central and South American Pacific shores. It is also present in the Galapagos. It is a mostly carnivorous turtle feeding on mollusks, crustaceans, and small fish.
- **Hawksbill Turtle** *(Eretmochelys imbricata)*: A curved hawk-like beak gives it its name. It nests on numerous tropical and subtropical beaches, including American Pacific and Caribbean shores. Juveniles are almost entirely herbivorous, but adults feed on octopi, crab, and corals, which are cut with their beak. The beauty of their top shell or carapace has resulted in their having been heavily hunted to use it as a trophy or wall decoration, or in the manufacture of all sorts of objects made from carapace material, known as tortoise shell. One of the biggest current threats is nesting ground destruction in the Caribbean and other places in the world.
- **Olive Ridley Turtle** *(Lepidochelys olivaceae)*: Found throughout the world, although its range is smaller than other sea turtles. It visits South American and Pacific North American coasts. It is a carnivore feeding on jellyfish, mollusks, crustaceans, sea urchins, and fish. It nests on Mexico, Central America, Colombia, Venezuela, Brazil, and French Guiana beaches. One of its main nesting grounds is Ostional, Costa Rica, where hundreds of turtles come ashore simultaneously in an event known as arribada. There are also arribadas in Jalisco, Guerrero, and Oaxaca, Mexico.
- **Kemp's Ridley Turtle** *(Lepidochelys kempii)*: Found along the U.S. east coast, as well as in the Gulf of Mexico, although only two nesting beaches are known in the states of Tamaulipas and Veracruz. The species is absent from the Caribbean Sea. It nests in arribadas, although the number of females per arribada has dramatically decreased since mid-twentieth century. It has a carnivorous diet based on mollusks and crabs sharing their habitat with several shrimp species, thus resulting in turtles getting often caught in shrimp boat nets.
- **Leatherback Turtle** *(Dermochelys coriaceae)*: It is the largest of all turtles, with a range covering the Atlantic, Indian, and Pacific oceans. It can be found on both American coasts, and its main nesting grounds are in Costa Rica, Guyana, Surinam, French Guiana, and Florida. It moves from Costa Rica to the

Galapagos Islands and returns to lay eggs. Indigenous people living near the coast in Belize contribute in monitoring this species. It feeds on jellyfish, fish, squid, crustaceans, mollusks, plants, and algae.

Marine turtles migrate and scatter over long distances. Therefore, their conservation does not depend on just one country, but on a collective effort by many nations. It is not just by protecting one beach or marine space that these species will survive. Protection should include migration routes, feeding grounds, mating areas, and nesting beaches. All sea turtles are protected and included in Appendix I of CITES, an international organization that regulates the trade in animals. There is also the Inter American Convention for the Protection and Conservation of Marine Turtles, an international treaty exclusively dealing with sea turtles. It has been signed by countries in North, Central, and South America and the Caribbean, as well as France, Netherlands, and the United Kingdom, which have territories in the region. Its goal is to promote protection, conservation, and recovery of marine turtle populations and their habitats, based on the most trustworthy scientific data available, and considering participant country environmental, socioeconomic, and cultural characteristics.

Where Can I Get More Information?

On ocean status

Several reports (Spanish and other languages)
In: Greenpeace-España
http://www.greenpeace.org/espana/reports

"Oceans and Marine Life"
In: National Environmental Trust
www.net.org/warming/

NOAA is a U.S. federal agency that provides information on ocean and atmosphere conditions.
In: National Oceanic and Atmospheric Administration, NOAA, US Department of Commerce
www.noaa.gov/

Greenpeace-España
Numerous articles (Spanish, English)
http://www.greenpeace.org/espana/

On wetlands

RAMSAR Convention on Wetlands
http://www.ramsar.org/

On mangrove swamps

Mangrove Action Project, MAP
http://www.earthisland.org/map/

On coral reefs

The Coral Reef Alliance, CORAL
www.coralreefalliance.org/

International Coral Reef Action Network, ICRAN
www.icran.org/

Alliance for the Meso American Reef (Spanish/English)
www.icran.org/icranmar/home_bil.html

On wildlife migration

Convention on migratory species
http://www.cms.int/

On marine mammals

Whale and dolphin Conservation Society, WDCS (English)
http://www.wdcs.org/

Whale and dolphin species lists
In: Whale and dolphin Conservation Society, WDCS (English)
http://www.wdcs.org/dan/publishing.nsf/allweb/A59B71D6C8A9EB17802568F800443577

Manatee Conservation (English)
http://www.thewildones.org/Animals/manateeCons.html

Proyecto Manatí (Spanish)
http://www.icomvis.una.ac.cr/noviembre/manati.htm

Fundación Salvemos al Manatí de Costa Rica (Spanish)
http://www.fundacionmanati.org/home.php

On marine turtles

Marine Turtle Restoration Program, PRETOMA (Spanish/English)
http://www.tortugamarina.org/

Caribbean Conservation Corporation & Sea Turtles survival League (English)
http://www.cccturtle.org/

On best practices

"Best Practices Guide: Environmental Issue Management in the Marine Recreation Sector" (pdf Spanish/English)
In: The Coral Reef Alliance, CORAL
www.coralreefalliance.org/

Lodging Infrastructure Construction

Photo: Ingrid Ayub

What Is the Issue?

- Civil, residential, and hotel infrastructure planning and construction processes on coastlines often do not consider essential issues in coastal forest, beach, mangrove swamp, and coral reef dynamics, nor the natural history of species inhabiting them, such as life styles, movements, food, mating, and nesting.
- Hotels and other tourist facilities are often built on shores at the cost of the environmental space of numerous plant and wildlife species, as well as the site natural scenic beauty.
- Earth movements for hotel buildings in coastal areas may create sediments ending up in the sea and affecting coral reefs.
- Sediments introduced in the ocean muddy the water and reduce the amount of light reaching corals, thus affecting their unicellular algae photosynthesis. If the amount of sediments is too large they could bury the coral to death. Even if sediment volumes are not large the coral still has to spend energy to get rid of such material, instead of using it to grow, heal wounds, fend off other organisms or diseases, and reproduce. This way, little by little, the coral may eventually die. A degraded coral reef hosts very little biological diversity. Additionally, it loses its ability to contain wave erosive forces during storms.
- Tall buildings very close to the beach could project their shadow over it in such a way that turtle eggs do not get enough heat to incubate, in addition to shedding lights over the beach and thus affecting turtles during nesting.

Why Should I Care?

- Biodiversity is one of the main attractions in marine-coastal environments and a strong motive for tourists to visit said destinations. In spite of it, many tourist developments contribute to destroying or deteriorating these valuable resources.
- Impacts from building on coastlines are often not felt in the immediate environment but instead affect resources found at greater distances, such as coral reefs and mangrove forests. These impacts are likely to be minimized through adequate planning and a careful construction process.
- With adequate building planning and processes, biodiversity may be built in the tourist facility environment, thus adding value to them.

Photo: Ingrid Ayub

What Can I Do?

Environmental Impact Assessments

- An EIA will help you anticipate likely negative effects on natural marine-coastal ecosystem dynamics, which, in turn, will allow you to take measures in advance to eliminate or minimize said effects.
- In some countries, companies are required to submit an EIA as a prerequisite to build and operate tourist facilities. Remember a serious assessment should be carried out by responsible and ethical professionals with knowledge and experience about resources in the area.
- Environmental impact assessments are also indispensable in civil works, such as roads, dikes, dams, and others.
- Analyze such impacts as habitat fragmentation, habitat destruction or conversion, loss of biodiversity, exotic species introduction, system deterioration from agrochemicals, sedimentation, water regime modification, water table changes, water quality alteration, water level changes, population decline, loss of genetic biodiversity, lower reproductive success in endangered species, among others.
- Get data ontemperature and rainfall, perturbance regimes.
- Identify suface and ground water regimes, soil moisture, water table elevation and surface, water mix and circulation, lake level variation, inflow variation (local runoff, ground water, rivers), water flow, storms.
- Identify water and soil chemical parameters, chemistry (nutrients, hydrocarbons, gases, salinity), temperature and pH, particulate and loose organic matter, water turbidity or clarity.
- Get data on geology, topography and batymetry, geomorphology, structure and drainage, soil porosity and texture, reef topography, coastline complexity
- If you are going to develop a golf course, perform an analysis of the potential site and identify areas that may be environmentally valuable or sensitive, particularly wetlands, mangrove swamps, and rivers; try not to plant exotic encroaching pastures, identify the viability of species that rely on the potential golf course and perform aquifer analyses to

make sure they will not be depleted and neighboring communities will not be deprived of water.

- Take into account natural risks, i.e., landslides and floods, that could increase runoff and the carrying of sediments to the sea.
- Start construction only after all permits have been granted.
- If you own an already existing operation, identify current impacts and take mitigation measures.
- Collect as many field observations as possible, enter your data preferably in a Geographical Information System, and take many digital pictures.

Adapt your design to environmental traits:

- Adapt to coastal landscape features, instead of radically changing it to accommodate your facilities. In designing and building your lodge, hotel, or residential development, take into account such issues as topography, coastline shape, site natural vegetation distribution, traditional marine turtle nesting grounds, and others.
- Remember that keeping natural ecosystems is an investment, since they are a value added to your project, on account of their biological diversity, protection against natural disasters, and scenic beauty. Emphasizing site characteristics preserves natural resources, facilitates maintenance, and reduces costs.
- In implementing works, choose contractors with experience in fragile sites.
- Adopt landscape-friendly designs to reduce impacts from the elements, such as waves, rain, or wind.
- You may adapt your design to the environment and then build it in. Remember that having a soil analysis available is important. When you are sure the soil is suitable to support the building, this can literally be "embedded" in the slope.
- Minimize the infrastructures as much as possible. Look for multi-use infrastructure.
- Design buildings in a "easy to clean" way to reduce the use of cleaning products and water use.
- Minimize sediments during construction:
- Adequately plan and implement such works as earth movements and waste disposal. For instance, first trace final access roads, and haul construction and waste materials on them, instead of building temporary roads or trails.
- Avoid using heavy machinery to excavate for foundations. If possible, digging should be done by hand.
- Prevent removed dirt from falling into bodies of water, i.e., rivers and creeks.
- Adequately dispose of generated waste, in such a way it will never pile up on forests or streams.
- Use local materials extracted in a sustainable manner and quickly biodegradable.
- If possible, distribute extracted materials in building site surroundings.

Adopt measures to decrease runoff impact:

- If possible, take advantage of natural drainage, instead of building sewages. On top of being more aesthetic, it reduces water speed and erosion, allows higher infiltration, and provides a habitat to wildlife.
- Build runoff management in facility design and operation. Apply architectural designs that make it possible to catch rain water from roofs and filtrate paved surface runoff, in order to have minimal disturbances in natural drainage patterns.
- Use roofing systems that include local vegetation to reduce rain water impact and heat loss, and to protect biodiversity.
- Build during months with less rainfall to prevent rain impact on the soil.

Using vegetation to manage impacts

- Plant native trees on your landscaped areas. The presence of trees decreases rain impact and reduces runoff speed and

volume, as well as flood damages; if strategically positioned, they reduce heat loss from buildings and provide shade.

- In your gardens always follow practices favoring soil conservation.
- Resort to using native plants to decrease erosion in very steep or vertical slopes. Some species are very well adapted to slope soils.
- Identify native plant species that are best adapted to your region. On this, seek the advice of a professional or of local people.

Using retaining walls

- Retaining walls will help you decrease erosion risks in industrial, residential, and tourist projects, as well as maritime constructions, i.e., ports, wharves, and breakwaters.
- If you are interested in building a retaining wall, get the advice of a qualified professional, usually with civil engineering training.
- Gabions are large stone-filled wire-mesh boxes used as retaining walls in buildings and river banks, as bridge protection, and on road sides.
- Gabion structures have a low environmental impact, since they adapt to different environments, do not block water flow, and are built with inert materials fostering rapid wildlife and plant recovery after construction.
- If gabions are used, make sure stones are extracted from a quarry in a sustainable manner under valid municipal permits.

Adopt protective measures in marine turtle nesting and hatching grounds:

- Avoid edification shade and introduced vegetation over marine turtle nesting sites. Plan your building height and distance to the beach, in such a way they will not project a shadow over marine turtle nesting sites.
- In different countries the distance to be kept between the beach and the buildings varies a lot, but a reasonable figure is between 60 and 120 meters from the dunes, not from the highest tide mark.
- Refrain from introducing tall vegetation near the beach.

Where Can I Get More Information?

On sustainable design

In Your Home Design Guide: Design for Lifestyle and the Future
http://www.greenhouse.gov.au/yourhome/index.htm

Photo: Ingrid Ayub

Energy Management

What Is the Issue?

Using energy is vital to tourist lodging business operation, with electricity being one of the most important energy sources. Electricity, however, is often generated through the burning of fossil fuels, such as coal, oil, and natural gas, resulting in the release of carbon dioxide to the atmosphere, and its consequent contribution to global warming and climate change. Climate change is a global phenomenon of huge proportions. Although it has multiple causes, the lodging industry actually contributes to it. Planet climate changes have a strong impact on biodiversity, and in many cases these effects are just beginning to be studied, including:

- **Negative effects on wildlife food sources:** Climate changes could directly or indirectly affect food sources of sea dwellers. In the southern hemisphere a reduction in the ice cap would lead to a decline in phytoplankton, the food for krill, which in turn is consumed by many marine animals, including whales. In the Arctic, ice-dependent Arctic or polar cods (Arctogadus glacialis) could end up with waning populations, thus endangering narwhals and belugas feeding on them.
- **Increased frequency and intensity of El Niño:** The term El Niño was originally coined by fishermen along Ecuador and Peru coasts in reference to a warm marine current that tended to appear typically around Christmas, hence the name alluding the Child Jesus. Every year the warm waters from Ecuadoran and Colombian coasts move towards northern coasts increasing sea temperature and causing torrential rains that last for several days in the area. In some years, however, the warm water mass is bigger and has a lower salt content, thus entirely changing area characteristics. In addition to physical changes in the ocean, the area experiences some major climate changes (rains, storms, strong winds), the emergence of unusual vegetation growth along the coasts, high mortality rates in schools of fish and flocks of gulls, and a sudden increase in river flow rates. These combined factors have led scientists to talk about the El Niño phenomenon, instead of only an intensification of El Niño Current. The causes of this anomaly are esentially of a meteorological nature and are related to the ocean.

  The El Niño phenomenon is a large-scale climate variation covering large areas of the planet and affecting three oceans —the Pacific, Atlantic, and Indian Oceans— and four continents —the Americas, Asia, Oceania, and Europe. The current spans a

large tract of the Pacific Ocean, particularly tropical and subtropical regions, but also involves the Atlantic and Indian Oceans. This phenomenon has increased in frequency and intensity in the last 30 years, and its effects on biodiversity are very serious. The El Niño-induced decrease in nutrients along the South American coastline has repercussions on phytoplankton production, which, in turn, affects the entire food chain. For instance, during the 1997-1998 El Niño, South American sea lion populations in Peru declined from 180,000 to a mere 30,000 individuals as a result of decreased food sources.

- **Ocean acidification:** With higher carbon dioxide levels, scientists predict a significant ocean pH reduction that would harm coral reefs and other organisms whose skeletons or shells contain calcium carbonate, because they would be exposed to acid-caused wear.
- **A rise in sea level:** A higher water level would produce coastal area flooding. Rising water could remove waste deposits, releasing large amounts of pollutants and solid waste to the sea, and affecting aquatic life. Similarly, coastal habitats, such as beaches, mangrove swamps, and estuaries, could be destroyed. Losing marine turtle nesting beaches, for instance, would be catastrophic to those species.
- **Loss of coral regenerating power:** An atmosphere increasingly rich in carbon dioxide and sea temperature increases may permanently damage coral regenerating power. When water gets warmer, corals expel the unicellular algae that provide them with nutrients and color, and therefore they bleach. Some scientist believe bleaching helps corals adjust to higher temperatures by replacing their algae with others that are more heat resistant. But as planet temperature increases, corals are reaching their upper heat tolerance limit. A degraded coral reef hosts few fish, marine mammals, and other important species.

Why Should I Care?

- If you leave your car parked out in the sun, the temperature inside the vehicle will usually be higher than outside. This is similar to what happens with the greenhouse effect, which is a natural phenomenon essential to life on earth, where the atmosphere acts like a shield contributing to keep the heat. In the last decades, however, the use of fossil fuels has left an excessive amount of carbon dioxide and other gases in the atmosphere, thus deepening this effect and increasing temperatures throughout the planet. Should this continue, it would be the strongest impact humankind has ever caused on climate and biodiversity.
- Climate change increases the risk of extreme events in coastal regions that can cause damage worth up to millions of dollars in replacement costs. In effect, there is a growing likelihood that tourists and operators will make insurance claims.
- Hotel businesses may be contributing to global warming and climate change by meeting their energy requirements through the burning of fossil fuels, namely, coal, oil, and natural gas, which release carbon dioxide.
- Air, land, and water transportation of people (tourists, staff) and goods (food products, hotel equipment) is carried out by means that use up fossil fuels.

What Can I Do?

Get information about climate change: Keep abreast of the climate change and its effects on oceans and biological diversity. New research findings on what is happening in the planet are available every day. Seek information about new trends and technologies that will allow you to minimize the impact of your activities on the environment. Some websites with information on the matter are recommended at the end of this chapter.

Adopt bioclimatic architectural solutions: A bioclimatic architectural design can help you decrease heat impact, air conditioning reliance, and electric power demand. If you are still at the design stage, the following strategies could be useful:

- Orient the project along a north-south direction, leaving the east-west for service areas, stairs, and others. If this is not possible, use movable or permanent parasols for protection against the sun.

- Avoid direct sunlight penetration by using eaves, perimetral corridors, roofed balconies, and parasols.
- Choose construction materials according to their heat absorption, reflection, and conservation capacity. Steel absorbs a lot of heat and glass has little ability to absorb it, but a high capacity for conserving it, sometimes creating a greenhouse effect.
- Use gardens around the building to minimize sunlight impact, since vegetation absorbs heat. Trees with horizontal tops create a wider shaded area and a cool microclimate.
- Locate the swimming pool and water sources in the wind direction to create an evaporation, condensation, and cooling effect that then penetrates buildings through corridors.
- Use cross ventilation, with fresh cool air coming into spaces in a horizontal direction and warm air leaving through vents at the top.

Start an energy-saving campaign: Since electricity is generated from fossil fuels in many countries, efficient energy use is required to minimize our business impact on global warming and resulting climate change. Adopt measures to decrease energy consumption. Work with your staff and your customers on an ongoing energy-saving campaign. The following recommendations will be useful.

Lighting:

- Make the best of natural light. Use indoor patios, skylights, and windows to illuminate your building indoors during the day.
- Keep curtains and blinds open during the day. If you are in a warm climate, close the windows at daytime, because opening them lets natural light in, but also heat and, at any rate, the cost of artificial lighting is lower than that of air conditioning the room.
- Paint walls and roofs in light colors to increase light reflection.
- Perform most activities taking advantage of daylight. For instance, do the laundry or iron under natural light, instead of doing these tasks at night.

Photo: Ingrid Ayub

- Turn off the lights you are not using. Instill in your customers and employees the habit of turning the lights off when not in use.
- Motion sensor switches can help you optimize the time lights remain on.
- Use energy-saving lamps. Some 85% of the power consumed by incandescent lamps dissipates in the form of heat and only the remaining 15% becomes light.
- Replace incandescent and halogen lamps with compact fluorescent bulbs, which are more expensive but consume four times less energy and last up to ten times as much. Their use is not recommended in bathrooms, since they should not be frequently turned on and off.
- Install fluorescent tubes for general lighting in kitchen, laundry, or service areas.

Climatization:

- Fans are the climatization devices with the lowest energy consumption. Clean their vanes periodically and do not leave them on unnecessarily.
- Thermal insulation can save you up to 50% of the power used in heating or air conditioning. Fill up and seal all cracks, change broken glass panes and seal any holes where air can leak through.
- Air conditioning equipment is accountable for some of the highest energy consumption. A reduction in climatization consumption, however, should not affect service quality.
- Ask your guests to keep their room doors and windows closed while the air conditioning unit is on, and to turn it off when leaving the room.
- Find the comfort zone, which is 22°C-27°C. Set the temperature at 25°C to avoid sacrificing user comfort. Remember a 1°C variation entails a 6% difference in power consumption.
- Keep air conditioning equipment well maintained and clean. Filters should be cleaned periodically. Air conditioning units without maintenance for two or more years have been found to consume twice the power.
- In case you require heating, use an architectural design that favors heat during the day and slows temperature loss at night.

Water heating:

- If you have an old electric water heater model, replace it with a newer more efficient one to save energy and money.
- Make sure there are no energy or water leaks. Install water consumption reducers, such as water-saving showerheads, to decrease the volume of water to be heated.

Kitchen area:

- When the range and the oven are not operated adequately they can result in high power or gas consumption.
- Use pots or pans that match the heating unit size. Using larger pans will extend cooking time. On the contrary, using smaller pots will lead to energy losses in the form of heat dissipation and will damage stove disks
- Use pressure cookers because they cook at higher temperatures and thus cooking time is reduced to half.
- Use pots, coffee pots, and pans made of such materials as stainless steel that conduct heat rapidly. Keep pots and pans covered with a lid, since water will boil faster and food will be ready in a shorter time.
- Use a lid-covered coffee pot with a warning whistle. Once water comes to a full boil, turn the heat source off immediately. If you drink coffee several times a day, brew it only once in the morning and then put it away in a thermos bottle.

- When using a conventional oven, bake several food items at the same time, do not use it for small quantities of food, and be careful not to open oven door unnecessarily. Take advantage of oven residual heat by turning it off a few minutes before taking the food out.
- Install the refrigerator at a place where there is enough room for air to flow between the back of the fridge and the wall, and be careful not to place objects that could block off good airflow; otherwise, the appliance will overwork.
- Install the refrigerator away from other heat-generating appliances, such as stoves, ovens, and dishwashers, since their nearness causes the refrigerator to overwork.
- Set the temperature at 4°C inside the refrigerator. In most refrigerators this setting is usually found at the middle of the setting knob.
- Check refrigerator door gaskets. For this purpose, take a piece of paper and pin it by closing the fridge door. If the paper falls down or can be removed without any friction, the door gasket seals are not in proper conditions and you are wasting energy.
- Do not open the fridge unnecessarily for more than ten seconds, since it operates efficiently when the door is opened as seldom as possible.
- Do not use the back of the fridge to dry towels or clothes, since this will increase power consumption.
- Disconnect refrigerators and coolers when not in use. Load the smaller equipment as much as possible to take advantage of its refrigerating capacity and prevent underutilization of several units at the same time.
- Use a dishwasher model that saves on water and power. Check product label.

Laundry area:

- Place the amount of laundry specified as the maximum allowable load. If you put less than that you will be wasting water and power, and if you place more than allowed, you may overload the motor.
- Try not to use hot water in the washing machine, unless laundry is too soiled. Rinse with cold water.
- The cloth drier consumes a lot of energy. Use it only when strictly indispensable. If possible, let the sun dry your clothes.
- Iron the largest possible amount of cloth in each ironing session, since the amount of energy required by the iron to heat up will be wasted when ironing just one garment.

Office:

- If possible, acquire laptop instead of desktop computers, since they consume five times less energy.
- Do not leave the computer monitor on, because it uses up enough energy to heat six TV dinners in the microwave oven.
- Disconnect electronic equipments to eliminate stand-by energy consumption. This could account for some 10% of consumption.

Means of transportation:

- If possible, choose hybrid engine vehicles that use ethanol, methanol, liquefied gas and/or biofuels
- When accesible, use fuel cell vehicles (FCVs)
- Provide your drivers with training on best driving practices that result in fuel savings.
- Use transportation vehicles with modern and fuel-efficient engines to limit pollutant emissions.

- Make sure transportation units —either your own or transportation service companies'— get periodic maintenance.
- Assess your vehicle occupancy rate. Share transportation to and from the airport or local destinations with other hotels.
- Provide your customers with information on existing public transportation (hours, rates, telephones, others).
- Procure food items from the region, since this practice lowers your transportation emissions.
- Estimate your business' annual amount of greenhouse gas emissions from transportation and offset it through payment for environmental services to some protected marine or coastal wilderness area.

Power generators:

- If you rely on power generation based on fossil fuels establish a schedule for generator operation, performing activities with the highest energy demand in a period of just a few hours.
- Consider using alternative energy sources, such as photovoltaic solar panels. These are an excellent alternative in areas with an abundant solar resource. Electricity thus obtained may be used directly or stored in batteries for night use.

Where Can I Get More Information?

On global warming and climate change

Information on the "United Nations Framework Convention on Climate Change" and the Kyoto Protocol" and their applications (English/Spanish/French) at the Convention Secretariat website
http://unfccc.int/2860.php/

"Global Warming – The Latest"
In: National Environmental Trust
www.net.org/warming/

"An Inconvenient Truth"
In: Official site of Al Gore's documentary
www.climatecrisis.net/

Introduction to climate change, causes, and evidence, environmental impact, social and economic impact,solutions, conventions, and treaties (English).
In: UNEP.NET
http://climatechange.unep.net/

On energy savings

"Guía Práctica para el uso de la Energía en clientes de Máxima Demanda "(Spanish).
In: Instituto Costarricense de Electricidad
www.grupoice.com/esp/cencon/gral/energ/consejos/usodelaenergia1.htm

"Home Energy Advisor": Energy and money saving tips (English/Spanish).
In: Florida Power and Light Company
http://www.fpl.com/index.shtml

"Eficiencia energética - Consejos de ahorro de energía": Focusing on home, commerce, industry, and transportation (Spanish).
In: Organización Latinoamericana de Energía, OLADE
www.olade.org.ec/php/index.php

On offsetting CO2 emissions

Program to offset CO2 emissions through planting forests (English).
In: Sustainable Travel International
http://www.sustainabletravelinternational.org/documents/op_carbonoffsets.html

Program to offset CO2 emissions through planting forests (English).
In: The Carbon Neutral Company
www.futureforests.com

Program for business and individuals to offset CO2 emissions through planting trees (English/Dutch).
In: Trees for Travel
www.treesfortravel.nl/general.html

Program for offsetting air and land transportation emissions through planting trees, product development, and event organization (English/Dutch).
In: Climate Neutral Group www.klimaatneutraal.nl/?language=EN

On vehicle maintenance:

Consejos para el mantenimiento de vehículos A series of practical advices in providing maintenance to private vehicles (Spanish).
In: Castrol México
http://www.castrol.com/castrol/subsection.do?categoryId=8364015&contentId=6006443

River Eco Lodge & Sustainable Living Center in Dominica has modified a pick up truck that has been retrofitted to run on used vegetable oil as well as diesel fuel
www.sustainabletourism.net/cs_destination.html

Water Management and Use

Photo: Ingrid Ayub

What Is the Issue?

- Increased water demand from tourists and residents at a tourist destination can result in water availability becoming insufficient to meet human needs and, at the same time, to support natural processes involving plants and wildlife.
- This problem is more serious in areas with a seasonal water shortage.
- Water shortage in rivers and lakes near the coast usually affects plants and animals in the first place, since people have the possibility of catching available water to meet their own needs.
- Water shortage affects all wildlife, particularly animals requiring water in their reproductive cycles and to keep their water balance, such as amphibians.
- Without enough ground water, plants may dehydrate and die. When plants disappear the soil is exposed, erosion increases, and a phenomenon known as desertification may appear.

Why Should I Care?

- Water is needed by all living organisms. Without it our planet would be lifeless.
- Nowadays, each of us spends 20 times as much water as our ancestors did, and if this trend continues a serious water shortage is expected in the near future.
- Tourism demands large amounts of water for normal operation of facilities (kitchen, laundry, rooms, gardens, others), guest consumption (drinking, personal hygiene, bathrooms), recreational activities (swimming pools), and others. Added to this is permanent resident consumption in the tourist area. All this consumption could lead to shortage.
- Water scarcity not only affects human beings, but also harms plant and animal species relying on natural sources. This is a very common problem found in many tourist beaches around the world.

- Water may come from surface sources, such as rivers and lakes, and from underground sources, such as aquifers. Overpumping water from aquifers near the coast may involve the risk of sea water infiltrating the aquifer.

What Can I Do?

Implement water use and water-saving programs with staff and guests:

- Keep monthly records of water consumption and cost, using utility bill data.
- If you have your own water source, generate your own data: install a meter on the main pipeline and keep water consumption records.
- If you can afford it, install meters in each operating area (kitchen, laundry room, guest rooms, etc.) to know which areas are generating the highest expenses and requiring savings measures.
- Develop operating manuals for efficient water use in tasks related to cleansing, laundry, food preparation, swimming pool maintenance, landscaped area irrigation, and others.
- Train your staff to implement operating manuals and to convey company environmental policies to customers.
- If possible, reuse water. For instance, laundry wastewater may be used for washing walls.
- If you are in the process of building, implement a full or partial reuse system for all kinds of water, in order to filter and recover both waste water and grey water to be used in the hotel.
- Do the laundry only when you have full washing machine loads and, if possible, acquire low water- and energy-consumption washing machines.
- Irrigate landscaped areas during late afternoon or at evening, in order to prevent water from evaporating. It is best to use sprinkler or drip irrigation systems.
- Use special devices to reduce water consumption in showers and bathrooms: efficient showerheads, compact-tank toilets, and others.
- Set up a leak detection and repair program, based on periodic checks and in charge of one person responsible for follow-up.
- Where conditions allow it, catch and use rainfall water.
- Educate your customers about ways of saving water: post discreet signs reminding them to shut off faucets when not in use, and inviting your customers to accept towel and linen changes less often.

Support forest and river conservation:

- Support programs for conservation and recovery of natural forests strategically located near tourist developments. Forests play a major role in water production and conservation.
- Support activities to conserve rivers flowing through your area, as well as other freshwater bodies, i.e., lakes, lagoons, and aquifers.

Where Can I Get More Information?

On freshwater

"Water: scarcity, irrigated agriculture, sanitation, quality, groundwater, ecosystems, floods and droughts, urban water" (English).
In: UNEP.NET
http://freshwater.unep.net/

Information on freshwater resource protection and rational management (English)
In: Freshwater Society
http://freshwater.org/

Conserving the source of life (English)
In: WWF: For a living planet
http://www.panda.org/about_wwf/what_we_do/freshwater/index.cfm

Photo: Ingrid Ayub

Wastewater Management

Photo: Ingrid Ayub

What Is the Issue?

Wastewater consists of water that has been used, is seen by direct users as something worthless, is formed by all waters going to the *sewage* system, and sometimes includes *storm* water and seepage into the soil.

Grey water is made up of suds from the kitchen, bathrooms, sinks, and laundry. It is not drinking water, but it is not wastewater either.

Wastewater comes from toilets, urinals, and animal fecal matter dumping sites. It is contaminated by *fecal substances* and *urine* from human or animal organic *effluents*. It has a high contents of organic matter, cellulose (toilet paper), nitrogen (urea), and a very high pathogen concentration.

- Wastewater contains human *bacteria*, *viruses*, and *parasites*. Therefore, if it is discharged into rivers or other sources of water for human consumption it may result in serious epidemics.
- Wastewater may cause wildlife death, particularly fish, when discharged into water sources because it consumes oxygen. Discharging it into continental marine waters is also hazardous, since it can contaminate *seafood*, particularly water-filtering organisms, such as *mussels*, cockles, and *clams*, among others.
- Microorganisms isolated from wastewater and relevant to public health are *Salmonella*, *Shigella* spp., *Escherichia coli*, *Campylobacter* spp., *Yersinia enterocolitica*, *Clostridium perfringens*, *Vibrio cholerae*, *hepatitis* A virus, *rotavirus*, *poliomielitis virus*, and *enterovirus*. As to parasites, *Ascaris lumbricoides*, *Giardia lamblia*, *Taenia solium*, *Taenia saginata*, and *Entamoeba hystolitica* eggs have been isolated.
- Wastewater, as well as garden, golf course, and orchard irrigation water, leads to increased organic waste in seawater along the shoreline, which creates problems to biodiversity and to people.
- An organic waste excess in shoreline waters increases nutrient level, thus speeding up the growth of oxygen-consuming algae, which reduces aquatic invertebrate and fish growth and diversity.

- Nitrogen is an element used in garden and orchard fertilizers, and is a major source of soil and water pollution.
- An excess of nutrients and organic matter in seawater alters ecological balance in coral communities, since the presence of nitrogen above moderate levels deteriorates coral growth and reproduction. Nutrients favor the growth of algae and phytoplankton. While the former compete with corals for space at the bottom of the sea, quickly growing until coral is covered and smothered, an increase in phytoplankton reduces the amount of light reaching corals and their unicellular algae, and thus promotes an increase in coral skeleton eroding organisms. These eroders, which are largely phytoplankton and organic matter filterfeeders, expand their populations due to food abundance and increase their impact on corals. Algae population explosion reduces available oxygen and suffocates corals.
- All these impacts also affect fish and other species populations that use the reef as food source and habitat. Organic or high nutrient pollution is also a major factor in red tide generation.

Why Should I Care?

- Untreated wastewater from land-based lodging facilities contributes to increase nutrients and organic matter in rivers, mangrove swamps, and reefs.
- Increased levels of viruses, bacteria and disease associated with human waste, threaten both reef ecosystems and human populations and diminish the attractiveness of an area as a tourist destination.
- Excess use of garden and orchard fertilizers, and inadequate gardening practices promote runoff and increase the presence of nitrogen in soils and water.
- Fecal contamination (from untreated wastewater) may reach aquifers, which means water extracted from wells can be contaminated.
- Using large amounts of water to maintain gardens and golf courses disseminates used agrochemicals.
- Another organic pollution source consists of vessels discharging both waste and untreated or partially treated sewage into coastal waters.
- Disposing of water in a wide range of ways under the generic name of septic pit or septic tank is common; not all of them, however, attain the goal of keeping aquifers free from contamination because they are usually just cesspools or absorption pits, where water seeps into the soil without any true treatment. The same name is often applied to sedimentation and storage tanks that are periodically emptied, surreptitiously dumping their wastewater at a site. This results in mangrove and estuary contamination.

What Can I Do?

- The right treatment of wastewater reduces the potential for polluting local water sources, rivers, beaches, mangrove swamps, and coral reefs, prevents the risk of guests and staff getting diseases, and helps keep the quality of natural features attracting tourists.
- Do not use untreated wastewater to irrigate vegetables meant for human consumption, such as those growing at ground level and typically consumed fresh (*lettuce*, *watercress*, *cabbage*, *parsley*, *coriander*, *celery*, and *leeks*).
- If you have domestic animals (or if you have a constant flow of visitors) you may use anaerobic digestors to treat animal waste, produce biogas, purify wastewater, and make biofertilizers.

Lodging Businesses

- Bear in mind that “the best waste is the one that is not produced” o the one that is disposed of “in situ”.
- Determine the nature of the problem associated with waste water in the property
- This will provide information on the type and amount of wastewater being generated and it will assess water use, reuse and treatment practices.
- Reduce organic pollution at the source. As much as possible, decrease the amount of wastewater generated by your hotel, thus reducing water consumption.
- According to your requirements, use dry or water-saving toilets.

- Make sure wastewater is treated before discharging it to the environment.
- Reuse water in buildings where it is produced, in order to reduce drinking water consumption (from 30 to 45% of total drinking water total consumption) and wastewater effluent volume.
- Grey water reuse facilities consist of reservoirs where grey water is collected and purified to be subsequently fed through a pipeline to toilet tanks, garden irrigation network, etc.
- Grey water may be given alternative uses that do not require drinking water consumption, such as flushing of toilets that use up 6-8 liters of drinking water in every flush, irrigating landscaped areas, or cleaning particular enclosures or facilities.
- Separate grey water from wastewater at the source, and also treat them separately at the source. This may also help solve environmental problems caused by wastewater.
- The most adequate treatment system should consider specific environmental and even cultural conditions. Treatment system installation should not only take purification effectiveness into account, but also analyze the relationship of surrounding elements, particular needs, cost, maintenance, reuse, and utilization or disposal of purification byproducts.
- Install grey water purification systems that use biomechanical filtering, UV lamp sterilization, or gravel tanks filled with grey water and floating water plants; in this latter system, water is circulated from one tank to another until it reaches the clean stage required to be reused.
- Recirculate grey water to toilets and urinals.
- If you have a septic tank, maintain it with efficient microbacteria (EM), phase out chlorine and non-biodegradable disinfectants (to prevent killing the bacteria that are cleaning the septic tank), keep all pipes with said bacteria, and use tank sludge as organic fertilizer in your landscaped areas.
- If you need to empty the septic tank, make sure the contracted company is disposing of contents in a proper manner, in sites designated for this purpose.

- Remember the objectives of biological water treatment: 1. reducing organic matter contents in water, 2. reducing its nutrient contents, and 3. eliminating pathogens and parasites.
- In the absence of a municipal system, identify the best wastewater treatment alternatives available. If possible, choose natural systems that treat water by means of inert matter, plants and bacteria instead of chemicals
- If there is a municipal system, make sure the sewage collecting network goes to a treatment plant and it is not directly discharged in the environment.
- In orchards and gardens use compost or other similar products in place of chemical fertilizers.
- Create your own compost with kitchen waste, and use it on your orchard and gardens.
- **Join programs that support beach protection and quality. The Blue Flag Program is an ecolabel that has been applied to some 3200 beaches and marinas in 36 countries around the world.** This program seeks sustainable beach and marina development through stringent criteria related to water quality, environmental information and education, information management, safety, and other services. It is implemented by the Foundation for Environmental Education (FEE), an independent non-profit organization. It is an award granted every year and it is only valid for one year. In order to be eligible for Blue Flag a recreational beach must meet all the requirements

Recreational and Lodging Vessels:

- **If available, use ground sewage pumping facilities:** If your vessel is small, you may dispose of wastewater on the ground. Make sure waste from pumping stations is sent to treatment plants.
- **When possible, use land-based restroom facilities:** Educate tourists and recommend that passengers use land-based restroom facilities before boarding a boat excursion. Land-based facilities are likely to be connected to municipal waste treatment facility.

- **Treat wastewater before discharging it from the vessel:** If there are no pumping stations available, use biodegradable chemicals and mechanical methods to reduce solid waste and waste pathogens before discharging into the environment. Small vessels should be as far away as possible from the coast before discharging treated wastewater to prevent coral reef pollution. Try not to discharge toilets or wastewater storage tanks in confined or heavy-traffic areas, or in sensitive environments, or in protected marine areas.
- **Keep sanitary fixtures in good conditions:** In order to prevent an accidental discharge of untreated wastewater, check and maintain all hoses, plumbing fixtures, and mechanisms concerning wastewater storage.
- **Respect "no discharging" areas:** Remember the creation and effective operation of areas where discharging is prohibited contributes to major coastal zone protection.

Where Can I Get More Information

On Blue Flag

"Awards for improving the coastal environment: The Blue Flag example" (pdf document in Spanish/English).
In: Blue Flag Program
www.blueflag.org/

Solid Waste Management

Photo: Ingrid Ayub

What Is the Issue?

Few of the things we dispose of every day are actually useless, since most could be recycled, repaired, or reused. Therefore, the concept of "trash" is rather relative. In current terms, any material thought to be useless or unnecessary is seen as "trash" and is then discarded. The word "residue" or "waste" is used in referring to "materials or byproducts of production, consumption, or devaluation processes that are rejected because they are seen as unsuitable for social and technical development." Depending on their physical state, waste can be classified as solid, liquid, and gas.

There are various solid waste classification criteria. Regarding their source, that is to say, with respect to activities that generate it, waste can be classified into household, industrial, and commercial waste. According to its chemical composition, it can be organic or inorganic. And for handling purposes aimed at reducing, reusing, or recycling, and based on its composition, waste can be classified into plant, animal, and edible waste, paper and cardboard, metal, plastic, glass, and other waste.

- Solid waste causes irreparable damage to marine and coastal life. Waste includes plastics, bags, cans, and cigarette butts, as well as fishing nets and lines.
- Many animals, such as birds, seals, turtles, fish, and cetaceans, instinctively come closer to solid waste in water —taking it for food— and may die in trying to eat it. An estimated one million birds and some 100,000 turtles and marine mammals die every year from this cause.
- A plastic bag floating on the ocean may look like a jellyfish, and when eaten by a turtle it can obstruct its stomach or intestines, starving it to death or causing harmful infections. The same happens to many cetaceans that eat plastic waste thinking they are eating squid. At least 26 cetaceans species consuming plastic waste, found in their bodies during post-mortems, have been identified.
- Birds, mammals, or fish may accidentally get entangled in fishing nets, soft drink or beer can plastic rings, packing straps, or other similar waste. If they cannot break loose, they die. Those that

manage to escape are left exhausted and weak, and become easy prey to predators or diseases.

- Along Caribbean coasts, manatees also die trapped in river and canal fishing nets.
- Trash on top of corals can damage or even suffocate them.
- Large pieces of waste or debris on beaches can block nesting turtle movements. This might hinder or prevent them from reaching safe nesting grounds, forcing them to look for inadequate sites or even failing to lay eggs. The presence of obstacles could also hinder or prevent hatchling journey from the nest to the sea, exposing them to predators and to the sun

Why Should I Care?

- Inadequate solid waste management results in waste ending up in the sea, often after being carried for long on the ground by wind and river currents. A piece of plastic can travel long distances before causing irreparable damage to some animal.
- Household, industrial, and agricultural solid waste dumped into rivers are carried downstream and may reach mangrove swamps, beaches, coral reefs, and the open sea, by the action of waves, currents, and tides.
- A lot of waste comes from fishing and sailing activities, since tons of gear, i.e., plastic nets, lines, and buoys with anchor ropes, are lost or discarded in the sea.
- Solid waste generation in lodging businesses increases significantly during the tourist high season.
- Cruise ships generate large amounts of waste in providing their food and other services

What Can I Do?

Solid waste management: Implement a solid waste management program aimed, first, at reducing, then reusing, and finally recycling. Start by quantifying the waste generated by your operation at least during one week and then sort and weigh the different types of materials (glass, plastic, cans, organic matter, others). This information will be useful in choosing the most appropriate actions in your company's waste management. Dispose of waste at the source, trying first to reduce, then reuse, and finally recycle. Involve your hotel staff in programs to reduce pollution from solid waste. Invite them to apply in their own homes what they learned.

Waste reduction

- Implement specific measures to reduce solid waste generation.
- Eliminate using disposable plates, cups, and utensils.
- If you must use disposable plates and cups, try to use those made of paper instead of plastic.
- Use washable napkins and towels.
- Do not use or allow sales of disposable containers.
- Acquire products in large quantities, instead of procuring the same amount in individual packages.
- Substitute liquid dispensers for individual soap, shampoo, and conditioner presentations in guest rooms.
- Carry your own shopping bag to reduce plastic bag consumption

Reuse

- Implement specific measures for reusing inputs:
- Reuse paper, printing sheets of paper on both sides.
- Use only returnable containers.
- Reuse empty containers for storage purposes.
- Reuse old clothes in cleaning tasks

Recycling

Use products that can be recycled.

Make use of recyclable products. Many plastic packages use a symbol indicating it is made of recyclable material.

Use recycled products. Products made with recycled materials indicate their condition through a symbol.

Tour or Lodging Vessels: The following recommendations will be useful in adequately managing onboard vessel waste.

- Never dump solid waste in the sea or on the shore.
- Adopt specific measures to reduce, reuse, or recycle solid waste.
- Tie up garbage bins or install them inside, in order to minimize the possibility of waste accidentally falling overboard.
- Never dispose of fishing nets and lines in the sea. If they are broken down, pick them up and dispose of them appropriately on dry land.
- Educate your customers about the hazards of improper solid waste disposal for marine wildlife and invite them to support your activities aimed at reducing said hazards

Marine-coastal environment clean-up campaigns: Promote and participate in activities to clean such environments as beaches, mangrove swamps, estuaries, rivers, creeks, and coral reefs. Identify waste that can be sold for recycling. The proceeds may be used to support these cleaning activities. Remove the following objects:

- Plastics, particularly plastic bags.
- Food packing bags.
- Fishing lines, nets, and fish and lobster traps.
- Batteries, bottles without organisms attached to them, and tin containers.
- Cigarette and bottle cap remnants.

Photo: Ingrid Ayub

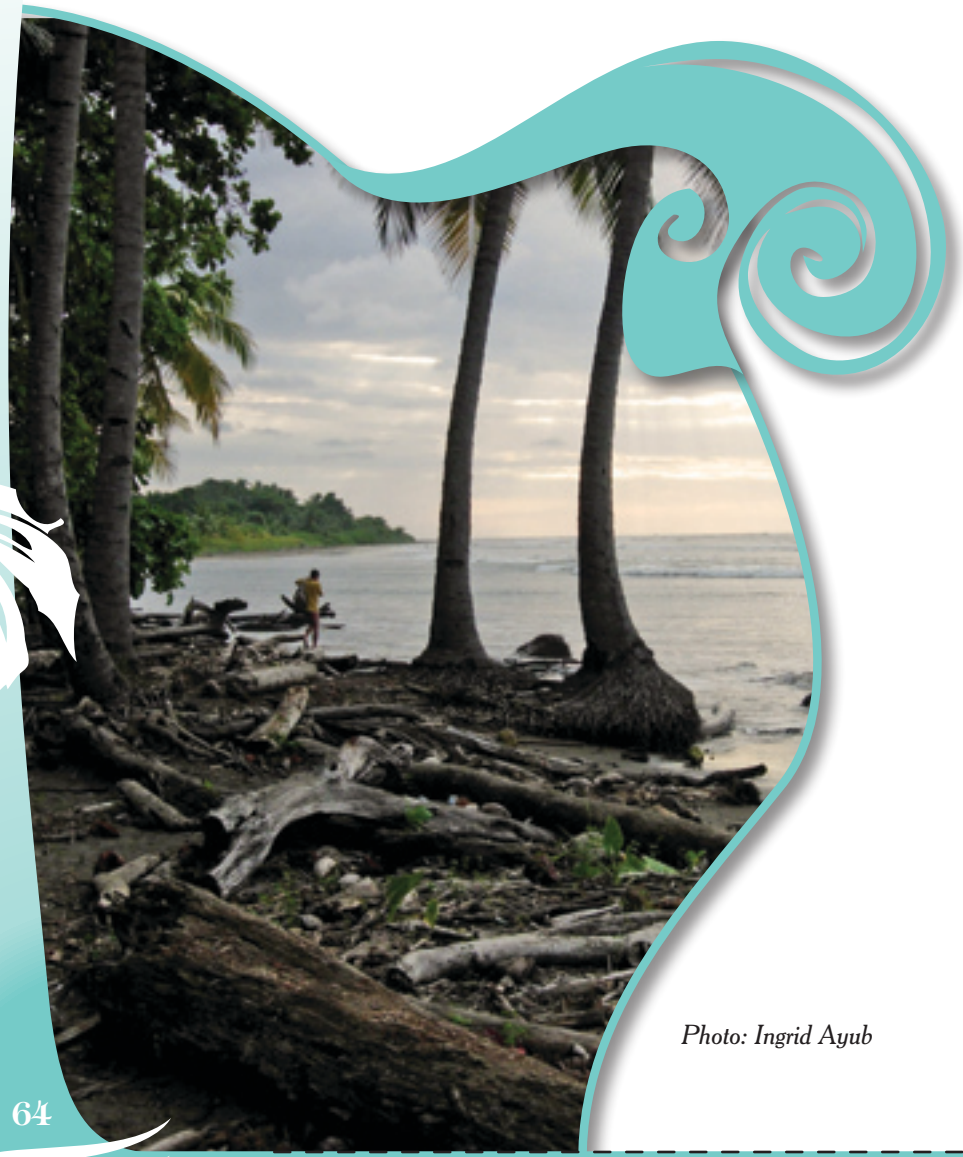


Photo: Ingrid Ayub

Cleaning rivers and creeks

Support campaigns to clean river and creek basins, in order to prevent or at least decrease solid waste carriage to beaches and sea on these streams.

Cleaning beaches during turtle nesting seasons

- Reduce the potential damage caused by debris, trunks, and other solid waste found on beaches by regularly removing them, both before and during the nesting season. This should be done by hand, since machinery may compact the beach and affect nesting sites.
- Develop alliances with businesses in your community to jointly carry out beach clean-up activities

Underwater reef clean-up

The following recommendation, adapted from The Coral Reef Alliance, Coral(©CORAL), will be useful in your underwater cleaning activities:

- Always dive with somebody else, and make sure to check the equipment before diving.
- Make sure underwater conditions and the weather are favorable for diving and diver safety.
- Your cleaning gear should include mesh bags, gloves as protection against sharp or rough objects, and scissors or shears to cut fishing lines and tin containers.
- Work slowly and carefully. Adjust your floatability throughout the diving session as collected waste turns increasingly heavier.
- Make sure your gear is well attached and fasten your mesh bag in such a way it will not be dragged on or stuck in corals.
- One of the divers should collect the trash wearing gloves, while the other holds the mesh bag.
- For safety reasons, place glasses, needles, and fishing hooks inside a different trash bag.

- Do not remove objects that have been built in the reef, and are now helping to maintain marine life. Make sure no organism is living on or inside objects before removing them.
- Never try to pull on fishing lines to break them loose. Cut them into sections with your pincers or scissors, and remove them to prevent damaging organisms growing around fishing lines.
- Do not remove heavy objects or any other thing that may seem dangerous.
- After diving, make sure trash is collected and taken to an official dumpster. Do not leave it on the beach.

Where Can I Get More Information?

On waste management

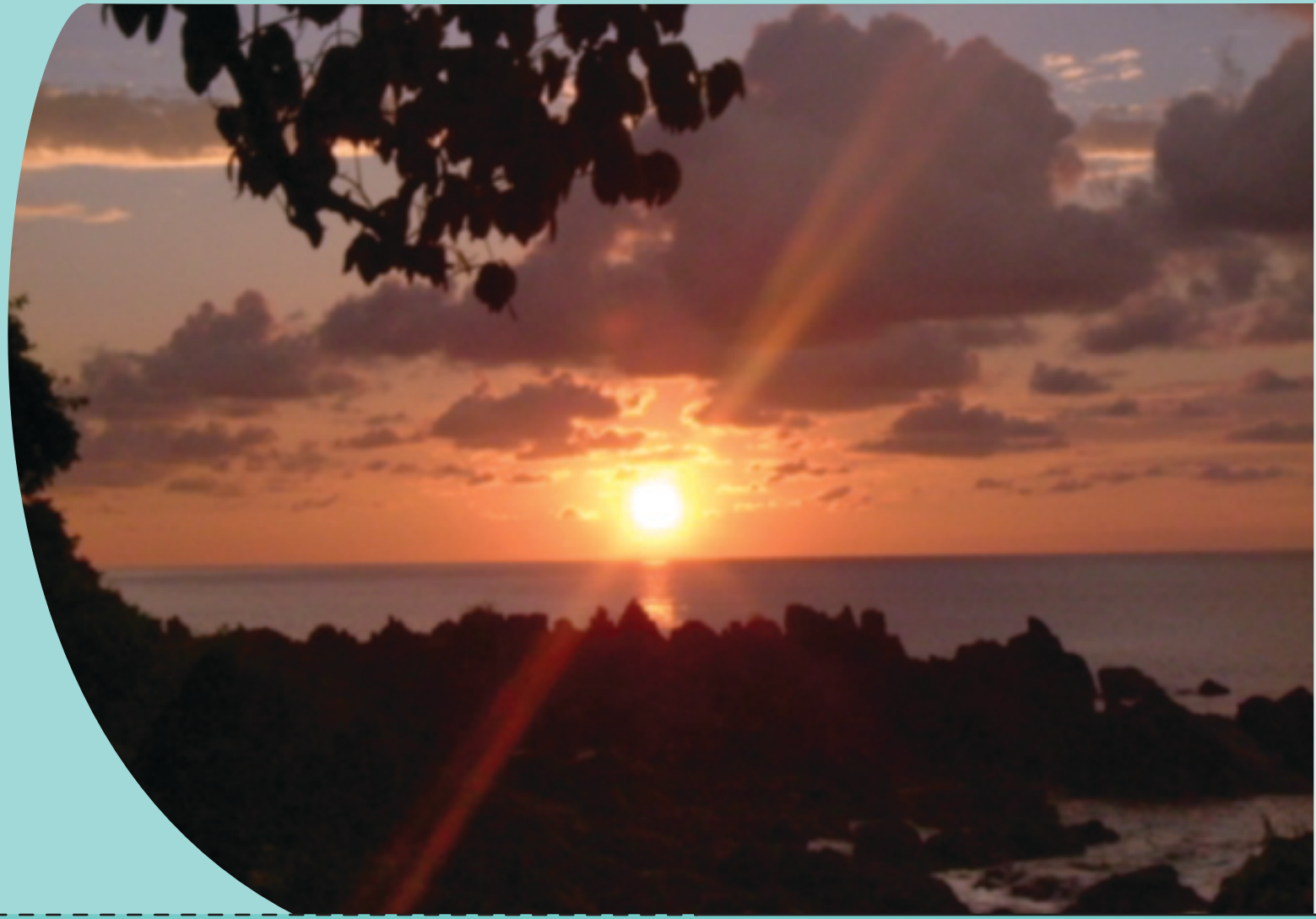
"Recycling"*: It provides answers to a series of basic questions about recycling, and offers practical tips to reduce waste (English).*
In: U.S. Environmental Protection Agency
www.epa.gov/epaoswer/non-hw/muncpl/recycle.htm

On underwater clean-up

"Guidelines for tourists: Underwater clean-up" (pdf Spanish/English)

In: The Coral Reef Alliance (CORAL)
www.coralreefalliance.org/

Chemical and Hazardous Waste



What Is the Issue?

Chemical hazardous agents are those that can directly or indirectly harm people, goods, and/or the environment. A preparation is hazardous if it contains at least one hazardous substance.

These include:

- **Explosives:** they can explode under the action of flames or heat, and are very sensitive to blows, rubs, or frictions.
- **Combustible agents:** in contact with other substances (particularly with flammable substances they produce a strongly exothermal reaction) they release heat.
- **Extremely flammable substances:** their ignition point is extremely low, under 0ºC, and their boiling point is 35ºC or lower.
- **Easily flammable substances:** they can become heated or inflamed in the air at room temperature and without any energy contribution. Liquids with ignition points at or above 0ºC and under 21ºC. Substances and preparations that release extremely flammable gases in hazardous amounts when in contact with water and moist air.
- **Flammable substances:** their ignition point is 0ºC and their boiling point is above 21ºC and under 35ºC.

Chemical waste includes pesticides and hazardous household agents (i.e., batteries, bleachers, paints, and insecticides).

Hazardous household agents may include: cleansing solutions, paint, paint thinner, turpentine, batteries, insect sprays, and garden chemicals, among others.

- Hazardous chemical agents can be:
  - **Very toxic:** by inhalation, ingestion, or skin penetration in a very small amount they can cause acute or chronic effects and even death.
  - **Toxic:** by inhalation, ingestion, or skin penetration in small amounts they can cause acute or chronic effects and even death.
  - **Noxious:** by inhalation, ingestion, or skin penetration they can cause ailments of limited seriousness.
  - **Corrosive:** in contact with living tissues they can have a destroying action on them.
  - **Irritant:** non-corrosive agents that may cause an inflammatory reaction when in brief, prolongued, or repeated contact with the skin or mucous membranes.
  - **Sensitizers:** by inhalation, ingestion, or skin penetration they can cause an immune system reaction, in such a way that a subsequent exposure to that substance or preparation triggers a series of characteristic negative effects.
  - **Carcinogenic or cancer causing:** by inhalation, ingestion, or skin penetration they can produce cancer or increase its frequency.
  - **Mutagenic:** by inhalation, ingestion, or skin penetration they can lead to genetic hereditary alterations or increase their frequency.
  - **Teratogenic:** by inhalation, ingestion, or skin penetration they can induce fetal lesions during intrauterine development.
  - **Hazardous to reproduction:** by inhalation, ingestion, or skin penetration they can cause negative non-hereditary effects on offspring, increase their frequency, or negatively affect reproductive capacity.
  - **Environmentally toxic:** they pose or may pose an immediate or future danger to one or more components of the environment.

- Chemical pollution affects both marine-coastal ecosystems (reefs, seagrass beds, beaches, mangroves) and individuals (fish, marine mammals, turtles, sea birds, and smaller species, such as plankton and other microorganisms).
- Chemicals causing the greatest concern are those from agriculture and industry entering the marine food chain and being passed on through all the links until they accumulate in large predators.
- Some chemicals seriously affect the quality of habitats used by cetaceans, reducing their prey availability.
- Seagrass bed and coral community deterioration due to pollution may be dangerous to marine turtles, since they feed and seek refuge in those environments.
- Many animals get sick or die every year from causes related to water chemical pollution. Marine mammals can accumulate toxic compounds in their reserve tissues and release them during fasting periods, when they are gravid or nursing their young. Furthermore, chemical pollution damages their reproductive and inmmune systems, which results in womb malformations, sex hormone balance changes, and cancer.
- In some parts of the world, whale and dolphin bodies washed ashore are so contaminated they themselves qualify as "toxic waste" and must be disposed of in a careful manner.
- South American sea lions at Mar del Plata port have been so seriously affected by toxic chemical waste and heavy metals that they suffer from skin infections, conjunctivitis, rhinitis, and alopecia.
- Hydrocarbons are some of the main continental and marine water pollutants often coming from water and land transportation of people and goods, as well as from spills.
- Fuels, oils, and antifouling paints contain carcinogenic substances and heavy metals. These substances can harm and kill corals and other living organisms. An increase in coral disturbances and death may result in an overall biodiversity reduction in a reef ecosystem.
- Toxic antifouling paints may spread throughout the food chain by accumulating in a delicate environment as small pellets deposited on a reef. Subsequently, when algae grow on them, they may be consumed by herbivores in the ecosystem, which leads to heavy metals being disseminated and taken in by the entire fish population, thus negatively affecting other consumers, which range from carnivorous fish to human beings.
- TBT is a feared antifouling agent with a disturbing hormonal effect, capable of making some particular marine snail species change sex, causing females to become males.

Why Should I Care?

- While there are many sources of chemical pollution beyond lodging operations, this industry could be contributing in different ways. For instance, a major pollution source consists of cleansing products used in tourist facilities and swimming pools.
- Fertilizers and pesticides used in gardens, landscaped areas, orchards, and golf courses are produce pollution.
- Heavy metals released from hull antifouling paints cause serious environmental damages. These paints are applied to prevent algae, mollusks, and other marine organisms from growing on a ship hull, but once their toxic compounds are dispersed in water they are fatal to marine species.
- Fuel and oil spills may alter beach, mangrove swamp, and reef chemical composition, poisoning the environment for many organisms.
- Sunscreens or suntan oils applied by water sportspeople snorkeling over corals is retained in the water surface layer and may affect polyps and their symbiotic algae.
- Poor boat maintenance causes environmental damage. One pollution source is the bilge waste from fishing and transportation vessels, as well as its inadequate handling. Bilge water is the waste generated by normal vessel operation, containing a mixture of machine room liquids, seepage, and fuel residues. Other source consists of oil and fuel leaks from sea and land transportation that eventually make it to the sea.
- Although a small fuel leak from a recreational vessel does not necessarily cause long-term damage, cumulative pollution effects from many vessels in a heavy-traffic area may result in major degradation of the different marine environments.
- With all these chemicals present, surface water is contaminated. It then runs off through drains and infiltrates in the soil, with the risk of reaching down to drinking water sources or reservoirs used for human consumption and for biodiversity.
- Water also runs off over the surface to rivers and creeks, and through them chemicals eventually make it to river mouths or estuaries, where mangrove swamps are commonly found. In the ocean, they pollute coral reefs and beaches

What Can I Do?

Cleansing Products

- Reduce the number of chemicals used in your company.
- Use natural products, such as salt, vinegar, and bicarbonate to clean ovens, drains, windows, and floors.
- Make use of biodegradable products. Cleansing and laundry products that reduce the amount of toxic chemical pollutants are currently available in the market.
- Check the environmental quality of products you purchase. They usually have symbols specifying package material and toxicity.
- Use automatic dispensers for cleansing products, in order to make sure the right amounts of chemicals are used for each task.
- Train your staff to know how to use and dispose of cleansing products in a responsible and safe manner.
- Dispose of hazardous materials in a responsible manner and according to national and international legislation.
- Pesticide waste disposal is very simple: Follow the instructions on the label. If you follow the instructions you will be abiding by the law. Some pesticide containers can be burned, recycled, or buried (see instructions on the label), if empty and rinsed three times.
- The best way to dispose of used oil is turning it in for recycling. Some service stations, autopart stores, and other automobile businesses collect used oil for recycling.
- Dispose of batteries in an appropriate manner. Take them to collection centers to prevent damage caused by metals contained in them, such as nickel, cadmium, lead, and selenium.
- Use rechargeable batteries, since one of them can substitute for up to one hundred disposable batteries.

Gardens and Orchards

- Select native plants that require less water, pesticides, fertilizers, and herbicides.
- Use compost or other similar products in place of chemical fertilizers.
- If feasible, in controlling insects substitute native fish, iguanas, and amphibians, for pesticides, and promote the use of natural insect repellants.
- Create your own compost with kitchen waste, and use it on your orchard and gardens.
- If possible, acquire organically-grown produce, so you can offer healthier food produced without affecting biodiversity. This way you will also be supporting farmers that conserve the environment.
- There is market availability of glyphosate-based herbicides, which have favorable physical, chemical, and environmental properties and cause a minimum environmental impact, when products are used according to technical recommendations:

  - They are biodegradable, disappearing from the environment in a short period of time.
  - Some 90 % of the product disappears within 60 days after application, and is broken down by natural soil microorganisms.
  - They do not leach, which means they remain where they were applied, strongly adhering to the soil and thus preventing water source pollution.
  - They are not volatile, reducing the likelihood of being air borne.
  - They are not biocumulative. Instead, they are rapidly metabolized

Water and Agrochemical Management in Golf Courses

- Identify, analyze, and adequately manage aquifers used in irrigation water extraction.
- Design irrigation, drainage, and retention systems for water-efficient use to decrease runoff, as well as water and fertilizer loss.
- During construction, implement strategies to effectively control sediments, minimize soil loss, protect the water resource, decrease an eventual agrochemical pollution, and reduce wildlife disturbance.
- Pest control measures should combine biological, cultural, physical, mechanical, and chemical methods. Chemical control methods should be used as the last resort.
- In applying fertilizers and pesticides always read the labels and follow the instructions. In order to maximize their effectiveness with minimum environmental impact, attack the problem as soon as you identify it; do not let it go out of control.
- Use agrochemicals and practices that decrease water pollution potential, such as using slow release or organic fertilizers. During application, do not exceed plant nutrient requirements.
- Use local plant species in the landscaping component, since they will be best adapted to local conditions and will require less water.
- Avoid irrigating more than needed. If possible, use modern irrigation control technologies to achieve a more efficient use of water.
- Remember that agrochemical containers (bag, bottles, or any kind of container) should be disposed of in a responsible manner. Ask the product distributing company about ways of handling and collecting containers.

Antifouling Paints

- If possible, use a nontoxic antifouling paint on boat hulls.
- International laws are beginning to ban antifouling paints. The International Maritime Organization (IMO) ratified an International Convention on the Control of Harmful Antifouling Systems in ship paints, making their substitution mandatory beginning in 2008.

- The market is beginning to offer antifouling paints based on organism-repellant agents, slippery and ant-adherent hulls, without toxic interactions with nature.

Water Transportation

- Fuel the vessel only at the port or the marina, since if you do it during the trip you could accidentally spill fuel on the water. Use non-toxic oils, if possible. Wait until you reach a marina before disposing of residual oil.
- Regularly inspect potential areas of toxic substance spills on the vessel. Include pipelines, fuel tanks, filters, separators, valves, and water bailing pumps.
- Keep absorbent sponges onboard to reduce or eliminate oil and fuel spills. There are sponges to absorb gasoline and oil, but not water. Keep them always at hand when fueling at a marina or port, and dispose of them properly.
- Unless the vessel is in danger, wait before bailing out oily bilge water, particularly when near a coral reef. Do not clean bilges with detergents or emulsifiers.
- Bilge water collection and treatment plants at port facilities are globally accepted preventive measures to avoid hydrocarbon pollution.

Land Transportation

- Use vehicles with modern fuel-efficient engines to limit pollutant emissions. Make sure they are subject to periodical checks and maintenance.

Where Can I Get More Information?

On golf course design, construction, and environmental management

United States Golf Association, USGA
http://www.usga.org/home/index.html

Environmental Principles for Golf Courses in the United States
In: United States Golf Association, USGA
http://www.usga.org/turf/articles/environment/general/environmental_principles.html

On marinas

"Guía técnica de buenas prácticas ambientales para la operación de las marinas turísticas en México" (pdf español/inglés)
http://www.crc.uri.edu/mxgmp/Guia_final_sept9.pdf

Water and Land Transportation

Photo: Ingrid Ayub

What Is the Issue?

- Recreational aquatic vehicles, such as jetskis, are driven at high speeds on shallow waters near beaches. These may cause sonic, chemical, visual, and behavioral contamination of aquatic animals (particularly sessile organisms, i.e., those unable to move on their own).
- Poor or irresponsible boat driving can result in accidentally hitting dolphins, marine turtles, freshwater turtles, manatees, and other animals. Finding dead animals as a consequence of these accidents is not uncommon. It can also lead to collisions with coral reefs, crushing large amounts of corals and other organisms living there.
- Birds, fish, and other organisms are disturbed by sonic pollution and stress caused by boat motors. In mangrove swamps, for instance, birds take flight when they hear the sound of motors, crocodiles and freshwater turtles swim away from boats, and monkeys are disturbed and start screaming. This may disrupt such vital activities as nesting, courtship, or feeding.
- Using anchors to moor recreational and lodging vessels can severely damage coral reefs. Repeated anchor dropping affects reef integrity, leaving extensive scars and exposing damaged corals to infections. Anchoring can also cloud water with disturbed sediment, choking tropical corals and limiting available sunlight, which the symbiotic algae need for photosynthesis.
- The use of vehicles, 4 wheelers, or horses can compact the sand, destroy marine turtle nests, accidentally crush hatchlings or crabs, and also cause pollution from sound, fuels, and oils.
- Turtle hatchlings can fall into tire treadmarks in the sand, thus being forced to use their energy reserves and increase their exposure on the beach

Why Should I Care?

- Poor practices concerning land and water transportation deteriorate living conditions for coral, mangrove forests, coastal lagoons, fish, birds, reptiles, mammals, and other animals, affecting important processes, i.e., feeding, resting, courtship, and nesting.
- Manatees are very shy and hard-to-watch creatures. However, a cause of death is collisions with power boats.
- Although coral reefs can recover from damages caused by dropping anchors on them, it is a slow process that may take decades, and in sectors where damage has been very extensive the reef may never manage to regenerate itself.
- Degraded habitat reduces the number and variety of fish important to attract visitors.
- Fewer living corals, fewer new corals, more stressed corals, more algae growth, cloudy water and destruction of seagrass beds

What Can I Do?

On the beach

- Regulate the use of motor vehicles and horses. If possible, reduce or ban the use of vehicles, 4 wheelers, and horses used on the beach to carry tourists and their luggage, or for rides. Decrease the number of trips on the beach by following a transfer schedule.
- During turtle nesting or massive crab movement periods, temporarily ban the use of transportation on the beach, or identify safe routes that do not harm biodiversity

On the reef

- Implement best navigation practices. Know and obey speed limit signs to decrease propeller jet impacts, as well as the wake left by the boat.
- Remain within designated canal boundaries.

- In unknown or non-demarcated reef areas do not come close to the most visible zone of the reef. Consider dark water areas as possible shallow-water important ecosystems.
- Learn how to properly read and interpret a navigation chart.
- If there are no regulations on these issues, promote their definition with relevant authorities.
- Use mooring buoys. These provide boats with rope ends for mooring, which eliminates the need for dropping anchor, which also clouds the water by stirring sediments. Mooring buoys provide permanent lines that allow boaters to fix their position without dropping anchor. An effective mooring program includes the installation of moorings that are suitable for near-shore marine and coral reef areas, use of moorings by all boats, and regular maintenance and correct use of moorings.
- Buoys should be located in marine areas close to shores and coral reefs, and should be used by all vessels frequenting those areas.
- If dropping anchor is absolutely necessary, make sure you do it in an area designated for this purpose, far from reefs and important ecosystems. Do it over sandy bottoms or in debris canals, leaving enough space to prevent dredging the bottom.
- Change boating practices: Small adjustments to standard practice can help save near-shore marine and coral reef eco-systems such as correctly using mooring buys whenever possible and running a check when you tie up to a mooring point,
- Educate Customers by explaining the proper way to anchor and through the use of written reminders of proper anchoring practices on al vessels

On the mangrove swamp

- When approaching mangrove swamp inner parts, you should turn the boat motor off and use paddles to propel the boat. Paddling allows navigation on the canals without any noise or waves that alter coast physionomy, and tourists can get more enjoyment out of watching animals in their natural environment.
- If you are coming by boat from the sea, slow down when you approach the mangrove swamp. This way there will be less noise, animals will be less scared, and you will minimize the risk of collisions against the boat.
- If possible, use canoes or kayaks for mangrove swamp tours to decrease impacts caused by the visit and enjoy a better experience.

Where Can I Get More Information?

Water transportation

In: Yatch Club Santa Fe-Argentina

http://www.ycsf.org.ar/ecologia.htm

Simple advices to save on fuel

In: Advance Autoparts

http://www.advanceautoparts.com/spanish/youcan/html/ccr/ccr20030101gm.html

The four-stroke engine

In: Applets de física

http://www.k-wz.de/vmotor/v_omotors.html

Product Suppliers

Photo: ACICACOF

What Is the Issue?

Products consumed by the hotel create a demand on local, national, or regional suppliers. Reaching sustainability involves not only performing your own activities, but also addressing the production system of your suppliers of raw materials for your business. This is why selecting suppliers and requiring them to follow sustainable and environmentally friendly procedures will expand the sustainability circle beyond the exclusive sphere of the hotel and its surroundings

- Accidental trapping of whales, dolphins, porpoises, sharks, turtles, sea lions, seals, and birds during fishing activities is a common occurrence. Some 23% of worldwide fishing catch is estimated to be disposed of because it has no commercial value. This waste has taken many species to the brink of extinction.
- Every year, some 300,000 cetaceans die trapped in fishing nets. Some techniques, i.e., driftnets, have a large negative impact, since they do not discriminate between target prey and cetaceans, and were thus banned by the United Nations, although they are still used. A dolphin trapped in these nets panics, and in its attempts at breaking loose and coming up to breathe could end up with broken teeth and jaws or torn flippers. Eventually, it will run out of oxygen and die of drowning.
- Shark finning is the practice of harvesting mostly shark fins, discarding the rest of the body. On top of being a waste, this endangers the entire food chain. Removal of sharks promotes a mushrooming of the carnivorous fish they prey upon, which, in turn, prey on herbivorous fish. A decline in herbivorous fish results in coral reef algae proliferation, which helps deteriorate that ecosystem.

Foto: Jason Neuerburg

- Turtle eggs are used as food or as ingredients in baked products. In many countries there is a belief they possess aphrodisiac properties. Green turtle meat and soup is considered a gourmet delicacy in most of the world. The olive Ridley turtle is hunted for its neck, shoulder, and flipper skin to manufacture shoes, bags, and boots. The hawksbill turtle carapace —the source of natural tortoise shell— is the raw material for rings, earrings, hair clips, combs, and other decoration objects. Its carapace is hung on walls as decoration, and even juvenile turtles are stuffed and sold as adornments. Many countries ban harvesting of egg turtles and using their meat and other byproducts. Illegal harvesting of eggs and animals, however, as well as marketing of turtle-derived products is a reality. Similarly, there are communities organized for a sustainable use of turtle eggs obtained in mass egg laying arrivals.
- Sea lions trail fishing boats hoping to capture something caught in fishing nets, and some of them are trapped in the nets. Species with relatively small populations, i.e., the Galapagos sea lions and fur seals that forage in fishing areas may be seriously affected. Other common problem is fishing hooks, largely affecting juveniles. While these are actual problems in the Galapagos, their impact on populations is still unknown.
- Shrimp farming in mangrove areas: Mangrove swamps are destroyed and turned into huge "ponds" to grow shrimp, thus endangering many species survival. Typically, large mangrove tracts have been felled to make room for shrimp farms, which generate excess organic matter from shrimp feed, thus polluting the bottom of highly productive bays. Water pumping is performed twice a day with a 10% minimum water renewal in each pond.
- Shrimp farm impacts on water should be seen from different angles: evaporation produced in water mirrors, water demands by the shrimp sector through daily water changes in ponds, mangrove deforestation resulting in soil erosion and concomitant mineralization, increased turbidity and conductivity, and water pH changes, nutrients meant for mangroves and aquatic plants have concentrated in the water, together

with those produced in the ponds by fertilization, pellet feeding, and biomass excretion processes, shrimp larva and maturation labs contribute large amounts of microbiological biocides and persistent pathogenic microorganisms.

- In coral reefs, indiscriminate harvesting of corals, snails, lobster, crabs, octopi, and fish may expose those ecosystems to negative transformations by changing the relationships among the different species

Why Should I Care?

- Overfishing is drastically decreasing populations of fish, octopi, whales, dolphins, marine turtles, and many others. In fact, many fishing businesses have collapsed.
- The use of trawl nets eliminates anything bigger than the mesh coming across the net, thus resulting in some 90% by-catch that is mostly returned dead back to the sea.
- The increased demand for fish and derived products are the causes of declining marine resources.
- While the lodging industry is not directly involved in commercial fishing, it is an important sea product customer, since providing good eating is one of its main activities. This includes fish, sea urchins, crustaceans (lobster, crawfish, crab, shrimp), mollusks (octopi, squid, clams, mussels, oyster, queen conch), and others.
- If the lodging business purchases these food items from companies that use non-sustainable fishing techniques it will be promoting the death of many marine species, which are ultimately trashed for lack of a commercial value.
- Marine turtle populations are declining in many parts of the world due to pressure from human beings.
- The shrimp farming industry is installed in mangrove swamp areas, since that is where they naturally develop. Although tourism is not directly involved in that activity, it is an indirect player by demanding their product and not analyzing either the shrimp source or their extraction or farming method.

Foto: Jason Neuerburg

- Coral and snail specimens are taken from the coral reef to manufacture tourist souvenirs and trinkets. Other species, i.e., lobster, oyster, octopus, and fish, are caught to be part of hotel and restaurant menus.

What Can I Do?

Implement best sustainable seafood practices: By implementing best sustainable food practices you will be using your purchasing power to support ocean and marine biodiversity conservation efforts. Some recommendations are:

- Design a menu that is friendly to sea and marine biodiversity conservation, and share it with your customers.
- Get information on the source of seafood products consumed at your hotel and identify reliable suppliers.
- Get information about the different fishing and aquaculture methods, as well as their impacts on biodiversity. Do not purchase products harvested at the risk of endangering cetaceans, turtles, and other species.
- Consume fish from companies that make use of turtle exclusion devices (TED). These devices are large holes at the back of fishing nets allowing marine turtles and other animals to escape, thus decreasing their accidental death rate.
- Reject products from protected or endangered species, of from declining or threatened populations, such as lobsters or oysters.
- Reject aquaculture products farmed at the cost of mangrove swamp destruction.
- Reject aquaculture products involving introduced encroaching or potentially encroaching species.
- Visit the websites recommended at the end of this chapter, where yo will find practical information on sustainable food with marine resources.
- Reject any product obtained through harming marine turtles. Marine turtles should no longer be objects of direct consumption. Fortunately, they are protected almost in every country through the enforcement of CITES, an international convention regulating the trade in threatened fauna and flora species. CITES entirely bans trade in these animals and their derived products.

Souvenirs and decoration items

- Do not sell marine souvenirs or decoration items, and explain your customers they can help control their harvesting by refraining from purchasing them.
- Remember many marine species may be endangered and are protected by national legislation and by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES.

Where Can I Get More Information?

On sustainable foodstuffs
Various reports on edible seafood products (Spanish)
In: Greenpeace-España
http://www.greenpeace.org/espana/reports

"Seafood Watch": Information on marine species that are safe to consume, according to their conservation status (English).
In: Monterrey Bay Aquarium
www.mbayaq.org/cr/seafoodwatch.asp
"From Sea to Table": Program for seafood lovers to better understand their relationship to the ocean through the food they eat (English).
In: Blue Ocean Institute
www.blueocean.org
"Eat Smart": Program on smart choices concerning seafood (English)
In: Oceans Alive
www.oceansalive.org/home.cfm
"Seafood Lover's Guide – Seafood Cards": It offers a series of cards with information on the different kinds of seafood, as a support in choice-making at a restaurant or market (English).
In: Audubon' Living Oceans
http://seafood.audubon.org/
Seafood Choices Alliance: It is a global commercial association of seafood industry conservationists and professionals. It provides information on the conservation status of species used for human consumption (English / French).
In: Seafood Choices Alliance
www.seafoodchoices.org/home.php
"Certified fisheries": Sustainable fishery accreditation program (English / Spanish).
In: Marine Stewardship Council
www.msc.org

Marine-Coastal Ecosystem Conservations

Foto: Jason Neuerburg

What Is the Issue?

- Coastal ecosystems, such as mangrove swamps, tropical forests, and beaches are often altered to accommodate tourist developer interests and needs.
- Many hotels are built on the beach frontline or on dune systems, coastal tropical forests are partially or entirely cleared to open up spaces for new beachfront buildings, and mangrove swamp areas are felled, drained, and filled with debris to build tourist infrastructure works and facilities.
- In some instances, in order to provide guests with a better view, coastline vegetation is removed. Vegetation removal jeopardizes native plant populations and curtails their nutrient contribution to the beach. Additionally, it increases the risk of sand dune erosion and its impact on organisms living there.
- Golf course development is often done at the cost of a complete mangrove swamp or forest destruction to provide the space for the links, which are planted with introduced encroaching grasses.
- Massive beach sand extraction to use it in constructions decreases its availability and alters marine currents and natural sand supply and loss, thus modifying the coastline.
- In many tourist beaches lost sand is artificially replaced with new material, which may lead to a serious compaction that alters the natural habitat of sand-burrowing organisms, i.e., polychaetes and pillbugs, and affects marine turtle nesting site selection.
- The presence of constructions hinders local movements of some species, such as the white crab (Cardisoma quanhumi) and the blue crab (Cardisoma guanhumi), which live in holes they dig in solid ground, but during the breeding season they march en masse towards the sea to lay their eggs, going through all sorts of obstacles, i.e., highways and buildings.

- Beach alteration makes it difficult or impossible for marine turtles to reach safe nesting grounds, forcing them to look for inadequate sites or even failing to lay eggs. Nesting in unsuitable places may result in eggs being flooded or swept away by waves. Ultimately, females would have to nest on other beaches or even dispose of their eggs at sea.
- Coastline alterations can increase silting on coral reefs, clouding the water and reducing the amount of sunlight reaching corals, which eventually leads to coral diseases or death.
- Some nearshore areas are chosen by humpback whales as nurseries for suckling and raising their calves. They usually settle in unpolluted, light-traffic waters without fishing activities. Therefore, a deterioration in these characteristics could hinder or prevent their reproduction.
- Manatees are also threatened by seagrass bed loss or deterioration due to agricultural and industrial runoff.
- Coastal region plant species are also affected, since many of them are removed or have to compete against species introduced for landscaping purposes. The Australian pine (Casuarina equietifolia) is an invading species in many coastal areas of Florida, where it forms dense clusters that eliminate dune native plants and project their shadow over extensive beach areas, forcing marine turtles to use the central and lower parts of the beach for nesting, which increases nest flooding risks at high tide.
- Domestic animals, like dogs and cats, can bring about the loss of local species, such as crabs, birds, turtle hatchlings and eggs, which end up in their menu

Why Should I Care?

- Tourist developments causing most destruction in marine-coastal ecosystems include airports, beach access roads, hotels, wharves, marinas, commercial properties, and housing.
- Marine-coastal ecosystem destruction or alteration breaks the delicate food web supported by these systems, since many marine species beginning their life cycle in a mangrove swamp can have their reproduction threatened. Some of these species are also important as food for humans.
- Marine-coastal ecosystem destruction or alteration can involve losing migratory bird and marine turtle resting and feeding sites.
- Some birds restricted to small geographical areas, like endemic species in a mangrove swamp, are in danger of becoming extinct.
- There is a balance among the different marine-coastal ecosystems, given some of them help protect the others against storm, hurricane, and tsunami impacts. If any of them is removed a protection barrier is lifted, to the detriment of the others and to an increased human population risk in face of natural threats.
- Works taking place far away from beaches may also have an impact, such as river sand mining, dam building, and flood control measures that can decrease the volume of material contributed to a beach and result in its erosion.
- Depending on alteration extent, marine-coastal ecosystem recovery can be very difficult or impossible, economic costs would be too high, and the time involved in regenerating original traits and dynamics could be many decades.
- Although people value beaches and other marine-coastal ecosystems as recreational, scenic beauty, and resting sites, they often do not understand their role as the habitat of numerous wild organisms, because they do not known this aspect

What Can I Do?

Coast Land Use Plans

- Urge your departmental, provincial, or municipal government to adopt and enforce a coast land use plan defining what can and what cannot be done in each place.
- The plan is an instrument that should combine population well-being, sustainable use of natural resources, and environmental conservation. Therefore, remember the idea is not to exclude development, but to build it in actual land capacities, preserving the natural cycles taking place in that area.
- Zoning should identify natural spaces that perform important ecological functions, such as species conservation, greenhouse gas sequestration, scenic beauty, and mitigation of natural events, i.e., storms and hurricanes. In this context, mangrove swamp permanence and integrity is fundamental
- Make sure to take into account what is provided for in national legislation concerning maritime zoning, river mouth areas, and mangrove swamp conservation. Also consider international conventions signed by the country, such as RAMSAR (1971), for wetland conservation.
- Contribute to participatory consultation processes for designing or updating the coast land use plan, and make sure it covers a comprehensive coastline plan that respectfully and seriously takes into consideration the requirements of natural life forms inhabiting the different ecosystems, as well as provisions in the relevant legislation.
- Your involvement can be very effective if done through the business association you represent, for instance, the local chamber of tourist businesspeople.
- The distance to be kept from beach to constructions varies a lot from country to country, but a reasonable figure is for buildings to be located between 60 and 120 meters from the dunes, not from the highest tide mark.

Protected Wilderness Areas

- An excellent strategy in conserving natural ecosystems and their biodiversity is the establishment of protected wilderness areas or RAMSAR sites.
- Support protected wilderness area establishment and management to conserve beaches, mangrove swamps, estuaries, coral reefs, and cetacean transit and reproduction areas with special scenic and biological features that should be strictly protected from environmental changes or alteration.
- If your country is signatory of the RAMSAR Convention it may propose sites to be included in the list of protected wetlands under this international convention.
- Support initiatives for establishing protected marine-coastal areas and national or international corridors benefiting migratory species. There is one such initiative between Ecuador, Colombia, Panama, and Costa Rica.
- Support initiatives for the establishment of Multiuse Marine Areas.
- Natural areas should have a biological resource inventory, a management plan, zoning, and, if applicable, a natural resource sustainable use plan.
- Get information on their management plan design, development and/or implementation and, if possible, get actively involved in it.
- Zoning defines the different uses and their intensities that can occur in the protected area, for instance defining such things as no-take areas, research areas, special areas for threatened species, and public visitation areas.
- Collaborate with protected area administration in defining carrying capacity of heavily visited sites to prevent excess visitation.

- Support the work of private conservationist organizations, as well as that performed by park rangers and coastguards working for the preservation of marine-coastal ecosystems.
- Pay protected area user fees.
- Provide your support through donations, and invite your guests to join you in this collaboration.
- Donate new or used equipment (photographic cameras, bird guidebooks, diving gear, and others) to protected area administration, in order to facilitate their job.
- Get acquainted with national and local protected wilderness area laws and regulations.
- Report environmental crimes to relevant authorities.

Introduced Encroaching Species

- Do not use introduced ornamental plants and choose instead local varieties for your landscaped areas. In addition to preventing imbalances in insect-plant relationships, this will also decrease water consumption and related costs, since plants will be best adapted to living under conditions prevailing at your hotel. This will also prevent plants from potentially encroaching on neighboring natural areas.
- Control and manage domestic animal population in a humane fashion. Keep pets away from beaches during turtle nesting and crab movement periods. Support periodic sterilization campaigns. A dog and cat overpopulation problem can be controled in a relatively short period of time.
- Reject aquaculture involving introduced encroaching or potentially encroaching species.

Environmental Education

- Learn about natural marine-coastal ecosystems and their biodiversity. The better you understand them, the greater your motivation to preserve them.
- Raise awareness in your employees, investors, customers, and local residents about the value of beaches, mangrove swamps, estuaries, and coral reefs as natural ecosystems and habitat for numerous wild organisms.
- Support local education programs targeted on community children and adults to disseminate the importance of coral reefs and awaken their enthusiasm to contribute to their protection.
- Distribute recommendations among your customers with the purpose of promoting the observation and enjoyment of nature connected to those ecosystems.
- Provide printed materials with illustrations and information on how natural ecosystems work and on the natural history of some species

Scientific Research

- Support scientific and academic organizations that create knowledge on marine-coastal ecosystems.
- Research creates valuable information that can be used in conserving these ecosystems and in adding value to tourist products.
- An ongoing monitoring is required to know marine-coastal ecosystem conservation status. For instance, the presence of some species, like sharks, in coral reefs is an indicator of this environment health status.
- Support initiatives to monitor biodiversity in marine-coastal ecosystems.

Tourist Product

- Design tourist products that include natural ecosystems existing in your region.
- Organize guided tours to the beach, mangrove swamp, estuary, and coral reef, or work with local tour operators.
- Promote the practice of respectfully watching wildlife, such as birds, marine turtles, cetaceans, and others.
- Some recommendations for responsible tour operations in these ecosystems are given below.

Whale Calf Nurseries

- Support research and conservation programs to better understand space, time, and physical requirements of whales in raising, feeding, and protecting their calves.
- Gather information on whale local movements and migration patterns, as well as the number of adults and juveniles visiting the area every year.
- Get involved in the international humpback whale monitoring if they swim past your area.
- Make sure all whale and calf requirements and needs are taken into account in these conservation initiatives.
- Invite the different users of whale habitat (fishermen, carriers, cetacean watchers) to carry out their activities respecting these animals' needs without disturbing or harming them. Some cetacean-watcher recommendations given below could also be useful to all users of marine environments.

Where Can I Get More Information?

On ocean conditions

Various reports (Spanish and other languages)
In: Greenpeace-España
http://www.greenpeace.org/espana/reports

Oceans and Marine Life
In: National Environmental Trust
www.net.org/warming/

NOAA is a U.S. federal agency that provides information on ocean and atmosphere conditions.
In: National Oceanic and Atmospheric Administration, NOAA, US Department of Commerce
www.noaa.gov/

Greenpeace-España
Numerous articles (Spanish, English)
http://www.greenpeace.org/espana/

Mangrove restoration in Sri Lanka
Post-Tsunami-Project. Global Nature
This is a mangrove reforestation initiative supported by the European Commission in communities affected by tsunami in Sri Lanka.
www.globalnature.org

Biodiversity Conservation

What Is the Issue?

- The majority of environmental management programs for hotels located in biodiversity hotspots are focused on procedures for internal resource conservation and their related cost-savings. Broader biodiversity considerations are overlooked. In addition, the many forms of accommodation ownership increase the difficulties of disseminating information and practical tools on how and why to incorporate sustainability into their management.
- Indiscriminate harvesting of mollusks and crustaceans to use them as sports fishing baits affects their natural populations.
- Sports fishing is no longer considered "harmless". It may lead to a decline in populations of large pelagic species that are selectively fished and which have a low survival rate upon their being returned to the sea after struggling for several hours on the fishing line; generally speaking, it does not provide local communities with significant revenues.
- Massive gathering of shells and snails to manufacture decoration items or for collection purposes results in less available shelters for hermit crabs, which use discarded snail shells as mobile homes. This can also alter beach composition, which is partially made up of particles from mollusk shell disintegration and coral remnants.
- Beach recreational and sports activities disturb the resident wildlife. Such sports as football and handball contribute to sand grain compaction, affecting hermit crabs (Coenobita compresus), ghost crabs, mollusks, and polychaetes. A decrease in their populations affects the food chain, since they are preyed upon by larger creatures, i.e., birds, coatis, and crab-eating raccoons.
- Recreational beach bonfires may destroy turtle eggs, if lit on top of nests. Mass sports and cultural events, such as music concerts or sports tournaments, can generate enormous amounts of solid waste and sonic pollution. Furthermore, the mass presence of people on the beach contributes to compacting the sand.
- There are tourist companies promoting wildlife feeding with the purpose of attracting animals and amuse or amaze tourists. Such animals as crocodiles, monkeys, hummingbirds, and others modify their feeding habits because of contact with guides or tourists providing them with food. Crocodile feeding in their natural environment, for instance, becomes a real show.

- Amateur snorkelers and irresponsible or inexperienced scuba divers may crush and break corals and other reef-dwelling organisms with their fins, gear, or part of their bodies. These damages usually occur when people move about, stand, or walk in a shallow area, swim against the current, or come closer to watch, photograph, handle, touch, and feed animals.
- When marine turtles find people on the beach at night during the nesting season they either choose to return to the sea, delay their egg laying, move to other beaches, or make a poor selection of alternative nesting sites. During the day, human activity disturbs and endangers eggs and hatchlings.
- Another threat on turtles is street and building artificial lighting because they are guided by moonlight reflected on the sea and can easily get confused. Females may lose their natural course towards egg-laying grounds and many of them shun artificially lit beach areas. Hatchlings coming out of the nest at night and relying on natural light as a signal to find the sea are disoriented by the presence of artificial lights, and may die from exhaustion, desiccation, predation, or be run over by cars.
- When cetaceans are frequently disturbed many abandon their usual homes for more quiet waters. Swimming with dolphins and sea lions in the sea may disturb their activities, such as feeding, resting, nursing, courting, and other conducts. In captivity, a dolphin cannot avoid humans even if it does not want to interact with them. In fact, dolphins may become aggressive and harm people swimming with them.
- Many dolphins are captured for shows and, according to the Whale and Dolphin Conservation Society (WDCS), dolphin capture and transportation methods can be cruel and many individual die in the process. Dolphins are often taken from populations that are already under great pressure from other human activities.

Why Should I Care?

- The lodging industry has a great opportunity to contribute to biodiversity conservation by adopting good practices and principles into design, planning, development and management of tourism products and services. The impact can be highly positive.
- A consequence of gathering shells and snails is a lower availability of calcium carbonate in the environment. This very important element is used by many animals and plants as a raw material to build their protective structures.
- Feeding wild animals can remove the natural distance some animals usually keep from humans and increase their aggressiveness in trying to get easy food.
- An excess number of people during marine turtle nesting, coupled with an inadequate behavior, could have a serious impact on the nesting process.
- Irresponsible operation of tours to watch whales, dolphins, and sea lions may cause serious disturbances to these animals.
- Captive dolphins have a lower life expectancy than wild ones, they cannot communicate, feed, reproduce, and play as they do it in the sea, and confinement-related stress typically results in their acquiring abnormal behaviors and diseases.
- Dolphin shows do not necessarily promote respect of nature, nor an understanding of these creatures' wonderful existence. On the contrary, these are animals controlled by humans and confined within an artificial environment.

What Can I Do?

Commitment

- Commit to industry-led voluntary environmental initiatives that include criteria for biodiversity conservation.
- Incorporate biodiversity conservation practices and principles into design, planning, development and management of tourism products and services into supply chain management.
- Use material produced by industry associations and organizations for the integration of biodiversity considerations into lodging management procedures (ie. UNEP, UNWTO, IHEI, IFTO, TOI).

Public relations and marketing

- Public relations is an excellent strategy to identify potential partners as well as to reach them in appropriate ways with the right information. These include the Media, governmental organizations, other enterprises, local community organizations and others.
- 'Customer Relations' can be used to integrate sustainability in the lodging industry and to promote knowledge. Partner with tour operators to influence tourists' responsible actions by preparing informational brochures to promote appropriate behavior in pre-departure information. Customer relations can raise awareness on the local biodiversity and tourism behavior that is acceptable for its conservation. Tour Operators can reinforce their messages by inviting feedback on sustainability issues and channel this feedback to hotel managers or lodging owners.
- Communication is essential to combat the degradation of biodiversity. It raises awareness of tourism key players from the supply and demand side.
- Implementation of good environmental practices can be used as a marketing tool. Lodging enterprises can promote their good environmental practices in promotional materials, advertising and educational displays to enhance their reputation and their public image.
- As a result, the hotel's credibility increases, as well as the potential to attract dedicated and motivated staff that will work towards protecting the marine-coastal biodiversity.

Local community

- Integrate local community tourism products and activities with potential to contribute with biodiversity conservation, such as: 1) learning about traditional farming methods 2) how to make and taste local dishes; 3) visiting organic farms; 4) visiting local schools to learn about local history, 5) learning to make local crafts. These activities can replace nature based activities which may pose threats on wildlife, such as huntinhg or over harvesting.
- Promote local training activities in topics related to biodiversity conservation and sustainable development.
- Local people can contribute to tourist's awareness during their engagement in activities at the community.
- Hire local staff known for their unsustainable practices (trawl fishers, poachers, miners, wildlife smugglers, river poisoners) who are well acquainted with the area and train them to progressively divert them from their activities, raise awareness, and simultaneously educate tourists.

Collecting organisms

- Discourage the collection of living organisms or their waste. Do not sell marine souvenirs or decoration items, and explain your customers they can help control their harvesting by refraining from purchasing or collecting them during their walks on the beach.

Beach Use Regulations

- Promote the adoption of regulations on using beaches for recreational purposes. This should be done in accordance with the Land Use Plan, and should specify what activities are allowed, what activities are excluded, and how permitted activities should be performed.
- Do not build infrastrcture in public areas.
- Subject-related entities, such as municipalities, public and private tourism and conservation agencies, can contribute in defining these issues.
- Regulations should not be seen as a straitjacket for business sector activities. On the contrary, they are a mechanism to conserve the natural attraction underlying tourist industry, which in this case is the beach and its biodiversity.
- When a beach is within a protected wilderness area its recreational use is defined in public use regulations, which, in turn, are based on the area's management plan. Respect established regulations and invite your customers to follow suit.
- Avoid using the beach for bonfires or barbecues. If this is not possible, control their number, frequency, and location, reserving a specific place for them in such a way bonfire negative effects will be limited to a particular site. Make sure the selected site does not affect turtle nests or beach vegetation.

Beach Cultural and Sports Events

- Beach use regulations should include rules concerning cultural and sports events taking place on the beach.
- Adequately plan concerts and other cultural and sports events for times of the year where they will not interfere with wildlife reproduction processes.
- Delimit the area for events so as to focus their effects on a particular sector.
- Keep the volume within acceptable human health limits.
- Develop a post-event waste collection and management plan to prevent waste from disseminating throughout the environment.
- Take advantage of the event to raise funds for conserving the beach and organisms living there or visiting it. Donate a percentage of said funds.
- During the event, send conservation messages to the audience, reminding them how important the beach is as an ecosystem and providing some interesting information or curious data about organisms living there or visiting it.

Responsible Wildlife Watching

- Promote responsible watching, of marine-coastal wildlife in its natural environment, and hire guides or tour operators that apply this principle.
- Explain visitors that they should not scream, use radios, or make noises that cause unnecessary disturbances.
- The best times to watch birds is early in the morning or at dusk, when they are most active. For this reason, keeping your distance and watching them with respect is important.
- Use binoculars with a good augmentation-luminosity ratio (10x50, 8x30, or 12x60) and field guides with good illustrations and natural history information.
- Dressing in neutral colors and according to weather conditions is recommended.
- Refrain from touching, handling, or feeding wild animals. Remember nature provides food to animals in their natural condition, and also that they play various roles in the ecosystem food chain.
- Discourage your guests from joining tours where feeding of wildlife takes place.
- Avoid accidental feeding by keeping garbage containers closed.
- Know the main marine-coastal species in your region or country. For example, in Central American waters some thirty whale and dolphin species live or swim by, but the majority of population ignore this important fact.
- Get familiar with the different species, their characteristics, habits, and if applicable, their migratory patterns.
- Understand habitat requirements and needs of species. If you really wish to contribute to their conservation, you also need to support conservation of all the habitats they need to survive. Sea lions, for instance, spend part of their life in the water and part on sandy and rocky beaches. Therefore, their conservation relies on the quality of both environments.

Diving and Snorkeling in the Reef

Ask your guests to behave responsibly while practicing snorkeling in the reef. The following recommendations, adapted from The Coral Reef Alliance, Coral (© CORAL), will be useful to your company and your customers:

- Before getting into the sea take good diving and snorkeling courses, and practice your skills in a swimming pool or over a sandy bottom, provided it is far from the coral reef.
- Make sure your gear is tightly fit to your body before entering the water, since it could be very difficult to fit it in the water.
- If you do not feel confident or have little experience, use a snorkeling vest to improve your floatability.
- When you get in the water, carefully choose entry and exit points to prevent standing on coral.
- Never touch corals, since even the slightest contact could damage them.
- Try not to use gloves and kneepads in these environments: bare skin makes divers more careful about the things they touch.
- Make sure you know where your fins are at all times, so you will not accidentally kick corals, and try not to stir the sand.
- Keep a horizontal position while on the coral reef to avoid standing on corals.
- Swim without using your arms to thus prevent touching the reef.
- Move slowly and carefully in the water. Relax while you swim and take your time.
- Marine life disturbance caused by diving and snorkeling may be reduced through a “take only pictures, leave only bubbles” voluntary policy that discourages feeding and harassing marine wildlife.
- Do not take anything dead or alive out of the water, except for recently thrown trash.
- Never chase or try to ride on marine animals.
- Use biodegradable sunscreens or sunproof suits to prevent polluting the water with chemicals that are toxic to marine life.

Marine Turtle Nesting Watching

- Carry out marine turtle watching with great respect, particularly during the critical egg-laying period. If your company offers guided tours to watch turtle egg laying, adopt stringent operating regulations.
- If tours are conducted by other companies or private guides, make sure they enforce the regulations.
- Regulations are not a straitjacket for businesses. They rather provide tourists with greater enjoyment and learning, in addition to giving turtles better opportunities for successful egg laying.
- Inquire about specific turtle watching rules in your area.
- Resort to properly trained local guides.
- Organize watching groups not larger than 10 people, although the ideal figure is five.
- Promote the use of dark cloth.
- Do not allow any light-emitting devices, such as flashlights or cameras.
- Keep the disturbance to a minimum, keep quiet, and move slowly.
- Do not get close to turtles as they just emerge from the sea, since they could get scared and go back to the water.
- Try not to get too close when the turtle is digging her nest, and keep out of her visual range.
- Remain at a minimum distance of 5 meters from the back of the turtle.
- Before approaching, after the animal is done digging, wait some five minutes to make sure she is not just resting and has started laying eggs.
- Keep quiet while watching the nesting process.
- During egg laying you can get a little closer to the turtle, always from the rear, since she is then less sensitive to disturbances. Use a small flashlight with a filter to point directly at eggs being dropped. Never shine any light on the turtle head.

- When the turtle is in the process of covering her nest she turns again sensitive to disturbances, and people should keep their distance and remain out of sight.
- Once the turtle has laid her eggs and is heading back to the sea, you can watch her better without negative consequences. Do not use flashlights, since that could scare away any other turtle that is just emerging from the sea.

Artificial Lighting Management on Turtle Nesting Beaches

- Try to avoid lights over nesting beaches. Turtle hatchling orientation towards artificial lights compromises their ability to respond to key natural orientation, both on land and at sea. Apply a dark tint over windows overlooking the beach to decrease indoor light glow.
- Choose lights that allow you to reduce lighting projected from your facilities. Install movable indoor lamps that can be focused away from the beach.
- Use yellowish or reddish lights that are less distracting than violet, blue, green, or golden lights. Low sodium vapor pressure lamps emit a yellow light having a weaker effect on turtles than light from other sources.
- Install opaque shades or screens to cover lamp posts. They direct the glow towards the ground and not towards the beach, thus preventing turtle-disorienting light dispersion.
- Regulate the use of lighting in your facilities during the nesting season and educate or instruct your staff to help minimize the use of lighting.
- Provide your guests with information on the matter and invite them to collaborate by turning lights off, or keeping their curtains drawn.
- Place decals on all switches, reminding guests and staff to keep the lights off during the nesting season.

Turtle Nest Rescue

- Develop a guide with recommendations concerning visitor behavior in nesting and hatching areas. For instance, make sure tourists do not "help" hatchlings in their first run towards the sea since a) hatchlings that did not follow this path might lose their ability to find their bearings at subsequent stages, and b) this run could provide an imprint for subsequent nestings.
- In cases of extreme threats to turtle nests, relocate the eggs.
- When great nest losses are sustained on account of severe beach erosion, nest flooding, illegal egg harvesting, or nest crushing by vehicles or people, one measure is to relocate nests to a safer and more stable area on the same beach, or even on other beaches.
- Do not carry out this activity by yourself. These process should be performed by organizations and people with knowledge and experience, and they also should have the relevant permits.
- This measure is applied in extreme cases, since the ideal is to protect eggs without any human handling or intervention.

Cetacean Watching

The following recommendations, adapted from The Coral Reef Alliance, Coral (© CORAL), will be useful to your company and your customers:

- Responsible whale and dolphin watching is an excellent alternative for seeing these animals in their natural environment, inspiring people to contribute to their conservation, providing scientific research opportunities, and opening work and revenue sources for coastal communities.
- Let whales and dolphins take control of the situation.
- Never surround, chase, or harass any animal, and leave an escape route open.
- If they seem to be restless or disturbed, abandon the area.

- Keep alert at all times to prevent collisions.
- Show great care when there are mothers and their young to prevent accidental separation.
- Keep noise to a minimum.
- Do not try to touch or feed the animals.
- Do not purchase any whale-derived products—they are in CITES protection list.
- Refrain from swimming with whales or dolphins. Their behavior is not fully understood and may risk people's lives.
- Avoid sudden speed or direction changes, as well as noise levels.
- Keep a distance of some one hundred meters from animals.
- Never get close to whales or dolphins from the front and stay out of their way, so they will not feel forced to change course.
- Limit your stay to 30 minutes per boat.
- Limit the number of boats to one or two at the same time.

Captive Dolphins

- Do not promote among your customers the visits to marine parks, aquariums, and zoos that keep captive dolphins.
- Share with your customers the captivity effects on dolphin physical and emotional health. It is important to remember these are intelligent and very sensitive animals that evolved to live in a huge environment and with an instinct for traveling long distances.
- Get in touch with dolphin aquariums in your region and express your opposition to keeping those animals in captivity.
- Promote responsible watching of whales and dolphins in their natural environments.

Where Can I Get More Information?

On diving and snorkeling tours

"Guidelines for tourists: Diving" (pdf Spanish/English)
In: The Coral Reef Alliance (CORAL)
www.coralreefalliance.org/

"Guidelines for tourists: Snorkeling" (pdf Spanish/English)
In: The Coral Reef Alliance (CORAL)
www.coralreefalliance.org/

On marine mammals

Whale and dolphin Conservation Society, WDCS (English)
http://www.wdcs.org/

Whale and dolphin species lists
In: Whale and dolphin Conservation Society, WDCS (inglés)
http://www.wdcs.org/dan/publishing.nsf/allweb/A59B71D6C8A9E B17802568F800443577

Manatee Conservation (English)
http://www.thewildones.org/Animals/manateeCons.html

Proyecto Manatí (Spanish)
http://www.icomvis.una.ac.cr/noviembre/manati.htm

Fundación Salvemos al Manatí de Costa Rica (Spanish)
http://www.fundacionmanati.org/home.php

On marine turtles

Marine Turtle Restoration Program, PRETOMA (Spanish/ English)
http://www.tortugamarina.org/

Caribbean Conservation Corporation & Sea Turtles survival League (English)
http://www.cccturtle.org/


Rainforest Alliance
Conservation International
Global Environment Facility
PNUMA
Asociación Ecuatoriana de Ecoturismo
ASEC
Programme for Belize