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Madagascar Madagascar is the world's fourth largest **island**, with 5000 km of coastline and 251 small islands. Although its unique terrestrial biodiversity has long been a draw for tourists, its coastal and marine attractions have received less attention. Visitor numbers are now increasing fast though, as Madagascar becomes more accessible and better known. Most visitors spend part of their trip at the coast, which is relatively undeveloped for **tourism**.

Madagascar has around 75% of the marine species found in the western **Indian Ocean**, including significant populations of endangered species. During the winter, especially June and July, visitors to the east coast are likely to see humpback **whales migrating**. Between November and January whale **sharks** can be seen near Nosy Be, an island off the north-west coast. Divers and snorkellers there also see hawksbill **turtles** that have historically been protected by a 'fady', a local taboo that forbids their killing. This means a very healthy population of turtles, which tend to be unafraid of people who approach with care and keep their distance (see Fig. M1).

In addition to marine biodiversity and the opportunity to spot big, charismatic animals,



Fig. M1. Hawksbill turtle taking a breath near Nosy Be, Madagascar (photograph courtesy of C. Townsend).

Madagascar's coastal culture and history is unique. The first inhabitants came from Indonesia, and later from Arabia and East Africa. The coasts reflect these influences with differing styles of boat, **fishing** methods and dialects. Most tourists take a trip in a traditional wooden sailing boat.

Marine Protected Areas in Madagascar have received less attention than those on land until recently. There are currently four official **marine reserves** that are part of the Masoala and Mananara Nord **National Parks**. The government plans four more parks that are entirely or partly marine. NGOs and communities in all regions are developing further parks, reserves and fishing no-take zones. Marine tourism is a priority to help raise the profile and provide income from these reserves.

Watersports operators are also increasing in numbers in Madagascar, offering **scuba-diving, sailing, windsurfing, surfing** and kite-surfing enthusiasts the opportunity to visit little-known sites and discover new ones. At least three specialist operators now offer equipment, teaching and travel to sites and, in 2005, Air Madagascar hosted an international wind-surfing competition.

Diving is best developed on the island of Nosy Be, which has around ten operators, as well as a number of **catamaran agencies** offering live-aboard holidays. A few dive operators are based in Anakao and Ifaty, in the south-west. Diving is also available from the island of St Marie in the north-east, and in the villages of Belo sur Mer and Andavadoaka in the south-west. Additionally, there are three British **conservation** organizations offering paying volunteers from overseas the opportunity to take part in marine surveys. These organizations are collecting a great deal of information on the health and biodiversity of marine **resources** in the areas where they work.

The combination of marine biodiversity, opportunities to spot marine megafauna,

undiscovered **beaches**, **waves** and **reefs** and unique traditional culture make Madagascar a diverse and attractive destination.

Related internet sources

Marine conservation NGOs for working holidays: Blue Ventures: <http://www.blueventures.org>

Frontier: <http://www.frontier.ac.uk>

Reef Doctor: <http://www.reefdoctor.org>

Madagascar's National Parks:

<http://www.parcs-madagascar.com/angap.htm>

Tourist information for Madagascar: <http://www.madagascar-guide.com>

Claudia Townsend

Madeira Madeira is one of two autonomous regions of the nation of Portugal (the other being the **Azores**) and consists of an archipelago of four **islands** and island groups situated approximately 360 miles off the coast of Africa in the north **Atlantic Ocean**. The largest of the group is Madeira Island, home to the capital, Funchal, and the majority of the quarter million population. Porto Santo Island, the Desertas Islands and the Savage Islands make up the remainder of the **archipelago**.

As a result of its geographic location, Madeira Island enjoys an oceanic subtropical climate with mild humidity and a sea water temperature range from 17°C in the winter months to a high of 26°C in summer. As a result, Madeira is a popular, year-round resort and cruise destination, and tourism contributes approximately 20% of Gross Domestic Product. The Madeira Islands are home to four **harbours** and multiple **marinas**. **Scuba diving** and **sport fishing** (for tuna and wahoo) are also popular activities. While the majority of the **beaches** on Madeira Island are basalt pebble, Porto Santo Island is known for its long, sandy **beach**. Madeira Island is also home to the first and only **marine reserve** in Portugal, the Garajau Natural Reserve near Caniço.

Related Internet Source

Madeira's Official Tourism Website: <http://www.madeiratourism.org>

Sarah Nicholls

Magellan, Ferdinand: see **Explorers**

Magellan, Strait of The Strait of Magellan is the navigable stretch of **water**

approximately 530 km long that lies between the southern mainland of South America and the **island** of Tierra del Fuego. The waters of the strait lie almost entirely in Chilean waters, through which there are several access points via the Queen Adelaide **Archipelago**, with the eastern access through Argentinean waters, although the exact land and maritime border between the two countries has often been a source of dispute. The strait was first discovered by Europeans on 1 November 1520 by Ferdinand **Magellan**, during the first circumnavigation of the world. Because of the date of discovery, Magellan originally named the strait *Estreito de Todos os Santos* (Strait of All Saints).

Since its discovery the strait has been an important shipping route, particularly for **sailing vessels**, as the strait provides a safer route between the **Atlantic** and **Pacific Oceans** than Drake's Passage between Tierra del Fuego and the **Antarctic Peninsula**. However, the significance of the strait for shipping was substantially reduced with the opening of the **Panama Canal** in 1914. The only major strait city is Punta Arenas on the Chilean mainland, which was founded in 1849 to reinforce Chilean sovereignty. Puntas Arenas and Porvenir on Tierra del Fuego are staging points for Antarctic **tourism**, as well as for regional, nature-based tourism that focuses on the spectacular coastal and mountain scenery and on **fly-fishing**. Although the indigenous population was wiped out by European settlement, the area around the strait is still of ecological significance, with substantial populations of **marine mammals** and **endemic** fauna and flora.

C. Michael Hall

Magnetic Pole The earth has two magnetic poles, north and south. The north magnetic pole is located approximately 965 km (600 miles) away from the geographic or true **North Pole** found on charts, maps and globes. The south magnetic pole is approximately 2414 km (1500 miles) from the true **South Pole**. Molten iron at the earth's core and deposits of the mineral lodestone are not uniformly distributed, causing this magnetic deviation. Navigators on ships and aircraft have tables that enable a quick calculation of the variance

of the magnetic direction from the true direction, making it possible to plot an accurate course.

Related internet sources

A discussion on the magnetic north pole: <http://www.tgo.uit.no/articl/roadto.html>

The problem with magnetic poles on charts: http://www.agu.org/sci_soc/campbell.html

Nancy Chesworth

MAIB: see Marine Accident Investigations Branch

Majorca Majorca, also known as Mallorca, is one of the **Balearic Islands**, located in the **Mediterranean Sea**. Four major **islands** form part of this Spanish **archipelago**: Majorca (the name derives from the Latin *insula maior*, 'larger island'), Ibiza, Formentera and Minorca ('minor island'). Majorca is a popular and well-established '**sun, sand and sea**' tourist **destination**.

In Germany and the UK, where package tourism to the island started in May 1952, Majorca has remained a popular destination. In fact, for decades these two countries have been the two major markets, ahead of the Spanish domestic market. Since the 1960s, Majorca has become a synonym for **mass tourism**. According to the Tourist Spending Survey (EGT), an annual survey conducted by the Balearic Government, nearly nine out of ten visitors to the Balearic Islands had a package holiday in the year 2000 (Aguiló *et al.*, 2005). Nevertheless, mass tourism in Majorca exists at the expense of high environmental costs.

After a period of stagnation and crisis in the 1980s, a successful revitalization process of Majorca as a tourist destination was achieved in the 1990s. Strategies used to rejuvenate the destination included: (i) public sector initiatives focused on improving the resorts' **environment** and **infrastructure**; and (ii) taking further steps to control development, whilst the private sector enhanced the quality of its product (Essex *et al.*, 2004). However, some fundamental problems, such as availability of drinking water and sewage systems for both tourists and residents, may jeopardize the sustainability of this process.

Other features of **tourism** in Majorca include the motives in choosing the Balearics as

a **holiday** destination, tourist satisfaction and the quality of the supply. Although the main reason for tourists visiting the islands is the desire to enjoy the sun and their **beaches**, price, quality of the surroundings and the hotels are considered very relevant. In 2000, the repeat rate for tourist visits was very high, with nearly 36% of all tourists repeating a visit for at least the fourth time, whilst first-time visitors represented one-third of tourists (Aguiló *et al.*, 2005). Due to the increase in the quality of hotel infrastructure, with government legislation preventing the construction of new hotels of a category lower than three stars, a decrease in the number of tourists staying in non-hotel accommodation, such as villas or apartments, has been identified.

Guilherme Lohmann

See also: Spanish Islands.

Maldives Located in the **Indian Ocean** several hundred kilometres to the west of India and Sri Lanka, this double chain of **atolls** extends 830 km from just south (0°42' S) of the **equator** to 8°10' N. Tropical, warm waters and white sand **beaches** have made the Maldives an ideal location for all forms of marine **tourism**, including **scuba-diving**, **snorkelling**, **fishing** and **surfing**. Of the 1190 islands that make up the **archipelago**'s 19 atolls, 87 islands have been developed as tourist resorts. The Maldives have a 'one island – one resort' approach, and all resorts supply their own power, **water** and waste management services and transport **infrastructure**.

Tourism capacity had an annualized average compound growth rate of 11.65% between the years of 1972 and 2004. Sustainable tourism development has been the key to the Maldives' success as a **destination**. The islands were largely unaffected by the Indian Ocean **tsunami** in 2004, and tourism recovered strongly in 2005 (see Carlsen, 2005, 2006; Carlsen and Frohoff, 2007). The 87 resort islands currently have a capacity of about 17,000 beds. In addition to the resort accommodation there are about 1700 beds on charter boats and 360 beds in guest houses on the island capital of Malé.

The rate of growth of tourism infrastructure has been controlled through a series of Master Plans. Tourism's importance to national

development was recognized in the First Master Plan, in 1983, which identified planning criteria, the selection process for new development **zones** and the key issues in future development. The Second Tourism Master Plan (1996–2005) identified islands for tourism development in each of the 19 atolls of the country. Information on the new islands chosen for tourism development was released in 2004, and the evaluation of development proposals was undertaken by the Maldivian Government. In December 2005 an additional 35 islands were made available for development over the following 2–5-year period, which will facilitate significant expansion, effectively increasing accommodation capacity by 50% by 2010. Successful bids for lease rent of five resort islands were announced in April 2006, which will add new capacity in the short term.

The volume of international tourist arrivals has risen from around 42,000 in 1980 to almost 616,000 in 2004 – more than a tenfold increase over the 24-year period, with an annual growth rate of above 9%. In 2004, 65% of visitors came from six main markets – Italy (19.4%), the UK (16.8%), Germany (10.7%), Japan (6.9%), France (6.8%) and Switzerland (4.3%) – indicating a high degree of dependence on a small number of markets for tourism. Tourism contributed about 30% of the Maldives' Gross Domestic Product (GDP) between 1999 and 2003, and about 40% of total taxation revenue. Inbound tourism has been responsible for gradual improvement in Maldivian foreign exchange earnings since 1983, when the value was US\$13.4 million compared with the same figures in 2003, by which time earnings had increased tenfold in value to US\$149 million (Ministry of Tourism, 2004).

Related internet sources

Ministry of Tourism and Civil Aviation: [http:// www.maldivestourism.gov.mv/index.asp](http://www.maldivestourism.gov.mv/index.asp)

Maldives Tourism Promotion Board: <http://www.visitmaldives.com>

Jack Carlsen

Mallorca: see Majorca

Malta and Gozo Set in the middle of the **Mediterranean Sea**, Malta and Gozo

have been colonized by numerous nations over the centuries. There have been various reasons why the colonists chose these barren **islands** with very little **resources**, although perhaps the main reasons have been strategic positioning and the hospitality of its inhabitants. Since 1950, the decline of the British Empire meant that the islands' dependence on military and naval services would need to be replaced with a strong industrial base. After the islands' independence in 1964, **tourism** was chosen as one of the three pillars of any future economy, the other two being ship repair and agriculture. The Italconsult plan (1963) looked at the development of tourism to the islands as a summer **destination**, which was the first report to consider the sustainability issues of matching industrial growth to resources and infrastructure.

Throughout the 1960s a number of new hotels were built or refurbished using government grants, since the primary resource on the islands has always been its human resources. The catering school at the new polytechnic was opened through funding assistance from **UNESCO**. The main market during the 1960s and 1970s came from the UK, as a result of the close ties that had been developed between the two countries over the 180 years of colonial rule. The increase in tourism arrivals, from 40,000 to 1 million between 1963 and 1987, has meant that the infrastructure and resources have been strained to the limit. For an island with a population of just 400,000 inhabitants, there was a need to develop a strategy that would consider more sustainable results.

Although Malta and Gozo today are still considered as a '**sun, sea and sand**' destination, the pressures that have been placed on the second greatest asset for this market – the coastal **littoral** and the sea – have prompted a number of studies, such as one on **carrying capacity** (1998) and the Branding Exercise being undertaken by the Malta Tourism Authority (2006), with the intention of removing the burden of tourist arrivals during the 3 months from July to September, and spreading these out to include the shoulder and off-peak months by focusing on attractions such as history, culture and gastronomy.

Julian Christopher Zarb

Mammals Encounters Education Research

Mammals Encounters Education Research (M.E.E.R e.V.) is an organization based on Project M.E.E.R. La Gomera (Mammals. Encounters. Education. Research.), and has its main seat in Berlin. It was founded in 1998 to carry out voluntary work for the protection of **whales** and **dolphins**. The main goal of the society is to support nature protection, education and research, with a special focus on the **conservation** of whales and dolphins (**cetaceans**) and their natural habitat. Research focuses on the tracking of **marine mammals**, behavioural studies and **photo-identification**. A special focus is the work on **whale-watching** regulations to cope with the increasing impact of tourism on mammals, particularly around the **Canary Islands**.

Related internet source

M.E.E.R e.V.: <http://www.m-e-e-r.de/home.0.html>

Friedrich M. Zimmermann

Manatee Manatees are grouped within the mammalian family Trichechidae and are represented today by three species: the West Indian, or **Caribbean**, manatee or sea cow, the Amazonian manatee and the West African manatee. When Christopher **Columbus** first saw manatees in the New World in 1493, he attested to their lack of beauty, noting that these “mermaids” were not quite so handsome as they had been painted’.

The West Indian manatee (*Trichechus manatus*) is considered divisible into two subspecies: *Trichechus manatus manatus*, ranging from Mexico south through Central into South America and as far south as Recife, Brazil, including the West Indies, and *Trichechus manatus latirostris*, from the south-eastern USA.

The West Indian manatee can reach up to 3.5–4.1 m in length and 1620 kg in weight. They are large, torpedo-shaped, thick-skinned animals with bulky bodies tapering to a spatulate tail. They have two paddle-like mobile front ‘flippers’, each having three to four nails. The body is grey to brown, nearly black in the newborn. They have a thick, wrinkled skin and prominent facial vibrissae, i.e. sensory hairs around the mouth. Manatees have a thick layer of fat or blubber under the skin, which they use

as insulator and energy storage. Because fat is lighter than water it also provides buoyancy. These animals spend much of their time at or near the bottom of the sea, and thus they have developed thick, dense bones in order to achieve neutral buoyancy.

West Indian manatees live in rivers, **estuaries** and coastal areas of tropical and subtropical regions. They prefer quiet, shallow coastal waters, estuaries, rivers and canals where vegetation is abundant. Manatees can, on occasion, swim from one Caribbean island to another one nearby, as well as up coastal rivers. West Indian manatees feed mostly on a diverse diet of aquatic and semi-aquatic plants.

Adult females breed about once every 2 years. They have a gestation period of 12–13 months, nursing takes between 1 and 1.5 years and the calves start grazing vegetation at the age of 3. West Indian manatees can live up to 50+ years and are generally solitary animals. When manatees do form groups, they are typically large, loosely associated and lack any real social structure. Manatees join and leave these associations at will.

Manatees lack natural enemies. In the past, West Indian manatee populations were decimated by hunting and loss of habitat; however, there are many other causes of death, including the abandonment of calves by their mothers, low water temperatures and **red tides**. Many manatees are killed by boat strikes, drowning or crushing in **navigation** locks or flood-control gates, entanglement in **fishing** gear and ingestion of foreign material.

Manatees are an important tourist attraction in Florida where there are organized manatee-watching operations. The country of Belize is currently attempting to build a **tourism** industry around manatees, with reformed poachers and local residents being employed in order to take advantage of their knowledge.

Aldemaro Romero
Shelly Kannada

Mangrove Mangrove forests comprise a diverse range of species of salt-tolerant trees and associated vegetation that occupy the intertidal zones of **estuaries** in tropical, subtropical and some temperate regions, occupying a worldwide distribution of over 17

million ha. The habitats created by mangroves are utilized as 'nurseries' for many commercially significant fish and **invertebrate** species, and they play an important role in carbon export, nutrient cycling and the uptake of heavy metals and other pollutants. They also help to stabilize and protect vulnerable coastal areas, where they act as an important buffer between terrestrial and **marine environments**. Many **indigenous peoples** have managed the use of mangrove **resources** in a sustainable way. Up until comparatively recently, however, mangrove forests have not been widely valued by industrialized or industrializing nations, and substantial loss of these forests has occurred on a global scale (see Fig. M2).

Land reclamation works for coastal developments such as resorts, golf courses, **marinas**, residential canal estates, roads and airports have destroyed much mangrove habitat, particularly in those nations comprising the '**pleasure periphery**' tourist zone, in South-east Asia, the Pacific Islands and central America. More recently, however, their **recreation** and tourism values have begun to be recognized.

Coinciding with a much greater appreciation of **wetland** values generally, mangrove ecosystems have begun to be incorporated into coastal tourism initiatives in a number of ways. Interpreted boardwalks have been constructed allowing tourist access and **environmental education**; birdwatchers visit mangroves to observe migratory **shorebirds**, while ecotourist

operations take small groups of tourists on guided **canoe** tours of mangrove systems.

Related internet sources

International Society for Mangrove Ecosystems: <http://www.mangrove.or.jp/index.html>

Ecotourism in the Maroochy Mangroves: <http://www.sunshinecoast-australia.com/102144.php>

Kevin Markwell
Geoff MacFarlane

Margate Margate is a coastal town of the Isle of Thanet in Kent in south-east England. It was already an established **fishing** and trading **port** by 1300. However, its significance in the history of **tourism** derives from its being an exemplar of temperate coastal resort change. Margate is recorded as being Britain's first commercial sea bathing resort in 1736, when a channel was cut from the sea to a tavern where bathing and the drinking of salt water was advocated for medical conditions. From 1750 onwards a bathing machine, invented by Benjamin Beale and first used at Margate, which allowed the occupant to be driven into the sea and enter the water in privacy, revolutionized sea access, and immediately popularized sea bathing. The Royal Sea Bathing Hospital, founded in 1791, was Britain's first specialized hospital and advocated sea bathing and sea air in cases of consumption.

Before the advent of the railways in the 1850s, visitors would arrive by sea. However,



Fig. M2. Mangroves at Likuri Island, Fiji (photograph courtesy of M. Lück).

once access had been improved, Margate rapidly became a **mass tourism** resort for London's working class. Growth continued after World War II, with Margate becoming the site of several Butlin's hotels, holiday camps, as well as Dreamland, a theme park that was once the most visited charging attraction in the UK. Like many British **seaside** resorts, its attractiveness as a **beach destination** declined rapidly once access to **Mediterranean** coastal resorts increased. Consequently, in the 1970s Margate experienced substantial loss of intellectual capital through emigration. Since 2004 it has aimed to regenerate through the development of the Turner Museum (J.M.W. Turner, 1775–1851, celebrated British landscape artist) and a **heritage** precinct.

Related internet source

Mayor and Charter Trustees of Margate, England: <http://www.margate.org.uk>

C. Michael Hall

Mariana Trench The Mariana Trench is located in the **Pacific Ocean**, with its central point at 11°21'N **latitude** and 142°12'E **longitude**. The trench originates from the subduction of the Pacific Plate underneath the Philippine Plate. The Challenger Deep is the area of the trench extending furthest below the ocean. The maximum depth recorded is 10,911 m, which is the deepest spot known to exist. At this depth the pressure is over 1000 times greater than at the Earth's surface. No light from the sun reaches the sea floor, and thus fish use bioluminescence (similar to fireflies on land) to see and to attract prey. The fish species that inhabit ocean trenches are among the most primitive on the planet; little evolution seems to have occurred, they seldom migrate and may live for over 100 years.

The volcanic **island** arc associated with the trench forms the Northern Marianas Islands (also Guam). Vulcanism is frequent in the northernmost islands. Saipan, Rota and Tinian are the major islands within the political entity of the Commonwealth of the Northern Marianas Islands (CNMI), which is part of the USA. The island's **indigenous peoples** are **Micronesian** in race.

The climate of the area is tropical, and the island region has seen tourism increase rapidly

in the last two decades. Japanese tourists, in particular, are fond of visiting Guam and the CNMI. A wide variety of facilities exist: **fishing, diving, snorkelling, sailing** and cruising can all be enjoyed in the waters above the depths of the Mariana Trench.

Related internet sources

My Micronesia: <http://www.mymicronesia.com/northernmarianas/#recreation>

The Mariana Trench: http://www.marianatrench.com/mariana_trench-biology_001.htm

Charles Johnston

Marina In contrast to **ports** and **harbours**, marinas are dedicated to mostly private, leisure shipping on sailing or motor yachts. Marinas commonly have finger-shaped pontoons to access the berths. They are mostly secured against the open sea by stone or concrete walls and can be accessed by a small waterway. The entrance to the marina is marked by lateral buoys, the depth and location of buoys and further characteristics of the marina basin being taken from Nautical Charts (see Figs M3 and M4).

To meet the needs of private boaters, docking spaces are equipped with access to drinking water and electricity. Depending on the size of the marina, the range of services in marinas covers dock masters, sanitary facilities, laundry, restaurants, bars, supermarkets, shops, boat equipment, cleaning and repair facilities, as well as petrol stations. The building of marinas is often controversial and, as a consequence, the city of Naples (Florida), for example, undertook a Marina Facilities Development Study to review critical economic, engineering and environmental marina aspects, and to maximize the return on investments by realizing sustainable marina redevelopment options.

The number of berths varies, with the average marina hosting between 30 and 100 yachts. Empuriabrava, on the Spanish Costa Brava, covers an area of 500 ha, of which more than 50 ha comprise canals or marina areas, with more than 80,000 visitors annually. The most expensive development to date is Dubai Marina, which is the world's largest man-made marina, covering an area of 500 ha and with more than 700 berths. It is not only a marina for yachts but also for exclusive living, and it is



Fig. M3. Marina Milna on the coast of Brač, Croatia (photograph courtesy of F.M. Zimmermann).

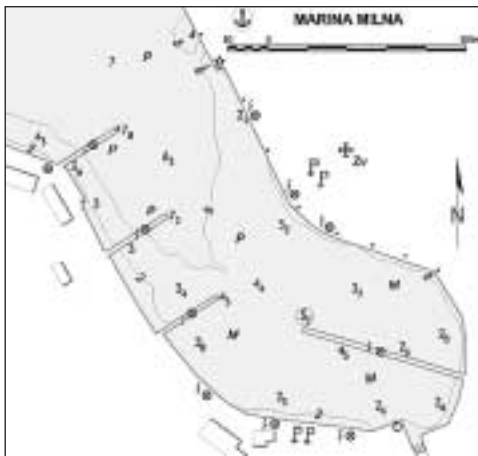


Fig. M4. Marina Milna on the coast of Brač, Croatia (from <http://www.aci-club.hr/aci.htm>).

amongst the world's largest master-planned waterfront developments.

Related internet sources

City of Naples: <http://www.naplescacitydock.com/main.htm>

EMMAR: <http://www.dubai-marina.com>

Marinas.com: <http://www.marinas.com>

Marinamap: <http://www.marinamap.com/en/search.shtml>

Friedrich M. Zimmermann

Marine Oceanic salt water, and the land beneath it (i.e. seabed and foreshore), are considered 'marine'. Inland seas, such as the Caspian Sea, are not usually considered marine, but many aspects of marine **tourism** are relevant to such areas. The **marine environment** includes those aspects of the adjacent land, ice and freshwater affected by marine processes. Marine tourism therefore includes shore-based tourism activities, amenities and facilities that have as their focus, or are within, the marine environment. **Oceanaria** and **maritime museums**, even if these are some distance inland, fall within marine tourism as they have a focus on the marine environment and related activities.

The extent of marine influence may be difficult to calculate, especially in tidally influenced rivers, and in practice many arbitrary definitions are adopted for administrative purposes. For example, New Zealand uses the line of mean high water at spring **tides** as the terrestrial boundary of the 'coastal marine area' for statutory planning purposes under its Resource Management Act (RMA), whereas in parts of Maine (USA) landownership includes intertidal areas.

The setting of boundaries affects the property rights that might be available for tourism facilities and activities. In Western law, marine

areas are usually considered public- or government-owned, and mechanisms to allocate use and occupation rights between different sectors can become a major arena of **conflict**. The intertidal area, between low-water and high-water marks, and adjacent **beaches**, have been described by social scientists as liminal zones, transitional areas of 'otherness' and 'alterity', where activities, dress and behaviour that might otherwise breach social norms are accepted (Shields, 1991). But for tourism planners there is continual tension over the privatization of the beach, intertidal and marine 'commons' by hotels, **marinas** and **aqua-culture** (Boissevain and Selwyn, 2004).

Hamish Rennie

Marine Accident Investigations Branch (UK) (MAIB)

The Marine Accident Investigations Branch examines and investigates all types of marine accidents to or on board UK ships worldwide, and other ships in UK territorial waters. The sole objective of MAIB accident investigations is to determine the circumstances and causes of the accident with a view to preserving life and avoidance of accidents in the future, not to apportion blame or liability. It endeavours to identify and analyse the relevant issues and make recommendations aimed at preventing similar accidents in the future. The full investigations and lessons learnt are available online at the MAIB web site (see below).

Similar bodies operate in other countries: the Transportation Safety Board of Canada, Australian Transportation Safety Bureau and the US **National Transportation Safety Board**.

Related internet sources

Marine Accident Investigation Branch: <http://www.maib.gov.uk/home/index.cfm>

Australian Transportation Safety Bureau: http://www.atsb.gov.au/about_atsb/about_atsb.aspx

National Transportation Safety Board: <http://www.tsb.gc.ca>

Ross A. Klein

Marine Ecosystem

A marine ecosystem is a cohesive community of organisms in the ocean or on the coast in addition to the inorganic elements that support that community. Some

examples of important marine ecosystems worldwide include: **estuaries** or **salt marshes**, rocky reefs, tropical **coral reefs**, **pelagic** (open ocean), sea mounts, **mangrove** forest, **kelp** forest, **seagrass** beds and intertidal ecosystems such as rocky intertidal or sandy shores. Such ecosystems house a wide range of component organisms interconnected through predation, competition or mutualism, from marine viruses and bacteria to zoo- and phytoplankton, to other **invertebrates**, fish species and **marine mammals**, birds and reptiles.

Marine ecosystems are set apart from other aquatic ecosystems by the high quantities of dissolved salts and other compounds. Sea water has an average **salinity** of 35 parts per thousand, but salinity can be much higher in marine ecosystems that are not flushed out frequently, such as estuaries and **lagoons** or mangrove forests. These high-salt environments are home to uniquely adapted euryhaline (salt-tolerant) organisms.

Like many terrestrial ecosystems, marine ecosystems are generally limited by nutrients and light. In addition to nitrogen and phosphorus, silicon is an important limiting nutrient in many marine ecosystems because it is required for the growth of important groups of phytoplankton. Photosynthesis can take place only in the top layers of the ocean where light can penetrate, called the photic zone. Marine ecosystems with the highest levels of productivity tend to be coastal, such as marshes and estuaries, or are associated with **upwelling** events in which cold, nutrient-rich water is brought to the surface.

The importance of marine ecosystems to human well-being has been emphasized in recent years. For example, marine ecosystems produce food for human consumption (open-ocean fisheries), act as filtration systems between land and water (estuaries) and house some of the highest levels of biodiversity on earth (coral reefs). The many threats to these ecosystems include: (i) pollution (both point, such as nitrogenous fertilizer, and non-point); (ii) **invasive species**; (iii) improperly implemented **aquaculture**; (iv) coastal development; (v) overfishing; (vi) by-catch; (vii) habitat alteration (for example, to **benthic** habitats from **trawling**); and (viii) **climate change**. **Tourism**, when improperly managed, has also become a threat to some marine ecosystems

through overuse or overdevelopment of coastal areas. For example, excessive **scuba-diving** in coral reef ecosystems can have adverse effects on **coral** health.

S. Elizabeth Alter

Marine Ecotourism Ecotourism is generally accepted to be **tourism** that is not only based on nature, but is learning centred (i.e. deliberately incorporating an educational component) and managed in a way that attempts to be environmentally, socioculturally and economically sustainable.

Marine tourism, because of its focus on the sea or coast is, by definition, 'nature-based'. However, because marine tourism activities are extremely diverse in terms of their scale, their management and their **impacts**, many cannot be considered as ecotourism operations. For example, it is clear that the great majority of recreational **fishing** activities should not be considered as ecotourism (despite some claims to the contrary). Similarly, the **cruise ship industry** – while clearly being based on the sea – is not ecotourism. However, there are many marine tourism activities that are inherently more sustainable in terms of their potential impacts. Examples include: scenic nature cruises, **sea-kayaking**, birdwatching, **whale watching**, **snorkelling**, **scuba-diving** and so on. Despite the lower scale and lower impact of these types of marine tourism, they are not automatically marine ecotourism operations. There is growing evidence identifying the environmental impacts of even the most apparently benign tourism activities. For example, habituation to frequent interactions with tourists and other behavioural reactions from marine species have been shown to alter natural wildlife behaviour affecting breeding, feeding and social interactions of various species (Orams, 2004).

As is the case with almost all nature-based tourism activities, it is extremely difficult (and perhaps unwise) to make definitive statements regarding those marine tourism activities that are ecotourism and those that are not. Often, critical factors pertaining to sustainability are unknown in the short term, despite management regimes that are directed at achieving this aim. In addition, while every effort can be made by a marine **tour operator** to adhere to

the principles of ecotourism, the simple pragmatics of operating a marine **vessel** can arguably render the operation as a contributor to environmental degradation. For example, most marine tour vessels (ecotourism oriented or not) utilize internal combustion engines of some type (many are diesel) that exhaust harmful emissions into the sea and the air. Most also utilize '**anti-fouling**' bottom paint to inhibit the growth of organisms on the boat hull. These anti-fouling paints all contain substances that leech into the marine environment and which are poisonous to marine life (some, such as Tributyltin, persist for a long time and pass up the food chain, causing an accumulation of toxins in organisms). In addition, vessels and other marine tourism facilities can contaminate the **environment** with effluent, food waste disposal or from inadvertent fuel leakage.

Thus, marine ecotourism has emerged as a subset of marine-based tourism activities and, in theory, offers a less **consumptive** and more sustainable form of marine tourism, with a focus on offering an educational experience of the environment. However, while marine ecotourism as an explicit label is relatively recent, marine ecotourism operations have existed since the middle of the previous century. For instance, **penguin**-, **marine mammal**- and marine **cetacean** (**whale**, **porpoise** and **dolphin**)-viewing operations existed in the 1950s.

It has been over the past decade, however, that they have experienced phenomenal growth. This has, in part, been driven by an increasing interest in things marine, but also accompanied by an increased interest in managing the **welfare** and **conservation** of marine ecosystems – and especially marine wildlife (Cater and Cater, 2001). This growth in demand has driven an increasing interest in supply-driven initiatives from operators, who perceive an opportunity to cater for the increased demand for marine ecotourism ventures. These ventures range from small-scale, specialist operations to larger-scale, popular activities.

Popular marine ecotourism destinations include the **Galapagos Islands** and coastal areas of Australia, India, South-east Asia, the Philippines, New Zealand, Belize, Argentina, Chile, British Columbia (Canada), Alaska,

North America, Scotland, Norway and Sweden. In many countries local communities have been revitalized economically and socially by marine ecotourism activities, for example the positive impacts from whale watching in Kaikoura, New Zealand (Cater and Cater, 2001).

Maritime environments are often challenging with respect to accessibility for visitors. The availability of marine- and nature-based tourism activities since the mid-20th century has resulted from increasing numbers of commercial operations providing services to enable experiences of marine species and seascapes, for example the cruise ship industry, **deep sea fishing**, bird or wildlife watching, **windsurfing**, **sea-kayaking**, **surfing**, **sailing** and scuba-diving. At times the commercialization of such tourism activities has been criticized for negatively impacting upon marine species and habitats. In particular, **swim-with-dolphins** operations and similar activities involving close encounters with marine mammals have been observed by scientists as negatively impacting on marine wildlife species (Orams, 1999, 2004).

The consequence of this growing understanding pertaining to the impacts of marine tourism operations is that many have developed a cynical view of the value of ecotourism as a concept. Some see ecotourism as simply a more palatable label that allows operators to continue to exploit nature without the guilt that sometimes accompanies the more obvious negative impacts of tourism (as in, for example, trophy bill-fishing). Despite this cynicism, there is no doubt that the ecotourism label is well established and is here to stay. It is also worth noting that most ecotourism operators see value in the concept and wish to do all they can to minimize the negative impacts of their operations and to maximize the **benefits** of the experience by informing and educating their clients regarding the value of nature and the need to care better for it.

In a number of areas, organizations and management regimes have been established advocating for marine ecotourism operations to adhere as closely as possible to the principles of sustainability and learning. The most frequently utilized approaches are the establishment and adoption of **codes of conduct** or practice and, in some cases, the addition of a formal

certification and accreditation of ecotourism operators. Additional approaches include the designation of **marine reserves**, maritime parks and **Marine Protected Areas (MPAs)** where marine ecotourism, and other activities, can be managed or regulated to ensure that the environment is conserved.

Codes of conduct or practice either advocate, or require, ecotourism operators to manage their operations in a way consistent with the principles of ecotourism. In particular industries the code is developed to deal with specific issues relevant to that industry. For example, minimum **approach distances** for whale-watch vessels to reduce the risk of disturbance. In the case of certification and accreditation, independent inspection and verification of an operator adhering to a code of practice – or a similar set of rules or guidelines – is carried out. The operator is then able to promote their certification/accreditation and consumers are encouraged to patronize these operators over others.

In some countries specific legislation or formal government regulations are used to manage a marine tourism industry. These regimes often utilize a permit system and/or punitive measures, which are applied if regulations are transgressed. A good example of this is the New Zealand Marine Mammals Protection Regulations that require any commercial enterprise wishing to offer and promote interaction opportunities (observing, swimming, snorkelling and so on) with marine mammals to have a permit. All permits require the operation to have no significant adverse effect on the species targeted, to be in the interests of conservation, management or protection of marine mammals and to have sufficient educational value. These compulsory conditions for permit holders do, of course, closely align with the principles of ecotourism and provide an example of state-regulated marine ecotourism.

Ecotourism and marine ecotourism remain contentious concepts: an idea that, in theory, has appeal in that it promotes a sustainable use of marine life. Marine ecotourism is also appealing because it can potentially provide a positive contribution to marine ecosystems through increasing the understanding of and appreciation for marine **resources**. Certainly the wider tourism industry, host communities,

tour operators and tourists themselves have embraced the term, as it is now in widespread use.

It is also important to acknowledge the corruption of the term and the concept. The cynicism of many tourism commentators and authors is easy to understand. However, as a counter to this, there are many ideas/concepts and labels that are widely used but similarly maligned. Examples include: sustainability, conservation, resource management and wise-use. This suspicion does not diminish the value of these concepts as worthy goals or targets. Ecotourism and marine ecotourism have similar value in that it is a concept worthy of striving for.

Related internet sources

Ecotourism Australia: <http://www.ecotourism.org.au>

Marine Ecotourism for the Atlantic Area: <http://www.tourism-research.org/METAhome.html>

The International Ecotourism Society: <http://www.ecotourism.org/index2.php?home>

National Geographic Sustainable Tourism (also 'Geotourism'): <http://www.nationalgeographic.com/travel/sustainable>

Mark Orams
Anna Carr

Marine Ecotourism for the Atlantic Area (META)

The Marine Ecotourism for the Atlantic Area project was funded under the EU's Interreg IIc spatial planning programme. Running from 2000 to 2001, four partner organizations were involved: the University of the West of England, Bristol (UK, lead partner), Torbay Council (UK), Marine Institute, Dublin (Ireland) and Escuela de Negocios MBA Gran Canaria (**Canary Islands**, Spain). The project set out to:

- Establish the principles of genuinely sustainable **marine ecotourism**.
- Provide advice on action and implementation through a series of 'toolkits' based on these principles.
- Offer a step-by-step programme for the responsible marketing of marine ecotourism.

The project deliverables comprise two documents, published in both English and Spanish (see web site address below). The first of these (Garrod *et al.*, 2001, 2002) initially defines marine ecotourism and then goes on to present:

- A discussion of the role of planning in promoting genuinely sustainable marine ecotourism.
- A model of planning good practice, based on seven principles for genuinely sustainable marine ecotourism.
- Six 'toolkits', through which these principles can be implemented.
- A digest of **resources** for local initiators and policy makers.
- A review of EU and international obligations for marine ecotourism planners.

The second document (Bruce *et al.*, 2001, 2002) provides a blueprint for the responsible marketing of marine ecotourism. Fully integrated into the META planning model, specific advice is offered on: marketing planning, developing a marketing group, conducting market research, implementing a marketing plan and monitoring and evaluation (see Fig. M5).

Related internet source

META web site: <http://www.tourism-research.org/METAhome.html>

Brian Garrod

Marine Hazard

Marine hazards present a potential source of danger to people, property or other objects of value. The danger is manifest as a form of loss that might be, for example, personal injury, damage to material goods or reduction in environmental **values**. The nature and severity of effects emanating from marine hazards will vary according to the type of marine activity undertaken, the experience of the person(s) exposed to the hazard, the equipment used, the extent of preparations made in response to the hazard and the negotiation through, or management of, the danger. As discussed below, marine hazards can be related to weather conditions, water conditions, marine animals, pollution and other water users.

A range of marine hazards are related to weather conditions. For example, fog can reduce visibility and so increase the likelihood of boat collision. Strong winds will lead to increased **wave** activity and heighten the risk of **vessel** capsize or vessel swamping. Other examples include water spouts, hail and extreme temperatures. Weather forecasts provide advance warning of weather-related hazards; however, the path of destructive tropical systems

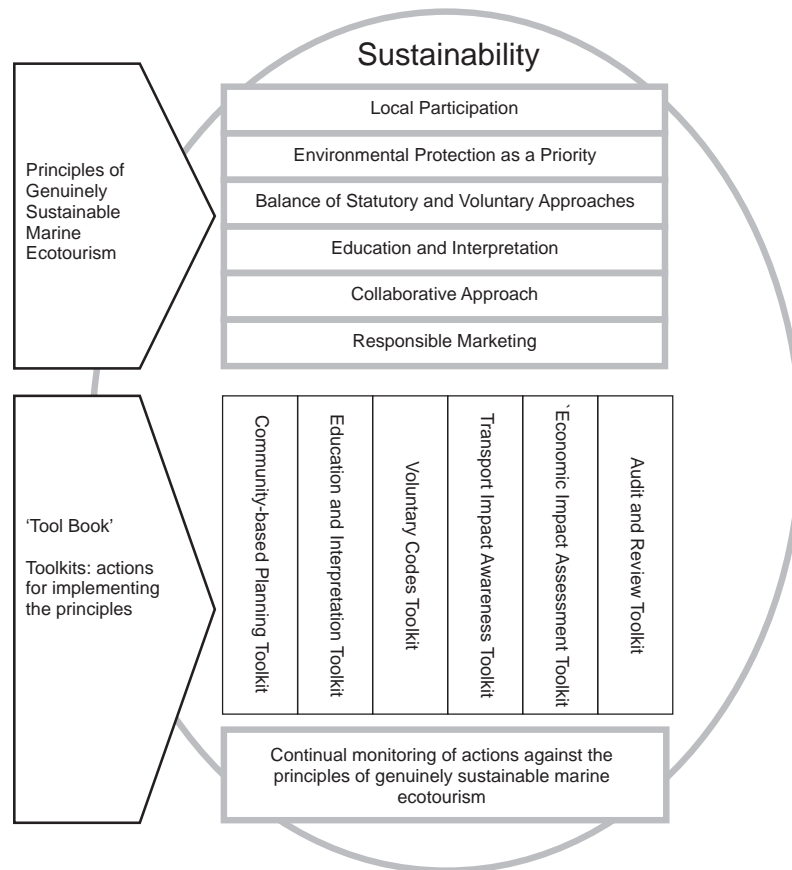


Fig. M5. The META model (from META, undated).

such as **cyclones** can be difficult to predict accurately.

Water-based marine hazards include those related to sea conditions and environmental features. These include swell, breaking waves, **currents** and **tides**. The nature and operation of water-based marine hazards will be generated or influenced by weather conditions, underwater processes and topography. For example, the energy released from breaking waves (a **tsunami** provides an extreme example) presents a potential danger to rock fishers, boaters and swimmers. Tidal movements can send boats off course, while surf **beach** rip currents can increase a swimmer's risk of drowning. Environmental features such as submerged rocks, **reefs** and sandbars pose a threat to all marine vessels.

Many types of marine animals present potential dangers to water users. Although a relatively uncommon occurrence, swimmers, surfers and divers face the risk of attack from a number of **shark** species. Other large marine creatures such as crocodiles and sea lions are known to attack humans in some circumstances. The sea also contains an array of venomous creatures including species of fish, octopus, starfish, urchins, sea snake and jelly-fish (**stingers**). Fast **algal** growth or blooms (known as **red tides**) also present a toxic hazard to both marine life and humans.

Many forms of pollution result in marine water hazards. For example, beach litter such as cans and broken bottles can lacerate feet. Oil spills can lead to the death of sea creatures and reduce the environmental amenity of coastal

locations. Similarly, the dumping of rubbish at sea presents hazards to marine users and sea creatures alike. Other users of the **marine environment** may become a hazard as well. For example, high-speed **personal watercraft** are a potential hazard for swimmers.

Tourist activities in marine environments expose tourists to a range of unfamiliar marine hazards. This behaviour underpins the important role of **tourism** managers in hazard recognition and the implementation of countermeasures to provide a safe experience.

Related internet sources

Weather.org: http://weather.org/marine_weather.htm

US Geological Survey: <http://marine.usgs.gov>

Hawaiian Lifeguard Association: <http://www.aloha.com/~lifeguards/critters.html>

Australian Government Department of the Environment and Heritage: <http://www.deh.gov.au/coasts/pollution>

Damian Morgan

Marine Mammal It is unusual for warm-blooded, air-breathing animals to live in an aquatic environment. Mammals are predominantly terrestrial animals and are, primarily, adapted for living in that **environment**. There are, however, four groups of marine mammals – mammals that have evolved to live exclusively or predominantly in an aquatic environment (some in fresh water, most in marine, some in both).

The largest and most diverse group of marine mammals is the **cetacean** group (**whales, dolphins and porpoises**). Over 75 species exist, ranging in size from as small as 1.4 m in length (Hector's dolphins and harbour porpoises) to the largest animal ever recorded, the blue whale, which can reach lengths of over 30 m and weigh as much as 190 t. Scientists divide cetaceans into two main groups (sub-orders), the mysticetes or baleen whales and the odontocetes or toothed whales.

Mysticetes differ from odontocetes in a number of ways: first, their feeding mechanism is different. Mysticetes all have baleen – rows of fringed plates on the upper part of the mouth, which are used to filter or sieve food (small schooling fishes, planktonic **crustaceans** such as **krill** and, in some cases, **benthic invertebrates**). Secondly, all baleen cetaceans are

large. Thirdly, they possess two external blowholes and fourthly they do not have an active **echolocation** ability (although they can use **sound** in other ways).

Odontocetes all have teeth (but in some of the beaked whale females they do not erupt from the jaw and cannot be seen externally) and they actively hunt their prey. In addition, all use active echolocation (**sonar**) and all have one external blowhole. Many odontocetes are social and found in large groups; however, some are relatively solitary and live in very specific ecosystems (such as the Ganges River dolphin).

The second largest group of marine mammals is the pinnipeds (**seals, fur seals, sea lions** and walrus). This zoological order is similarly divided into three main groups: the odobenidae (the Walrus), otariids and the phocids. Otariids include those pinnipeds that have external ear flaps, extended forelimbs and primarily use an external covering of dense fur for insulation (all sea lions, fur seals). Phocids (true seals) do not possess these characteristics and are less mobile on land.

The third group of marine mammals contains only four species: the sirenians (or 'sea-cows') include the **manatees** (West Indian or Floridian, Amazon and West African) and the **dugong**. These herbivorous mammals are found in both freshwater and marine environments.

The fourth, and smallest, group of marine mammals (which are a component of the large mammalian order Carnivora) is the **sea** and **marine otter** group (some marine mammal scientists also include **polar bears** in this group, but only because they spend the majority of their time out of the water).

All four groups of marine mammals have significant **tourism** activity based around them. Odontocetes (especially delphinids) are widely kept in **aquaria**, as are pinnipeds (especially otariids), sirenians and sea otters, and used in captive settings as tourism attractions. Whale and **dolphin watching** and 'swim-with' programmes that promote observation and interaction with cetaceans in the wild are similarly offered for tourists to view and interact with other types of marine mammals.

The growth of all forms of marine mammal tourism, but especially those based on wild

marine mammals, has been spectacular over the past two decades. Many scientists have expressed concern over the potential **impact** of tourism on the behaviour and long-term health and survival of these animals. This is particularly relevant to marine mammals because many species are already endangered and suffer from a wide variety of human-based impacts such as pollution, overfishing, habitat loss, coastal reclamation, dredging, shipping and other **vessel** activities. The targeting of specific populations of marine mammals for tourism has been shown to be damaging in some cases, and there is a growing body of evidence that marine mammal tourism is not necessarily benign and must be very carefully managed.

Related internet sources

Whale net: <http://whale.wheelock.edu/whalenet-stuff/interwhale.html>

Net Vet – the electronic zoo: <http://netvet.wustl.edu/marine.htm>

Whale and Dolphin Conservation Society: <http://www.wdcs.org>

Society for Marine Mammalogy: <http://www.marine-mammalogy.org>

Mark Orams

Marine Mammal Commission (MMC)

The Marine Mammal Commission (MMC) is an independent agency of the Executive Branch of the US Government. The MMC was created by the **Marine Mammal Protection Act** of 1972 to provide oversight of all US programmes pertaining to **marine mammals** and their habitats, and to make recommendations to the federal regulatory agencies responsible for those programmes (including the **National Oceanic and Atmospheric Administration, National Marine Fisheries Service, US Fish and Wildlife Service**, US Navy and many others).

In implementing its mandate, the MMC has worked closely with the regulatory agencies, state and local authorities and **non-governmental organizations** to protect many species of **cetaceans** and **pinnipeds**, as well as **sea otters**, **manatees** and **polar bears**. The MMC supports a modest but innovative research programme, has been active in the international arena (including the support of conservation and research efforts in **Antarctica**) and has worked

closely with **indigenous peoples** in the **Arctic**. The MMC is one of several US agencies that oversee the regulation of **tourism** involving both wild and captive marine mammals, reviewing permits for the acquisition and maintenance of marine mammals in zoos, **aquaria** and other public display facilities and for the operation of **whale watching** and other **nature-based tourism** affecting marine mammals.

Related internet sources

Marine Mammal Commission: <http://www.mmc.gov>

National Marine Fisheries Service: <http://www.nmfs.noaa.gov>

National Oceanic and Atmospheric Administration: <http://www.noaa.gov>

US Fish and Wildlife Service: <http://www.fws.gov>

Richard L. Wallace

Marine Mammal Protection Act (MMPA)

The Marine Mammal Protection Act is a US law originally passed by Congress in 1972, and amended in 1994, to protect **marine mammals** in US waters and by US citizens on the **high seas**. It forbids the take of marine mammals or importation of marine mammal products into the USA, where 'take' is defined as 'harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill any marine mammal'. Harassment has been further defined as acting in any manner that disrupts an animal's feeding, breeding or migrating behaviour, and thus governs the behaviour of marine mammal-watching tourist operations in the USA.

Two separate governmental bodies are responsible for protecting various species of marine mammals. The Secretary of Commerce (and within it, the **National Oceanic and Atmospheric Administration**) has jurisdiction over all cetaceans including **whales**, **porpoises** and **dolphins**, and **seals** and **sea lions**. The Secretary of the Interior has jurisdiction over issues related to **sea otters**, **polar bears**, walruses and **manatees**.

Exceptions built into the MMPA include takes or imports for the purposes of: (i) scientific research; (ii) public display; (iii) photography for educational or commercial purposes; (iv) enhancing the survival or recovery of a species or stock; and (v) importation of polar bears

taken in sports hunts in Canada. The MMPA also provides an exception for marine mammals accidentally killed in the course of commercial **fishing**, and for deterring marine mammals that are damaging private property (including fishing gear) or endangering personal safety. Finally, the MMPA provides exceptions for First Nation (Indian), Aleuts and Inuit (Eskimo) who take marine mammals for subsistence purposes or when creating native clothing or handicrafts.

Many countries around the globe have adopted similar regulations in the form of Marine Mammal Protections Acts and Marine Mammal Protection Regulations.

Related internet source

Marine Mammal Protection Act web site: <http://www.nmfs.noaa.gov/pr/laws/mmpa>

S. Elizabeth Alter

Marine Mammal Science *Marine Mammal Science* (ISSN 0824-0469) is the primary academic journal publishing current research on the biology, ecology and **conservation** of **marine mammals**, including marine **tourism**-related research (for example, the effects of **whale**, **dolphin** and **manatee** watching). It is published by the Society for Marine Mammalogy, which is the professional society for scientists and others interested in the biology and conservation of marine mammals across the globe.

Related internet sources

Society for Marine Mammalogy: <http://www.marine-mammalogy.org>

Marine Mammal Science:
<http://www.marinemammalogy.org/mms.htm>

Leslie A. Cornick

Marine Otter The marine otter (*Lontra felina*) is one of two otter species classified as marine mammals (the other is the **sea otter**), feeding exclusively in the sea (Estes and Bodkin, 2002). The marine otter is very similar in appearance to the freshwater otter. Individuals attain a total length (including the tail) of slightly over 1 m and weigh between 3.2 and 5.8 kg. The marine otter is listed as an endangered species by both the US Endangered Species Act and the IUCN **Red Data Book**.

The marine otter lives along exposed rocky **shorelines** on the South American Pacific Coast, from northern Peru (at least to Chimbote, northern limit 6°S) south along the Chilean coast to **Cape Horn**, Straits of Lemaire and adjacent **islands** (Larivière, 1998). It is also present in isolated populations in Argentina, especially in the **Strait of Magellan** and on Staten Island (Larivière, 1998). The coastal **beaches** of the Paracas National Reserve (the only **Marine Protected Area** in Peru) are a good site for viewing this species. In the **fishing ports** of Mooro Sama and Vila Vila in Peru, marine otters inhabit the artificial breakwaters that protect the ports. The marine otter also occasionally enters **estuaries** and freshwater habitats, and uses caves and tunnels along the coast (Ebensperger and Castilla, 1992).

The marine otter enters the sea only briefly, to feed predominantly on **crustaceans** and fish and, to a lesser extent, molluscs. The most common prey for these otters is the one most available in the subtidal environment. Individuals are found mostly alone or in pairs, though groups of three or more are sometimes seen. The marine otter is known locally as *chungungo*, *chinchmén*, *gato marino* and *nutria del mar* (Larivière, 1998).

There is currently no directed tourism, although marine otters are a great attraction. In terms of promoting ecotourism, the non-governmental group Pro Delphinus Peru, with support from the Columbus Zoo and Fulbright Commission Peru, began a research and education programme to raise awareness in the local community and better understand the behaviour of marine otters in Peru, and to try to reduce potential threats to their survival. Vila Vila gets many tourists in the summer months, and the organization is working to post more educational signs down by the beach areas to alert people to the presence of otters, since people are swimming in the same areas used on a daily basis by the resident marine otters. Discussions with marine otter experts indicate that there is potential for directed ecotourism.

See also: Sea Otter.

Related internet sources

IUCN/SSC Otter Specialist Group: <http://www.otter-specialistgroup.org>

Earthwatch's Marine Otter Program: http://www.earthwatch.org/site/pp2.asp?c=dsJSK6PFJnH&b=1147573#situation_report

Pro Delphinus Peru: http://www.prodelphinus.org/nutrias_mar.php?lang=EN

Dagmar Fertl

Marine Park

1. see Marine Protected Area (MPA)

2. Oceanarium

Oceanaria are essentially theme parks with a marine focus, or **aquaria** with amusement park add-ons. They are hybrids, with amusement park rides, vaudeville and carnival performances, scientific research programmes and education services. They also often provide rescue and rehabilitation services for marine species and are active in environmental rehabilitation beyond the bounds of their park. Nevertheless, at their core, oceanaria have live marine species as their primary exhibits and their focus is on a world in which humans are intrinsically aliens – the marine world. They provide an opportunity for gazing at, and even interaction with, that world in a controlled, safe setting. At the same time, oceanaria are multi-million-dollar businesses and are managed to achieve a variety of corporate goals (Davis, 1997), either as individual parks or as a chain of parks.

The basic model, epitomized by the SeaWorld theme parks, comprises a large area of land with separate areas themed to particular target audiences. These range from playground areas for younger children, amusement rides and aquaria, to large entertainment amphitheatres (see Fig. M6). These are linked by paths and village green-like, grassed or paved open areas. The amphitheatres are for the most popular spectacles, usually those shows with the largest of the trained animals, and for SeaWorld this is for Shamu, the killer whale (orca). The main pool in SeaWorld San Diego, California, USA, for instance, measures $50 \times 24 \times 10.6$ m and contains 11.4 million l of water, but the holding pools from which Shamu enters are much smaller and half as deep (Williams, 2001, p. 32).

The pools seldom use natural sea water, as that would limit visibility. The walls are usually



Fig. M6. Orca performing the daily show at Marineland, Niagara Falls, Canada (photograph courtesy of M. Lück).

smooth, clear plexiglass to aid spectator viewing rather than the contoured shapes that would be expected in the wild. The lack of variation in the surface deprives the orcas of the acoustic variations that they would experience in the wild, but are easier to clean. The fences above the water are usually clear plexiglass, and not much above waist high, thereby heightening a sense of immediacy and accessibility, a pseudo-direct contact with the performing animals. Smaller pools and theatres may feature other trained animals, such as **seals**, **dolphins**, walrus and sea elephants.

The presentation of animals is accompanied by a narrative performance that humanizes the events and their animal 'actors'. The **sea lions** for instance, carrying out the activities in which they have been trained, might be identified as 'actors' playing such roles as '**pirates**' or 'adventurers' rescuing 'friends' from 'pirates'. The show pools are often landscaped above water level to provide visual clues for the spectators, and the major show pools may have large cinema screens to help the audience keep

track of the performance, including underwater movements. Soundtracks are carefully prepared and played through loudspeakers to supplement the show choreography and the ringside or voice-over announcements. Slipped within the narrative of the performance will be **marine educational** information, but this is seldom the focus of the presentation of the animals. Instead the emphasis, in the larger species like the dolphins and orcas, is on their 'enhanced natural' behaviour. Labelling such trained behaviour as natural has been the focus of some criticism (Desmond, 1999; Williams, 2001).

These performances have their antecedents in circuses, acrobatic troupes and other forms of performance. In her deconstruction of the shows and the staging of the activities and displays in oceanaria, Desmond (1999) has drawn on feminist theory and critical race theory in highlighting the role of physical foundationalism (the bodies) in shaping identity and reinforcing power relations. For instance, common tropes at SeaWorld include the heterosexual family as the basic norm of society, or the hierarchical class structure that places humans at the peak, with dominion over the species being displayed. Homosexual relations and the savagery of the hunting whale in the wild cannot be contemplated in such presentations. The dominant tropes of friendly heterosexuality prevail despite, and are strangely reinforced by, displays of species miscegenation that seem to reinforce the alterity of the bodies of the non-humans while also humanizing them.

Photographs may be taken with downscaled orca images, where the outspread side fins symbolize arms, encompassing the human families photographed between them. In SeaWorld shows, the audience perceives the orca, Shamu, kissing humans, not the reality of the trained orca correctly touching its beak to a target in order to gain a fish reward. This at once produces a human expectation of genuine affection, while the differences in the bodies transform what in human to human relations may be seen as sexual to an asexual and acceptable act (Desmond, 1999).

The immortality of Shamu (if Shamu dies there is always a new Shamu) – the brand creature of the SeaWorld chain – is not highlighted

for the sham that it is, the taking of an individual's identity. While SeaWorld actively subjectivizes the orca, the orca are not given their own subjectivity. Instead, SeaWorld creates a brand product, an image sold in all manner of souvenirs, games and even a TV show (Williams, 2001).

The narratives have evolved over time, reflecting sensitivity to the changing socio-political context. Notably, the animals are less likely to be clothed in imitation of humans or ridiculed as inadvertent comedians as they once were. But while we may no longer see dolphins wearing bikinis lying on dry land beside bikini-clad beauty queens, the seals and sea lions tend to be the exception, and are often still required to wear humanizing clothes in many performances (Davis, 1997). There is a form of class distinction in the narrative. As Desmond (1999) argues, the actual scale and shape, the physical foundation that is 'the body' of the orca, lend them to being displayed in balletic performances where their mass and size are contrasted with that of their human masters. This is most apparent in the climactic performance of the SeaWorld orca diving deep and rising vertically to expose its full body size above the water in an 'unnatural' momentary poise, before crashing back into the water, the extent and sound of its splash emphasizing its scale relative to humans.

The performance is enhanced by having a trainer propelled upward on the nose of the **whale**, who dives from the nose at the point of maximum height above the water. The two bodies create a fantastical image of equal partners, albeit of unequal size and power, creating a synchronous ballet able to be captured in the photographs and memories of the audience. Such a performance stands in stark contrast to that of the sea lions, whose physical characteristics tend to their being humanized as cartoonish characters in the narratives of their shows (Desmond, 1999).

It is sometimes assumed that oceanaria developed after and were modelled on Disneyland, which opened in 1955. Certainly, Disneyland may have influenced SeaWorld, but Marine Studios, later Marineland, opened in St Augustine, Florida in 1938 and has good claims to being the first oceanarium. Intended as an indoor ocean, realistically replicating the

underwater world, it was also designed to provide facilities for underwater filming. Theater of the Sea followed in 1946, originating as the redevelopment of a quarry and inspired by Marine Studios.

This entertainment connection, especially with the film industry, is exemplified by Six Flags Marine World. Six Flags originated in 1961 with a focus on history at its Texas, USA, theme park, but its subsequent expansions included the taking over of Marine World USA. Marine World USA originally opened in 1968 in Redwood City California, and relocated as Marine World Africa USA to Vallejo, California in 1985. Since 1997, it has been part of the Six Flags theme parks. Six Flags is owned by Time-Warner. Consequently, DC Comics and Looney Tunes' fantasy characters are themed into the park, its promotions and products. Unlike comic books, however, the cost of entry to these major theme parks can exclude those on lower-level incomes.

The integration of corporate marketing within oceanaria is especially apparent in these major chains. SeaWorld, for instance, is owned by beer barons Anheuser-Busch, renowned for the Budweiser and Michelob brands. SeaWorld San Diego opened in 1964 and expanded into a chain of four (Cleveland, sold to Six Flags in 2001, Orlando and San Antonio). By 1989 SeaWorld Florida and SeaWorld California were fifth and sixth, respectively, on the list of North America's top amusement attractions (based on attendance) (Adams, 1991). Busch Entertainment added the SeaWorld chain to its existing parks for US\$1.1 billion in 1989, and became the largest owner of theme parks at the time (Adams, 1991). Davis (1997) argues that, in addition to the profit potential, the SeaWorlds have provided a connection with the **environment** and **conservation** that has helped the image of the brewer. Moreover, the SeaWorlds have provided opportunities for product placement. Busch has opened a micro-brewery and introduced free beer tasting in each SeaWorld. In the 1990s the four SeaWorlds were estimated to host 11.6 million paying visitors annually, providing excellent promotional opportunities amongst middle-class consumers.

The role of oceanaria in reinforcing social norms may be controversial, but there is little

doubt that the orca shows at oceanaria have helped transform the popular image of the 'killer' whale from a dangerous predator of the oceans to a friendly orca worthy of protection. It is at this point that the nature of oceanaria becomes most problematic. On the one hand they may well be bringing the ocean to terrestrially bound humans and changing their views on the importance of protecting ocean life; they may be building a consensus for protecting oceans and their biodiversity; they may be active in undertaking research on reproduction and other aspects of interest to scientists; and they may be investing in environmental protection activities that would not occur without them. Nevertheless, oceanaria can also be seen as places of imprisonment and misery.

The capture of orcas and their placement in oceanaria, which commenced with Ted Griffin (of the Seattle Public Aquarium) in 1961, has especially led to countermovements seeking to free the orcas. Ironically, given the oceanarium industry's close connections to the entertainment industry, these countermovements have been inspired and strengthened by the 1993 Warner's movie *Free Willy*, which featured a boy befriending and ultimately freeing an orca. This countermovement, informed by reports of such organizations as the UK-based **Whale and Dolphin Conservation Society (WDACS)**, contrasts the lifestyle within the oceanaria with that enjoyed by orcas in the wild. It provides an important critique of the conservation claims of the oceanaria and orca capture industry. The techniques used to capture orcas, especially the use of seal bombs to drive them into nets, have led to outrage and, commencing in the 1970s, the passage of legislation banning the capture of orcas in places such as Washington State, USA (Williams, 2001).

As a consequence, the business of capture and transfer of orcas and dolphins for oceanaria has moved from the coasts of North America – and, subsequently, **Iceland** – to nations like Japan. Regulations for the transfer, handling and captivity of orca and other marine species vary considerably from nation to nation, and some oceanaria have been very creative in finding ways around the regulations (Williams, 2001). However, the larger oceanaria – for example, Disney's Living Seas at EPCOT

(Florida) – frequently make a point of their membership of industry associations, such as the American Zoo and Aquarium Association. Most of these associations impose some form of animal welfare **standards** on their members and, by highlighting their membership, the oceanaria seek public recognition that they are ‘socially’ responsible animal keepers.

The SeaWorld model is not the only model and it is hard to draw clear boundaries between oceanaria, **dolphinaria** and aquaria. Nor are all oceanaria owned by corporate conglomerates or only in North America. Yokohama, Japan, has its Sea Paradise, while Sarkenniemi in Finland lays claim to being the northernmost oceanarium, and **Hawaii** has Sea Life Park, part of a chain that stretches into Latin America. Hong Kong’s Ocean Park, opened in the mid-1970s, is run by a non-profit statutory body and receives more than 4 million visitors each year. Dolphins are among the most common species in oceanaria but some, like Yokohama, feature belugas, with others increasingly emphasizing **sharks**. Locally specific species might also feature, such as the **dugong** in the Gold Coast Sea World (Australia) or the Florida **manatee** in the Living Seas at EPCOT (USA). But, in most cases, the same attractions are present: park-like surroundings, theme rides, educational material and performances of trained animals.

There is, however, an increasing focus on physical interaction and special features, such as staying in a limited-entry resort inside the oceanarium grounds or overnight in a pool-side tent. Opportunities for **diving** and swimming with dolphins, sharks and other fish, and being a ‘trainer’ for an hour or a day – depending on how much one is willing to pay – are also available. Whether the growth of such experiences will increase the support for protecting feared species such as sharks in the way that it appears to have altered the image of the killer whale will be an area of developing research over coming decades.

Related internet sources

Alliance of Marine Mammal Parks and Aquaria (AMMPA): <http://www.ammpa.org>

Anheuser-Busch Adventure Parks: <http://4adventure.com>

Six Flags: <http://www.sixflags.com>

Whale and Dolphin Conservation Society: <http://www.wdcs.org>

Hamish Rennie

Marine Protected Area (MPA) Marine Protected Areas have been variously defined by different authors but, at the broadest level, MPAs are defined as designated areas of **marine ecosystems** that are protected at some level (see Fig. M7). The **IUCN** defines MPAs as ‘any area of the intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment’.

In many nations, MPAs include a broad array of protected zones such as national marine sanctuaries, **national parks** and seashores, national monuments, fishery management zones, state **conservation** areas, state reserves and so on. These areas can range in size from several hectares (e.g. the Farnsworth Bank Ecological Reserve, California, USA) to hundreds of thousands of square kilometres (e.g. the **Great Barrier Reef Marine Park**). They may fall under federal jurisdiction if placed 4.5 to 300 km offshore, under state jurisdiction or under both (e.g. Channel Islands National Marine Sanctuary and Channel Islands National Park, US). Some marine reserves are jointly managed by multiple nations, for example the Binational Red Sea Marine Peace Park, jointly managed by Israel and Jordan in the Gulf of Aqaba.

Various levels of use are allowed in MPAs. The least-protected MPAs include fishery manage-

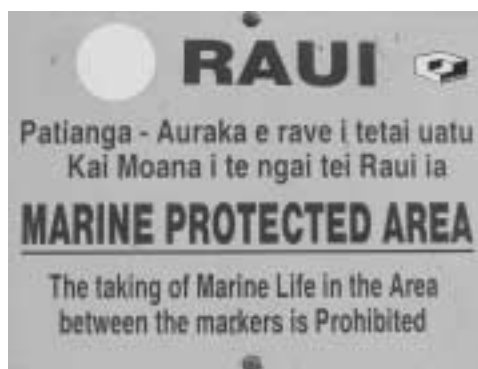


Fig. M7. Marine Protected Area on Rarotonga, Cook Islands (photograph courtesy of M. Lück).

ment and multiple-use areas (e.g. Florida Keys National Marine Sanctuary, Florida, USA). Other MPAs allow recreational use but have a 'no-take' **policy** forbidding **consumptive** use of any kind, such as Te Tapuwae o Rongokako Marine Reserve in New Zealand. Finally, the most-protected MPAs do not permit public access of any kind (for example, Crocodile National Wildlife Refuge in Key Largo, Florida).

Many MPAs are designed to conserve and restore specific fisheries or items of cultural **heritage**. For example, the Midway Atoll National Wildlife Refuge (**Hawaii**) was established both to protect items of historical importance from World War II and critical habitat for several endangered species, including the Hawaiian monk **seal**. As another example, king crab aggregations in Alaska are protected by the Bristol Bay fishery closure. The effectiveness of MPAs is frequently debated by the fisheries and conservation communities; however, a recent study reviewed 89 marine reserves around the world and indicated that such reserves do improve fish biomass and density by a factor of three and two, respectively, and that individual size and species diversity are improved by 20–30% (Halpern, 2003).

Currently, less than 1% of the world's oceans and coastlines are protected by MPAs. At the 2002 World Parks Congress held in Durban, South Africa, it was proposed that the level of protection be raised to at least 20% of coastlines by 2012. In 2006, US President George W. Bush designated 139,793 square miles (357,870 km²) of US territory as the world's largest marine protected area – the North-west Hawaiian Islands National Monument. This MPA will be larger than all US national parks combined, and will encompass **islands** and atolls from the main Hawaiian islands to beyond Midway Island. The next largest MPA is the 330,112 km² Great Barrier Reef Marine Park in Australia, created in 1975.

Marine tourism can be both a positive and negative force for MPAs. MPAs are often attractions for various tourist activities, such as **scuba-diving** and **snorkelling**, as they tend to preserve the local flora and fauna in a more pristine state, and thus tourism brings the tangible economic **benefits** of MPAs to the local community. A growing **ecotourism** industry can often provide economic and political

incentives for greater conservation efforts (Brown *et al.*, 2001). However, large numbers of tourists can exact a severe strain on the ecosystem and can threaten to degrade it if left unchecked, reducing the value of the MPA. For example, a 2002 study on diver behaviour in the **Red Sea** found around ten incidents of reef contact per dive, leading the authors to judge the current levels of diving tourism as being unsustainable (Zakai and Chadwick-Furman, 2002).

These trade-offs are felt in areas such as the **Caribbean**, where scuba-divers may account for one-fifth or more of the total tourism revenue, and MPAs are frequently used as recreational diving sites. The Red Sea, **Galapagos Islands** and Australia's Great Barrier Reef are also locations where heavy levels of diving tourism and MPAs intersect. Multiple-use **zoning** plans have been put forth as a possible solution to conflicts between users of MPAs. In addition, evidence suggests that critical biological and social thresholds exist and can be measured, above which the **values** of MPAs are reduced by ecological damage (Davis and Tisdell, 1995).

Related internet source

Department of Commerce (NOAA) web site on Marine Protected Areas: <http://www.mpa.gov>

S. Elizabeth Alter

Marine Raptor Marine raptors include fish eagles (including the American bald eagle), kites (see Fig. M8), osprey, fish owls and more.



Fig. M8. The Brahminy kite (*Haliastur indus*) is one of the most popular wildlife species in Pjang Nga Bay National Park, Thailand (photograph courtesy of M. Lück).

Known as predators, marine raptors are also rubbish collectors of the marine **environment**, gathering a considerable portion of their diet from floating carrion. Kites are considered the most manoeuvrable of raptors. Marine raptors are important elements of marine **nature-based tourism** throughout the Pacific Basin. Raptors are also an important element in ecosystems in Africa and South America.

John Gray

Marine Reserve: *see* **Marine Protected Area**

Marine Safety Authority (MSA)

Marine safety authorities are government agencies charged with the determination, promotion and maintenance of marine practices and safety **standards**. MSAs typically fulfil a range of functions including: (i) safety and design regulation; (ii) marine-related legal compliance; (iii) training; (iv) commercial shipping and recreational boating certification; (v) surveying and licensing; (vi) **port** operation and security; (vii) **search and rescue**; (viii) **navigation** aids and marine communication; (ix) marine accident investigation; and (x) environmental protection. In many countries, a range of agencies are responsible for various marine safety functions and the enforcement of law and regulations.

For example, the United States Coastguard provides a wide range of public services including recreational boating safety, aiding persons in distress, law enforcement and pollution control. Marine accidents in the USA or those involving US merchant **vessels** are investigated by the **National Transportation Safety Board**. In New Zealand, Maritime New Zealand is responsible for marine safety functions such as ship registration, seafarer qualifications and adherence to regulations relating to port operation and security.

MSAs provide a range of direct and indirect **benefits** to tourists: for example, the enforcement of shipping and port regulations facilitates the safe conduct of **cruise tourism**. In the event of a boating mishap, MSA will coordinate the search-and-rescue mission. The role of MSAs in environmental protection contributes to the **tourism** amenity found in marine environments. Through carrying out the range of functions and services, MSAs make a positive

and valuable contribution to the tourist experience of marine environments.

Related internet sources

United States Coastguard: <http://www.uscg.mil/USCG.shtm>

National Transport Safety Board: <http://www.nts.gov>

Maritime New Zealand: <http://www.msa.govt.nz>

Damian Morgan

Marine Sanctuary: *see* **Marine Protected Area**

Marine Sanitation Device (MSD)

A Marine Sanitation Device was commonly used on cruise ships prior to introduction of **Advanced Wastewater Treatment Systems (AWTS)**. One of two types of MSD is commonly used on cruise ships: maceration–chlorination or biological–chemical disinfection systems.

Maceration–chlorination systems reduce biosolids through maceration, internal dilution, oxidation and chlorine disinfection. The macerator pump breaks up solids in the sewage influent to a maximum particle size of 1.5 mm. The wastewater is then mixed with ambient sea water and passed between charged cell plates, causing the electrolytic breakdown of organic molecules and producing sodium hypochlorite from the salt in the sea water. In low-salt **brackish water**, some operators add chlorine to the tank to ensure that disinfection is complete, or add salt to the waste stream. No sludge is produced. Gases produced from reactions are mixed with ambient air and exhausted.

Biological and chemical disinfecting systems have three steps:

- **Aeration:** a process where raw sewage mixes with a large concentration of active aerobic bacteria that consume the organic waste in the sewage; the chamber contains air diffusers that provide oxygen to keep the aerobic bacteria healthy.
- **Clarification and filtration:** a filter removes larger pieces of organic waste not consumed by bacteria in the aeration chamber; the aerobic bacteria also consume the biomass on the filter.
- **Final chemical disinfection:** wastewater flows into the chlorine contact chamber and

remains until virtually all bacteria are killed, resulting in a chlorine residual of 1–2 mg/l (ppm).

Replacement of MSDs by AWTS after voluntary monitoring in Alaska in 2000 found that 79 of 80 ships' effluent had levels of faecal coliform or total suspended solids that would be illegal on land – up to 100,000 times the federal **standard**. All samples also contained 'conventional pollutants'.

Ross A. Klein

Marine Wildlife Tourism While **whale** and **dolphin watching** are probably the best known forms of marine wildlife tourism, this term covers a range of activities based mostly, but not entirely, on the observation of marine wildlife under wild or captive conditions. Other marine or estuarine species that are the focus of organized **tourism** operations include **pelagic** or ocean-going birds (**seabirds**), **penguins**, **turtles**, crocodiles, **pinnipeds** (**seals**, **sea lions** and walruses) and **sharks**. Commercially operated **aquaria**, **oceanaria** and **sea life centres** also offer an array of captive wildlife viewing opportunities featuring both vertebrate and **invertebrate** species.

Fishing-based tourism can be considered a form of marine wildlife tourism that involves the capture and subsequent release of the fish caught, or in the death of the fish either for food or as trophies and, as such, is regarded as a form of **consumptive recreation**. Just like its terrestrial counterpart, marine wildlife tourism offers opportunities for businesses and communities to establish ecologically and economically sustainable operations that might also lead to a greater appreciation for the wildlife being viewed. Such activities can provide a valuable source of income for many coastal **indigenous communities**, particularly if they are able to maintain ownership and control of the key elements of the experience.

While well-organized and sensitively run tours can provide opportunities for tourists to have profound experiences with marine animals, unregulated and poorly managed tours can create **impacts** that have negative effects on the natural behaviour and breeding success of many of these species. Several studies have found that dolphin and whale species can be affected by boats (and in some cases,

helicopters) coming too close to the animals, and that the noise of boat engines may interfere with dolphin **echolocation** systems. Seabird rookeries, spectacular sights popular with both serious bird observers and more casual nature tourists, are also affected by inappropriate visitation. Research conducted on **Antarctic** Adelie penguins indicates that nesting birds will stand off their nests if approached too closely, thus cooling the egg and compromising hatching success. Increased heart rates, an indication of stress, also occurred in penguins that were approached too closely by visitors. Similar findings have occurred in studies of other seabirds.

Scuba-diving and **snorkelling** are also popular activities involving the viewing of fish and other wildlife, which can sometimes create undesirable impacts relating to damage to **coral reefs** and interference with marine life. Regulations governing contact with certain animal groups such as whales and dolphins, turtles and nesting seabirds, as well as industry-based **codes of conduct** for both operators and tourists alike, have been established in many nations in an attempt to minimize the risk of harm or disturbance to these animals from tourists and tourism developments. Much more research is needed before the longer term impacts of tourist activities on marine wildlife are understood well enough to ensure the sustainable use of these animals in tourism ventures.

Related internet sources

Great Barrier Reef Marine Park Authority: <http://www.gbrmpa.gov.au>

International Association of Antarctic Tour Operators: <http://www.iaato.org/wildlife.html>

Marine Conservation Society (UK): <http://www.mcsuk.org>

Scottish Marine Wildlife Watching Code (draft): <http://www.marinecode.org/the-draft-code-g.asp>

Kevin Markwell

Maritime Events and Festivals

Maritime events and festivals are 'specific rituals, presentations, performances or celebrations that are consciously planned and created to mark special occasions or to achieve particular social, cultural or corporate objectives' (Allen *et al.*, 2002, p. 10) that are held on **water**. There are literally thousands of maritime events and festivals held each year.

These can involve **tall ship** flotillas, yacht races, celebrations of the great maritime journeys and the history of settler nations. More recently, maritime events have been used to promote the **tourism** qualities of city states that have a maritime history or focus.

One world-renowned example is in Australia, Sydney's New Year's Eve celebration held each year, where the **harbour** and Sydney's Opera House and Harbour Bridge provide the iconic backdrops for a spectacular fireworks display that is broadcast throughout the world. Maritime events and festivals differ from land-based counterparts through the numerous people participating in the on-water components involving the use of watercraft. Large numbers of boats require significant on-water planning by coordinating authorities, who adopt exclusion **zoning** as the main management strategy (see NSW Maritime, 2005a; Fig. M9).

Events using this strategy include race starts, fireworks, races, parades, concerts and assemblies, where exclusive zoning is required to facilitate on-water traffic flow, safety and risk

management considerations (NSW Maritime, 2005b). Furthermore, maritime events and festivals usually disrupt normal traffic flow on roads surrounding land-based spectating areas, as well as on-water participant and spectating areas. Maritime events and festivals are also used as a rationale for the redevelopment of some of the world's great dockland areas (e.g. London, Sydney, Dublin and Toronto) as these have moved from industrial to postmodern world cities (Marshall, 2001).

See also: America's Cup, Atlantic Rally for Cruisers, Around the World Yacht Races.

Related internet sources

Chicago Maritime Festival: <http://www.chicagomaritimefestival.org/2006>

Sydney to Hobart Yacht race: <http://rolexsydneyhobart.com/default.asp>

America's Cup: <http://www.americascup.com/en>

London Dockland: <http://www.lddc-history.org.uk>

Sydney New Year's Eve: <http://www.cityofsydney.nsw.gov.au/nye>

Simon Darcy



Fig. M9. An example of zoning for the Sydney-Hobart yacht race, 2004 (from NSW Maritime, 2005a).

Maritime Museum Maritime museums are vital links between visitors and marine environments, often being located near **harbour**, estuarine or seaside environments. Maritime museums primarily collect, manage, restore and exhibit artefacts or records related to maritime history. This can involve **conservation**, preservation, research, **interpretation**/visitor education, public sailings and service provision for staff and visitors. Collections can include charts, globes, ship logs, **navigation** equipment, art works, literature, models and full-scale original (or replica) boats and ships (see Fig. M10). Historical collections can be related to maritime exploration, naval history, settlement, ship or boat building and fisheries. Worldwide, there is a predominance of military maritime museums. Museums are increasingly involved in restoration projects of **heritage** boats or fleets, which are often major tourist attractions, for example, the SS *Great Britain* in Bristol or the *Royal Yacht Britannia* in Edinburgh (both UK). Contemporary ocean-going **vessels** may complement heritage fleets.



Fig. M10. The Maritime Museum of British Columbia in Victoria, Vancouver Island, Canada (photograph courtesy of M. Lück).

Maritime museums may range in scale from local collections to those of national and international significance. There are over 250 and 600 maritime museums in the USA and UK, respectively (Smith, 2006). Notable examples are the New Zealand National Maritime Museum, Australian National Maritime Museum, the **German Maritime Museum**, the RMS *Queen Mary* Museum in Long Beach, California, and the National Maritime Museum, Greenwich, London; this latter site is the world's largest maritime museum, presenting maritime history from 1450 up to the 21st century. The Royal Naval Base, Portsmouth, UK houses the Royal Navy Museum, **Submarine** Museum, Museum of Naval Firepower, HMS *Victory*, HMS *Warrior* and the *Mary Rose* Museum. At Greenwich, Sir Francis Chichester's boat, *Gipsy Moth IV*, is a reminder of the first solo sailing circumnavigation of the globe. Nearby, the *Cutty Sark*, the last tea clipper from the China tea trade is in **dry dock**. This vessel was badly damaged by fire in 2007, but restoration is under way.

Related internet sources

Australian National Maritime Museum: <http://www.anmm.gov.au>

New Zealand National Maritime Museum: <http://www.nzmaritime.org/home.html>

Smith's Master Index of Maritime Museums: <http://www.maritimemuseums.net/index.html>

The National Maritime Museum (UK): <http://www.nmm.ac.uk>

The Royal Naval Museum (UK): <http://www.royalnavalmuseum.org>

Anna Carr

Maritime Zone The Third **United Nations Convention on the Law of the Sea (UNCLOS)** provides detailed descriptions of various maritime zones. These maritime zones provide coastal states with different rights and responsibilities as to the waters located adjacent to their coastlines. UNCLOS provides for seven different maritime zones: internal waters, territorial sea, archipelagic waters, the **exclusive economic zone**, the **continental shelf**, the **high seas** and the area.

Internal waters are those waters located landward of baselines, usually the low-water line as marked on state charts and can be seen, in

general, as those waters within a state's coastline. The territorial sea comprises those waters that extend from the baseline up to 12 nautical miles (nm) in which states are expressly vested with sovereignty. Archipelagic waters are those sovereign waters within an archipelagic state subject to a number of limitations. The exclusive economic zone comprises those waters located beyond the territorial sea up to 200 nm in which states are expressly provided with sovereign rights as to living and non-living natural **resources**. The continental shelf is that area of the seabed that extends through the natural prolongation of its territory to the edge of the continental margin, or 200 nm, subject to limitations, on which states are vested with rights to explore and exploit natural resources. The high seas are all areas of the ocean that do not lie within the jurisdiction of any state. The area is the seabed located beyond the jurisdiction of any state, generally underneath the high seas.

Related internet sources

United Nations Division of Ocean Affairs and Law of the Sea: <http://www.un.org/Depts/los/index.htm>

International Tribunal on the Law of the Sea: <http://www.itlos.org>

International Maritime Organization: <http://www.imo.org>

Thomas Street

Marlborough Sounds, New Zealand

The Marlborough Sounds are located in the north-east region of New Zealand's South Island and include 4000 km² of bays, islands, peninsulas, coves and waterways. The main sounds are Queen Charlotte Sound, Pelorus Sound and Kenepuru Sound. The main port, Picton, is on the mainland at the head of Queen Charlotte Sound.

The Marlborough Sounds offer many opportunities for recreation and tourism. The main channels have calm waters and are popular for sailing, cruising and fishing. The bays, coves and inlets are perfect locations for sea-kayaking. The Marlborough Sounds offer some of New Zealand's best diving year-round due to the protection offered by surrounding hills and inlets that cut deep inland. One of the world's best wreck dives is the *Mikhail Lermontov*, a Russian cruise liner that sank close to the mouth of Queen Charlotte Sound in 1986.

The sheltered waters of the Marlborough Sounds also provide the perfect environment for the viewing of marine life. Many tours offer opportunities to view New Zealand fur seals (*Arctocephalus forsteri*), dusky dolphins (*Lagenorhynchus obscurus*), Hector's dolphins (*Cephalorhynchus hectori*), bottlenose dolphins (*Tursiops truncatus*), common dolphins (*Delphinus delphis*) and, occasionally, killer whales (*Orcinus orca*). Swimming with wild dusky dolphins is also popular in this area. Other wildlife attractions include little blue penguins (*Eudyptula minor*) and two rare New Zealand native seabirds, the king shag (*Leucocarbo carunculatus*) and the South Island saddleback (*Philesturnus carunculatus carunculatus*).

Related internet sources

Marlborough Sounds: <http://www.destination.co.nz/marlborough>

Official tourism site:

<http://www.destinationmarlborough.com>

Dolphin Watch Ecotours: <http://www.naturetours.co.nz>

Amy D. Whitt

MARPOL: see International Convention for the Prevention of Marine Pollution from Ships

Martha's Vineyard, USA This quintessential summer resort island lies off the coast of Cape Cod, forming a chain with the Elizabeth Islands. This island, of over 256 km², is a pleasant mix of bustling towns, such as Vineyard Haven and Edgartown, and remote areas such as Katama Beach and Menemsha (the setting for the movie *Jaws*). Like **Nantucket**, the Vineyard experienced financial good fortune from the **whaling** and **fishing** industries until the mid-19th century.

Today it is a playground for the rich and famous, with American movie stars, entertainers and presidents enjoying the **beaches**, shops and beautiful country roads that make up this retreat. Of interest to both the historian and visitor is the village of Oak Bluffs. The town was originally a summer encampment for Methodists who sought to escape the heat and stress of nearby cities such as Boston. Over time their tents became ornate gingerbread cottages in an architectural style known as Carpenter Gothic. The Campground is a charming enclave of remark-

ably detailed homes that provide summer living at its best. The Illumination Night, which occurs in August, features all the cottages brightly decorated, with Chinese lanterns producing a magical aura to an already exceptional environment.

Oak Bluffs proper, outside the campground area, is noteworthy as one of the first resort areas for African Americans of the upper middle class. For over a century, African Americans have come to the Vineyard to enjoy the shops and villages, the beaches and the harmony that typifies this special island.

Lee J. deLisle

Masirah Island, Sultanate of Oman

Masirah, the largest **island** in the Sultanate of Oman, is 14 km off the south-eastern coast of Oman, between 19–20°N and 58–59°E. One of the largest islands off the Arabian Peninsula, it has an irregular, oblong shape, about 66 km long from Ras Half in the north to Ras Abu Rasas in the south, and varies from 6 to 17 km in width. The land surface, coastal plains interspersed with hills, is about 655 km²; it is surrounded by spectacular barrier **coral reefs**, and coastal **mangrove** forests are widespread. The climate is generally hot and arid. A British Royal Air Force base was active on Masirah from the 1930s until 1977, when duties were transferred to local authorities. Permanent inhabitants immigrated with the construction of the military base, and there are now some 8000 inhabitants; **fishing**, net making and weaving are the main occupations, beside those related to the base.

Various wildlife species on Masirah include Arabian gazelle and Masirah hare, with several species of **seabirds**, **whales** and **dolphins** in the offshore waters. On its eastern coast the island provides nesting habitat for four of the five species of **sea turtles** known from the western **Indian Ocean**. Of special importance are the loggerhead and green turtles, the numbers of the former considered to be the largest in the world, with some 30,000 female loggerheads nesting per year. Turtles are hunted for meat, and eggs taken for food and medicinal purposes. Ra's al-Hamra on the mainland has one of the oldest cemeteries in Arabia, dating back to 3800–3300 BC. In nearly half of the 121 excavated graves, bones of sea turtles have been found, together with human bones, in

several cases lying in close contact – for example, entire turtle crania lying on an interred human skull. Hence, the region is of immense importance for both natural history and ancient human history. Despite a growing coastal **tourism** industry on the mainland, Masirah has limited tourist facilities.

Jack Frazier

Ali Bin Amer A-Kiyumi

Mass Market Cruise Line Mass market cruise lines provide basic cruise products at reasonable prices. These lines aim their service at attracting large numbers of passengers. Such lines generally have very large **vessels**, with lower unit product costs. Lines in this category include **Carnival**, MSC Cruise Line, Norwegian (including NCL America), **P&O Princess** and **Royal Caribbean**.

Fredrick M. Collison

Mass Tourism Mass tourism can be defined as a form of tourism in which large numbers of tourists (the 'masses') travel to similar places at similar times. However, although this definition encompasses the theme of 'scale', it can be viewed as somewhat of an oversimplification. As many authors have argued, mass tourism is more frequently viewed as a point of reference, a contrasting pole for other forms of tourism such as special-interest or alternative tourism (Moscardo *et al.*, 2001).

Mass travel developed due to the following two crucial factors: first, improvements in technology have allowed the transport of large numbers of people and, secondly, a greater number of people being able to enjoy the **benefits of leisure** time. During the earlier days of the tourism industry, travel was significantly aided by the forces of the Industrial Revolution. Rail, as well as sea, travel allowed tourism to begin its development into an international industry. However, the beginning of true international mass tourism can be marked by the growth of air travel following World War II. Also, with the development of modern jet airliners, along with cheaper air travel prices and the introduction of the packaged tour, the mass tourism industry really took flight. Today, massive new-generation aircraft such as Boeing's B747 and Airbus A380 have transformed the way people travel. In fact, the newly

launched A380 is capable of transporting some 555 passengers, making it the most advanced, spacious and efficient aircraft to date. Thus, air travel has afforded the 'masses' incredible opportunities to visit remarkable **destinations** the world over (see Fig. M11).

Of the many destinations being visited, marine-based destinations have experienced a dramatic increase in tourist visits in very recent times. In fact, marine and coastal tourism is one of the fastest-growing areas within the tourism industry (Hall, 2001). Some of the many recreational activities attracting large numbers of visitors to the marine **environment** include: **scuba-diving, fishing, snorkelling, reef-walking**, cruising, marine wildlife viewing, boating and **sea-kayaking**. Although some forms of marine tourism, such as marine wildlife viewing, may be viewed as lower impacting or alternative forms of tourism, others such as cruising continue to be a major force in modern tourism in attracting the masses.

The viewing of wildlife in their natural habitat is an activity that has grown exponentially in the past decade; **whale watching**, for example, currently takes place on every continent and in countries as diverse as Argentina, South

Africa, Japan, Canada, Norway, New Zealand and Tonga (Orams, 2000). Scuba-diving has also become a mass movement in the marine tourism sector as many divers flock to marine environments yearly to partake in this popular activity (Van Treeck and Schuhmacher, 1998). Although mass marine tourism appears to be beneficial economically, there are also concerns regarding the ongoing management and conservation of marine tourism resources.

Roberto D. Altobelli
Torsten Kirstges

Mediterranean Sea The Mediterranean Sea is an inland sea surrounded by Asia, Europe and Africa. In the west the sea is connected to the **Atlantic Ocean** by the Strait of **Gibraltar**. In the east it is linked to the **Red Sea** and the **Indian Ocean** by the **Suez Canal**, and the Black Sea at the Dardanelles and the Sea of Marmara.

The Mediterranean Sea covers an area of 2,509,000 km². It has an east-west extent of 3900 km and a maximum width of 1600 km. Generally shallow, with an average depth of 1500 m, it reaches a maximum depth of 5150 m off the southern coast of Greece. The



Fig. M11. Many towns on the Spanish island of Majorca are traditional destinations for mass tourism, such as El Arenal on the south coast (photograph courtesy of M. Lück).

coastline of the Mediterranean Sea extends over 46,000 km, touching 22 countries.

Thirty million years ago, in the Oligocene epoch, the Mediterranean Sea appeared from the vast ancient sea called Tethys, when the tectonic plates of Africa and Eurasia collided. Today, the plates are still grinding together, causing the appearance of volcanoes such as Vesuvius, Stromboli and Mount Etna in Italy. Frequent emerging earthquakes that historically have destroyed parts of Italy, Greece and Turkey are still one result of moving tectonic plates.

The Mediterranean is divided into eastern and western basins by an undersea sill from Sicily to Tunisia. Moreover, another seafloor sill, which is only 300 m deep and stretches from Spain to Morocco, restricts the water circulation of the Mediterranean and the Atlantic through the Strait of Gibraltar. This restriction of circulation causes the reduction of tidal range and, in connection with high levels of evaporation, makes the Mediterranean much saltier than the Atlantic Ocean.

The year-round relatively mild climate, the endless coastlines and **islands**, as well as the close proximity to Northern Europe (2–3 hours' flight) make the Mediterranean one of the most popular holiday **destinations** in the world. The **Balearic Islands** (Spain), for example, were at the forefront of the **mass tourism** development in the 1960s.

During the 12th Conference of the Contracting Parties to the Barcelona Convention (Monaco, November 2001), 21 Mediterranean countries and the European Union (EU) decided, according to the process of the World Summit of Sustainable Development (Johannesburg, South Africa, 2002), to prepare a 'Mediterranean Strategy for Sustainable Development' (MSSD). The MSSD is meant as a framework strategy, to adapt international commitments to regional conditions, to provide a sample for national sustainable development strategies and to pursue a cooperation between Mediterranean countries with varying levels of development. Within the strategy, the partners call for action to strengthen sustainable development to foster peace, prosperity and stability. This also implies reducing the gap between industrial and developing countries connected to the Mediterranean Sea.

The Strategy takes into account recent developments in regional cooperation, with particular reference to the Mediterranean Action Plan and the Euro-Mediterranean Partnership, the Arab Initiative for Sustainable Development and the EU Sustainable Development Strategy. The EU Strategy directly concerns Mediterranean EU Member States and countries likely to become EU members. It also indirectly affects the EU's Mediterranean neighbours in setting the requirement that all Community policies must place sustainable development as their priority.

(United Nations Environment Program, 2005)

Since the EU launched the goal of 'depolluting' the Mediterranean, this Strategy could play a leading role in reducing the **impact of tourism** on the Mediterranean Sea.

Related internet source

Plan Bleu: <http://www.planbleu.org/indexUK.html>

Friedrich Zimmermann

M.E.E.R. e.V.: see Mammals Encounters Education Research

Megaship The term 'megaship' first appeared in 1988 when **Royal Caribbean Cruise Line** introduced the *Sovereign of the Seas*, a 73,192-ton (74,400 t) ship that accommodated more than 2800 passengers and 800 crew members, branding her as 'the largest ship ever built'. Many in the late 1980s wondered whether cruise ships could ever become larger than the *Sovereign of the Seas* and its two sisters. However, it was not long before newer and larger ships were introduced.

Carnival Cruise Line launched a new wave of megaships in 1997 with its first Destiny class ship: 101,000 tons and with a passenger capacity of 3400. Princess Cruises followed a year later with the *Grand Princess*, physically larger at 109,000 tons but accommodating a 'mere' 2600 passengers. These ships were the start of a competition for the largest ship afloat, which included vying for the distinction of having the most passengers on board (and listed in the *Guinness Book of World Records*). That honour was held in turn, by the *Monarch of the Seas* in 1992 (2655 passengers), *Carnival Destiny* in 1996 (3255 passengers), *Carnival Triumph* in 1999 (3413 passengers) and the 142,000-ton *Voyager of the Seas* in

2000 (more than 3600 passengers, and the ship could actually accommodate 3840).

Megaships have continued to grow. In 2006, Royal Caribbean International introduced the 160,000-ton *Freedom of the Seas* (approximately 4300 passengers), followed by her sisters *Liberty of the Seas* in 2007 and *Independence of the Seas* (due to be launched in 2008). Royal Caribbean will introduce its first of two Genesis class ships in 2009, each accommodating more than 6000 passengers and more than 1500 crew members.

Ross A. Klein

Melanesia The following islands and groups of islands are traditionally considered part of Melanesia: Fiji, New Caledonia, New Guinea, Solomon Islands, Vanuatu, Maluku Islands and the Torres Strait Islands (administered by Australia).

Fiji's tourism sector is dominant within the Melanesian group of nations, with over 500,000 arrivals in 2004. The Fijian tourism industry has been described by the Asian Development Bank in their Outlook 2006 as the 'pillar of the Fiji economy'. In the north of the country, where dwindling EU subsidies and expiring land leases have had a negative **impact** on agriculture, **tourism** can provide a particularly important source of economic development.

Despite some political unrest in the past two decades Fiji has continued to grow as a tourist **destination**, and much of the development has been based around 'sun, sand and sea'-based **mass tourism**. The most popular areas have developed relatively near to the major international gateway of Nadi. Like many nations in the developing world, Fiji is facing the challenge of managing tourism growth in a fashion that is environmentally sustainable and is also in keeping with the needs and wishes of host communities. Nowhere are these tensions more keenly felt than in the marine **environment** and coastal areas.

The mixed tourism and residential development at Denaru, just 20 minutes away from the main airport, provides a good example of the rapid changes in coastal geography associated with increasing **coastal area reclamation** driven by tourism and urbanization. Aggregate mining in **reef** areas also causes coastal insta-

bility and pollution and, of course, damages the reef itself. Reef damage reduces the experience of visitors, but more importantly can have a dramatic impact on local **marine ecosystems** and fisheries. The Denaru development is on a low-lying coastal area and has had a major impact on **mangroves**. Such low-lying developments are also prone to difficulties should **cyclone** activity or sea-level rise cause flooding.

Tourism development is also spreading beyond the main island of Viti Levu to outer islands, including the largest northern island, Vanua Levu. The Savusavu area, in particular, is likely to see significant growth in the future. Savusavu's development is driven by new **marina** construction and related accommodation. **Diving, snorkelling** and **cruise** activities are the dominant offshore uses of the marine environment by tourists that visit outlying areas of the Fijian group. Charter **fishing** also represents a sector with some potential for development.

Government **policy** in the area of marine tourism is focused on enabling local people to have a greater say over the use and planning of marine **resources**. Community consultation and agreement is a vital element of any new tourism development, and local people must be guaranteed access to marine resources. Increasingly, local people are also becoming directly involved in developing marine-related tourism products and experiences. Local Fijians are heavily involved in the dive sector and are also a growing component of the fishing charter sector.

Vanuatu stretches from the Banks and Torres Islands in the north to the islands of Tanna and Aneityum in the south. The economy of Vanuatu is primarily based on small-scale agriculture, which provides the country's principal exports. Like many nations in the Melanesian group, Vanuatu is characterized by a substantial deficit on its trade account; nevertheless, it has a smaller current account deficit due to revenue generated from offshore financial services and tourism. Tourism is seen as a vital pillar in supporting economic stability and growth.

Vanuatu has the second largest tourism sector among the Melanesian nations, but its performance since 2000 has been somewhat constrained by high costs relative to competitors, weak investment in new accommodation

and relatively limited air links. Total tourist numbers in 2004 were approximately 60,000.

Most tourist facilities are on the island Efate, but tourist activity also occurs on Tanna (location of the active Yasur volcano), Espiritu Santo and Pentecost (renowned for the ritual of N'gol, where young people jump from a tree with vine leaves around their ankles).

Resort tourism based on **beach** and **water** activities (specifically swimming, snorkelling, **sea-kayaking**, **game fishing**, **sailing**, **windsurfing** and **water-skiing**) predominates, but business tourism (including conferences and incentives) accounts for one-fifth of tourist arrivals. Tourism to Vanuatu remains dominated by Australians, and New Zealand is the second-largest source market. The European and North American markets are relatively small. Both Australia and New Zealand are served by direct flights from Vanuatu's national carrier, Air Vanuatu.

Tourism is a major source of employment on the main island of Efate, especially in the capital, Port Vila. The industry's role as an employer is also felt on Espiritu Santo and Tanna. In general, however, limited tourism and infrastructure development on the outer islands has meant that tourism development in the Port Vila area continues to be a major magnet for those seeking work. Taking account of the part-time/occasional, indirect and induced employment attributable in large measure to tourism, the South Pacific Tourism Organization (SPTO) estimates that the sector may account for 12% of the ni-Vanuatu workforce – almost half of the employment in the services sector.

Bauerfield International Airport on Efate Island, close to the capital city, is the port of entry into Vanuatu. Domestic services are operated by the government-owned Vanair to a range of mainly unpaved domestic airfields. Access to the islands is restricted to Twin Otter aircraft, with the exception of Tanna and Espiritu Santo, the latter being the only outer islands to receive a daily air service.

Vanuatu has two international shipping **ports**, Port Vila on Efate and Luganville on Espiritu Santo. Cruise ships call at both these ports and at 'Mystery Island', where supplies are brought in for the cruise ship passengers to enjoy a beach and bathing experience in a remote setting. Day visitors (cruise ship visitors)

have been a highly volatile segment for much of the past 20 years, with major fluctuations in visitor numbers occurring; numbers have been as high as 50,000 visitors per annum.

The diving industry in Vanuatu is centred around Espiritu Santo and, in particular, the world-famous *President Coolidge* wreck. Vanuatu's culture is diverse and retains its traditional customs. In most cases the interface between traditional customs and tourism is positive for both visitor and local; on occasions, however, tensions can arise and in many cases these tensions occur at the water's edge. In recent years there have been some confrontations between cruise ship operators and local landholders over the amount of compensation to be paid for use of the locally owned waterfront. Some tourists are also unaware of the fact that many beaches around the island of Efate require an entry fee.

Marine-based activities feature strongly in the Vanuatu government's plans for future tourism development. The current objectives for the tourism sector, as stated in the August 2004 Statement of National Investment Policy, include the need to promote the industry as a means of conserving Vanuatu's unique culture, archaeological and historical sites, and the natural environment, including the nation's marine ecosystems. There is also a call to facilitate foreign investment in a range of new marine-related experiences that offer potential for high-revenue returns, including natural **dolphin** parks and **dolphin-assisted therapy** (swimming and interacting with dolphins for health purposes). Inter-island cruising and yacht charter operations are also seen as major areas for future growth, as are dive operations in some of the less-developed offshore islands.

Any growth in tourism within Vanuatu (or elsewhere in Melanesia) will create the potential for increased environmental degradation in the offshore and coastal zones. Coastal development represents a moderate-to-severe threat around Efate, resulting in the destruction of **coral reefs**, **lagoons**, **seagrass** beds and beaches. There are real concerns about species depletion or loss, and also concerning ground and surface water shortages as a result of developments. The collection of corals and molluscs for the souvenir trade has also been identified as a marine threat driven by the expansion of tourism.

The disposal of solid waste is also resulting in the deterioration of aesthetics, alteration of coastal habitats and damage to coastal and marine life. Beach litter has become a growing problem in coastal areas near to the main urban centre of Port Vila, and has been the focus of several tourism industry-led clean-up campaigns. A lack of adequate waste disposal regulations, inadequate enforcement and limited public awareness frustrate control of this problem.

Simon Milne

Melville, Herman: see also *Moby Dick*
Author, poet and traveller Herman Melville (1819–1891) is perhaps best known for producing one of the greatest American literary works of the 19th century, the novel *Moby Dick*, inspired by his 3-year voyage on the whaling ship *Achusnet*. The young Melville left the port of Fairhaven, Massachusetts in 1841 and headed off for the South Seas, but his orientation towards a life at sea had begun 2 years earlier, as a merchant mariner. Melville's whaling adventure around the globe came to an end when he jumped ship at the Marquesas Islands. Melville later reached Hawaii and eventually worked his way back to New York, where he began to write books based on his travel memoirs, such as *Typee* and *Mardi*, and developed a name for himself as a young writer of note.

He then sought a base to pursue his writing and purchased the farm Arrowhead in the Massachusetts countryside, where he wrote poetry, short stories, magazine articles and novels, including *Moby Dick*. Arrowhead is now a museum based on the life of the Melville family in the Berkshires. The port of New Bedford also uses the Melville association with whaling for tourism purposes, with a brochure, 'Melville's New Bedford', available for those wanting a self-guided tour. Melville's work tapped into the human fascination with whales, which is manifested in the growth of whale watching and associated tourism.

Related internet sources

Berkshire Historical Society – Herman Melville's Arrowhead: <http://www.mobydick.org>

City of New Bedford, Office of Tourism and Marketing: <http://www.ci.new-bedford.ma.us/Nav5.htm>

Louisiana Office of Tourism: <http://www.louisianatravel.com>

Seamen's Bethel:

<http://www.newbedfordseamensbethel.org>

Jennifer Laing

Geoffrey Crouch

Memorandum of Understanding (MOU)

A memorandum of understanding is a common legal document in which two or more parties formalize an agreement. It has been used in some jurisdictions to lay out environmental behaviour expectations of cruise ships, most notably in the US states of Florida, Washington and Hawaii. The strength of an MOU is that a government can gain agreement for certain behaviours or actions without the time and expense needed to promulgate laws. The weakness of an MOU is that in most cases it is non-binding in a strictly legal sense, and often violations are not known and, when they are found out, are often not penalized. While the cruise industry appears to prefer these voluntary arrangements to legislated regulations, the Organization for Economic Co-operation and Development notes, in a report published in 2003 (*Voluntary Approaches to Environmental Policy: Effectiveness, Efficiency, and Usage in Policy Mixes*), that there are few cases where voluntary approaches have improved the environment beyond a business-as-usual baseline.

Related internet sources

The Cruise Industry and Environmental History and Practice: Is a Memorandum of Understanding Effective for Protecting the Environment: http://www.bluewater-network.org/reports/rep_ss_kleinrep.pdf

Ross A. Klein

Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-east Asia

The Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-east Asia (IOSEA) is a non-binding agreement under the Convention on the Conservation of Migratory Species of Wild Animals (CMS), which was developed between 1999 and 2001 and became effective on 1 September 2001. Appended to the MOU is an ambitious Conservation and Management

Plan, organized into six objectives, with a total of 105 activities.

At the time of writing there are 23 Signatory States. The MOU covers a region extending from South Africa to the Republic of **Korea**. A Secretariat for the MOU is housed in UNEP facilities in Bangkok. A ten-person Advisory Committee is selected by consensus. The Region is not only vast, but has enormous diversity in cultures, economies, histories, languages, laws, political systems and **environments**. The working language of the MOU is English; the official text is also in Arabic and French, and the MOU has been translated into at least four other languages. Hence, sub-regional groupings of the **Indian Ocean** are under consideration: Western, Central, and Northern, as well as South-east Asia. An advanced electronic reporting facility, a projects database and an interactive mapping tool are available on the IOSEA web site, which has monthly updates of programmes and news briefs for the region.

The Signatory States agreed to organize the Year of the Turtle for 2006. Like the **Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC)**, specialists outside governmental delegations contributed substantially to the development of the instrument. **Non-governmental organizations (NGOs)** continue to be active and welcome at the meetings of the Signatory States. The Secretariat has initiated interactions with the Indian Ocean Tuna Commission (IOTC) and other regional bodies with concern for the marine environment, such as the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) and South Asia Cooperative Environment Programme (SACEP), while the South East Asian Fisheries Development Center (SEAFDEC) is a valuable ally for the ASEAN area.

Related internet source

Indian Ocean – South-east Asian Marine Turtle Memorandum of Understanding: <http://www.iosea.turtles.org>

Jack Frazier

Mergui Archipelago, Myanmar and Thailand Spread over a maritime area of

48,000 km² between 13°14' and 8°54'N **latitude**, some 840 **islands** form the Mergui Archipelago, known also as 'Myeik' in Myanmar, to which 95% of the islands belong. Emerged peaks of several submarine ridges, the islands fall into the Indo-Chinese and Sundaic biogeographic realms. The **archipelago** sits on the Burma Bank, where relatively little has been documented, but the area is thought to be of great regional importance for marine and coastal biological diversity. This includes large **mangrove** forests, ancient cycus trees, rich **coral reefs**, many species of **sharks** and birdsnest swiftlets in caves, and outstanding landscapes and scenery.

The oldest ethnic group is the Sea Gypsies, called 'Salone' in Myanmar and 'Mokan' in Thailand. They live on their boats during the dry season (October to April), and in small settlements during the rest of the year. Ethnic Burmese and Thais also have permanent settlements, but the majority of the islands have no permanent habitations. Major fisheries include sea cucumber, molluscs, spiny **lobster**, grouper, Indian mackerel, sardine, snapper and tuna. Some legal logging also occurs.

Myanmar has established Lambi Marine **National Park**, an ASEAN **Heritage Site**, and the National Shark Reserve, while Thailand has established Laem Son, Phayam, Phra Thong, Simlon Island and Surin Island National Parks. Marine **adventure tourism** has become increasingly popular, especially from companies based in Phuket that bring dive boats into less-developed Myanmar, where a small number of national tour companies are now licensed.

Major threats to the **environment** include illegal logging, dynamiting for fish, over-exploitation of certain areas, marine pollution, sedimentation, anchor damage and trampling. Many of the problems in Myanmar are driven by economic gain through (illegal) export to Thailand. Rapid social change threatens the **resource** base, way of life and culture of the Sea Gypsies.

Related internet source

Shambhala Tours: <http://www.shambhalagroup.com>

Jack Frazier
Yuza Maw Htoon

Mermaid Mermaids are mythical marine creatures with a human-like female head and upper torso and the lower body of a fish. The myth is deeply embedded in the folklore of the sea and is possibly associated with **dugongs** or **manatees**, **marine mammals** found in coastal waters. Contemporary media have promoted the myth through movies such as *The Little Mermaid*.

Bruce Prideaux

Mermaid Lines Mermaid lines are lines of ropes with floats that are streamed from a **vessel's** stern. Swimmers participating in a swim with wildlife (e.g. humans swimming with free-ranging **dolphins**) hang onto these lines. In some parts of the world, it is a legal requirement that swimmers hang onto these lines at all times during a human-wildlife swim. Mermaid lines may be used as a safety device for tourists (e.g. in strong **currents**) and/or a tool to reduce the **impact** that human swimmers may pose on the targeted wildlife. The effectiveness of mermaid lines as opposed to free swims has not been evaluated.

Carol Scarpaci

Mermaid Propulsion: see **Azimuthing Propulsion**

META: see **Marine Ecotourism for the Atlantic Area**

Micronesia, Federated States of Politically, Micronesia is divided between eight territories: The Federated States of Micronesia (sometimes referred to simply as 'Micronesia', or alternatively abbreviated 'FSM'); The Republic of the Marshall Islands; the Republic of Palau; the Commonwealth of Northern Mariana Islands; the Republic of Nauru; the Republic of Kiribati; and the US territories of Guam and Wake Island.

This region of the Pacific has been heavily influenced by both Japan and the USA, and was the scene of many large-scale battles during WWII – both on land and at sea. The relics of these battles now represent an important **tourism** asset for many of these nations – attracting returning servicemen wishing to see the areas they once fought in, and younger generations of divers and sightseers.

The **resource** base and economic structures of these **island** nations vary considerably and are often tied closely to military- and tourism-based relationships with Japan and the USA. The economy of Guam, for example, revolves around the presence of US military bases and servicemen. This US territory has also come to rely heavily on large numbers of Japanese tourists seeking a tropical climate and attractions, and also on a range of US-owned shopping outlets.

The economy of the Federated States of Micronesia is also closely tied to the USA through grants received under the Compact Agreement, which was part of its gaining independence in 1987. As in other Pacific nations, these aid payments make up a substantial component of the FSM economy. In 1997, when US Compact grants were reduced by 22%, the economy contracted by more than 6%.

The FSM have a total population of approximately 110,000 and are a federation of four states – Pohnpei, Chuuk, Yap and Kosrae – each of which has considerable autonomy in defining its economic **policies** and approaches to development. The government remains the major single source of employment – accounting for over 5500 formal-sector jobs – but in total the private sector has now outstripped the public sector as a source of employment. The relatively high level of unemployment has also been a factor behind a strong outward flow of people seeking jobs in the relatively high-wage economy of Guam and on mainland USA.

In each of the FSM states, marine-focused tourism is seen as an important tool in achieving income and employment generation for local citizens; nevertheless, the industry is in a very early stage of development. Total visitor numbers have fluctuated between 15,000 and 20,000 since 2000, with the USA and Japan accounting for around 50% of all international visitor arrivals. Many of the arrivals are accounted for by business-related travel.

There are several constraints to the development of **marine tourism** in the FSM. Human resource development across most segments of the tourism industry is at a rudimentary level and training requirements are significant. Infrastructure also remains a problem. **Water quality** and sewage disposal require improve-

ment in much of the FSM, while electricity supply and telecommunications can be inconsistent. Air access is delivered through a subsidized service provided by a large US carrier that flies to all the states three times a week from Honolulu, via the Marshall Islands. The carrier also provides services from Guam, providing useful links to South-east Asian markets and, in particular, Japan.

There are no marine transport services to the outer islands of the FSM that are suitable for tourist use. **Dock** facilities in the **lagoon** islands, particularly in Chuuk lagoon, are inadequate and hamper the development of the dive industry. Marine recreational facilities such as **piers** and cruise terminals are almost entirely lacking.

While many factors have impeded tourism development, the FSM has considerable potential. The main feature attracting international visitors is the high quality of dive attractions. **Coral**, fish and WWII wrecks are the main draws for these visitors – with the Truk lagoon regarded as perhaps the best site in the world for diving on war-related relics. While other attractions, such as charter **fishing**, cultural activities, historical terrestrial ruins (Nan Madol and Leluh) and WWII battle sites, help to contribute to the diversity of visitor experiences, they are not, in themselves, ever likely to match **diving** as a focus for leisure visitors.

The Marshall Islands, located at 4–19°N **latitude** and 160–175°E **longitude**, is made up of 29 coral **atolls** and five single islands spread over an **exclusive economic zone** of nearly 1.2 million km². The atolls themselves comprise a further 1220 islands. In effect, the nation's land mass accounts for only 0.1% of its total territorial area. The country is made up of two key island groupings, the Ratak Chain and the Ralik Chain, and has a population of approximately 55,000. Most of the population (nearly 50%) reside in the capital – Majuro Atoll.

During WWII the Marshall Islands served as the eastern defensive perimeter for Japanese military forces in the central Pacific. After taking control of the Marshalls from Germany in 1914 the Japanese increased their military presence – with the 1930s witnessing the heavy fortification of the atolls of Kwajalein, Wotje, Maloelap, Jaluit and later, Mili and Enewetak.

The 3 years of fighting between US and Japanese forces (1942–1945) left behind a diverse array of war wrecks and relics.

In 1947 the Marshall Islands were given by the United Nations to the USA as a Strategic Trust. In 1951 the administration of the islands switched from the US Navy to the Department of the Interior. During the late 1970s a growing desire for independence saw the beginnings of a move towards self-determination. In 1986 a Compact of Free Association was signed with the US government – transforming the US Trust Territory into a freely associated nation, the Republic of the Marshall Islands.

Much of the drive for self-determination was based on concerns over the US use of the islands as a base for a series of nuclear weapon tests. The atolls of Rongelap and **Bikini** were the sites of some of the largest above-ground hydrogen bomb tests ever conducted. The **impacts** of the tests on the populations of these islands was devastating – with many communities being resettled and much of the population being directly exposed to radioactive fallout. Since republic status was achieved, the USA has continued to make use of the Marshall Islands as a testing ground for unarmed Intercontinental Ballistic Missile tests – with the waters of, and skies over, Kwajalein Atoll (the largest atoll in the world at over 1400 km²) being used as the final destination for missile launch/destroy tests. Most of the 10,000 Marshallese living on Kwajalein are employed in some way in servicing the highly sensitive military activities that are located on the atoll.

Most international arrivals come in the form of business- and military-related arrivals. No accurate figures exist for the number of genuine leisure visitors that arrive each year. Majuro, the site of the major international airport, plays host to virtually all leisure tourists and offers visitors a glimpse of what the rest of the country is like. Despite pollution being a problem in some sections of the 180 km² lagoon, the outer stretches of the island such as Laura Village at the far western end of the atoll provide opportunities for lagoon boat trips and **scuba-diving** or **snorkelling** activities.

The military activities that have shaped the Marshall Islands represent the main draw for this small nation's nascent tourism industry. Several areas outside Majuro have been able to

tap into tourism development. There is basic accommodation in Arno, Jaluit, Mili and Likiep, but many of the activities that take place outside Majuro involve charters or small, sea-faring **vessels**. Dive packages to the atolls of Bikini and Rongelap are available. The USS *Saratoga*, a WWII US naval aircraft carrier, the world's largest diveable wreck, and the only diveable aircraft carrier in the world, rests at the bottom of Bikini Atoll. The Battleship HIJMS *Nagato*, the flagship of the Imperial Japanese Navy, is also to be found at Bikini.

Relics are not, however, the only attraction for divers. With excellent underwater visibility, year-round warm weather, 250 species of hard and soft coral and over 1000 species of fish (several of which are endemic), the Marshall Islands also offer a range of attractions for those seeking natural attractions. Inshore waters are particularly diverse in terms of fish life, with over 860 inshore/**reef** varieties to be found.

Fishing is another important pursuit for a smaller group of tourists, with opportunities existing within lagoons, on reef flats and on the open ocean. This diverse array of **marine environments** enables anglers to employ **fly-fishing** techniques, trolling, jigging, bottom-fishing and a number of other methods.

The nearby nation of Kiribati serves to highlight the key role played by air and sea transport in tourism development in Micronesia. This nation, like the Marshall Islands, has a vast sea area. Its 33 atolls are home to over 100,000 people. The Gilbert Islands (now Kiribati) were granted self-rule by the UK in 1971, complete independence coming in 1979.

While it does not share the diverse array of war relics found elsewhere in Micronesia, Kiribati does have several important battle sites and also offers an array of interesting diving and fishing opportunities. The bulk of international tourists are, however, coming for short-term, work-related activities. Total arrival numbers by air have hovered around 3000–5000 since 2000. The bulk of international air travellers do not move beyond the main atoll of Tarawa.

Air links to Kiribati have always been problematic. Without the ability to rely on a large international carrier, unlike their neighbours the Marshall Islands and the FSM, the Kiribati government has been forced to subsidize small

and often unreliable airlines from around the region in the hope of receiving some international connections. Attempts by the Kiribati government to own and control their own international airline ended when it collapsed in 2004. Air Kiribati now flies only domestically.

Cruise-based visits have, on the other hand, grown on the back of reliable and frequent schedules. Fanning Island, situated in the far east of the nation, is the focus of the growing **cruise industry**. The year 2003 saw a rapid growth in cruise arrivals from Hawaii (over 65 vessels) and total visitor numbers of 120,000, compared with approximately 10,000 visitors in previous years. This rapid growth has stemmed from the introduction of weekly visits by a major cruise line operating from Hawaii. While there are concerns that the number of cruise visits could decline just as quickly as they have risen, it is likely that cruise tourism will remain an important component of the national economy.

As in many of the densely populated atolls of Micronesia, Kiribati faces a range of pressing environmental concerns that can have a direct impact on marine tourism development and resident quality of life: fill reclamation for road construction, blasting for reefs for boat channel construction and aggregate mining for building purposes have led to concerns over coastal **erosion** – especially in the heavily populated area of South Tarawa. The South Tarawa lagoon is also heavily polluted by lagoon toilets and open-pit dumping. Such activities not only place sea water quality at risk but also threaten ground-water resources. The issue of sustainable shore-front development is one of the most pressing concerns facing this nation. Simon Milne

Midcentric: see Continuum of Vacation and Leisure Travellers

Migration

1. Whales

Most baleen **whales** undertake annual migrations from their feeding grounds in the cooler, food-abundant waters of the high **latitudes** to their mating and birthing grounds in warmer, sheltered waters of the low latitudes. Why whales leave the rich feeding areas is not yet fully understood.

Some of the factors that may influence whale migrations are climate changes, water temperature, depth and **salinity**, and the topography of the sea floor. It is likely that some of these factors enable the whales to follow their migration routes over distances of up to 20,000 km. Some of the longest migrations are undertaken by grey whales, which travel between their southern breeding grounds off Baja California, Mexico and their northern feeding grounds off Alaska and the Beaufort Sea. Humpback whales are also known to undertake long journeys, migrating south from the **Arctic** or north from the **Antarctic**, to the tropics.

The whales whose migration patterns are best understood and which follow the coast are often the focus of well-developed **whale-watching** industries and research projects. Their appearance in a particular coastal location at a given time means that there is almost a certainty of seeing them. Grey, humpback, right and minke whales are the focus of whale-watching industries around the world, whilst sighting the more enigmatic fin, blue and sei whales relies more on chance encounters.

Alexandra Coghlan

2. Other Species

Migration refers to the movement of individuals and their propagules (e.g. larvae, seeds or spores) from one region to another. Three cases can be identified: (i) emigration, which is outward only; (ii) immigration, which is inward only; and (iii) migration, which in this more exact sense refers to the periodic, two-way movement to and from a given region and usually along well-defined routes. In the case of (i) and (ii), movement usually occurs because of environmental disturbance, such as fire or flooding. Increasingly, such migration may also occur because of anthropomorphic disturbance as a result of habitat and environmental changes related to land use, urbanization, pollution or changes to ecological systems. The capacity of species to cope with such migration is dependent on the suitability of the environments to which they have moved.

Two-way migration is the form of migration that most people associate with fauna. In the marine **environment** many fish and mammalian species engage in migration

patterns that are regular in time and space. The link between two biogeographical regions that allows the interchange of animals or plants is referred to as the migration route. For **conservation** purposes attention is often focused on how the environment and/or human practices can be maintained along the migration route or corridor in order to enable species to move without unnecessary reductions in numbers.

Because migration patterns cross national borders, successful conservation of migrating species requires the development of international conservation agreements that regulate human activities in relation to the different life stages and habitats of target species. For example, Canada and the USA have developed agreements with respect to the exploitation of Pacific salmon, including the establishment of a Pacific Salmon Commission to implement the Pacific Salmon Treaty, while **non-governmental organizations** are seeking similar regulation with respect to Atlantic salmon.

At a global level, the **Convention on the Conservation of Migratory Species of Wild Animals (CMS)** aims to conserve terrestrial, marine and avian migratory species throughout their range. As of December 2005, 95 states have become parties to the Convention. CMS acts as a framework convention that provides for agreements that range from legally binding treaties between state parties to **memoranda of understanding (MOU)**. Treaties concluded under the CMS have been developed in relation to marine species, including **albatrosses** and petrels, African–Eurasian migratory waterbirds, **seals** in the **Wadden Sea**, and **cetaceans** in the **Mediterranean**, Black Sea and the Waddell Sea. MOU have also been developed with respect to marine **turtles** of the Atlantic coast of Africa, and of the **Indian Ocean** and South-east Asia. The **Convention on Wetlands of International Importance**, popularly referred to as the RAMSAR Convention, is also of significance in the conservation of coastal **wetlands** that are of significance to migratory birdlife. Despite the development of international conservation agreements, many marine migratory species remain under threat because of overexploitation, pollution and habitat damage.

Related internet sources

Convention on Migratory Species: <http://www.cms.int>

The International Atlantic Salmon Accord: <http://www.asf.ca/Nasco/Nasco.html>

Pacific Salmon Commission: <http://www.psc.org/index.htm>

C. Michael Hall

Mingan Island Cetacean Study (MICS)

The Mingan Island Cetacean Study (MICS) is a non-profit research organization dedicated to ecological studies of **marine mammals**. Founded in 1979 by Richard Sears, MICS was the first organization to carry out extensive, long-term research of cetaceans in the **Gulf of St Lawrence**. The principal study area is along the Quebec North Shore in the Mingan Island/Anticosti region. MICS is best known for being the first organization to carry out long-term studies of the blue whale (*Balaenoptera musculus*) (see Fig. M12). It has also pioneered **photo-identification** techniques for this species. MICS also conducts fieldwork on blue whales in the Sea of Cortez, Baja California (Mexico), as well as in **Iceland** and the **Azores**. MICS has accumulated a catalogue of over 700 blue whales, 650 humpback whales (*Megaptera novaeangliae*) and 450 fin whales (*Balaenoptera physalus*).

In order to fund its research, MICS invites the public to participate in ecological studies of marine mammals. Each year, MICS offers research sessions from June to October in the St Lawrence, and during February/March in the

Sea of Cortez. The purpose of these sessions is not only to help finance the research, but also to educate the public on marine mammal ecology while observing these animals in their natural habitat. The aim of the research sessions is to provide participants with an opportunity to contribute to the research during fieldwork and land-based activities, such as photo-development and -matching.

Related internet source

Mingan Island Cetacean Study: <http://www.rorqual.com>

Frédéric Paquet

Richard Sears

Mixing Zone (MZ) Mixing zones are regions in public waters where pollutants are diluted. State Water Quality Standards (WQS) – the maximum levels of contamination that can be tolerated without acute or chronic effects on people, fish or wildlife – are weakened by applying dilution factors within MZ areas.

Under the US Clean Water Act (CWA), all discharges of pollutants into public waters must be permitted under the National Pollution Discharge Elimination System (NPDES) programme. NPDES permits are designed to ensure that all beneficial uses of a waterbody are protected. Permits are not required for cruise ships because these are not land-based.

The objective of the CWA is to restore and maintain the integrity of the waters of the USA. Its goals include the elimination of all discharges of wastes into public waters, a pro-



Fig. M12. A humpback whale spy-hopping next to a MICS research boat (photograph courtesy of MICS).

hibition against discharging toxic pollutants in toxic amounts and having all possible US waters fishable and swimmable. With an MZ regulation, dilution factors may be applied and limited regions of toxicity created. According to the Environmental Protection Agency (EPA), the CWA's goals and prohibitions do not require the protection of uses in all portions of a water body, but rather in the water body as a whole.

The fundamental concept of MZ authorization has never been tested in a federal court. Various legal reviewers over the years have questioned whether MZs are, in fact, legal under the CWA, which was intended by Congress to ban the 'dilution solution to pollution'.

Related internet source

Campaign to Safeguard America's Waters: <http://www.earthisland.org/project/reportPage2.cfm?reportContentID=80&subSiteID=6&pageID=174>

Ross A. Klein

MMPA: see Marine Mammal Protection Act

Moby Dick (see also Melville, Herman)

The novel *Moby Dick* is an example of literature entwined with travel writing that leads the reader on a quest (Mewshaw, 2005), depicting America's capitalistic zeal through the character Ahab's relentless obsession with capturing the white **whale**, as well as the journey that individuals such as Ishmael take through the self (Boughn, 1993). Based in part on author **Herman Melville's** own experience on board a **whaling** ship in 1841 (Boughn, 1993; Davis, 1995), *Moby Dick* also incorporates landmarks of the city of New Bedford, centre of a thriving whaling industry, including the Seamen's Bethel, dedicated to local sailors and immortalized as the 'Whaleman's Chapel', where Ishmael listens to a sermon on **Jonah**. The New Bedford Whaling National Historical Park commemorates the **port's** whaling **heritage** and includes exhibits connected with the novel and Melville, and the city celebrated *Moby Dick's* 150th anniversary in 2001 with a number of special events.

The birth and subsequent growth of **whale watching** as a tourist activity has been seen as a way of harnessing human interest in whales (Orams, 2002b) and providing a sustainable

and non-extractive alternative to whaling (Garrod and Fennell, 2004). Whale-related **tourism** now takes place across the globe, and a number of **tour operators** use the moniker of *Moby Dick* as a marketing tool. A number of films based on the *Moby Dick* story have also been produced, and some locations used in their filming, such as Point Cook in Australia, now attract tourists (Beeton, 2001).

Related internet sources

New Bedford Whaling National Historical Park: <http://www.nps.gov/nebe>

Whale Watching, Iceland (MS *Moby Dick*): <http://www.dolphin.is>

Whale Watching, Western Australia: http://www.calm.wa.gov.au/tourism/whale_watching.html

Wings Over Whales (Kaikoura, NZ): <http://www.whales.co.nz/whales.htm>

Jennifer Laing
Geoffrey Crouch

Mollusc: see Seashell

Monkey Mia Monkey Mia is a coastal resort town on the east coast of the Peron Peninsula in Shark Bay, Western Australia. The main attraction of the resort is the daily feeding of bottlenose **dolphins** (*Tursiops* sp.) that have been coming to feed since the 1960s, when fishermen began providing them with unwanted catch. News of the phenomenon initially spread by word-of-mouth, but it had become part of **tourism** promotion of the region by the early 1970s. Improved transport access to the main population centre of Perth meant that, by 1985, the State Government had to begin to provide better facilities, such as car parks, toilets and an information centre. In 1988 the Monkey Mia Reserve was jointly vested in the Department of Conservation and Land Management (CALM) and the Shire of Shark Bay, in recognition of the area's recreational significance and environmental **values**. The waters adjoining Monkey Mia were declared a **marine park** in 1990. In 2001 a new Monkey Mia Visitor Centre was established as a means of educating the public about the dolphins and the marine **environment** of the region. All matters relating to dolphin interaction are managed by CALM. Shark Bay was declared a **World Heritage Site** in 1991 because of its outstanding natural

universal values, but it is important to note that the dolphins are not significant in **conservation** terms, although the length of habituation with humans does provide an opportunity for longer-term study of human–dolphin interaction.

Related internet sources

Monkey Mia Resort: <http://www.monkeymia.com.au>

The Dolphins of Monkey Mia Research Foundation: <http://www.monkeymiadolphins.org/>

West Australian Department of Conservation and Land Management: http://www.calm.wa.gov.au/national_parks/previous_parks_month/monkeymia_reserve.html

C. Michael Hall

Monsoon The word monsoon comes from the Arabic word ‘*mausim*’, meaning season. It is a wind system that demonstrates pronounced seasonal reversals in wind direction of at least 120 degrees. It occurs due to differential pressure between the continent and the ocean that is caused by the unequal heating of the earth’s surface by solar radiation. Monsoons are usually associated with alternating hot, dry conditions and wet, cool conditions, depending on the direction of the winds. Onshore winds bring moist air and heavy precipitation that usually coincide with the summer months, while winter months are associated with the offshore winds and dry, humid air.

Monsoonal circulation occurs in many areas of the world and directly affects about 50% of the world’s population. The most widely known, as well as the most severe, is the Asian monsoon that occurs over the **Indian Ocean** and South-east Asia. It has two distinct seasons – winter and summer. The summer monsoon is characterized by intense rainfall, which is often associated with deadly floods and mudslides. In some areas more than 13 m of rainfall can occur in four months, and every year an estimated 1000 people perish from flash floods in India alone. However, the summer monsoon also brings a welcome relief from the hot, dry winter monsoon, where India receives less than 0.5% of the country’s annual total rainfalls. Monsoon has significant effects on the agriculture and the population in this region, which would starve without the monsoonal rains since their livelihoods are dependent on agriculture.

Monsoons have considerable influence on **tourism** in areas subjected to these climate phenomena. Tourism usually booms at the end of the monsoons, due mainly to the festivals that are observed by the natives at the end of the monsoon such as Onam, which is celebrated in Kerala, India. During the monsoon, tourism is usually at a standstill; however, cities such as those in Kerala have learned to market themselves by advertising healing and rejuvenation therapy based on monsoon rains during the wet months. This has created an increase in tourism during this period, which many other monsoonal areas hope to achieve.

Related internet source

Nature: <http://www.pbs.org/wnet/nature/monsoon/html/intro.html>

Ohnika S.D. Singh

Mooring Buoy Legal and illegal mooring buoys may be used to tie a boat offshore, and are mostly placed in marked anchorage areas. Their shapes can be spherical or cylindrical, with a white body and a blue horizontal band. For anchoring during night-time mooring, buoys have white reflectors or white lights attached. One very important aspect of the use of mooring buoys is nature **conservation** by avoiding any damaging effects of anchors on delicate underwater ecosystems, especially **coral reefs**. The **Project AWARE** is involved in the worldwide efforts of dive industry leaders and environmental groups in promoting, constructing and funding the placement and maintenance of mooring buoys according to nature preservation guidelines.

Related internet source

Project AWARE Foundation: <http://www.projectaware.org/americas/english/mb.asp>

Friedrich Zimmermann

Moray Firth, Scotland The Moray Firth, the largest embayment in the UK, is home to the only resident population of bottlenose **dolphins** in the **North Sea**. A European Special Area of Conservation was first proposed in 1995 and established in 2004 to protect this small population. These dolphins have been sustaining a **dolphin-watching** industry for over 15 years.

The industry operates small power- and sailing boats offering short trips leaving from several villages along the coastline. Recreational sailors also regularly view **cetaceans** in the area. The Moray Firth is the only place in Europe where shore-based dolphin-watching is thriving, with several key locations sustaining year-round visitors purposefully coming to watch bottlenose dolphins and harbour **porpoises** from the shore. In addition, the **estuary** attracts other wildlife watchers drawn by the wide variety of **seabird** colonies and the possibility of watching harbour **seals** and **sea otters** at close range. Several key rivers for Scottish salmon flow into this estuary, and therefore the **fly-fishing** sector relies indirectly on the welfare of the Moray Firth.

Both residents and visitors also use the Moray Firth for a variety of marine sports such as **sailing**, **sea-kayaking**, **jet skiing** and **diving**. Charter boats offer sea **angling** experiences; however, this sector remains on a small scale. Besides **nature-based tourism**, visitors come to the Moray Firth to experience historical sites both from the shore and on **cruises**. Like many other populated estuaries, the Moray Firth presents an interesting management challenge because of the many different professional and recreational competing activities co-occurring in one place.

David Lusseau

Moreton Island, Australia Moreton Island is a large sand **island** lying on the eastern side of Moreton Bay, on the coast of south-east Queensland, Australia, 58 km north-east of Brisbane. The island was formed as a result of sand movements caused by wind, **waves** and **sea level fluctuations** over thousands of years (see Fig. M13). **Cape Moreton**, at the north-eastern tip, is the only rock outcrop on the island. Moreton Island is 38 km long and 10 km at its widest point. It covers an area of 168 km², 95% of which is the Moreton Island **National Park**.

The Park was developed to provide for nature-based **recreation** whilst protecting the island's native flora and fauna, as well as archaeological (ancient Aboriginal shell middens) and historical sites (e.g. remains of early settlers, military occupation and Queensland's first and only **whaling** station, as



Fig. M13. View looking south from from Moreton Cape (photograph courtesy of E. Martinez).

well as Cape Moreton **Lighthouse**). Unlike other islands in the area, the **impact** of sand mining has been minimal.

Moreton Island is renowned for its relatively undisturbed wilderness. It is home to a diverse range of wildlife (e.g. humpback **whales**, **dugongs**, **dolphins**, **sea turtles**, **sharks**, **seabirds** and numerous fish species) and vegetation. Most of the island is vegetated with thick forests, open woodlands, swamps and coastal **dune** areas. It is also home to some freshwater lakes, coloured sands, rugged **cliffs**, sand hills and the largest sand dune in the world, Mt Tempest (278 m). Today, Moreton Island is a very popular destination for **nature-based tourism**, including **whale watching**.

Related internet sources

See Moreton Island web site: <http://www.seemoretonisland.com/about.html>

Tangalooma Wild Dolphin Resort web site: http://www.tangalooma.com/tangalooma/general/moreton_island.asp

Emmanuelle Martinez

MPA: see **Marine Protected Area**

MSA: see **Marine Safety Authority**

MSD: see Marine Sanitation Device

Mudflat Mudflats are coastal **wetlands** that are formed in areas where mud is deposited by **tides** or rivers. They are generally found in intertidal, sheltered areas such as **bays**, **lagoons** and **estuaries**, between the sublittoral zone and vegetated **salt marshes**. The sediments that form them generally consist of silts and clays of high organic content.

Mudflats are typically highly productive habitats supporting a high biomass but relatively low species diversity, with few rare species. They provide feeding and resting areas for internationally important populations of migrant and wintering waterfowl, and are also important nursery areas for flatfish. In addition, the mud (and its microbial and macroinvertebrate fauna) plays an important role in nutrient cycling.

Mudflats are threatened by a number of human processes, including: (i) land claim for urban and transport **infrastructure** and industry; (ii) barrage schemes for water storage, amenity, tidal power and flood defence; (iii) discharges from agriculture, industry and urban areas; (iv) oil and gas extraction; (v) dredging for **navigation**; and (vi) **fishing** and bait digging. Finally, rising sea levels due to global warming are likely to pose the greatest threat to mudflats.

The destruction of mudflats will have **impacts** on estuary and salt marsh productivity and the survival of bird and fish species that use these areas as feeding and resting grounds. The loss of mudflats will also increase the risk of erosion of salt marshes, damage to coastal defences and flooding of low-lying land. Some protection is offered by the Ramsar **Convention** in protecting wetlands of international importance, and also by the Bonn **Convention on the Conservation of Migratory Species of Wild Animals**.

In some parts of the world, such as the western coast of **Korea** and Germany's **North Sea Coast**, mudflats are increasingly visited by tourists for their beauty and abundant wildlife. Mudflats are also recognized as sources of seafood cuisine, which in turn attracts **seafood tourism** to the regions.

See also: Wadden Sea (North Sea).

Alexandra Coghlan

Multifunctional Resort A multifunctional resort is a type of **destination** resort that does not rely specifically on any one feature as its primary focus. Multifunctional resorts often contain **recreation** activities and amenities that complement each other to augment consumer or resorter (which guests to destination resorts are often called) attractiveness. These properties are not solely tied to oceanic coastlines and can be found along large, inland lakes or seas or in non-marine **environments**.

In a maritime location, recreation activities and amenities can include a **marina**, **beach** and **water** activities, spa or other relaxation features, convention and meeting space, golf courses and amenities tied to their geographic location. Unlike **beach resorts**, these properties are not necessarily weather dependent or reliant upon superior natural attractions to draw customers. It can be said that, as beach resorts increase and change their amenity mix for continued viability, they are becoming multifunctional resorts. From a global perspective, there are numerous properties that belong to this classification. Atlantis Paradise Island in the **Bahamas** and Jumeirah Beach Resort in **Dubai** exemplify the multifunctional classification.

Related internet sources

Atlantis Paradise Island: <http://www.atlantis.com>

Jumeirah Beach Resort: <http://www.jumeirahbeachhotel.com>

Eric T. Brey

Multiple-use Very generally, multiple-use is a term used by natural **resource** managers, planners, developers, scientists and others to refer to situations where two or more human activities are undertaken in the same place. Mixtures of activities may include variants of **leisure** forms, work and industrial forms, residential forms and military forms, as well as combinations of these. It should be noted that 'no-use' also qualifies as a kind of use as, for example, when access of fishermen and recreationalists to some types of **marine protected areas** is prohibited.

Multiple-use frameworks are commonly used by government policy makers and planners who work in the fields of **tourism** management, natural resource (for example,

fishery) management, **coastal zone management** and **national park** management. An early example of a legislative mandate for multiple-use management by the US Forest Service is found in the Multiple-Use Sustained-Yield Act of 1960 (as amended 31 December 1996: P.L. 104–330). According to the Act, multiple use is defined as:

The management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

(Sec. 4 [16 USC 531])

Over the last 50 years, multiple-use management has been used with effectiveness in many of the world's coastal zones. To illustrate this, the **Great Barrier Reef Marine Park** is partitioned into many **zones** according to activity types permitted. Some zones allow multiple use, while others are managed for a single use. Environmental **non-governmental organizations (NGOs)** and private sector entrepreneurs also endorse multiple-use solutions when basic incompatibilities of uses are not issues. Increasingly, however, the high level of human population coupled with the high value of scarce natural resources and leisure amenities in the coastal zone is resulting in multiple-use **conflicts** that pit advocates of development against those of **conservation**.

Related internet source

Multiple-Use Sustained-Yield Act of 1960: <http://www.fs.fed.us/emc/nfma/includes/musya60.pdf>

Marc L. Miller

Multiplier The multiplier is defined as the ratio of direct to indirect (and sometimes induced) economic impacts of an increase of

spending in a specified economy. The economic impacts of tourism and recreation in marine environments come in three main forms: direct, indirect and induced, and usually take the form of increased incomes and employment in the economy concerned.

Direct impacts result from people spending their money on food and drink, accommodation, souvenirs, equipment, car parking, admission fees and so on. This is known as direct expenditure, which creates direct revenue for the businesses and public organizations concerned. A proportion of this direct revenue will be needed to pay for supplies. The revenue that remains, which comprises wages, salaries and profits, is known as direct income. Similarly, direct employment relates to the number of jobs directly supported by the specified expenditure. The overall impact of additional expenditure in the local economy is not, however, restricted merely to these direct impacts.

The businesses and public organizations that receive the direct expenditures will need to respond some of this direct revenue in the purchase of supplies, a proportion of which will be from other businesses in the local economy, the rest being spent outside of the economy concerned. These are indirect impacts, taking the form of indirect incomes and indirect employment. Spending on supplies from outside the local economy, meanwhile, is known as 'leakage'.

The third type of impact, induced impacts, arises from the respending of wages, salaries and profits earned directly or indirectly as a result of the initial injection of expenditure. As residents of the specified economy become wealthier they will spend some of this additional money in the economy. The incomes created in this way are known as induced incomes, and the jobs created in this way represent induced employment. The overall impact of an increase in spending, for example on recreation or tourism activities in a **coastal resort**, is thus the sum of the direct, indirect and induced impacts.

Additional expenditure by coastal resort users thus has 'knock-on' effects in the local economy, the final impact being a multiple of the initial injection of expenditure. This is caused by the recirculation of money around the local economy and is known as the

'multiplier effect'. The magnitude of the multiplier effect is determined to a significant extent by the propensity of money to be retained in the economy concerned.

Multiplier analysis identifies a single multiplier coefficient, which specifies how large the overall impact of income or employment will be in comparison with the initial injection of expenditure. Extreme care is needed, however, in the interpretation of multiplier coefficients, there being a number of different versions in common use.

First, there are three major varieties of multiplier: output, income and employment. The output multiplier measures the relationship between initial expenditure on the level of production. It therefore measures the effect of additional expenditure on the level of output of the local economy. The income multiplier is the most commonly quoted of all multipliers and is usually regarded as the most important indicator of the impact of spending in the local economy. It measures the relationship between an initial injection of expenditure and the increase in incomes in the local economy associated with this, including wages, salaries and profits. The employment multiplier, meanwhile, measures the increase in employment associated with a specified increase in initial expenditure, usually in terms of the number of full-time equivalent jobs associated with a specified amount of initial expenditure.

Second, there are two different formulations of each of these three major varieties of multiplier coefficient: Keynesian (proportional) and ratio (conventional) multipliers. Ratio multipliers relate the final impact of an increase in expenditure to the direct income it creates. Consequently, ratio multipliers are always greater than unity. They tend, however, to be of limited use to planners and **policy** makers because the level of investment required in order to produce a desired increase in final income is not readily discernible. Keynesian multipliers, on the other hand, relate the final impact directly to the level of direct expenditure in question. This makes Keynesian multipliers somewhat easier to apply and to interpret. It is also a simple matter to compute the equivalent ratio multiplier from the Keynesian multiplier, while the reverse is not necessarily true. Keynesian multipliers may be less than, greater than or even equal to unity.

Third, there are two types of each variety and formulation of multiplier, known as Type I and Type II. Type I multipliers include only the direct and indirect impacts of the initial increase in spending, while Type II multipliers include not only the direct and indirect impacts but also the induced impacts.

The different versions of the multiplier coefficient are summarized in Box M1, below, along with a worked example of each in the case of an income multiplier. Thus, using either the

Box M1. Variants of the multiplier coefficient.

E = initial injection of expenditure, e.g. US\$100

D = direct income, e.g. US\$40

I = indirect income, e.g. US\$20

N = induced income, e.g. US\$10

Keynesian, Type I	$\frac{D + I}{E}$	$\frac{40 + 20}{100}$	0.6
Keynesian, Type II	$\frac{D + I + N}{E}$	$\frac{40 + 20 + 10}{100}$	0.7
Ratio, Type I	$\frac{D + I}{D}$	$\frac{40 + 20}{40}$	1.5
Ratio, Type II	$\frac{D + I + N}{D}$	$\frac{40 + 20 + 10}{40}$	1.75

Keynesian or ratio multiplier, an initial increase in expenditure of US\$100 would be expected to result in an increase of US\$40 in direct incomes in the local economy. This would then go on to be multiplied up so that an additional US\$60 of final income is added to the local economy using the Type I multiplier, or US\$70 using the Type II multiplier. The second of these totals is larger, simply because it includes induced as well as direct and indirect incomes.

The size of the multiplier coefficient depends ultimately on the extent to which injections of expenditure are retained and respond in the economy concerned. Consequently, the more narrowly the economy is defined, the lower the multiplier will tend to be. This is because there is a greater propensity for expenditures to leak out of a more narrowly defined economic space. It also tends to be the case that remoter, more rural, locations tend to have a higher multiplier effect, even after allowing for the above effect. This is because poor communications tend to reduce expenditure leakages from the local economy. **Islands** in particular tend to have higher multipliers associated with them relative to equivalent mainland economies.

Multiplier analysis is widely used in assessing the local economic impacts of particular activities. Essentially there are two approaches to developing estimates of multiplier coefficients. The first is through the collection of the primary data needed to establish the relevant coefficients of expenditure leakage from the local economy in question. This approach tends, however, to be technically complex and rather data intensive. An alternative approach, which has been developed in the UK by the New Economics Foundation, is known as 'LM3'

(Sacks, 2002). This rather less data-intensive approach uses surveys of local businesses and households to estimate the proportion of expenditure leaking from the local economy during only the first three 'rounds' of circulation. This limits the amount of information required to generate functional multiplier coefficients. Furthermore, it is argued that in most cases the majority of relevant spending and responding tends to take place during first three multiplier rounds.

The second approach is to 'borrow' coefficients from previous studies of similar economic activities. This, of course, tends to introduce a degree of subjectivity in the analysis, since the researcher must decide how applicable the coefficients derived from other studies are likely to be to the specific context at hand. Sometimes researchers choose to adapt these borrowed multiplier coefficients so as to make them more applicable to the activity and/or local economy in question. This adds additional subjectivity to the process and means that such coefficients must be interpreted with extreme care. The approach is, nevertheless, quite widely adopted in local economic impact studies.

Advice on the use of multiplier analysis in the context of recreation and tourism in marine environments (specifically **marine ecotourism**) can be found in the documentation of the **META** project (see Garrod *et al.*, 2001).

Related internet sources

META web site: <http://www.tourism-research.org/META/home.html>

New Economics Foundation:
<http://www.neweconomics.org/gen>

Brian Garrod

