MEDITERRANEAN ACTION PLAN

Coastal Area Management Programme (CAMP) for Israel

Coastal Zone Management in Israel

Report prepared by
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FOREWORD

Growing threats to coastal environments have precipitated a world-wide move toward the integrated management of coastal areas. The Mediterranean Action Plan (MAP), in general, and the Coastal Area Management Programme (CAMP), specifically, have played a vital role in introducing this concept to Israel. In 1996, a CAMP Israel Agreement was signed in response to the growing recognition by national authorities and institutions in Israel that an Integrated Coastal Zone Management (ICZM) programme should be implemented in Israel. The principles of the programme accord with the sustainable development approach defined in MAP Phase II and Agenda 21.

The purpose of this document is to describe and analyse Israel's coastal resources, development pressures on the coastal environment, and current and proposed policies and tools for coastal planning and management. The review focuses on the major coastal issues which face Israel, on the institutions involved in tackling these issues, and on the tools available for coastal zone management, today and in the future. It covers such sensitive issues as impact of marine structures, public access to the coast, beach and cliff protection and pollution prevention. Furthermore, it concentrates on the conflicts which have emerged in this area and presents new initiatives and policies which are expected to move Israel along the path of integrated coastal management in accordance with world guidelines.

Israel's 188-kilometre long coastal strip has been subject to ever-growing pressures and conflicts. The need to formulate specific policies to protect this sensitive and dynamic environment has been recognised by the Ministry of the Environment for more than two decades. Therefore, the Ministry is especially pleased to see the shift toward wise management of the coastal zone which has emerged in recent years and wishes to express its appreciation to MAP for its continued guidance and support. Hopefully, the experience which has been accumulated in Israel in the area of ICZM will be of interest and use to all who are concerned with this important issue, both in this country and elsewhere.

Valerie Brachya
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INTRODUCTION

Long and narrow in shape, Israel makes up for its small size with a wide range of physical features. Within its small land area, Israel embraces landscapes that are normally separated by thousands of kilometres in other countries. Mount Hermon in the north boasts snowy slopes and alpine fauna and flora, while the Gulf of Eilat, in the south, harbours spectacular coral reefs and colourful fish that represent the tropical zones. Lying between these two extremes are arid desert areas, lush oases, green Mediterranean woods and forests, and the lowest point on earth - the Dead Sea.

Geographical Features

Israel may be divided into four geographical regions: three parallel strips running north to south and a large, mostly arid zone in the southern half.

The coastal plain runs parallel to the Mediterranean Sea and is composed of a sandy shoreline, bordered by stretches of fertile farmland extending up to 40 kilometres inland. In the north, expanses of sandy beach are in places backed by low sandstone cliffs. The coastal plain is home to over half of Israel's population and includes major urban centres, deep-water harbours, most of the country's industry and a large part of its agriculture and tourist facilities.

Several mountain ranges run the length of the country. In the north-east, the basalt landscapes of the Golan Heights, formed by volcanic eruptions in the past, overlook the Hula Valley. The hills of Galilee, largely composed of limestone and dolomite, ascend to heights ranging from 500 to 1,200 metres above sea level. The Jezreel Valley, separating the hills of Galilee from those of Samaria, is Israel's richest agricultural area. The rolling hills of Samaria and Judea feature rocky hilltops and fertile valleys, dotted with groves of olive trees.

The Negev, comprising over half of Israel's land area, is inhabited by only 8% of its population, living mainly in the northern part. Further south, the Negev becomes an arid zone characterised by hills and plains, abounding with canyons and wadis in which winter rains often produce flash floods. Even further south, the region gives way to an area of bare craggy peaks, craters and gravel plateaux. The Negev desert contains unique features such as erosional craters (*makhteshim*) which cut deep into the earth's crust, displaying a range of colours and rocks. At the tip of the Negev, near Eilat on the Red Sea, sharp pinnacles of grey and red granite are broken by dry gorges and sheer cliffs, with colourful layers of sandstone.

The Jordan Valley and the Arava, running the length of the country in the east, are part of the Syrian-African Rift which split the Afro-Arabian continent millions of years ago. Its northern stretches are fertile, while the southern portion is semi-arid and arid. The Arava begins south of the Dead Sea and extends to the Gulf of Eilat, Israel's outlet to the Red Sea. The sub-tropical Gulf of Eilat, noted for its deep blue water, coral reefs and marine life, lies at the southern tip of the Arava.

Israel's location at the meeting point of four phyto-geographic and zoo-geographic zones - the Mediterranean, the Irano-Turanian (steppe), the Saharo-Sindic and the Sudanese -gives the country a rich variety of plant and animal life. Israel's water bodies are also varied. To the west lies the Mediterranean Sea; to the east, the salt-laden Dead Sea with its unique attributes;

in the north is the freshwater Lake Kinneret (Sea of Galilee); in the south, the Gulf of Eilat and the Red Sea.

Population Growth

The most outstanding characteristic of Israel’s population is its rate of growth. Since its establishment in 1948, the country's population has increased more than seven-fold, mainly as a result of large-scale immigration—and now numbers about 6 million residents. Decreased immigration in recent decades was dramatically reversed at the end of 1989 as a massive wave of immigrants arrived in Israel from the former Soviet-bloc and from Ethiopia. Since 1990, Israel’s population has grown by over 30%. The average rate of growth in recent years has been about 2.5% annually as compared to 3.5% in 1990-1995.

About 90% of the population lives in some 200 urban centres. The three largest cities are Jerusalem (620,000 inhabitants), Tel Aviv (350,000) and Haifa (260,000). Over 2.5 million people reside in the greater Tel Aviv metropolitan area alone—nearly 44% of the total population. The population along the coastal plain has grown from about 100,000 in the beginning of the century to over 4 million today.

From a sparsely populated country with 800,000 residents spread over 21,000 square kilometres in 1948, Israel today has become a densely populated country, in which 92% of its 6 million inhabitants reside in 40% of the total land area (north of Beersheba). In the area north of Beersheba, Israel is now one of the developed world's most densely populated countries. In the Tel Aviv region, population density exceeds 6,680 per square kilometre as compared to just over 1,000 in Jerusalem and only 57 in the southern district.

In the thirty-year period between 1960 and 1990, Israel's population more than doubled and its built-up area quadrupled. According to Israel’s long-range masterplan (Israel 2020), the country’s population will reach about 8.5 million in 2020 (nearly doubling the 1990 population) and its built-up area will more than double. Increased stress will be placed on a diminishing pool of land resources.

COASTAL RESOURCES – NATURAL

Geological and Geomorphological Features

Israel's Mediterranean coastline extends about 188 kilometres from north to south. With the exception of Haifa Bay, it is a smooth coastline which gradually curves from Northeast-Southwest in the south to almost north-south in the north. The coastline is largely smooth and sandy, in places with a back-shore cliff. It can be divided into the following five geomorphological units:

1) *Rosh Hanikra to Acre*, a region of abraded rocky platforms and pocket beaches with local sand backed by a low cliff;
2) *Haifa Bay*, a region of wide sandy beaches backed by dunes and bounded by the Acre promontory on the north and the Carmel mountain range on the south;
3) *The Carmel coastal plain*, a region between Haifa and Hadera consisting of three low parallel ridges of calcareous sandstone, parts onshore and parts offshore, with sandy beaches and, in places, small embayments;
4) *The Sharon coast*, a region of narrow beaches (up to about 30 metres) backed by cliffs up to 50 metres high between Hadera and Tel Aviv; and
5) *Southern coast*, a region of wide sandy beaches (30-50 metres wide) backed by a low bluff and wide dune fields between Tel Aviv and the Gaza strip in the south.

Kurkar Cliffs and Ridges

The continental shelf and coastal plain of Israel are built of a series of shore-parallel carbonate-cemented quartz sandstone (locally termed kurkar) ridges, separated by longitudinal shallow depressions. The kurkar ridges are a lithification product of windblown sands that were piled up into shore-parallel dunes during the Pleistocene. The sharp drop in the global sea level and regression during the last glacial period exposed the continental shelf to sub-aerial processes, erosion and dune movement. The subsequent Holocene transgression drowned the westernmost kurkar ridges and filled the depressions between them with delta-derived sand and clayey silt reaching 20-40 metres.

On land, up to eight shore-parallel kurkar ridges are discernible, the easternmost lying 25 kilometres inland. The number of these ridges diminishes northward. Opposite Mount Carmel only three ridges remain, of which only one reaches the Carmel Cape.

Offshore, the shelf’s ridges are of low relief, with irregular upper surface, suggesting that they are the abraded cores of ridges which have passed through the high energy zone of the advancing Holocene transgression.

The broadly concave Israeli shoreline cuts this ridge-and-depression system at a slight angle. Consequently, Israel's northern shoreline includes stretches of unabraded back-shore ridges, whereas the coastal ridge along the central shoreline is abraded, forming a prominent back-shore cliff. In this 50-kilometres long stretch, known as the Sharon Escarpment, the cliff and ridge are at their highest. Southward, the ridges are not clearly aligned, causing irregular and widely spaced cliff sections.

Sand Supply

Israel's littoral zone is a part of the Nile littoral cell which extends from the Nile Delta in Egypt to Acre at the northern tip of Haifa Bay, a distance of some 650 kilometres. This cell consists of input of quartz, sand, silt and clay sediment from the Nile Delta by longshore drift, transport of sand by waves and currents eastward along the Sinai coast to Israel, wind-blown sand from the beach landward and a sediment sink in Haifa Bay. The flow of sand by longshore sediment transport has been estimated at 170,000-540,000 m^3/year, but can vary significantly depending on the severity of winter storms. The highest sediment flow is found along the southern beaches (estimated at 300,000 m^3/year north-east flow), diminishing to 200,000 m^3/year north of Tel Aviv, and ending in Haifa Bay. The pattern of sand movement along the northern section of the coast between Tel Aviv and Haifa is still not clear. North of Acre, the sand is meagre in quantity and largely biogenic in origin, consisting mostly of crushed shells, calcareous algae, carbonate pebbles and granules and a very small percent of quartz grains.

Studies have shown that sand migrates seasonally in the on-offshore direction down to 10-15 metres (the offshore limit of substantial sediment transport by wave action known as the "closure depth"). With increasing distance from the shore, the sediment gradually becomes finer, progressing from medium sand to fine sand, silt and clay.

Based on the longshore and the onshore/offshore sediment transport of the Israel coast, most experts agree that any disturbance, such as sand dredging, in depths down to 30 metres should be avoided because its removal may divert an equal volume of sand from the shoreline, thus enhancing shore erosion. On the other hand, a recent survey on fill material sources (undertaken within the framework of the artificial islands feasibility study) has revealed that some 1.3 billion m^3 of sand are buried under the mud in the continental shelf beyond the 30 m depth in the area between Hadera and Zikim. The survey discovered four zones (where the relative ratio of sand thickness to mud thickness is greater than one), in which 400 million m^3 of sand are buried beneath a cover of 120 million m^3 of mud. This sand contains silt and clay and may therefore not be appropriate for fill material. The economic feasibility of dredging this sand for other purposes, such as beach nourishment, requires further study and analysis.

The sand balance along Israel's coastal zone is a product of natural processes and human intervention. Sand losses due to the outgoing longshore transport, seaward escape and landward wind transport exceed the natural gains from the incoming longshore transport and the abrasion of the coastal cliffs. This deficit was aggravated by use of beach sand for construction from the beginning of the century until 1964 when sand mining was outlawed and by the construction of seaward-projecting structures that trap sands on the upstream side, and offshore detached breakwaters that trap sands between themselves and the coast. It is estimated that since the beginning of the century some 10 million m^3 of sand have been mined from Israel's beaches, 4 million m^3 of which were quarried from 1948 to 1964. This uncontrolled mining caused narrowing of the beach and seasonal sand stripping, and several of the damaged beaches have not yet recovered. It is estimated that the total volume of sand trapped by coastal structures is also close to 10 million m^3, thus bringing to 20 million m^3 the total volume of sand removed from the coastal system due to human activity (see p.18).

Based on an estimated rate of sand supply by natural longshore sediment transport of some 330,000 m^3/year, it may be said that the coastal system has lost about 60 years of sand supply from the beginning of the present century as a result of human intervention alone.

Landscape and Natural Values

Israel's geographic location at the junction of three continents coupled with the climatic changes throughout the history of this region have been largely responsible for its diversity of landscapes, habitats and species. Thus, species widely distributed over the entire Mediterranean climate region reach their southern limit of distribution in Israel and Saharan or Asian desert species reach their northern limits of distribution here.

The coastal landscape consists of several components. They include rocky shoals and nearshore islets, abrasion platforms and vermetid terraces, swash zone (mostly sandy, rarely rocky), sand berms, back-shore escarpment or truncated shore ridge(often with a shallow trough behind the shore ridge), shore hillocks, crescentic baylets, river gaps, maritime plain and coastal hummocks. The shoreline is more varied north of Haifa Bay; from Haifa southward, uniformity prevails over longer distances. Wind-blown sand becomes common toward the south.

The kurkar ridges, shifting and semi-stable sand dunes, rocky shore habitats, limestone ridges and sea caves, hamra (red sands distinctive for their orange-red colour) soils, remnants of former coastal swamps, rivers, and carob and pistachio woodlands support different associations of vegetation and animal species.

The sand and kurkar landscape of the coastal strip is especially important as a unique ecosystem in global terms which supports a relatively large number of endemic species and a wide variety of fauna.

Rocky shores which are characterised by abrasion platforms, tidal pools and shoals provide a substrate for a rich assemblage of invertebrates.

The central and northern coastlines, particularly in the Western Galilee and Carmel regions, are important sites for turtle nesting, mostly of the loggerhead sea turtle (*Caretta caretta*), but are otherwise relatively poor in species. On the other hand, migrating and semi-stabilised sand dunes serve as habitats for a variety of species including numerous reptilian species. One of the last remaining reserves of active sand dunes on the coastal plain is near Ashdod. This sand dune, ranging between 600 metres to 3 kilometres in width and reaching up to 35 metres at its highest point, was recently granted protected status as a landscape reserve.

The coastal system also comprises about 10 rivers and their tributaries. All of Israel's coastal rivers have been rechanneled over the years in order to supply urban and agricultural demand under conditions of water scarcity. They were then transformed into receptacles for urban and industrial sewage and agricultural drainage. In an effort to restore the coastal rivers, a National River Administration was set up in 1993 to co-ordinate the restoration of the country's rivers and the preservation and renovation of natural and historic sites along riversides. A model for river rehabilitation was formulated and ecological surveys implemented in order to pave the way for actual restoration.

The importance of river mouths has also been recognised in recent years based on their ecological, physical, landscape, and human use aspects. These coastal landscape units are characterised by wide physical changes within short time frames, as a result of floods, flows, storms, runoff and tides. River mouths, which are usually plugged by sand in summertime, are a meeting point between saline and freshwater and support a unique population of flora

and fauna. They serve as a "gateway" for species which require both types of water and habitat for their survival and development.

Various factors affect the distribution of coastal vegetation, especially proximity of the vegetation to the sea, topography and substrate. Thus, along the shoreline, salt spray and strong winds result in vegetation belts which can tolerate harsh conditions. Other types of vegetation are adapted to the high coast, where the coastal cliff is in close proximity to the water line and low coast, where the coastal cliff is interrupted by rivers and wadis. Primarily, vegetation is influenced by the presence of the kurkar-hamra-sand complex.

Offshore, the Mediterranean environment is an important and active site of bio-geographic interaction between the marine biota of the globe. The inauguration of the Suez Canal in 1869 launched a migration of hundreds of Red Sea species into the Mediterranean. Thus, the strong impact of the lessepsian migration from the Red Sea creates a unique environment in the south-eastern Mediterranean from the point of view of both flora and fauna. As a result of the continuous growth in the number of Red-Med migrants, modification of the composition and structure of the Levantine biota has already begun. One of the adverse consequences of lessepsian migration was the discovery of large aggregations of jellyfish along the Israel coast in the 1980s. The jellyfish was identified as a new species, *Rhopilema nomadica*, originating in the Red Sea. Mass swarming of the jellyfish in the summer has exerted adverse impacts on fisheries, coastal installations and tourism.

Israel's Mediterranean coastline is also distinguished by its vermetid reefs, small-rimmed intertidal structures which only developed in the subtropical marine water of the southern Levant and the Atlantic (Bermuda) coasts. These reefs support a diverse and rich intertidal fauna.

More than two dozen small islets (totalling over 0.15 km^2), which represent remnants of kurkar ridges, are preserved in close proximity to the shore. None of the islets are currently inhabited or subject to human use, and vermetid reefs are well preserved in these islets. These micro-ecosystems provide nesting sites for marine birds and an important winter roost for thousands of great cormorants (*Phalacrocorax carbo*).

Coastal Open Space

In a country with high density urban development and scarce land resources, the coast and seashore serve a vital role as open spaces. The scarcity of open space is especially evident along the coastal plain since the country's settlement tradition has primarily concentrated on the seashore. This has led to encroachment on and loss of scenic landscapes, nature and agricultural land. Today, coastal agricultural lands serve to break up stretches of built areas and prevent the formation of a megalopolis throughout the coastal plain.

Out of Israel's 188-kilometre shoreline, 50 kilometres are used for national infrastructures and defense uses and are closed to the public. The remaining coastline has been designated as follows: 59 kilometres as municipal shores (adjacent to urban settlements), 43 kilometres for preservation as nature reserves and national parks, and 36 for open space (free of all infrastructures and facilities). A recent survey has revealed only two areas of continuous undisturbed beaches along Israel's Mediterranean coastline: the area between Ashdod and Ashkelon (in part) and the Carmel Coast. These stretches, along with the few additional

stretches of open land available along the coastline, have special social value for the country's population and provide opportunities for recreation, leisure and nature protection.

Fisheries

The Eastern Mediterranean is relatively poor in nutrients and fish, especially since the construction of the Aswan Dam. Therefore, fishing is small scale and is not a major component in the coastal environment.

Three coastal fish farms and one cage farm currently produce seawater fish in significant quantities on Israel's Mediterranean coast. The contribution of Mediterranean mariculture to fishery harvests has grown significantly in recent years and reached nearly $5,000.000 in 1997. Based on current proposals for additional mariculture projects, marine farming may increase significantly in the future.

COASTAL RESOURCES – CULTURAL

Coastal Archaeological and Historic Sites

Alongside its natural and environmental resources, Israel's coastal plain includes a rich cultural heritage. Intensive human activity has characterised this Mediterranean coastline for thousands of years. This activity has left numerous archaeological remains along the shoreline and shallow water.

Several ancient coastal cities dot the Mediterranean coastline. Acre, situated on a promontory at the northern end of the Bay of Haifa, is first mentioned in Egyptian texts dating back to 1800 BCE. As a result of its geographic position, this port city served as an important military and naval base through the centuries. The earliest remains show that the beginnings of Acre were built a few kilometres east of its present seashore location where the Phoenicians manufactured and traded in glass and in purple dye. During the reign of Ptolemy II, the name of the city was changed to Ptolemais, by which it was known until the Arab conquest. The city became the Crusader capital from the 1191 until 1291 and reminders of Crusader times include the great Crypt of St. John of Acre and the Knights Halls. The city was fortified and rebuilt during Ottoman rule when it became a political and military centre strong enough to deter Napoleon, who in 1799 unsuccessfully besieged the city. Efforts have been made to preserve the oriental character of the Old City of Acre and to excavate and restore the archaeological remains. The ancient remains largely date back to the Crusader and Ottoman periods and include the harbour, the double walls of the city, the citadel, two caravanserais, a mosque, a bath and the Pisans and Venetian quarters.

Atlit, an ancient port on the Mediterranean coast, lies about 31 kilometres south of Cape Carmel. Excavations have shown that the site was inhabited in the Iron Age, probably by Phoenicians. In the early 13th century, Crusader pilgrims built a castle which was held by Templar knights. The castle was built on a promontory, jutting out into a bay which served it as a harbour. It was defended by a flooded fosse, an outer wall and an inner wall with two towers. Inside are vaulted store rooms, the foundations of an octagonal church, a vaulted refectory and other ruins. The castle served through most of the Crusader period as an absorption and clearing station for newly arrived Knights of the Cross. Despite repeated

sieges and attacks, it was never captured in Crusader times. Atlit was finally evacuated in 1291, a few months after the fall of Acre, and its fall marked the end of the Crusader presence. Near Atlit are the ruins of the Destroit fort, constructed about 100 years prior to Atlit, to protect passer-by and caravans from robbers.

Further south, between Haifa and Tel Aviv, the ancient port city of Caesarea, built by Herod the Great about 2000 years ago on the ruins of a Phoenician anchorage known as Straton's Tower, is world renowned. It served as the capital of the Roman Empire in this part of the world for about 500 years. Herod enlarged the city, surrounded it with a wall and built a deep sea harbour. Caesarea was also an important Christian centre fought over and conquered alternately by Crusaders and Moslems until it was finally razed at the end of the thirteenth century. During Crusader times, the city was fortified by a deep moat and high walls. Remains of several periods may be seen at the site. The Herodian period is represented by the remains of a harbour, a vault and the remains of a wall with round towers. The Roman and Byzantine cities are represented by a city wall, hippodrome, aqueducts, theatre and a paved square, with staircase and mosaics, where Roman statues were set up, in secondary use in Byzantine times. Remains of the Crusader period include the wall of Louis IX, with its sloping fosse, gateways and towers. Numerous remains of sculptures and hundreds of inscriptions have been found at the site and the Roman amphitheatre is now used for concerts and other art performances.

In the country's central region, Jaffa has been identified as one of the world's oldest coastal cities. Archaeological remains show that Jaffa existed as far back as the 16th century BCE. Jaffa changed hands many time in the ensuing centuries as empires rose and fell as witnessed by remains dating back to the Hellenistic, Roman, Arab, Crusader, Mamluk and Ottoman periods. In the 19th century, the anchorage and its installations were enlarged and improved and a lighthouse was built. In the 20th century, Jaffa served as the gateway for new immigrants into the country and its port, which was expanded during the mid-1930s, served as the main exit for citrus fruit. Today, the city boasts historical buildings along narrow streets, mosques, city walls, towers and an inner citadel. The port is now only used as a mooring berth for recreation and fishing vessels.

Further south are the ancient cities of Ashdod and Ashkelon, two of the five city-states of the Philistines, one of the so-called Sea People. Although the city was situated on the *via maris*, the trade route near the city, it was not directly on the coast but possessed an ancient port which was called Ashdod Yam ("Ashdod-on-the-Sea"). Remnants of the Byzantine and Moslem periods were discovered in the fortress of Ashdod Yam. Excavations at Ashdod have uncovered remains of Canaanite and Israelite fortifications and a Hellenistic plant for extracting purple dye from murex (shells). Stratigraphical evidence shows nearly continuous occupation from the seventeenth century BCE until the end of Byzantine times. Ashkelon was inhabited long before the Philistines and was the site of one of the oldest settlements in the area. It is first mentioned in the Egyptian Execration Texts of the 11th dynasty (about 20th-19th century BCE). In the Middle Ages, Ashkelon was a Crusader city, and the remains of a church, walls, statues, columns, inscriptions and an ancient dyke are still standing.

Number of visitors to selected National Parks in Israel is given in Table 1.

Table 1: Number of Visitors to Selected National Parks in Israel

National Park	Number of Visitors in 1996	Percentage of Israelis
Caesarea	550,000	25%
Achziv	60,000	98%
Ashkelon	35,000	majority

Several other ancient coastal cities dot the Mediterranean coastline. They include, among others, Yavne-Yam, Appolonia, and Dor.

Marine Archaeology

The deficit in Israel's sand budget which has resulted from quarrying and from coastal and offshore construction in recent decades has revealed thousands of buried artefacts. Countrywide underwater rescue surveys have been carried out in Mediterranean waters for the purpose of discovering the remains of shipwreck assemblages, cargoes, anchorage sites, and submerged prehistoric settlements. Of special interest are remnants of prehistoric settlements on the sea floor off the Carmel coast, north of the Crusader fortress at Atlit, 250-400 metres from the coastline at a depth of 8 to 12 metres. Remnants of prehistoric settlements and facilities were discovered dating back to the pre-pottery Neolithic period, some 8000 years ago. Excavations at the site have revealed foundations of stone dwellings, burial grounds with human skeletons, ritual installations, water wells (the oldest known in the world), animal and fish bones, flint and stone tools, bone implements, and a large quantity of plant remains (mostly charred or waterlogged seeds and branches).

The waters of the Eastern Mediterranean were one of antiquity's most travelled routes, and shipping dates back to the Middle Bronze period (4000 BCE). It is assumed that the sailing vessels and equipment used at that time, coupled with the physical characteristics of the Israel coastline (lack of natural shelters) and the frequency of unexpected storms, led to hundreds of shipwrecks throughout the centuries. As a result, shipwrecks and cargoes have been discovered in the breaker zone near the shoreline and adjacent to such ancient coastal cities as Ashkelon, Ashdod, Yavne, Appolonia, Caesarea, Dor, Atlit, Acre, and others. A 4th century BCE shipwreck was found in the sands of Kibbutz Ma'agan Mikhael in 1985 and the full cargo of a Roman ship was discovered in Ashkelon during the course of a survey in the 1990s. It may be assumed that hundreds of sites are still left to be excavated including ancient towns and countless wrecked ships buried under silt and sediment.

DEVELOPMENT PRESSURES ON COASTAL RESOURCES

The combination of urban and economic pressures for development, coupled with the attraction of the coastline for tourism and recreation, has exacerbated the conflicts along Israel's Mediterranean coastline. Moreover, reduced profits in the agricultural sector are likely to trigger pressures for the conversion of agricultural lands along the coastline into built-up areas, especially in the central region of the country. Development pressures have accelerated in recent years along with the increase in population, standard of living and leisure time. The greatest pressure for development is along the central section of the coastline where population and industrial activity are concentrated.

Urban Development

Problems of urban sprawl and sub-urbanisation are especially acute in the central section of the coastal strip. As a result of the steep rise in demand for residential areas on the coastal plain, property values in this area are 50% higher than their equivalent inland. Today, the population in the country's major coastal cities is already high: about 260,000 in Haifa, 150,000 in Netanya, 84,000 in Herzliya, 350,000 in Tel Aviv-Jaffa, and 138,000 in Ashdod. Based on present trends, it is expected that demands for additional residential, employment and infrastructure areas will continue to grow as a result of the rise in standard of living and population.

The population in the Greater Tel Aviv metropolitan area (encompassing the central region of the country and the municipality of Ashdod), already exceeds 2.5 million residents, nearly 44% of the total population of the country. Based on an annual rate of growth of 1.2% to 1.4% annually, the population of this metropolis is expected to reach about 3.5 million in 2020. This growth will bring about a demand for an additional 70-75 million square metres of floorspace for residential purposes in this area of the country alone.

Tourism

Israel's tourism potential is largely based on its religious-historic heritage. Therefore, tourism to and within Israel has largely focused on historic and pilgrimage sites, tourist cities and familiar tourist routes. Although Israel's natural resources, including its beaches, are not presumed to be key elements in tourism potential, coastal tourism is a complementary part of the vacation package. Beach resources may be used for creating tourism packages which combine site visits and excursions with recreational tourism.

Israel's coastal strip is divided into tourism sections from north to south, based on their natural features, types of accommodation and target audiences. By far, the most highly developed section, in terms of tourism and recreation, is the central coastal stretch which includes Israel's most densely populated cities of Tel Aviv, Netanya and Herzliya.

The annual number of tourists to Israel in recent years stands at about 2.4 million, of which about 14% (some 330,000) include coastal recreation in their visit. About 10,000 hotel rooms, nearly 30% of the total number of hotel rooms in Israel, are distributed along the Mediterranean coastline.

Table 2 shows the number of hotel rooms in the metropolitan area of Tel Aviv in 1995 as well as the forecast for 2010. The forecast shows an anticipated growth rate of 255% in this areas alone, as compared to 1995 figures.

Table 2: Hotel Rooms in the Tel Aviv Metropolitan Area – 1995 and 2010

City	Rooms – 1995	Rooms – 2010 Forecast
Netanya	2,500	6,000
Herzliya	750	2.250
Tel Aviv	6,300	13,300
Bat Yam	800	1,800
Rishon Lezion		1,000
Ashdod	100	2,100

Tourism is a powerful economic and social force and promises to be a primary export and business sector in the future. Optimistic forecasts by the Tourism Ministry anticipate a constant and steady growth in tourism to about 5 million tourists annually by the year 2010 and 7 million tourists by 2020. These forecasts require suitable preparations to adequately absorb the visitors. An important planning principle calls for determining the optimal balance between population needs and the capability of tourist areas, sites, regions and centres to withstand the pressures of the visits. Planning of tourist sites requires in-depth reviews of the carrying capacity of tourist sites.

Internal Tourism and Recreation

About 70% of Israel's population live within 15 kilometres of the Mediterranean coastline, and the population of the coastal plain has the highest rate of growth. During the warm months, millions of Israelis flock to dozens of official bathing beaches which are supervised by lifeguards (about 27 kilometres) and to other "undeclared" beaches which are open to the public but do not include lifeguards or sanitary and public services. The local population is by far the greatest “user” of the beach for leisure and recreation.

Over the past three decades, public demand for coastal recreation has grown significantly. Calls for new beaches, shoreline restaurants and cafes, berthing spots for yachts and small boats, gliders, all terrain vehicles and scooters have grown concomitantly, thereby increasing the conflicts between the different components of recreation - water sports for the few versus swimming and recreation for the many.

Marinas

Israel’s coastlines have eight marinas, of which three (Herzliya, Ashdod and Ashkelon) were constructed in recent years. Israel’s first marina was built in 1972 in Tel Aviv to serve small vessels. The others have largely been integrated with fishing harbours (Acre, Kishon, Jaffa) and another small harbour serves an adjacent naval academy (Mikhmoret). Today, the marinas in Acre, Jaffa, Tel Aviv, Herzliya, Ashkelon and Ashdod “consume” some 13 kilometres of coastline - 7% of the total length of the coast.

In the 1970s, a massive rise in demand for moorings of small sports and recreational boats was forecast, and consequently the coastal masterplan designated 14 sites for marinas along

Israel's coastline. It was also decided that an adequately large hinterland would be made available for the development of tourist and commercial activity in order to make such plans economically attractive. As a result, new marinas were built in Ashkelon, Ashdod and Herzliya. Plans for additional marinas in Nahariya, Haifa, Acre, Caesarea, Netanya, Tel Aviv and Bat Yam have already been advanced. All the plans, with the exception of Nahariya, involve land reclamation and construction of multi-story buildings for residential and tourism purposes.

Israel currently has 2,350 berthing sites in its marinas (excluding the Ashdod marina which will shortly be inaugurated for 550 berthing sites). In practice, only 1,350 vessels utilise these marinas (57%) – see Table 3. Clearly, the original forecast of 20,000 berthing sites was grossly exaggerated. Pressures for additional marinas have been attributed to purposes having little to do with providing new berthing sites. The underlying aim of the marina plans may well be to obtain building approval on the shoreline.

Table 3: Vessel Capacity and Actual Utilisation in Israel's Marinas

Marina	**Number of Vessels in Practice**	**Vessel Capacity/ Berthing Sites**
Acre	155	160
Haifa-Kishon	200	200
Herzliya	280	800
Tel Aviv	280	300
Jaffa	215	220
Ashkelon	170	600
Caesaria, Sedot Yam, Mikhmoret	50	70
Total	1,350	2,350

Industry and Energy

A large portion of the country's economic and commercial activity is concentrated on the coastal stretch. This is especially evident in the Tel Aviv and Herzliya areas which are at the hub of the country's industrial (especial high-tech), commercial and financial activities, producing some 45% of the GDP. The number of people employed in this area of the country reached 955 thousand in the mid-1990s, out of a total of 2 million in the country as a whole. It is expected that the Tel Aviv metropolitan area will preserve its share of total employment in the future, some 47.5% of the total - reaching 1.55 million in 2020. Economic growth in this region is expected to reach an average of 4% per year. To accommodate this rate of growth, some 40 million square metres of additional floorspace will be required.

Energy facilities are also scattered along the Israeli coastline. The country's oil refineries operate around the commercial ports of Haifa and Ashdod. Its three oil fired power plants are situated in close proximity to the coastal cities of Haifa, Tel Aviv and Ashdod, and its two coal-fired power plants are adjacent to the cities of Hadera and Ashkelon. These power complexes were sited on the Mediterranean Sea in order to use its seawater for cooling purposes.

Israel is currently considering importing large quantities of natural gas for electricity production as a substitute for petroleum-based fuels and designating sites for central storage systems and primary transmission and distribution systems for liquefied petroleum gas (LPG). One possibility is acquiring natural gas supplies from neighbouring countries through a marine pipeline system. Thus, the coastal strip may be subject to additional pressures including an infrastructure for the distribution and transmission for natural gas and LPG which will link with central points of consumption such as coal and oil-powered plants and gas turbines.

Furthermore, in light of water scarcity in Israel, desalination will become imperative sometime in the next century and sites for desalination facilities on the coast will have to be allocated.

Ports and Marine Transport

Modern construction of coastal structures in Israel began in 1932 with the establishment of Haifa Port. In the early 1960s, the new deepwater port of Ashdod was constructed to service the southern parts of the country. Plans are currently being made to expand Israel's existing port facilities to keep pace with the country's needs.

Crude oil storage facilities are distributed throughout the country and are connected by a pipeline system to the unloading ports and to the oil refineries in Haifa and Ashdod. These activities are carried out by the Eilat-Ashkelon Pipeline Co. and Petroleum and Energy Infrastructure Ltd. The Eilat-Ashkelon pipeline system has a throughput capacity of 45 million tons of crude oil per year. In addition to catering to the Israel oil sector, it can also serve as a land bridge for oil shipment between the Red Sea and Mediterranean ports.

Coal for the purpose of electricity production is unloaded directly at Hadera (where the ships dock at the north end of the off-loading jetty, built some two kilometres from the shore), and at the port of Ashdod. A coal terminal is also under construction at the Ashkelon power plant.

Finally, two other ports exist along the Mediterranean coastline which served as commercial ports in the past: Jaffa Port and Tel Aviv Port.

Defense Requirements

Large sections of coastline are used by the military. It is estimated that about 50% of the coastal area south of Tel Aviv is not accessible to the public.

CONFLICTS AND EMERGING SOLUTIONS IN COASTAL AREAS

Urban growth, industrial development, sand management, offshore structures, erosion and instability of the coastal cliff are critical issues in the densely populated coastal plain of Israel. The following major conflicts have been identified in the area between the shoreline and coastal waters:

- Marine and coastal pollution from land and marine based sources which conflict with recreation, and tourism activities, with ecological processes and with infrastructure.
- Interference with longshore sediment transport and coastal and cliff erosion and retreat as a result of marine structures such as ports, marinas and detached breakwaters.
- Development of the coastline and the adjacent shallow water strip for leisure, recreation, tourism and urban development versus conservation of historic, archaeological and natural values.
- Closure of access to sea and coast by defense and infrastructure uses versus water sports, fishing, diving, bathing and recreation for the public.

The primary coastal issues which are currently on Israel’s agenda include the following: pollution prevention, balancing development and conservation, protecting the sand balance and preventing damage to the shoreline and coastal cliff, conserving the diversity of species and their ecosystems, preserving the archaeological, historic and cultural heritage, and protecting the coastline as an open space for the enjoyment of present and future generations.

Marine Pollution

Oil Pollution

Pollution accidents on the Mediterranean coast are mostly due to oil discharge from vessels and tankers, leaks from marine fuelling facilities and discharge from land-based sources. Ports and oil facilities along the Mediterranean coastline of Israel present a major oil pollution threat. Since the number of cargo and passenger ships arriving in Haifa and Ashdod ports is on the increase, as is the loading and unloading of oil near coastal installations, the risk of major spills is considerable. Moreover, a major accident at the northern entrance to the Suez Canal may well cause damage to the long and straight coastline of southern and central Israel.

All Israeli ports have reception facilities for oily bilge and ballast waters. In the event of a major spill, these facilities can be utilised to store "clean" recovered oil prior to its transfer to refineries for treatment.

The Ministry of the Environment has issued guidelines on the use of advanced (third and fourth generation) dispersants. Use of such dispersants requires the prior, written authorisation of the director general of the Ministry of the Environment and must be carried out under the supervision and guidance of the ministry's marine pollution control inspectors.

Contingency Plans for Large-Scale Oil Spills

While Israel is equipped to effectively combat small and medium-scale oil spills in the Mediterranean, the country has long lacked the capability to effectively respond to large-scale oil spills. Capability is now being strengthened as a result of regional co-operation to prevent and minimise the environmental and economic damage that may be caused by large-scale marine pollution. A sub-regional agreement between Cyprus, Egypt and Israel on preparedness and co-operation in response to medium and large-scale oil spills was signed in 1995 within the framework of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) and the International Maritime Organisation (IMO). The agreement requires each state to prepare a stockpile of marine pollution abatement equipment which will be available to its partners in case of a spill in open waters. Using their joint forces, the states (which will also join forces in a co-operative task force, common exercises and common training) will be able to deal with a spill of up to 15,000 tons. Israel's own oil combating capability has been significantly boosted with the preparation of two oil pollution combating centres in Haifa and Ashkelon, which will be capable of dealing with spills of up to 4,000 tons. An inter-ministerial steering committee has been appointed to establish strategic principles and guidelines for preparation of a National Contingency Plan for Preparedness and Response to Combating Marine Oil Pollution. The plan is slated for completion in 1999.

Dumping of Waste

Dumping of waste into the sea from a vessel or aircraft is regulated through a strict permit system, instituted in 1984. The regulations list categories of substances prohibited or permitted to be dumped to sea and establish procedures and considerations for issuing permits. A special inter-ministerial committee decides on each permit application. Permits are granted or refused according to criteria stipulated in the regulations and only when the committee is convinced that there are no reasonable land alternatives for disposal and treatment of the waste and wastewater and that the best available technological means have been implemented to prevent the pollution. The applicant must reasonably prove that no damage to the marine environment will be caused. Even when permitted, dumping must comply with detailed regulations specifying maximum level of heavy metals in the residue, distance from shore, sea depth at the dumping site, and type of vessel used to transport the waste. In addition, a monitoring programme must be implemented around the dumping site.

By the end of 1998, in line with changes to the Dumping Protocol of the Barcelona Convention, sea dumping was stopped in Israel with the exception of dredged material (sand) from maintenance dredging in Haifa and Ashdod ports and in the cooling ponds of Israel's coastal power plants, brines (following pre-treatment) from food plants, and vessels to serve as artificial reefs and diving sites.

Land-Based Sources of Pollution

Land-based sources of marine pollution are the most serious environmental problem in the Mediterranean Sea area. A few coastal municipalities and a number of industries continue to sporadically discharge partly treated sewage into the Mediterranean Sea. Consequently, major efforts are being made to eliminate all land-based sources of sea pollution. Israel supervises and enforces all land-based sources of marine pollution within the framework of an inter-ministerial permits committee.

In recent years, substantial progress has been made in preventing pollution from land-based sources, including domestic and industrial waste, agricultural runoff and river discharges. This is largely attributed to increased supervision and enforcement of the Prevention of Marine Pollution (Land-Based Sources) Law and its regulations coupled with better information and guidelines to industrial plants and municipalities. In 1998, efforts were increased to prohibit indirect marine pollution through coastal streams, especially in the Haifa Bay area which has been identified as one of Israel's pollution "hot spots."

A pilot project was recently launched to install sensors on pipelines which discharge effluents to the sea. The sensors will relay on-line information on everything spewed into the sea from land-based sources to a computerised control system in Haifa. It is anticipated that all plants which discharge, or may potentially discharge, waste to the sea or to a river, will eventually be connected to the system - about 30 plants or potential polluters in all. The system will eventually become a comprehensive computerised environmental surveillance system of the marine and coastal environment.

Bathing Water Standards

According to the Israeli standard for seawater quality, public bathing is prohibited in the following circumstances: epidemiological evidence of infectious disease connected with bathing in the sea; discharge of sewage in the vicinity of the bathing beach; detection of excrement on the beach or in the sea; conditions which may endanger the health of bathers; and water which does not meet strict water quality standards.

Routine microbial tests at Israel's authorised beaches are conducted by the regional public health laboratories of the Ministry of Health. Local authorities are required to test water quality in authorised beaches in their jurisdiction and to transfer the samples to the Ministry of Health. Samples are taken once each week during the bathing season (May through October) and once a month during the winter.

If test results indicate potential public risk, the Ministry of Health consults with the local authority and with the regional bathing supervisor of the Ministry of the Interior on the advisability of closing the beach to bathers. Although beaches have at time been temporarily closed, Israel's authorised beaches generally comply with bathing water standards and meet stringent international criteria.

Beach Cleanliness

Solid waste, including plastic, bottles and driftwood, is a major blight on the country's shorelines. While current and wind regimes in the eastern Mediterranean are known to deposit significant quantities of waste from other countries on Israel's shores and therefore require international co-operation, at least half the litter on the beaches is left behind by vacationers.

Local authorities are responsible for the regular cleaning of all authorised bathing beaches in Israel, but these beaches constitute only a small percentage of the Mediterranean coastline (less than 30 kilometres). Since 1984, the Ministry of the Environment has financed the cleaning of all open beaches twice during each bathing season. Beginning in 1997, the Ministry initiated an experimental project whereby dozens of kilometres of shoreline are cleaned by local environmental units on a weekly basis. The project was expanded in 1998 in

the hope that in future years local authorities will take responsibility for the cleanup of all of Israel's open beaches for the benefit of the entire population.

Beach cleanliness has also been targeted as a priority for public awareness and involvement. Over the years, several large-scale volunteer cleanup campaigns have been undertaken, to assist in actual beach cleaning and to increase public awareness. In addition, thousands of young people participate in cleaning coastal stretches within the framework of camps run by the Society for the Protection of Nature in Israel. Other projects promote the participation of soldiers in cleanup activities within the framework of an army-sponsored educational campaign. In recent years, Israel has participated in volunteer coastal cleanups within the framework of International Beach Cleanup Day in September and has initiated underwater cleanups, by hundreds of volunteers, to rid the water of unsightly and environmentally harmful waste.

A recent study has shown that partial beach cleanups have only short-term impact due to the dynamics of the waste. Continuous cleanups along the entire stretch of the Mediterranean coastline are necessary in order to assure a litter-free coastal environment.

Economic Instruments for Marine Pollution Control

Monetary resources for combating marine and coastal pollution, purchase of equipment, law enforcement, monitoring and research activities and beach and shore cleanups are generated by the Marine Pollution Prevention Fund. Income is from fees collected from all oil terminals and ships calling at Israeli ports and from fines collected from individuals and bodies convicted of transgressing marine legislation. In addition, a Cleanliness Fund helps finance a wide array of environmental activities including beach cleanups. Income is derived from fees imposed on manufacturers and importers of disposable beverage containers and fines imposed on violators of environmental laws.

Impacts of Marine Structures

The damage caused to beaches by marinas and other offshore structures is a matter of serious concern. Fifty-five seaward-projecting and offshore structures, including harbours, marinas and anchorages, intake and cooling ponds for power plants, and groins and detached breakwaters were identified in a coastal study conducted about a decade ago. Since then, additional structures were added to the list: the coal terminal at the Ashkelon power plant and the marinas at Ashkelon, Ashdod and Herzliya. Studies confirm that these marine structures intercept the longshore sand transport, causing sand accumulation on the upstream side of the structure and beach erosion downstream. It is estimated that the total volume of sand trapped by offshore coastal structures has reached 10 million m^3.

The effects of manmade structures have been quantitatively recorded at several localities including the Ashkelon-Eilat Pipeline Company, Ashkelon marina, Ashdod Port, Herzliya marina and Netanya. The cases of Herzliya and Ashdod are reviewed in greater detail below, but damages have been recorded at each of the sites as follows:

- The cumulative effects of the anchorage breakwaters of the Ashkelon-Eilat Pipeline Company, built in 1972-1974 south of Ashkelon, were analysed by several researchers. All confirmed beach accretion to the south of the breakwater and shoreline retreat to the north of the anchorage.

- Erosion of the coastal kurkar cliff north of the Ashkelon marina began in 1994, two years after the start of construction. In just four years, the cliff to the north of the marina retreated by more than 10 metres. Moreover, substantial sand loss exposed the underlying kurkar rock and uncovered archaeological remains.
- In the Netanya area, where longshore currents flow southward rather than northward during some periods, damages were discovered following the construction of two detached breakwaters opposite the coast in 1969-1970. Beach accretion has occurred north of the breakwaters and shoreline retreat to the south.

A 1998 study conducted by the Geological Survey of Israel on marine sand resources offshore Israel notes the following: the sand balance at many localities along Israel's shoreline has been negative, at least during the last 40 years, and is likely to worsen as coastal development increasingly intervenes with the natural sand replenishments. The report concludes that "the Mediterranean coast of Israel has reached a state where its future depends largely on human actions. An integrated coastal management policy that emphasises environmental protection concerns must be urgently adopted to secure well-balanced and sustainable development."

The Case of the Herzliya Marina

The marina in Herzliya is one of the foremost examples of coastal damage as a result of offshore construction. This marina was the first to be built within the framework of the coastal masterplan, and was only approved for construction following an Environmental Impact Assessment (EIA) and a physical model (see Appendix). The studies showed that construction of the marina, with measures for coastal protection to its north, is not expected to cause coastal degradation. Coastal protection measures, detached breakwaters and sand nourishment were incorporated into the marina plan. The regulations also required monitoring and inspection, including aerial photographs, bathymetric mapping and a follow-up report.

Construction of the Herzliya marina was completed in 1992. By June 1994, it became clear that the impacts of the marina did not match those anticipated in the EIA. Monitoring indicated coastal damage and significant erosion north of the three detached breakwaters. Swimming beaches along some 15 kilometres north of the marina lost about half of their original width in just five years due to the reduction of sand supply from the south.

The case raised many issues for reconsideration. Most specifically, the realisation that physical and mathematical models cannot accurately predict the environmental impacts of a project led to a re-evaluation of Israel's policy on offshore marine structures and sand management. In 1995, the Minister of the Environment wrote to heads of local authorities along the coast, asking them not to advance plans for marine structures which may threaten coastal resources before the mechanisms of coastal damage are determined.

The issues related to marinas were reviewed in a recently published Territorial Waters Policy Document (see p. 36). Based on the adverse impacts of existing marinas and the surplus of berthing sites, the document proposes a freeze on the construction of new marinas on the Mediterranean coast until the subject is re-examined for the purpose of establishing long-term policy. The document recommends that the scope of berthing sites should be based on updated demand data, that the tourist character of marinas should be protected, and that the special character of the ancient ports of Jaffa and Acre should be preserved. The Ministry of the Environment and the Society for the Protection of Nature in Israel will shortly submit a

document on marinas to the National Planning and Building Board which will require, *inter alia*, cancellation of new marina plans.

The Case of Ashdod Port

Sand management is an essential consideration in plans to expand Ashdod Port. This massive deepwater structure, constructed in the southern part of the country in the early 1960s, has partly blocked the movement of sand from south to north. To ensure that port expansion will not bring about adverse results, the Environmental Impact Assessment (EIA) guidelines, which were issued by the Environment Ministry for the Ashdod breakwater extension plan, called for an investigation of the harbour's impact on sand supply over the past 30 years.

The resulting studies revealed that approximately 4.5-5 million m^3 of sand were trapped by the port. While Ashdod's beaches gained 0.12 km^2 of sand, the offshore seabed and beaches to the north suffered substantial sand loss. A subsequent review of these figures by an independent expert confirmed these findings. Its conclusion, which related not only to Ashdod Port but to the impact of other offshore structures as well, may be summed up as follows: construction of harbours, marinas, and detached breakwaters along the Israel Mediterranean shore has disrupted and will continue to disrupt the littoral system.

To minimise these adverse impacts, the following solution is advocated: making offshore structures "transparent" to the sediment transport system by artificial bypassing, through sand dredging and transport. The accreted sand, particularly the large volumes accreted south of the structures should be passed from the south to the north side of the structure, using dredges, by sea or overland.

Therefore, as part of the Ashdod Port expansion project, discussions were initiated on bypassing 120,000 m^3 of sand annually from south to north. Additional deliberations focused on potential sources for the fill required for the new wharves, an issue which is also relevant to expansion plans for Haifa Port. The Ports Authority intended to dredge the sand which had been trapped in the port for deepening the approach channel and to utilise this sand for fill material. The Ministry of the Environment, on the other hand, regarded the sand as a resource that belongs to the marine system of the country. If used for fill, the ministry required a further bypassing of 120,000 m^3 annually as compensation.

In a January 1999 decision, the Territorial Waters Committee adopted the bypass principle. It called for bypassing 120,000 m^3 of sand every year for the lifetime of the structure in order to ensure transparency, but for only bypassing another 60,000 m^3 as compensation for the sand used for fill. Quantities would be re-evaluated by the Territorial Waters Committee after five years. Discussions now focus on how these principles should be implemented.

The decision of the Territorial Water Committee is an important breakthrough in sand management policy in Israel. It is now understood that the sand debt must be repaid - not only by Ashdod port but by all marine structures that have damaged the country's coastline.

Risk of Cliff Instability

Scientists have calculated that the coastal cliff along central Israel retreats landward at an average annual rate of 15-22 cm. Since cliff abrasion shows no signs of abatement or of attaining topographic stability, it is expected to continue actively in the future.

Given the consequences of sudden collapse of a section of cliff and the value of land at the top of the cliff, a study was carried out on the stability, dynamics, risks and environmental management of the heavily-populated Sharon Escarpment in the central coastal plain. The escarpment forms a sharp dividing line between the coastal plain to the east and the beach and upper shelf to the west. It rises up to about 40 metres above the beach and usually slopes about 75-90º in a laterally variable profile.

The report notes that the escarpment moves evenly eastward by discontinuous collapse on the seaward side. The main driving force behind cliff retreat is wave-shore interaction. The multi-annual rate of cliff retreat is controlled by the rock's overall strength and the frequency of apron clearance by wave swash (a climatic constant), and cannot be slowed or accelerated without modifying these constants. No rockfalls occur as long as the talus protects the cliff's foot. The frequency of rockfalls, averaged on a multi-annual basis and along the entire length of the escarpment, is uniform and independent of cliff height or rock properties.

While cliff retreat is periodic, with each cycle beginning with the undercutting of waves at the bottom of the cliff, additional factors that impact on cliff retreat and collapse include run-off from the top of the cliff and washing away of the hamra (loam) layers beneath the porous kurkar cliff. Human interference, in the form of drainage, road-building and quarrying of sand, calcarenite and hamra in back-cliff areas and construction of offshore structures and removal of beach sand, beachrock and talus aprons along the beach, has also impacted on cliff destruction.

Geologists believe that non-intervention with cliff retreat may be the cheapest and surest way to conserve the cliff. Nevertheless, safety requires a belt of no-development along the cliff's rim and a safety strip on the beach, in sections where the cliff is bare of talus. To help protect existing cliff top structures, several options are proposed including, among others, buttressing of the cliff's base (which will protect private property but reduce width of beach available to the public), beach nourishment and measures to reduce drainage and irrigation from the top and back of the cliff.

Impacts of Sea Level Rise

Sea level rise, as a result of global warming, threatens to increase the rate of shoreline migration although its effects on Israel's coastal region are as yet unstudied. The main risks associated with sea level rise are believed to include: loss of the width of beach where the slope is relatively gentle (in the southern beaches), infiltration of seawater into the coastal aquifer and aggravation of the salinization problem. In addition, global warming may bring about an increased frequency of extreme conditions, such as storms and floods. Extreme conditions should therefore be taken into account in developing efficient coastal management practices.

Loss of Areas for Tourism, Recreation and Public Access

Israel's existing institutions and legal instruments have been successful in preserving the Mediterranean coastline outside urban areas but have not succeeded in protecting coastal stretches alongside Israel's major cities from persistent and powerful development pressures, particularly for exclusive residential development. Massive pressures by both developers and

municipalities for coastal sites have led to repeated breaches of the coastal masterplan, particularly in relation to construction within 100 metres of the coastline.

As most land in Israel is under national ownership, the problem of public access and use of the coastline for recreational purposes should not have been acute. The Israel Lands Administration is responsible for managing national land, both rural and urban, which accounts for more than 90% of the total land in the country (including the submerged offshore continental shelf). By law, this land cannot be sold and can only be provided to developers for specific projects on long-term leases. The object is to ensure wise use of the land and to prevent abuse of one of Israel's most valuable and irreplaceable assets. In reality, however, the Israel Lands Administration has joined with local authorities to privatise much of the coastal land.

In such urban centres as Tel Aviv, Haifa, Herzliya, Ashdod, Ashkelon, Netanya and Nahariya, developers have joined with municipalities, their economic development companies and the Israel Lands Administration to transform coastal resources into real estate destined for high-income residents. Local planning committees have often approved developments on the water's edge as exceptions to the coastal masterplan, allowing public beaches to become the exclusive domain of those with the financial resources necessary to purchase the view. In the centre of the country, inflated rights have been given for construction as an incentive for building hotels. In practice, as a result of the decrease in coastal tourism and the rise in demand by Israelis for coastal accommodations, new high-rise developments have emerged along the coast. Constructed under the guise of "apartment hotels" or "resort apartments." These luxury buildings block sea views and sea breezes and interfere with public access to the shore.

Since the term "holiday apartment" is not specifically defined by law, it has come to include a wide range of accommodations that fall into the "grey" area between hotel accommodations and residential dwellings. The term has also been used to allow luxury apartments in areas that are designated for hotels. Today, it is clear that holiday apartments along the coast interfere with the public's right to the beach, both in terms of physical access and open view to the beach, deplete future land reserves for tourism purposes, and allow for the development of residential areas in locations and building standards which are unsuitable for residential purposes.

In order to stop the growing phenomenon of new residential units along coastal stretches designated for tourism, the Society for the Protection of Nature in Israel and the Israel Union for Environmental Defense, two of Israel's foremost non-governmental environmental organisations, published a position paper on the subject in 1988.

The position paper proposes the following guidelines:

- Holiday apartments, in any form, should not be constructed on open coasts and rural areas.
- Holiday apartments, especially for residential areas, should not be permitted on reclaimed land or in the hinterland of marinas. Based on the scarcity of coastal resources and the negative impacts of marine structures, marinas should only be permitted for tourism purposes while minimising the scope of development and environmental damage.

- Holiday apartments may be permitted in urban and suburban areas, in the second strip from the coast and further. In these cases, clear and recognised definitions for such terms as recreation and residence should be used instead of vague definitions in order to prevent misguided planning.

The position paper maintains that areas with high landscape and environmental value, which are designated for tourism and recreation in the national tourism masterplan and other masterplans, should be preserved exclusively for these allocations and protected from over-development. Clear guidelines must be formulated to distinguish between permitted and prohibited uses in these areas. At all times, private use of coastal areas designated for tourism and recreation should be prohibited in order to ensure the original purpose of public use and enjoyment.

Sustainable tourist development should help to preserve coastal open space and to conserve natural and historical resources. A cautious development policy is called for which will serve the needs of modern tourism and provide site accessibility while reducing to a minimum the impacts of tourism on landscape and open spaces.

Alternatives to Urban Development

The high demand for construction along the shoreline and the attractiveness of housing and tourism along the beach suggest a number of alternatives: *building up* by means of high-rise buildings to allow for more building on less space; *building out* into open landscapes which will lead to urban encroachment; *building underground* which is not yet fashionable; and *dispersion* to the periphery in the north and south of the country, which has not yet been successful. Yet another possibility raised for discussion is sea reclamation. Coastal conditions in Israel are potentially suitable for artificial islands, and experts have argued that artificial islands opposite Israel's shores will significantly alleviate land pressures in the central coastal strip.

The idea of erecting artificial islands off the Israel Mediterranean coastline, first raised in the 1960s, has been revived during the last decade when it became clear that the central Mediterranean coastal plain of Israel (Greater Tel Aviv and its surroundings) is one of the densest regions in the world in terms of population, commerce, industry and tourism. This region is expected to reach an expected population of some 5 million in an area of 1,250 km^2 (4,000 per km^2) by the year 2020. Demand for land is rising precipitously with current land prices at prime sites reaching \$ 4,000/m^2.

The subject of artificial islands is currently investigated by a joint Israeli-Dutch team. Two main subjects were targeted for evaluation during the first phase of a feasibility research and development study which was initiated in mid-1997:

1) Effects of artificial islands on the coastline: environmental and morphological changes.
2) Appropriate fill material: availability, quantities, costs and environmental effects.

Case Study: Tel Aviv Coastal Stretch

Tourism facilities first sprang up along Tel Aviv beaches in the 1920s, and building and development subsequently sprawled northward, parallel to the shoreline. When the state was

established in 1948, Tel Aviv's beaches became public land, and private entrepreneurs built the city's largest hotels there. During the 1960s and 1970s, the narrow sand beaches of Tel Aviv were widened by means of detached breakwaters. A 50-metre wide bathing beach, the longest declared swimming beach in the country, was created, and a promenade was constructed alongside the beach.

Some 150,000 people congregate on the city's beaches on summer weekdays and 250,000 on Saturdays. According to the national coastal masterplan, the capacity of the beach area in Tel Baruch (central Tel Aviv) is 78,000 people per day.

The 13.5 km long Tel Aviv-Jaffa coastal stretch is divided into several sections, each of which is characterised by different natural features, history, land use and future plans. Following is a short description of the coastal stretches, from north to south:

North Tel Aviv (from the city boundary to the Yarkon River Mouth): A 3 km long area, most of which is undeveloped. Beach access is restricted by a cliff and two areas that are closed to the public: the Reading Power Station, near the Yarkon River Mouth, and Sde Dov Airport. There is a developed bathing beach at Tel Baruch, with an offshore detached breakwater. The rest of this coastal stretch is mostly natural and is characterised by a relatively narrow strip of sandy beach backed by a cliff. The area east of the cliff offers a wide variety of nature and landscape values.

Yarkon River Mouth: A small area which is the only place on the Tel Aviv coast where a river enters the sea. Today, the north side is occupied by the Reading Power Station. There is no bathing beach south of the river mouth. The area is situated in the meeting point between two main axes of open public space: the Yarkon River and park and the coastline, and therefore holds major potential for coastal development.

Tel Aviv Port Area: The historic port of Tel Aviv ceased functioning as a commercial port with the opening of Haifa Port. Development plans call for turning the port into a tourist attraction, which will be integrated with the Yarkon Park and Yarkon River Mouth area and will offer a wide range of seaside leisure and recreation activities.

Tel Aviv Bathing Beaches: This is the "main segment" of Tel Aviv's bathing beaches, largely consisting of sandy beaches and short sections of coastal cliff. Facing the beach are detached offshore breakwaters. Another marine structure is the Tel Aviv Marina. Behind the sandy beach is the beach promenade, a string of hotels, public parks and the main thoroughfare. The width of the sand strip varies and reaches dozens of metres in some areas.

Jaffa Port: Since Jaffa Port fell into disuse as a commercial port in 1966, it has functioned as a mooring berth for pleasure and fishing vessels. Jaffa Port is one of four ports used for fishing in Israel. Some 30% of the mooring area is allocated for fishing and the port capacity is for 220 vessels.

Jaffa Slope, South Jaffa to Giv'at Aliyah: In the past, the Jaffa coastline from south of the port to the Giv'at Aliyah Beach, was a rocky beach cove, supporting a variety of flora and fauna. The residential area of Jaffa was in close proximity to the shoreline. Over a 20-year period, the buildings were destroyed and the area was transformed into a disposal site for building debris. The refuse heap now reaches some 20 metres above sea level, and lies 200

metres westward of the original shoreline. The garbage heap has destroyed the area's natural and landscape features.

Development plans exist for each section of Tel Aviv's coastline - whether residential, tourist or commercial development - and each has engendered its own set of conflicts.

Conflicts Revolving Around the Yarkon River Mouth

An assessment of conflicts related to coastal development was undertaken within the framework of an International Workshop on Conflict Resolution held in Israel in January 1999. The case of the Yarkon River Mouth was used to illustrate the difficulties encountered in coastal planning, in general, and in the central area of the country, in particular.

A municipal company owned by the Tel Aviv Municipality first proposed construction of a marina in an area encompassing 0.536 km^2 at the site of the Yarkon River Mouth. Out of this total area, some 0.490 km^2 were to be at sea, of which 0.225 km^2 were allocated for land reclamation. The aim of the plan was "to develop the Yarkon River Mouth as a zone of tourism, special accommodations, and recreational and marine sport activities." The marina was planned for 630 mooring berths, 330 for public use and the remainder for private use.

The plan was submitted to the planning authorities in 1992 and an environmental impact assessment was presented by the developer in 1995. Since the scale of damages caused by marine structures was being re-examined at the time with relation to the Herzliya marina, environmental bodies contested the decision of the planning commission to deposit the plan. They asked for a postponement, pending completion of the Herzliya marina study. Subsequently, the Israel Union for Environmental Defense (IUED) petitioned the Tel Aviv District Court, and a temporary injunction was issued preventing deposition of the plan.

After publication of the Herzliya marina report, the Ministry of the Environment demanded supplementary material for the Yarkon marina plan. At the same time, the Society for the Protection of Nature in Israel, the country's largest environmental NGO, prepared a legal opinion showing that the marina plan contradicts the provisions of the coastal masterplan.

The country's environmental organisations objected to the plan on several grounds including potential beach erosion to the north of the plan area and sand accumulation to the south. Other objections related to obstruction of an open sea view at this meeting point of river and sea, land uses for which proximity to the seashore is not essential, wide scope of private space on reclaimed land, and planning procedures which run contrary to the coastal masterplan and EIA requirements. These arguments were presented to the Tel Aviv District Court with a request that the planning proceedings for the marina be halted.

In a November 1997, the District Court ruled that the Tel Aviv District Planning and Building Commission had no authority to decide on plan deposition without a full EIA and that construction of residential buildings within the 100-metres zone contradicts the coastal masterplan.

This decision, coupled by the strong public protest elicited by other development plans along the Tel Aviv coastline, led the Tel Aviv municipal council to freeze all building plans along the shoreline until a special committee, with representatives of environmental organisations and the general public, re-examines coastal development policies and presents its

recommendations. The decision reflects a significant change in the relation of local authorities to the coast and to the rights of the public to it.

The case of the Yarkon River Mouth illustrates the conflicts that are often evoked by a coastal plan. Stakeholders in this case included private and public planners and developers, government representatives at the local, district and national level, non-governmental organisations (both environmental and other) and nature conservation and environmental bodies. The critical issues included: the coast as a public asset, construction of marine structures and environmental damage, tourism development and residential building. The case highlights the complexity of the coastal system in which the multiplicity of stakeholders and institutions makes compromise difficult. On the other hand, it accentuates the need for new forms of conflict resolution, whether through the participation of all stakeholders at earlier stages of planning or through a negotiation-based planning process with the possible aid of mediators or facilitators, to reconcile competing demands.

Damage to Natural and Cultural Resources

The conversion of open spaces into built areas is an irreversible process: a “natural” area once transformed into a built area can never be recreated. In a small country such as Israel, pressures for development and urbanisation along the highly sensitive coastal area threaten natural and cultural resources. These damages are further exacerbated by disturbances caused by vehicle traffic along the sandy coasts for recreation purposes -by jeeps, all-terrain vehicles, motorcycles and other modes of transport. In addition, offshore structures increase shore erosion and disrupt the littoral system along with its natural values. All have taken a toll on the sand and kurkar ecosystem of the coastal strip, which was identified as one of Israel’s most endangered ecosystems in a recent assessment of open space landscapes.

Similar threats loom over Israel’s cultural resources, on both land and sea. Until recently, for example, Israel’s ancient harbours were not modernised, and new ports (Haifa and Ashdod) in different locations took the place of such ancient ports as Acre and Jaffa. However, new development initiatives now threaten the country’s ancient ports. Moreover, the accelerated rate of cliff retreat has led to the destruction of cliff top archaeological and historic sites and the exposure of an ancient city (Ashkelon).

Underwater, sand depletion has led to the exposure of archaeological remains that were previously protected by layers of sand. The exposure of many findings simultaneously, after hundreds or thousands of years in which they were safely protected by the sand layer on the seabed, threatens to destroy these remains since authorities are unable to deal with a large number of findings simultaneously. Further changes in the shoreline threaten to destroy remnants not yet discovered. Thus, if development continues at its present pace, important findings of the marine heritage of 3000 years may be lost to residents and tourists alike. The Marine Archaeology Branch of the Israel Antiquities Authority is trying to tackle these challenges through a variety of means including: underwater surveys and excavations, mapping of sites to form a national database, declaration of protected underwater archaeological sites, supply of data to planning authorities, follow-up of development plans, research and publication of discovered material, creation of underwater archaeological parks for divers, and information and education designed to raise public awareness of the importance of preserving the underwater heritage.

Protection of Coastal and Marine Ecosystems

The coastal masterplan has for the most part prevented scattered development along the coast and protected open coastal areas from development. Moreover, nature reserves along the coastline have been allocated to help preserve unique natural assets. Efforts are currently focusing on accelerating the declaration of designated coastal and marine reserves and parks, assessing the possibility of expanding the boundaries of protected areas and proposing new reserves based on new and cumulative data on natural values on coast and sea.

The Nature and National Parks Protection Authority (NNPPA), as the government agency in charge of nature conservation in Israel, oversees 444 nature reserves (proposed and declared) which span over 6,240 km^2. It is also responsible for 14 Mediterranean coastal parks (landside only), amongst 129 national parks which encompass 376 km^2. Nature reserves are defined as areas containing unique and characteristic animal, plant and mineral forms which must be protected from undesirable changes in their appearance, biological composition or evolution. National parks are defined as areas of natural, scenic, historic, archaeological or architectural value which are protected and developed for recreational purposes. Israel's coastal parks play an important role in protecting the country's natural beauty from rapidly-encroaching urbanisation and restoring and maintaining antiquities that have been lost or neglected for centuries.

There are four types of nature reserves along the Mediterranean: marine reserves (proposed and declared), coastal reserves (proposed and declared), islet reserves, and protected natural asset belts. Declared reserves have full legal protection while proposed reserves have a limited level of protection until they are declared.

Israel has 14 proposed marine reserves, with a total area of about 25 km^2. In addition, it has 20 coastal reserves with an area of about 35 km^2, 16 of which are proposed and 4 declared. Marine reserves are declared up to the mean high tide level, while coastal reserves are declared down to the mean low tide line, providing overlap at the waterline. Because the cross-shore borders of the two types of reserves are not always congruent, only about 2/3 of the shoreline of the marine reserves has a parallel coastal reserve. Nevertheless, coastal reserves are important for the preservation of both the aquatic and the littoral environments, as they prevent shoreside development.

The third type of reserve is the islet reserve. Israel currently has two islet reserves comprised of small islands with a total area of about 0.33 km^2. These islet reserves will be incorporated within the proposed larger marine reserves in order to enlarge the number of protected islets along the Israel coast. Most of the islets are in proposed marine reserves and five islets are already declared as nature reserves.

There are more than two dozen small islets (totalling over 0.15 km^2) which represent tiny remnants of kurkar (sandstone with calcite matrix) ridges. Although little ecological research has been carried out on the islets, they are considered to be unique and important micro-ecosystems.

The fourth type of reserve is the protected natural asset belt. There are two such belts with a total area of about 12 km^2, most of which will be included in the proposed marine reserves (i.e., 8.7 km out of 11 km of the natural assets belts). One is between Rosh HaNiqra and Akhziv and the second between Atlit and Dor. All fish, molluscs and most marine

invertebrates are fully protected in these belts (See Appendix for a full list of Israel's coastal and marine nature reserves.)

Case Study: Protection of the Carmel Coast as a Coastal Reserve

The Carmel coastal area, spanning from Atlit (south of Haifa) to Caesarea, represents Israel's longest continuous undeveloped coastline. This 32 km long and 4 km wide coastal stretch is characterised by a high level of ecological diversity and archaeological treasures: partially submerged fortresses at Atlit, Tel Dor and Caesarea, and ancient boats at Nahsholim and Ma'agan Michael. The Dor-Habonim Nature Reserve, the only declared coastal nature reserve in the Carmel Coast, is located at the centre of this area. It includes a unique rocky beach, home to a broad array of flora and fauna, both on land and in the sea. The beach is also of crucial importance to an endangered species of turtle which lays its eggs there.

A national survey of open coastline areas, which are as yet unoccupied by construction, military facilities, and infrastructures, has revealed only two areas of undisturbed beaches along the Mediterranean coastline: the area between Ashdod and Ashkelon (in part) and the Carmel coast. The importance of conserving this region in its natural state has been confirmed in natural asset and landscape surveys performed by the Society for the Protection of Nature in Israel (SPNI). As a result, a map was produced which ranks areas according to five levels, based on their sensitivity to development and importance for preservation.

Yet, in contradiction to survey results and to the provisions of national masterplans, individual local councils in the area have submitted plans for tourism development which maximise their immediate profits while ignoring the sensitivity and uniqueness of the region as a whole. The number of rooms planned by local developers exceed demand forecasts by hundreds of percentages. One of the foremost proposals was for a recreation village on the Habonim Coast.

To help promote a sustainable planning approach for this area in the face of growing development pressures, the SPNI prepared a position paper on the subject in 1997. Two primary goals are at the basis of the sustainable tourism planning approach which is advocated for the Carmel coast: conservation of ecosystems along the coastline and preservation of the continuum of open spaces along the seashore. Measures to achieve these goals include: linking development plans to existing centres according to the principles of the coastal masterplan, comprehensive review of development plans, concentration of rights of property owners in regional focal points, prohibition of residential and recreation apartments along the coastline, preservation of the rural character of the area, prohibition of tourist attractions in the midst of environmentally sensitive areas, and promotion of rural tourism. Finally, the paper objects to establishing a recreation village on the Habonim Coast and advocates instead that the Dor-Habonim Nature Reserve be expanded and that a management plan for the area be prepared.

The public protest against tourism development in the Habonim coast has led to a withdrawal of the recreation village scheme. However, building initiatives in sensitive areas along the Carmel coastline continue. The SPNI has recently completed the preparation of yet another position paper laying out guidelines and principles for the sustainable development of this entire area based on the sensitivity of coastal resources.

EXISTING INSTITUTIONS AND RESPONSIBILITIES

A wide range of stakeholders are involved in issues related to the coastal and marine environment in Israel. They include local authorities, government ministries, independent authorities and private and public bodies. Table 4 gives is a general description of the institutions involved in coastal planning and management today.

Table 4: Existing Institutions and Responsibilities

Institution	Responsibilities
Ministry of the Interior Territorial Waters Committee National Planning and Building Board District Planning and Building Commissions Emergency Services, Special Duties and Bathing Beaches Administration	National planning and building, declaration of new protected areas. Approving offshore structures. National masterplans. Regional masterplans. Supervision of bathing beaches, bathing safety and instruction.
Ministry of Transport Shipping and Ports Administration	Testing, licensing and supervision of vessels and anchorages.
Ministry of the Environment Marine and Coastal Environment Division Environmental Protection Control	Marine pollution prevention, supervision of environmental legislation.
Ministry of Agriculture Fisheries Division	Inspection and supervision of fishing and of fishing vessels.
Ministry of Health	Inspection of bathing beaches.
Ministry of Tourism	Development of tourism and recreation.
Ministry of Education	Naval schools, clubs, Diving Authority.
Ministry of National Infrastructures Israel Oceanographic and Limnological Research Geological Survey of Israel	Gas and oil infrastructures. Monitoring and research on coastal and marine resources. Investigation of Israel's geology, coastal studies.
Ministry of Defense	Marine and coastal security, closed military areas on the coast.
Ministry of Internal Security Coast Guard	Law enforcement at sea, search and rescue operations.
Ministry of Police Naval Operations Border Police	Security, registration of entrances and exits.
Ministry of Foreign Affairs	International marine conventions.
Ministry of Justice	Marine legislation and conventions.
Local Authorities	Coastal planning, business licenses, maintenance of public areas.
Israel Land Administration	Management of national land in Israel.
Nature and National Parks Protection Authority	Nature protection and administration of coastal national parks and nature reserves.
Antiquities Authority	Coastal and marine archaeology.
Ports Authority	Commercial ports, loading and unloading facilities.
Eilat-Ashkelon Pipeline Co.	Fuel loading, unloading and storage.
Natural Gas Authority	Marine pipeline for natural gas.
National Coal Supply Corp.	Coal supply to power plants.
Israel Electric Corporation	Power plants.
Petroleum and Energy Infrastructure Ltd.	Tank far and fuel pipeline along the coast.
Water Commission	Infiltration of seawater to groundwater.
Artificial Islands Committee	Advancement of planning for islands.
National Sewage Authority	Marine outlets.

EXISTING POLICIES AND TOOLS FOR INTEGRATED COASTAL MANAGEMENT

Coastal Legislation

Israel's environmental legislation uses all forms of legislative instruments - laws, regulations, administrative orders, decrees and bylaws - and is linked to an international legislative system which includes international conventions. A comprehensive coastal law does not yet exist in Israel (a draft law has recently been drafted and is presented on p. 56), but marine and coastal issues are included in a wide variety of legislation. Moreover, the Lands Law of 1969 includes the seashore in the framework of "designated land" which is "public land designated for public use."

Following is a brief description of the laws which directly impact marine and coastal area management in Israel:

- *Prevention of Sea Pollution by Oil Ordinance (New Version), 1980:* This law provides the legal basis for controlling marine oil pollution. It prohibits discharge of oil or oily substances into territorial and inland waters from any shore installation or vessel, and makes any such act a criminal offense. The Minister of the Environment is empowered to appoint inspectors to discover or prevent violations. The law establishes maximal fines for oil spills and liability for cleanup expenses. Other salient features of the law and its regulations include an obligation to keep oil record books on vessels, measures to be taken in case of oil discharge, and requirements for vessels to use port reception facilities for oily wastes. Regulations promulgated within the framework of the ordinance establish a Marine Pollution Prevention Fund to generate income for preventing and combating marine and coastal pollution, cleanup operations and purchase of equipment. The major sources of the fund are fines collected from court convictions and fees levied on owners or operators of vessels calling at Israeli ports and on shore facilities handling oil.
- *Prevention of Sea Pollution (Dumping of Waste) Law, 1983:* This law prohibits the dumping of any waste from vessels and aircraft into the sea, except under permits which may be issued by an inter-ministerial committee, headed by a representative of the Minister of the Environment. A court convicting an offender under this law may require, in addition to the fine levied, payment of cleanup expenses or of locating the waste dumped into the sea. The law provides for the appointment of inspectors to carry out inspections, investigations and searches to prevent or discover offenses. Regulations under the law, drafted according to the Dumping Protocol of the Barcelona Convention, include lists of substances which may or may not be dumped and conditions for issuing permits.
- *Prevention of Sea Pollution from Land-Based Sources Law, 1988:* This law forbids the discharge of waste, including wastewater, into sea in all cases where practical and economic alternatives for treatment or reuse exist on land, under the condition that such processes are less harmful from an environmental point of view. An inter-ministerial permits committee, chaired by a representative of the Minister of the Environment, determines what may or may not be discharged into the sea and under what conditions. The conditions and criteria for granting permits, and the types of waste which may not be discharged at sea were

established according to the provisions of the Land-Based Protocol of the Barcelona Convention. The law provides for the appointment of inspectors to carry out investigations and searches for the purpose of preventing or discovering offenses. Israel has initiated steps to broaden the prohibitions on land-based sources of pollution to discharges from rivers, coastal establishments, outfalls or any other land-based sources and activities.

- *The Ports Ordinance, 1971:* This ordinance provides for the operation and management of ports in Israel. It contains a specific section on handling hazardous substances in ports. Regulations promulgated under the law cover such matters such as collection of waste, bilge and ballast water from vessels. Regulations on Loading and Discharging of Oil, promulgated in 1975 under the Ports Ordinance, control all procedures for safe loading and discharge of oil and contain specific instructions on the following: entry into territorial waters and ports; vessel operations during their stay in terminal; measures for fire prevention and fire fighting; conditions of oil terminals; transfer of oil from road tankers; and other regulations aimed at ensuring environmentally-safe practices. While most of the regulations are supervised and enforced by the Ministry of Transport, provisions concerning environmental issues are administered by Environment Ministry inspectors.
- *Fisheries Ordinance, 1937*: This ordinance is enforced by the Fisheries Board of the Ministry of Agriculture. The ordinance requires a license to fish with the exception of fishing from shore with hook and rod. It sets conditions and restrictions on a wide range of subjects including prohibitions on use of explosives or poisons to catch or kill fish, prohibitions on fishing methods which may damage or threaten the survival of fish species, prohibitions or limitations on fishing in certain areas or during certain seasons, size limits for species of fish, and mesh size and calibre of fishing nets. Other regulations prohibit fishing of marine turtles and restrict fishing of sponges.
- *The Bathing Places Law, 1964*: The law permits local authorities to formulate bylaws for maintaining beach cleanliness. It empowers the Minister of the Interior, in consultation with the Minister of Health, to close bathing beaches for the protection of bathers.
- *Prohibition of Vehicle Driving along the Coast Law, 1997*: This law was specifically enacted to stop the growing use of vehicles, especially all-terrain vehicles, along the coastline.

In addition to the above, the following legislation is also relevant to the coast:

- *Planning and Building Law, 1965*: This law sets the legal framework for development and land use in Israel and serves as the basis for environmental policy. All development is subject to the approval of statutory planning boards, on the national, regional and local levels. The law has major significance for all development activities on the coast.
- *Planning and Building Regulations (Environmental Impact Statements), 1982*: These regulations under the Planning and Building Law mandate the preparation of an environmental impact statement when the planning authority considers that significant impacts may occur as a result of a plan or project. The regulations can be utilised as an important tool in protecting and using Israel's coasts. Any proposed project which is liable to adversely affect Israel's coast may be subject

to the preparation of an environmental impact statement according to specific guidelines issued by the Ministry of the Environment.

- *National Parks, Nature Reserves, Memorial Sites and National Sites Law, 1998:* This law, first enacted in 1963 and revised in 1992 and 1998, provides the legal structure for the protection of natural habitats, natural assets, wildlife and sites of scientific, historic, architectural and educational interest in Israel. It establishes systems for declaring nature reserves, marine protected areas and national parks and for listing protected natural assets which include many families and species of flora and fauna. This legal protection extends to many taxa, originating within or outside of Israel. The law establishes a new and united Nature and National Parks Protection Authority (NNPPA) which replaces the previous Nature Reserves Authority and National Parks Authority as separate entities. A National Parks, Nature Reserves and National Sites Council, composed of all relevant stakeholders and appointed by the Minister of the Environment, advises the relevant ministers on implementation of the law.
- *Antiquities Law, 1978*: This law, which is enforced by the Antiquities Authority, protects all artefacts of human civilisation prior to the year 1700. No collecting, selling or disturbing of such artefacts is permissible anywhere in Israel, including territorial waters.
- *Zifzif Law, 1964*: This law prohibits beach sand quarrying and sand removal.

Additional environmental laws which impact on the marine environment are listed in the Appendix.

Litigation and Court Decisions

The heightened awareness of coastal management issues is reflected in a number of court decisions against coastal development plans which violate environmental laws and masterplans in Israel. The Society for the Protection of Nature in Israel (SPNI) and the Israel Union for Environmental Defense (IUED), two of Israel's foremost NGOs, have been especially effective in initiating these cases. (See p. 51-53).

Following are some relevant rulings:

- *Tel Aviv*: The IUED petitioned the District Court to prevent the deposition of plans to construct a marina at the mouth of the Yarkon River, since, *inter alia,* a complete EIA was not available to the Tel Aviv Planning and Building Commission at the time of deposition and since the plan violates provisions of the coastal masterplan which prohibits the construction of residential building along the coastline. The judge ruled as follows: "We must also leave something to our children. In this case, the issue relates to public property and therefore the growing trend of reaping financial profits must make way for other needs which are for public benefit. In this case, the matter relates to a river outlet into the seashore. Planning which is not based on an EIA, which takes account of all restrictions, may endanger the northern part of the seashore and damage the area beyond the plan. Therefore, in these circumstances, top priority must go to a comprehensive EIA." (For further information on the proposed marina at the Yarkon River Mouth, see p. 25).

- *Tel Aviv*: IUED has filed suit against two companies responsible for a residential development (Sea and Sun) on the beach just north of Tel Aviv. Contrary to the stipulation in the coastal masterplan which limits seashore construction to tourism, the apartments are marketed unconditionally as regular apartments for the exclusive use of their owners. Furthermore, the landscaped gardens go beyond the boundaries of the property and encroach on the public beach. The petition is limited to the section at the front of the complex where the apartments have not yet been sold.

- *Ashkelon*: Utilising its legal status to represent the public in court on environmental issues, the IUED negotiated in the Ashkelon District Court for a halt to the extensive building project in its final stages on the Dalila beach. Local residents claimed that the development dramatically alters the shore and in effect destroys the town's last open stretch of beach. In view of the lateness of the complaint, the court called for construction to cease temporarily in order to allow the parties to reach a compromise.

- *Nahariya*: IUED along with a local NGO petitioned the Haifa District Court against a "holiday apartment" project which intruded into the 100-metres prohibition on building near the shoreline. In a precedent-setting ruling, the court ruled that the fence which was erected on the shoreline is illegal since it blocks entrance to the shore and encloses an additional private area in the project area. Moreover, the judge ruled that since the coastal area is designated for tourism, some of the apartments must be made available for rental every few months to ensure free access.

- *Herzliya*: The IUED joined Herzliya residents in protesting a multi-story building complex in the hinterland of the Marina-Li area. The court ruled that the approval procedure for the plan was void since the planning institutes ignored the fact that about half of the area of the plan was to serve as public open area according to the coastal masterplan.

- *Haifa* (marina project): The SPNI and IUED appealed to the Haifa District Court in 1996 against plans to deposit the Haifa marina project, Israel's largest ever coastal development project which includes land reclamation and large-scale residential, tourist and commercial development. Moreover, planners and scientists argued that if built, the marina would cause severe destruction to the coastline and underwater flora and fauna. The petitioners claimed that prior to any efforts to push the proposed marina plans forward through the planning commissions, the coastal masterplan should undergo a full review at the national level. The court agreed to delay deposition of the plan until the Territorial Waters Committee discusses it. The Committee, in turn, transferred the matter to the National Planning and Building Board. In May 1999, the National Board unanimously decided to open the marina plan for re-evaluation. The Board called for amendments to the masterplan for the coasts of Haifa to be made within half a year. These are likely to include limits on residential areas, hotels and land reclamation areas which are included in the original plan. The editors of the plan are called upon to re-examine existing planning material including the original guidelines of the National Board for the marina in Haifa which date back to 1991. It was also decided that the principles of full public access, open sea view to the

sea, and preference for recreation activities will be reflected in the amended masterplan.

- *Haifa* (Carmel Towers Project): In June 1998, the National Board accepted the position of the IUED that construction of the Carmel Towers Project violates the instructions of the coastal masterplan. The hearing took place as a result of a direct order handed down by the Haifa District Court which ruled that additional hearing must be held against the Carmel Towers Development Co. and the local Haifa district planning commissions. The Carmel Towers Project is one of Israel's largest coastal development project including massive residential towers and hotels which make use of public space for private use. The ruling of the district court is now on appeal in the High Court of Justice.

In all of the above cases, the petitioners claimed that coastal development plans blatantly violate the letter and the spirit of the coastal masterplan. The court rulings represent an important precedent in the protection of Israel's coastline from encroaching development. Moreover, the decisions, coupled with strong public protest, are leading to reassessments of coastal development plans in Haifa and Tel Aviv.

Nevertheless, Israel's environmentalists are aware that the court challenges have not put an end to plans for marinas and beachfront high-rises. Many of the decisions have already been contested and are now heading for appeal in the High Court of Justice. Therefore, both the Ministry of the Environment and Israel's non-governmental bodies are continuing their vigilance, informing the public of new coastal plans, supporting public protest, preparing position papers on coastal development and drafting coastal bills (see p.56).

Planning Institutions and Instruments

Coastal zone management in Israel uses the land-use planning system established under the Planning and Building Law of 1965. The law establishes a comprehensive legislative framework which regulates all building and land-use activities in Israel, public and private, within a three-level hierarchy: national, district and local. The Ministry of the Environment is represented at all levels of planning in the country.

The National Planning and Building Board (the National Board), at the top level of national planning, is composed of representatives of government ministries, local government, and public and professional organisations, including nature protection bodies. The National Board provides a broad and extensive forum for deliberation by all concerned bodies and allows for the mobilisation of professional input and expertise from a wide variety of disciplines.

The primary responsibilities of the National Board are to enact masterplans, review regional masterplans and serve as an appeal board for decisions of the District Planning and Building Commissions. National masterplans (mostly sectorial masterplans which lay down the planning structure for the entire area of the country) are prepared for issues of national planning significance or for land uses that serve national interests. Masterplans are commissioned by the National Board and then submitted to the government for final approval. Once approved and announced in the official gazette, they have the status of legally binding plans. Recently, the National Board has commissioned non-statutory national policy documents to guide its decisions.

The national level of the hierarchy includes two statutory committees: the Committee for Protection of Agricultural Lands and Open Spaces, responsible for protecting lands of agricultural value and open spaces and minimising their loss to building, and the Territorial Waters Committee, responsible for approving all offshore structures (see p.43). No plan or building permit regulating agricultural lands or offshore projects may be endorsed without prior approval of these committees.

The regional level of the planning hierarchy is the responsibility of six District Planning and Building Commissions, five of which include coastal sections. The District Commissions are composed of regional representatives of government ministries and representatives of local authorities within the district.

The local level consists of about a hundred Local Planning and Building Commissions, serving one or more local authorities and composed of the elected members of the municipal councils. Some 25 local authorities are dispersed along the Mediterranean coastline.

National Masterplans

National masterplans are prepared for land uses and projects of national significance. Environmental aspects are integrated into all relevant national schemes and, in some cases, they are the dominant considerations. National planning requires the integration of environmental considerations from the earliest stages of planning until final formulation of the planning documents which are presented for approval to the statutory planning agencies.

Several national plans are targeted at protecting specific natural resources considered to be of high value as part of the natural and cultural heritage, such as plans for nature reserves and national parks and forested areas. Other plans address particularly sensitive areas warranting special attention such as plans for the Mediterranean coastal area. Following is a short review of masterplans which relate to coastal zone management in Israel:

The National Masterplan for the Mediterranean Coast (NOS 13) was approved in 1983. It is based on two underlying principles: preference to recreational activity on the coast and land use as a function of the carrying capacity of the coastline. Based on these principles, the plan determines land allocations along the coastal strip for the purpose of managing, preserving, developing and using them for such purposes as: swimming, recreation and sport; tourist facilities; protection of antiquities, nature reserves, national parks, forests and coastal reserves; ports and other essential uses which require a coastal location. The plan aims to prevent development which is unrelated to the coast and to resolve conflicts of interest among land uses which require a coastal location. It includes a clause prohibiting development within 100 metres of the coastline and requires environmental assessments as prerequisites for all coastal plans (specification of local conditions including coastal impacts, surveys and analysis of plan proposals, environmental impact statements, detailed coastal surveys, surveys and proposals on access routes, surveys of infrastructure systems and their impact on the proposed site). The masterplan also allocates sites for several ports and fourteen marinas.

The National Masterplan for Ports and Marinas (NOS 13B) was commissioned by the National Planning and Building Board to regulate use of marine and land areas for seaports, which include ports for tourism and sport activities. The discussions of the steering committee on marinas revolved around such issues as distribution of marinas, scope and type of development in the hinterland of marinas, anchorage spaces, and allocation of coastal and

marine areas based on the number of vessels. The proposals have not yet been presented to the National Board.

The National Masterplan for the Resource Management of the Mediterranean Coastline for Tourism and Recreation (NOS 13C) was commissioned by the National Planning and Building Board to help provide a comprehensive long-term guide to planning policy. The coastal management plan, prepared by the Environment Ministry and approved in principle by the National Board, bases development policies on principles of suitability and sensitivity of coastal resources. Suitability for tourist and recreation development was assessed on the basis of geological, vegetation, landscape and archaeological surveys, and levels of development were then defined for each site along the Mediterranean coastline in relation to resource sensitivity. Multidisciplinary teams of land use planners, geologists and ecologists prepared surveys of coastal resources and guidelines for some of the main resource management issues, as follows:

- *Sand supply*: Because sand supply along the shore is limited, existing wide sandy shores should be designated only for those activities that require such natural shores. Other activities should be directed to non-sandy shores.
- *Offshore structures*: Offshore structures change nearshore sand and water flows and may result in sand accumulation and/or shore erosion. Any proposal for offshore structures should therefore be evaluated carefully. The development of offshore structures should be limited to certain designated sections of the coast.
- *Cliff erosion*: Because cliffs are in an active state of erosion, structures should be set back far enough from the cliff edge to reduce risk to property and eventually to enable measures to stabilise the cliff. This will also help preserve open seascape view and cliff top archaeological and historic remains. Offshore structures along the cliff shore may influence the rate of cliff retreat.
- *Special geological features*: Special features should be protected from development (e.g., active sand dunes, rock formations).
- *Natural coastal processes*: Planning and construction proposals should be consistent as far as possible with natural coastal processes. Those which require an engineering solution to prevent damage by natural coastal processes should be avoided.

The multidisciplinary teams also prepared ecological guidelines for the resource management plan, including the following principal recommendations:

- *Rare and unique habitats*: As a result of heavy human disturbance, habitats once typical are becoming rare. Thus representative habitats (kurkar ridges, sand dunes, carob and pistachio woodlands) should be protected from the impacts of development.
- *Rocky shore habitats*: These habitats are rich in invertebrate life and need both onshore and offshore protection measures.
- *Important biotic features*: Restrictive conditions on activities and development may be sufficient to enable important biotic features and habitats to survive outside the boundaries of nature reserves. These may include breeding and nesting grounds of migrating and non-migrating birds (particularly near fishponds and around river mouths) and egg-laying habitats of sea turtles.
- *Areas adjacent to nature reserves*: Recreation areas adjacent to nature reserves or sensitive habitats should be designated for low intensity activities.

The overall national policies proposed for resource management of the coast include:

- Development other than for essential coastal uses should not be permitted along the coast and its immediate hinterland;
- Policies for recreation and tourist development should ensure that opportunities for a variety of daytime activity and overnight accommodation experiences are made available to the entire population;
- Recreation and tourist development of the hinterland should be confined to centres. In order to protect as much open space as possible, linear development along the coastline should not be permitted;
- Highly intensive uses should be confined to existing urban centres;
- Sites not previously developed, where resources were identified as having recreation potential, could be designated for low intensity levels of development;
- Offshore construction for recreation and water sport activities should be restricted to urban centres; and
- A public footpath should be designated along the coastline to ensure public access by foot to and along the coastline.

The dominant principle adopted for resource management of the coast was the definition of intensity of development. Four levels of development were defined for beaches and their immediate hinterland, four levels of intensity for overnight visitor accommodation, and three levels of development for hinterland day-visitor areas. Detailed regulations were then defined for each site, including measures for resource protection within areas allocated for development, location of beach facilities and height of built structures in relation to landscape features.

Special regulations were proposed for river mouths to differentiate between natural conditions which should be protected and approvals for man-made changes in hydrology.

Significantly, these principles were also incorporated into the newly revised National Masterplan for Tourism (NOS 12).

The National Masterplan for Tourism *(*NOS 12) was first prepared in the early 1970s and approved by the government in 1983. It determined, *inter alia*, coasts designated for extensive development, recreation villages, numbers of hotel rooms, and spaces in bathing beaches based on a population forecast of five million residents. An amendment to the masterplan was prepared in the 1994 and is now in the final stages of approval. Prepared by the Tourism and Interior Ministries, in close co-operation with green organisations, the amendment incorporates many of the principles of the coastal masterplan. It recognises the importance of maintaining sufficient land reserves for tourist accommodation and services, in the face of development pressures, in order to help realise the country's long-term tourism potential. The amendment will strengthen the measures for preserving land reserves for tourism purposes, especially along the coastal strip, and will protect important open space landscapes for tourist activities.

The National Masterplan for National Parks, Nature Reserves and Landscape Reserves (NOS 8), approved in 1981, is a legally binding national plan setting aside specific areas as national parks or nature reserves. The purpose of the plan is to designate areas for nature conservation, protect areas of high scenic value from unsound development and preserve

areas with high recreation and tourism potential. The scheme constitutes an initial safeguard and is backed by another legal procedure - declaration of areas as nature reserves or national parks through the Nature Reserves Law. Over one-quarter of the country's land area is designated for these purposes in the masterplan.

The National Masterplan for Forests and Afforestation (NOS 22), in force since 1996, grants certain areas legal status as forested areas, and thus protects them from development. The main purpose of the scheme is to protect existing "man-made" and natural forests and to designate areas for future afforestation to meet ecological and recreation goals. It designates 1620 km^2 for the development and conservation of forested lands in Israel and includes eight categories of forest including coastal park forests and riparian plantings. Some 42 km^2 of coastal parks are allocated along the shoreline. Tree planting along rivers for recreational purposes is also an important component of this masterplan.

The National Masterplan for Building and Development (NOS 35), now nearing completion, is an integrated development plan which gives strong emphasis to environmental management principles and to the protection of areas of high natural and landscape value. Among other provisions, it calls for the protection of open space both in the periphery and in the densely populated central area of the country where "buffers" along riverbeds will separate urban concentrations and where coastal protection areas will be designated.

Urban Coastal Planning: The Case of Greater Tel Aviv

The National Masterplan for the Coast designates many sections of the Tel Aviv shoreline as bathing beaches and identifies five marinas in Tel Aviv or its immediate vicinity (Herzliya, Yarkon River Mouth, Atarim Plaza, Jaffa Port and Bat Yam). The first strip alongside the beach is designated for tourism according to the principle that only uses for which a coastal location is necessary should be permitted adjacent to the coastline. The second strip (to the east) is designated for residential building and urban land uses.

Israel's Tourism Masterplan defines Tel Aviv's shoreline as an urban coast which should serve as a main reserve for urban tourist development. It proposes that the northern section of the coastline (between Tel Aviv and Herzliya) become the central "riviera" of the Israel coastline including a promenade bordering bathing beaches, high-class hotels, complementary tourist services and commercial activities. At Tel Baruch, the emphasis will be on luxury hotels while at the Yarkon River Mouth and Tel Aviv Port, intensive tourism will be encouraged. The masterplan notes that the existing municipal plan for the northern section of the beach does not place sufficient emphasis on tourism. Accordingly, tourism zonings should be increased, and optimum locations for tourism uses should be ensured.

In the central section of the Tel Aviv coastline, where there are no large-scale reserves for new hotels, the plan recommends that buildings worthy of preservation in old neighbourhoods be utilised for special tourist accommodations, such as small hotels. It recommends extending the promenade until Old Jaffa, and developing Jaffa Port as a tourist marina, which will include commercial, entertainment, cultural and other uses.

A district masterplan and a metropolitan masterplan for Tel Aviv are currently nearing completion. Both of the plans pay particular attention to the coastal area, which they define as a central axis of important contiguous open spaces, connected to "green fingers," particularly along riverbanks.

In the “open spaces” section of the Tel Aviv District Masterplan, the coastal area is defined as “the national and metropolitan riviera region.” This region is a focus for seaside entertainment, recreation and leisure both for the local population and for the population of the entire country. The planning policy proposes a comprehensive planning approach to the coastal area, distinguishing between different sections of coast, and addressing the structure of the coast, current state of development and potential for future development. It sets principles, guidelines and conditions for development on the sandy shoreline, the hinterland and adjacent offshore waters. Its guiding principle is “to protect the public interest and public rights in the development of the coast, while enabling economic and urban development with an affinity to the coast and ensuring sustainable development.”

According to the masterplan, the northern stretch of the Tel Aviv coast is designated for the expansion of bathing beaches through artificial nourishment of sand and construction of offshore breakwaters. The coast and a 100-metre strip from the foot of the cliff eastward are defined as a “Coastal Park,” a strip free of buildings. The area to the east of the park is defined as an urban building area. The plan proposes green strips and pedestrian routes in an east-west direction between the areas zoned for building. The point where the Yarkon River enters the sea is defined as a special planning area. The plan emphasises the importance of maintaining broad vistas at the nexus of the two main axes of open areas (the Yarkon Park and the coast).

The masterplan for the Tel Aviv metropolitan area (which includes the Tel Aviv and Central Districts and the municipality of Ashdod) is not a statutory plan but it outlines planning principles which will then be incorporated into district and sectorial plans for the metropolis. Alongside urban areas, the plan places special importance on recreational use of the coast while along non-urban routes, major emphasis is placed on the coastal resource itself.

The masterplan relates to the following components of the coastal strip:

- The shoreline where recreation is concentrated and where an open view to the sea should be preserved.
- The urban seashore which represents the most intensive open space in the urban area.
- The urban coastal promenade which provides pedestrians with leisure and enjoyment.
- The urban coastal road which provides for vehicle movement alongside the coast.
- The urban hinterland which provides for development near the coast. Its use dictates the character of the urban coast.
- The rural coast which provides for leisure and recreation in rural landscapes.

Both the metropolitan and the district plans note the importance of the coastal strip, both to the population of Tel Aviv and to residents of the entire country. Its importance is based on its natural and landscape assets, social, cultural and historic assets, national and economic assets, and urban assets. The guiding principle behind the planning approach is to allow for development/preservation of the coastal area while preserving the interests and the rights of the public within a sustainable development perspective.

Following are the planning policy recommendations which are presented both in the district and metropolitan masterplans for the Greater Tel Aviv area:

- Adapting comprehensive planning, development and protection of the coast to changing coastal conditions through the preparation of a comprehensive masterplan for the metropolitan coastal area and its division into representative sections.
- Adapting planning and development of sea-projecting projects, such as artificial islands, marinas, breakwaters, reclamation sites, to coastal and marine conditions, environmental impacts and land uses through the definition of planning conditions and requirements for future projects.
- Maintaining contiguous open space along the coastal strip and kurkar cliffs and creating a "Coastal Park."
- Developing and expanding bathing beaches for the benefit of the public as a whole, through the use of appropriate marine technology in suitable areas.
- Ensuring that bathing areas are open to the entire population, and preventing private beaches.
- Protecting the kurkar cliff area through controls on development and setback of building.
- Creating green routes and pedestrian routes linking the built hinterland and the coastal promenades and connecting inland urban open areas to the coastal area.
- Allowing access to central areas along the coastal strip by cycling, pedestrian traffic and public transport in order to maximise public access and reduce dependence on private vehicles.
- Creating a variety of activities in the inland section of the coast, while respecting compulsory building regulations and restrictions.
- Controlling development of the hinterland and the seafront in order to prevent walls of high building and in order to maximise sea views from the hinterland and the adjacent urban area.
- Developing the coast with emphasis on the needs of the user population and the general public through the creation of public assets designated for public use.

NGO Position Paper on Comprehensive Planning of the Tel Aviv Coastline

The variety of plans for development of the Tel Aviv coastline have elicited both public interest and wide media coverage. Several meetings were dedicated to the subject in the Tel Aviv municipal council. To help clarify the variety of opinions, the Society for the Protection of Nature in Israel and the Israel Union for Environmental Defense prepared a preliminary position paper on comprehensive planning of the Tel Aviv coastline. The paper was submitted to the city council as background material for a comprehensive review of coastline development.

The position paper is based on the principles of Integrated Coastal Zone Management, in general, and on the principles for sustainable development of urban shores, in particular (see p. 54). It presents the following general guidelines for planning the Tel Aviv coastline:

- Comprehensive planning for the coastal strip on two levels: metropolitan and urban.
- Planning on the basis of environmental analysis which takes account of the major environmental issues (coastal cliff, beaches, and sand balance) and development

of alternatives for comprehensive planning of the coastal area and the hinterland taking account of environmental issues.

- An open and transparent planning procedure based on joint discussions with all stakeholders and interaction between the public, planners and decision makers throughout the process.

The position paper discusses the problems and conflicts which are associated with each of the existing plans for the different sections of the Tel Aviv coastline and recommends planning guidelines for each section. It is expected to serve as a basis for joint deliberation of coastal development plans.

NGO Masterplan on Protection and Development of the Netanya-Tel Aviv Coastline

Growing concern over the scarcity of open coastlines, especially in the central area of the country, has prompted the Israel Union for Environmental Defense to initiate a plan for the protection and development of the coastline in this region. The plan examines the potential of preserving this coastal stretch as the "green lung" of the central region while giving special preference to the public interest vis a vis entrepreneurial and institutional activities.

The plan examines existing conditions along the shoreline and hinterland of the central coastal strip, surveys existing and future plans for each section, and presents specific guidelines for protection and development. Following are some of the principles which are advocated: protection of the shoreline for public use, preservation of the coastal strip, beach nourishment, prohibitions on building, maintenance of open access and views, review of existing structures, and development of promenades and green routes to the sea in the urban built section. At the same time, special attention is accorded to the preservation of a continuum of open space.

The masterplan recommends that certain stretches of the coastline be declared as nature reserves and national parks in order to protect archaeological, historic, natural and landscape values and to preserve agricultural areas as open green spaces or open rural landscapes. The main objective of the plan is to inform both the public and decision makers about different plans which threaten to increase urban sprawl while reducing open spaces and damaging natural and landscape resources. At the same time, it proposes specific strategies for protecting sensitive areas and developing others for the benefit of the entire population.

Territorial Waters Policy Document

The Planning and Building Law confers exclusive rights on the Territorial Waters Committee to prepare, approve, postpone, or approve with revisions or conditions, any plan connected with the coast and the territorial waters of Israel. In recent years, as a result of ever-growing development pressures and conflicts along Israel's coastline and territorial waters, it has become increasingly clear that a comprehensive, multi-disciplinary and dynamic policy on the sustainable development of Israel's territorial waters must be prepared.

In 1997, the Territorial Waters Committee initiated an integrated coastal zone management (ICZM) approach in a policy document which was completed in May 1999. The policy document is expected to guide the decisions of the committee on integrated marine and coastal planning and use.

The document is founded on the principles of Integrated Coastal Zone Management (ICZM) which bases decision making on clear *policy*, effective *organisation* for control and enforcement and accumulated and open *data*. The main objective of the document is to create an effective tool for management and planning of territorial waters. The proposed approach should provide the conditions necessary to facilitate sustainable development while protecting the environment.

The policy document includes the following components:

- The comprehensive policy, its aims and principles.
- The spatial policy which guides designations on the beachfront and the breaker zone.
- Thematic policy on specific subjects: marine structures, sand reservoir, infrastructures, transport, tourism, natural assets and archaeology.
- Measures for ICZM including organisational recommendations, assessment tools for reviewing initiatives and proposals on planning, enforcement, monitoring, databases and other subjects.
- Compilation of data.

Objectives of the Policy

The overall target of Israel's ICZM policy, as expressed in the document, is as follows: management of the coast and territorial waters as a primary national and public asset, integration of coastal management in comprehensive national planning objectives and policy, and careful development of this approach according to the sustainability principle.

The specific objectives are outlined below in hierarchical order according to their importance:

- Assuring maximal coastal accessibility to the general public and providing for a multiplicity of human uses on the beachfront and sea, both in the breaker zone and shallow continental shelf.
- According maximal and careful consideration to sand and marine resources, conserving ecological processes and archaeological and heritage resources and assuring a rich diversity of landscapes and species based on a comprehensive vision which is multidisciplinary, multi-spatial and multi-generational.
- Placing high priority on leisure and recreation uses which are directly linked to the coast and sea.
- Utilising with care the unique economic potential of marine resources including fishery, mariculture, mining, food, and energy.
- Providing for the development of public engineering infrastructures in cases in which there is clear advantage to a coastal or sea location, but with preference to disturbed areas.
- Allowing for the limited development of economic infrastructures while carefully protecting the public interest, in those cases in which there is a clear advantage to a coastal or sea location, while implementing all the objectives outlined above and creating appropriate tools for monitoring and controlling implementation.

The policy document is divided into two policy planes: thematic and spatial. Policy is partially assimilated in maps on intervention levels and partially in thematic recommendations which will be expressed, *inter alia*, in requirements for environmental impact assessments for coastal plans.

For the purpose of establishing the spatial policy, the area up to the boundary of the territorial waters (12 nautical miles) was mapped in strips parallel to the coast. The longitudinal division includes five strips according to major features:

- ***Shoreline***: from the water line to 100 metres eastward or more in cases where a direct impact on the water is anticipated.
- ***Breaker zone***: from the water line to a depth of 10 metres below sea level westward.
- ***Shallow continental shelf***: from a depth of 10 metres to a depth of 30 metres below sea level.
- ***Continental shelf***: from a depth of 30 metres to a depth of 200 metres.
- ***Continental slope***: from a depth of 200 metres to the limit of territorial waters.

Spatial Policy

For the purposes of collating, classifying and analysing the data, Israel's territorial waters were divided into strips and sections based on such primary parameters as natural processes and human activities, both existing and planned. Detailed spatial policy was drawn up for so-called field cells on the seashore, breaker zone and shallow continental shelf since these strips are subject to the most intensive development pressures. More general policy guidelines were set for the deeper longitudinal strips which are more distant from the coast and thereby from the impacts of coastal land uses and designations.

The value of the field cells was evaluated according to their features and land use allocations and in accordance with the following four criteria:

- *Sensitivity*: Value and vulnerability of the cells from the environmental aspect based on the uniqueness, sensitivity and inventory of natural resources in the cell.
- *Continuity*: Continuity of the cells from an environmental aspect (ecosystems, landscape units and public use) in terms of the east-west axis and north-south axis and in relation to the marine and coastal strips.
- *Accessibility*: Proximity of the cells to different types of population concentrations (e.g., large cities, smaller or sparsely populated areas, or open or rural landscape) and ease of access.
- *Importance*: Social importance of the cells based on heritage and archaeological sites and level of attractiveness to the public for purposes of leisure, tourism and recreation.

Alternatives to spatial policy were developed based on targets, demands, conflicts and general approaches. Four desirable levels of intervention were defined for the field cells: preservation of an open and natural coast, regulation for leisure and recreation, development for leisure and recreation, and infrastructure development, as follows:

- The first level, which includes marine and coastal nature reserves and archaeological sites, calls for preserving coastal and marine resources in their natural state for the benefit of the public. In these areas, activities which threaten the area's natural and landscape features will be prohibited and approach routes from both land and sea will remain open.
- The second level, which includes, *inter alia*, bathing beaches, marine parks for scuba diving, and sailing for leisure uses (exclusive of accommodation), allows for basic facilities for the comfort and safety of visitors.
- The third category includes development for public recreation (including accommodations) and marine activity in accordance with environmental reviews and site-specific environmental restrictions and conditions.
- The fourth level, designated for infrastructure purposes, is based on allocating coastal sections and marine areas for development according to considerations of maximum public benefit. The establishment of marine structures, such as ports, breakwaters and infrastructure facilities, will be accorded preference in these cells while giving special attention to pollution prevention.

Finally, the significance of these four intervention levels is analysed according to three different alternatives:

- *Environmental alternative*: priority to land uses and designations which conserve natural and landscape values.
- *Social alternative*: priority to land uses and designations which assure access for recreation and will meet a wide range of population demands.
- *Economic alternative*: controlled development of land uses which are related to the sea and unique added value which derives from proximity to the sea for purposes of public access and well-being.

The spatial policy that is proposed in the document is based on the application of policy alternatives and intervention levels to the geographical features of the field cells of the Mediterranean shoreline, break shelf and shallow continental shelf.

Thematic Policy

Thematic policy relates to the policy which is proposed for each of the issues relevant to the territorial water, both natural processes relating to oceanography and marine geology, and anthropogenic activities such as marine transport and fishing. Principles and guidelines are formulated for each of the issues based on coastal zone management principles.

Thematic principles and guidelines are set for three major categories:

1) The environmental realm which includes natural and landscape values, marine archaeology, and marine pollution.
2) The economic realm which includes human uses such as infrastructures, urban shores, tourism, marine transport, defense uses, and fishing.
3) The physical realm which includes factors impacting on the sand balance such as waves, currents, marine structures, marine mining and the interrelations between these and other components.

Thus, the document relates to all of the major issues which impact on the coastal and marine environment. The thematic policy on marinas and offshore structures is particularly important since it accepts claims that were previously not considered valid.

Environmental Impact Assessment

One of the most important tools for evaluating individual projects in the land-use planning process is environmental impact assessment (EIA). EIAs have been used in Israel from the mid-1970s although regulations governing the requirements of EIA documents were only promulgated under the Planning and Building Law in 1982. The regulations have been fully integrated into the planning system, ensuring that at all stages and at all levels of the planning process, major development plans (as defined in the regulations) undergo environmental assessment.

The regulations call for EIAs to be prepared according to guidelines, formally issued by the planning authority but prepared by the Environment Ministry. The ministry invests special efforts in the preparation of appropriate plan-specific guidelines to ensure that the EIA, when submitted, will be a useful tool to decision-makers.

An EIA must include five chapters, as follows:

1) Description of the environment to which the plan relates prior to plan implementation.
2) Presentation of alternatives and specification of the reasons for preference of the proposed site and for planning principles.
3) Description of the plan and of the activities resulting from implementation of the proposed plan.
4) Assessment of anticipated environmental impact and the means necessary to prevent or abate negative impacts.
5) Conclusions and recommendations for integration in the regulatory provisions of the plan.

Projects expected to have significant environmental impact are subject to EIA requirements. In some cases, this obligation is explicitly defined in legislation and in statutory plans while in others it is subject to the discretion of planning authorities or to a representative of a minister in a planning authority.

Plans that are specifically enumerated in the EIA regulations include power stations, airports, seaports and hazardous waste disposal sites. Plans which, in the opinion of the planning authority, may have significant environmental impact include landing strips, marinas, national water supply arteries, dams and reservoirs, wastewater treatment plants, mines and quarries, waste disposal sites, and industrial plants situated outside designated industrial zones. Since 1983, the coastal masterplan requires environmental impact statements on all coastal development projects unless exempted by a decision of the planning authority. While this has not always been implemented, EIAs have been prepared for marinas, port expansion, breakwaters, and tourist and hotel projects along the coastline.

While the regulations do not specify how an EIA should be reviewed, the Ministry of the Environment has examined all EIAs since 1987. Experts at the ministry evaluate each EIA

and issue an opinion which includes a summary of the main findings of the EIA, the ministry's conclusions about the assessment, and a list of recommendations for the planning authority. The planning authority generally welcomes the ministry's professional advice and incorporates its recommendations in the decision on the plan. If the plan is to be deposited, the planning authority decides which instructions should be incorporated in the plan regulations. When the plan is deposited, both the EIA and the ministerial opinion are open to the public along with the plan documents.

An example of the EIA guidelines which were specifically prepared for the Herzliya marina is presented in the annex to this report.

Geographical Information Systems

The development of Geographical Information Systems (GIS) has led to major breakthroughs in the organisation and analysis of geographic data for environmental purposes. The Environment Ministry's Planning Division has developed a GIS which contains about 25 layers of information for the country, the average scale being 1:50,000 metres.

The first GIS project undertaken by the ministry was the Mediterranean coast database, which originally produced the maps included in the National Masterplan for the Mediterranean Coast. The coastal area is divided into 18 designated sections/maps, each of which includes the following layers of information: land-use features; areas including archaeological, vegetation, and natural landscape sites; and communication lines (i.e. roads, railroads). The Mediterranean coast database has been expanded to include information on monitoring sites and beach access.

The second database covers the entire country. It includes information, based on national masterplans, on areas exposed to airport noise, quarries, roads, and solid waste sites as well as areas of aquifer sensitivity. This information was combined, analysed and displayed in map form for use in national masterplans. Sites designated by the Israel Lands Administration for residential building and industrial development were compared with the database to identify areas where potential development may be subject to environmental degradation.

The third database deals with open spaces. It delineates national parks, nature reserves and landscape reserves which are included in national and regional masterplans; areas of special landscape value which were identified in a survey of open space landscapes; and areas proposed for afforestation in the afforestation masterplan. This database will provide a basis for open space policy and decision making.

In recent years, the GIS has been used for the following coastal projects:

- Maps pinpointing the locations of microbial and heavy metal monitoring stations along the Mediterranean coast and displaying coastal land uses along the Mediterranean at a scale of 1:100,000 were produced. Land use types include swimming beaches and industrial, municipal and defense uses.
- Oil spill sensitivity mapping of the Mediterranean coastline has recently been initiated in order to promote sound decision making on priority treatment in cases of large-scale oil spills.

- Maps on the built up area of the country for the purpose of ranking open spaces were produced in integration with the 2020 masterplan and in order to demonstrate ministerial policy on building in the country.

Remote Sensing Support for Analysis of Coasts

Another important development has seen the official launching of the Remote Sensing Support for Analysis of Coasts (RESSAC) project within the framework of the European Commission Programme on Environment and Climate. The programme, developed between 1997 to 1999, in co-operation with several European and Israeli institutions, aimed at demonstrating the usefulness and cost-effectiveness of multi-satellite based data in the assessment and monitoring of coastal dynamics in Israel.

The project focused on the monitoring and study of several topics, in the 100 km coastal stretch between Hadera (south of Haifa) and Ashdod (on the central part of Israel's coast). These included: offshore and coastal wind and sea-state data, seabed topography, sediment pattern, bathimetry, sand inventory, coastline changes, and land-use changes.

Monitoring and Research

Monitoring and research are vital for sustainable coastal development. It is imperative that national decisions on Mediterranean development are based on the results of sound scientific research.

Israel Oceanographic and Limnological Research (IOLR), a non-profit corporation affiliated with the Ministry of National Infrastructures, is the national institution dedicated to advancing knowledge about the aquatic world and developing methodologies and technologies for sustainable use of coastal, marine and freshwater sources. In fulfilling its mandate, much of the IOLR's scientific effort is directed to monitoring and assessing the status of Israel's sea areas and predicting their response to environmental perturbations. Research activities involve field observations, theoretical and modelling work and laboratory experiments. The broad range of questions considered include such diverse topics as ocean circulation and mixing; air-sea interaction; coastal erosion; bio-geochemical cycles; immunology, physiology and ecology of marine organisms and the dynamics of their populations; and impact of human activities on coastal and marine ecosystems and resources.

The research programme in marine biotechnology focuses on the development of innovative technologies for commercial exploitation of marine organisms. Areas of current research include production of biochemicals from marine algae for industrial, food and medical applications; cryopreservation of fish gametes and embryos for aquaculture applications; genetic engineering of fish; and control of crustacean reproduction.

Research and monitoring activities are also designed to provide a better understanding of the processes and phenomena involved in the complex mechanisms of pollution. Studies vary from such subjects as monitoring of marine pollution by nutrients from land-based sources to biological monitoring of the marine environment to development and assessment of monitoring and characterisation methods for marine pollutants. Studies include systematic monitoring of heavy metals along the Israeli coastline and monitoring of atmospheric pollution input into the Mediterranean.

The Geological Survey of Israel, also under the Ministry of National Infrastructures, is responsible for the systematic investigation of the geology of Israel and for providing geological information to the government and the public. Its geotechnical maps provide planners with essential data on the suitability of different areas or of different types of structures for certain types of development. The Geological Survey has carried out major studies on such topics as erosion of coastal cliffs and sand balance. The extensive range of disciplines covered by this institution include: paleoseismicity and earthquake risk assessment; geological mapping and geological risks; feasibility of artificial islands; climate change; building materials; paleoclimatology; aquifer pollution. geochemistry of rock, soil and water, hydrogeology and hydrochemistry, stratigraphy; and structural geology,

The Nature and National Parks Protection Authority carries out marine monitoring in the marine and coastal protected areas along the Mediterranean The programme is carried out in shallow water (0-10 metres depth) and largely relates to human load in the coastal region. Additional monitoring relates to algal communities, ichthyofaunistic surveys, macroinvertebrate fauna in three representative reserves, surveys of marine turtle landings and nesting on the Israeli coastline as part of an action plan for turtle conservation, and long-term monitoring of the Israeli Cetacea by the Israeli Marine Mammal Research and Assistance Centre of Haifa University which includes monitoring of tens of dolphins living in the territorial water.

Public Education and Participation

Information and education are essential components of coastal management. Environmental subjects, including coastal zone management, have entered the school curriculum at all levels. This year, within the framework of activities associated with the International Year of the Oceans, a special booklet on the marine environment was distributed to intermediate grades in Israel's school system. This curriculum programme, as well as most of Israel's environmental education programmes, focuses on field work, observation and surveys in addition to studies within the school.

Moreover, each of Israel's institutes of higher learning offers programmes and courses in environmental science with a coastal perspective. Worthy of special mention is the Inter-University Institute for Marine Sciences which is affiliated with the Hebrew University of Jerusalem and the Centre of Maritime Studies in the University of Haifa. Israel's other universities - Tel Aviv, Bar Ilan, Ben-Gurion, Technion and Weizmann Institute of Science - also offer environmental courses on both the undergraduate and graduate level.

A great deal of non-formal environmental education is carried out by non-governmental organisations, foremost among which is the Society for the Protection of Nature in Israel (SPNI). This organisation has 24 Field Study Centres around the country, many located on the coastal strip, and offers students and visitors the opportunity to study the land and the environment at close quarters. In addition, SPNI Youth Clubs educate more than 9,000 teenage members about understanding and caring for their environment.

The Role of Non Governmental Organisations

Public awareness of coastal management issues is critical in the coastal conservation campaign. Over the past few years, the public has taken an active part in the struggle against

the privatisation of the coastline. Through such means as litigation, protests, coastal cleanups and dissemination of information, the issue has been accorded higher priority on the national agenda.

The country's non-governmental organisations, along with the local and national press, have played an important part in educating the public to take greater responsibility for coastal management. These organisations have placed the subject at the top of their priority list and have spearheaded numerous public campaigns and activities on behalf of coastal conservation. Perhaps more than any other organisation, the **Society for the Protection of Nature in Israel** (SPNI), Israel's largest environmental NGO, has been instrumental in raising public consciousness of coastal protection. During its forty-year history, the organisation has initiated dozens of campaigns against the destruction of unique ecological systems and scenic landscapes through unwise development. As a public representative on the National Planning and Building Board, it has also been a strong advocate of environmental interests. Its activities have been backed up by public protest and legal action, including petitions to the High Court of Justice. In recent years, campaigns have largely focused on protecting Israel's open spaces and coastlines.

The establishment of the **Israel Union for Environmental Defense** (IUED) in 1990, proved a milestone in the use of legal means to tackle environmental problems. Since its inception, IUED has emerged as Israel's only public interest environmental advocacy group using the courts, independent scientific analysis and a range of other strategies to address the country's mounting environmental challenges. Coastal conservation is of foremost importance in the organisation's current agenda and it has instigated several important court cases on the subject.

Other NGOs which have played an important part in increasing public awareness and participation, are **GreenAction,** an environmental activist group for social-ecological change, which was set up in 1994 and **Green Course**, a student environmental organisation which was launched in 1997. The latter now includes hundreds of activists in twelve university and college campuses around the country. **GreenPeace**, which inaugurated its Israeli office in 1995, has focused its initial campaigns on preventing pollution of the Mediterranean Sea.

The activities of these and other organisations have already borne fruit. Firstly, the issue has penetrated the media, and issues relating to coastal conservation are appearing in the daily press at a scope and frequency previously unknown. Secondly, the organisations have succeeded in mobilising support for the issue, both among decision-makers and the general public. Position papers have been prepared, information has been disseminated, and protests have been organised. Furthermore, preservation of open spaces along the coastline emerged as a central issue in Israel's November 1998 municipal elections. Staunch public support for this issue helped change the composition of municipal councils, especially in Haifa and Tel Aviv. The subject was also mentioned in Israel's recent national elections, but was not a major issue in the party platforms.

Public Review and Litigation

One of the goals of Israel's environmental administration is to inform and educate the public to become more active in enforcing environmental laws and to provide it with the technical data and legal tools necessary to fight for that right - whether through private criminal suits, civil proceedings, demonstrations or public pressure.

Within the framework of Israel's land-use planning system, the Israeli public is informed about schemes presented to regional and local planning authorities through public notices published in the legal gazette, in offices of the local authority, and in daily newspapers. Public bodies or individuals are free to inspect such schemes and to file opposition during the deposition period of any given plan. Plans are now being advanced to amend Israel's environmental impact assessment regulations to allow for greater public review and public hearing.

In addition to objections submitted to planning authorities, recent years have witnessed a number of important court cases which have been initiated by the public. Citizens and NGOs, especially the SPNI and IUED, have used their right to file oppositions to numerous development projects along the coast. These cases have significantly contributed to the enforcement of environmental standards, catalysed government agencies to initiate and implement more rigorous enforcement policies, and resulted in important court decisions and rulings on environmental matters. Notable examples of successful private suits against major industrial plants include court cases initiated by the IUED against major industrial polluters of Haifa Bay and the Kishon River. After a long and exhaustive legal battle, agreement was reached on comprehensive steps to prevent marine and water pollution in the future according to a strict timetable. As a result, dumping of sludge into the Mediterranean Sea by one of the country's major polluters of the sea was stopped in 1998. (See p.32).

Participation in National and International Campaigns

Since 1964, when the country's nature protection legislation was first enacted, Israel has celebrated Nature Protection Week. During this week, one important and relevant issue is brought to the attention of the public in an effort to raise environmental consciousness. This year (1999), the week was devoted to the marine environment, both as part of national activities dedicated to the International Year of the Oceans and in recognition of the importance of the coast as a national asset which must be preserved in the face of development pressures. Moreover, for the first time ever, the events of Nature Protection Week are taking place throughout the entire year and include production of information pamphlets and a poster on the marine and coastal environment, seminars, marches and cleanups along the coastline and a call to policy makers to voice their commitment to the protection of the marine environment (see p.59).

Israel also adopted an action plan within the framework of the International Year of the Ocean (1998). Its main aim was to promote public awareness of marine and coastal resources with special emphasis on education and youth activities. Activities included production of an educational kit for teachers and guides, new educational programmes on marine science, school competitions and prizes, conferences, lectures and workshops and coastal cleanups.

Volunteer coastal cleanups take place each year within the framework of International Beach Cleanup Day and on various occasions throughout the year. In recent years, underwater cleanup campaigns have been initiated as well. The major aim of these campaigns is to inform the public about the importance of the marine environment.

PROPOSED NEW POLICIES AND INSTITUTIONS

Principles for Sustainable Development of Urban Shores

Numerous position papers on integrated coastal zone management, which comply with the principles of sustainable development, were published in recent years by non-governmental organisations, foremost among which are the SPNI and IUED.

In March 1999, the Society for the Protection of Nature in Israel published a special booklet entitled "Principles for Sustainable Development of Urban Shores." The document presents planning principles which were collected from policy documents on integrated coastal zone management in various countries and from international conventions on coastal protection and biodiversity. The principles have already been applied to specific position and policy papers for coastal planning in municipalities along the Mediterranean coast.

Following is a summary of the principles presented in the document:

1st. The seashore as a public asset

- *Preserving the public designation of the coast*: coastal uses should be allocated for leisure and recreation of the local population and tourists rather than for residential or other uses which preclude the general public from fully enjoying the coast.
- *Preserving free public access to the coast*: special preference should be given to footpaths, bicycles and non-polluting transportation. In case of conflicts with existing uses, means should be found to improve land use systems and reduce conflicts to assure maximal access to the coast and alongside it.
- *Preserving a free and open view to the sea*: blockages by high and dense building should be avoided so as to provide for an open view to the sea.
- *Promoting a transparent, shared and open planning process*: planning should be shared by all stakeholders and common principles should be formulated for sustainable development policy on the coasts. Planning should be transparent to allow for public response and opposition during the process itself, utilising such means as public hearings, presentation of alternatives, etc.

2nd. Planning principles for urban coasts

- *Comprehensive coastal planning vision*: planning initiatives on the national, district and municipal levels should be examined from a comprehensive point of view. On the municipal level, masterplans should be prepared for the coasts in the jurisdiction of each local authority and an EIA should be prepared to review the cumulative impacts of all plans on the coast.
- *Coastal planning and development on the basis of comprehensive environmental analysis of the coast*: comprehensive planning must be based on the examination and treatment of all aspects the coastal system (e.g., cliff erosion, sand balance) in the different coastal strips.
- *Preservation of a building-free coastal strip*: this requirement should extend to 100 metres from the shoreline minimally and more, if necessary, according to the physical characteristics of the coast. Infrastructures should be moved as far away as possible from the shoreline.

- *Coastal locations reserved for uses which are vital to the coastline only*: uses such as industry, commerce, and defense installations, which are not inherently coastal dependent, should be moved elsewhere. Construction of residential neighbourhoods on reclaimed land or on the seashore should be prevented.
- *Distancing intensive building from the coastal vicinity*: massive and tall buildings should be avoided in the first and second strips from the shore in order to preserve open views and sea breezes and to link the seashore to urban open spaces.
- *Preservation of landscape and historic assets*: in order to maintain the special character and appearance of the city, open views to landscapes should be assured by providing public access to observation points.
- *Priority to reconstruction and renewal projects*: special attention should be given to waterfront reconstruction and renewal projects before initiating new buildings including promenades, restaurants, museums and public parks.
- *Promotion of environment-friendly public transport*: this should include footpaths and cycling paths and minimise private cars and allocation of parking areas along the coast.

3rd. Responsibility of the local authority for coastal management and operation

- *Routine maintenance of the shore*: this will include coastal access, facilities and cleanliness.
- *Rehabilitation of damaged shores*: this is of special importance for neglected coasts, coasts plagued by erosion and sand depletion due to marine structures, and coasts affected by pollution and litter.
- *Prevention of marine pollution by wastewater*: sources of land-based pollution should be treated.

Sand Management Policy

Based on the adverse impacts of Israel's offshore structures and in order to protect Israel's coasts against erosion and preserve and maintain sandy beaches for tourism and recreation, the Ministry of the Environment has advocated the adoption of a sand management policy in Israel. Following are some of the recommendations:

- Sand should not be removed from the littoral zone, and its movement along the coast should not be impeded. If this occurs as a result of engineering activity, sand of similar properties should be deposited on the beach as compensation for the missing sand or a mechanism should be found to allow the sand to bypass the artificial obstacle and continue on its natural course. Sand trapped artificially by coastal structures should not be used for land reclamation. Such sand should be used for artificial feeding of impoverished beaches or be returned to the natural sediment transport system;
- Sand should be recognised as a national resource, and therefore, sand dredged from a port or another marine installation should remain the property of the state which would then determine how best to manage this resource;
- Monitoring the bathymetric and sedimentological changes next to any coastal engineering project should be mandated both before and after implementation. Monitoring results should dictate the remedial steps to be undertaken to minimise the adverse effect of the project on the environment; and

- The country should search for sand deposits on the seabed as a potential source for dredging and beach nourishment, fill material and building.

Calculation of an accurate sand budget for the Israeli shoreline, based on past and present sources, natural and anthropogenic losses and estimates of future trends, will facilitate the development of a coastal sand management programme for the country.

Recommendations for Planning and Institutional Changes

The Territorial Waters Policy Document advocates several planning and organisational changes to implement the ICZM approach. These along with two new initiatives of the Ministry of the Environment (a coastal law and conflict resolution) are briefly described below:

National Masterplan: The preparation of a masterplan for territorial waters or for the breaker zone is recommended. Another option may be to revise or expand the existing National Masterplan for the Coastline (NOS 13) into an integrated masterplan for the coast and sea which includes the 100 m. realm. In all cases, the plan must relate to the entire range of coastal impacts and must ensure an open view to the sea, free access of the public to the sea and passage of sea breezes.

Further Power to the Territorial Waters Committee: The authority of the committee should be extended and broadened to include the 100 m area in which building is prohibited according to the provisions of the existing coastal masterplan. Additional observers should be included in the committee and regular meetings should be held to follow-up on the implementation of the recommendations set out in the document.

Environmental Impact Assessment: All marine and coastal plans should be subject to EIA requirements. This may be regulated within the framework of an amendment to the existing EIA regulations or through an addendum to NOS 13.

Inspection and Supervision: The Territorial Waters Committee should be entrusted with further inspection capabilities utilising the general inspection system of the Ministry of Environment or District Planning Commissions or alternatively, through a joint inspection and enforcement system which may include any or all of the following:

- Creation of a co-ordinating body and headquarters for field activities under the responsibility of the Ministry of the Interior or the Environment.
- Establishment of a Blue Patrol to unite the personnel, budgets and authority of the Ministries of Environment, Tourism, Education (Antiquities Authority), etc.
- Establishment of a Coastal Authority (lower priority).

Information and Monitoring: An updated and reliable database on territorial waters management should be established which would allow for the compilation and concentration of data. A professional advisory committee should be established to recommend means of completing the material and updating the data collected in the policy document.

Concessions: Land on the beach and territorial waters should not be sold to the public but should rather be developed by means of special concessions granted to private developers for

a limited period by means of a tender. The records of the developers which relate to services provided to the public should be subject to scrutiny and supervision.

Conflict Resolution: The consensus building approach to coastal conflicts should be promoted. This requires the participation of all stakeholders in a dispute resolution effort. The approach should increase the efficacy of decision making, avoid stalemates, and reduce the need for litigation while promoting integrated coastal management.

Changes in Legislation: The Territorial Waters Policy Document maintains that preservation of the shores and territorial waters may be accomplished by means of amendments to the coastal masterplan or by amendments to legislation within the framework of the Planning and Building Law. However, the Ministry of the Environment and Israel's non-governmental organisations have advocated a new Law for the Protection of the Coastal Environment.

Law for the Protection of the Coastal Environment

In 1998, in an effort to protect coastal resources in the face of mounting pressures for development, the Ministry of the Environment formulated a draft coastal law aimed at preserving and restoring the coastal environment and its fragile ecosystems, reducing and preventing coastal damages and establishing principles for the management and sustainable development of the coastline.

The rationale behind the law is aptly expressed in the memorandum which was recently distributed among government ministries. Following is a general translation of the preamble and major principles of the proposed law:

The seashore is a unique natural resource with importance to the entire public. The coastal environment and its natural resources serve the public for leisure and recreation purposes and constitute a national "green lung."

Israel's Mediterranean coastal strip is characterised by a rich diversity of natural assets, landscape and heritage, which are important assets of the state and its residents, and have intrinsic value and economic significance in various areas, especially for tourism. The Lands Law of 1969 includes the seashore within the framework of "designated land" which is "public land designated for public benefit."

Demand for this short and very limited coastal strip exceeds supply. Furthermore, the seashore attracts people and economic activities and includes important facilities and vital infrastructures such as ports and power plants.

As a result of activities and uses that do not take account of the significance and cumulative implications and long-term impacts, the coast is exposed to the risk of destruction and loss. Unwise economic exploitation of coastal resources may irreversibly harm its unique components - physical, ecological, marine and land.

One of the natural resources of the coast is the coastal sand, which grants the coast its special character and protects it from erosion. The coastal sand is nourished by longshore sand transport by means of wave movement and currents from south to north. Construction activities on the coastline have caused and continue to cause blockages to sand movement and lead to coastal erosion.

To prevent irreversible damage to coastal resources, including the coastal sand, the state must undertake every means possible - including legislation - to protect them and regulate the activities and uses permitted in them in a manner which will ensure conservation of coastal resources for the enjoyment and benefit of present and future generations.

Recently, a trend of intensive development and building along the coast and in its vicinity has been noted. This activity, which in many cases is not directly related or necessary to the seashore, has caused and continues to cause damage to the coastal environment, which is at times irreparable.

This damage is reflected, inter alia, in the following phenomena:

- Construction of marine structures blocks sand movement and causes a significant reduction in the width of bathing beaches.
- Construction of structures and erection of fences near the shoreline reduces the coastal area that is accessible to the public and restricts free passage of the public along the coast.
- Massive building on the seashore and its vicinity encroaches on bathing beaches that are available to the general public.
- Erection of tall and dense buildings along the seashore in the jurisdiction of municipalities blocks sea views and the flow of air.

These activities constitute a type of development which does not preserve or sustain, whose profits are enjoyed by the few, and whose adverse effects are borne by the public as a whole.

Existing legal tools, which are meant, inter alia, to protect the shoreline, do not provide a solution to the full gamut of problems. Thus, for example, within the framework of the Planning and Building Law, a Territorial Waters Committee was established, but its authority only relates to planning and building in marine waters. Similarly, the National Masterplan for the Coast, approved in 1983, established, inter alia, a prohibition on building within 100 metres of the shoreline but, in practice, fences and barriers are erected which prevent free access to and alongside the coast.

Furthermore, these legal tools, important as they are, are not based on a comprehensive view of the range of problems and do not succeed in affording a sufficient legal infrastructure for the protection of coastal resources from development pressures. Therefore, if the legal infrastructure is not strengthened and clear principles are not formulated, the system may continue to fail in fulfilling these objectives in the future as well.

Coastal damages resulting from unwise development activities are well-known phenomena world-wide and have led several countries, including Turkey (1990), Spain (1988), France (1986) and the USA (1972) to enact special legislation for coastal conservation. In addition, a model coastal law is currently being prepared by the European Community. The draft law is based on existing data and experience which have been adapted to the special needs and conditions of Israel. It should be noted that specific legislation on coastal conservation also exists in countries with planning and building laws. Its aim is to express the uniqueness of coastal protection and public rights to a proper marine environment and to improve and strengthen the legal tools for their protection. For this reason, such a law should be enacted in Israel as well.

Therefore, the purpose of this draft law is to establish in legislation the principles and legal framework which will ensure sustainable development of the coast, so that the public may enjoy and bequeath to future generations a coast whose value is no less than its present value.

The law is expected to determine, in the clearest and most explicit manner, that the State of Israel views its seashore as a public asset whose protection and conservation are of high national importance. Accordingly, its instructions, which are declaratory in nature, are meant to guide the activities of the general public as well as the consideration, activities and decision making processes of the authorities in carrying out their powers, implementing the laws, and undertaking administrative measures on matters related to the coastal environment.

Major Elements of the Draft Law

Objectives: The major objectives of the bill for the protection of the coastal environment are: to protect the coastal environment and its natural treasures, to prevent damage to the coastal environment and to establish instructions for management, development and sustainable development of the coast.

Coast as Public Property: The bill determines that the coast and the coastal sand are public property.

Definitions: The bill delineates the coastal area both on land and in the sea. The area was delineated in terms of floral and faunal systems which are representative of the coast and the coastal sand system. The borders of the marine area were established from the shoreline to a water depth of 30 metres in the sea or to a distance of one nautical mile, whichever is farthest from the land. The land border was established at 100 metres landward in built areas or areas designated for building in the coastal masterplan and 300 metres landward in other areas.

Protection of the Coastal Environment: The bill sets guidelines and principles for prohibited and permitted uses along the coastline. It proposes that only uses designated for public welfare, which are inherently coastal dependent (e.g., ports, coastal recreation, marine sport, swimming) will be permitted in the future. It also proposes that coastal areas will not be allocated for uses for which alternatives exist that are economically feasible and environmentally preferential. This principle is meant to prevent the privatisation of large coastal areas for the benefit of a limited public and to the detriment of large segments of the population which would be denied access and enjoyment of the beach.

Restriction of Activities which Endanger the Coastline: It is proposed to restrict and prohibit activities which threaten to damage the marine environment with the exception of activities which comply with the principles and provisions of the law. Accordingly, the bill specifies a long line of activities which are deemed to damage the coastal environment. Furthermore, the Environment Minister would be empowered to promulgate regulations on measures for the prevention of marine and coastal damage, on the one hand, and rehabilitation and restoration of damaged areas, on the other hand.

Right of the Public to Free Passage: Based on the principle that the coast is public property designated for public enjoyment and in order to ensure that this principle does not remain on the theoretical level only, the bill determines that the coast should be accessible to pedestrians, by means of access routes and passages along the entire length of the coastline

with the exception of areas which are restricted for safety or security reasons and ports, power plants other uses which will be determined by the Environment Minister.

Assuring Open Sea Views: The aim of this principle is to ensure that planning authorities adhere to this principle when deliberating on plans and buildings adjacent to the shoreline. An open view to the sea is part of the public right to the coast as a public resource. Therefore, neither the marine landscape nor the sea breeze should be blocked.

Responsibility of the Local Authority: Since local authorities are responsible for cleanliness, wise management of public areas for public benefit, and supply of environmental services within their jurisdiction, they must also be responsible for maintaining cleanliness along their shorelines.

Public Information: The importance of the marine environment and the complexity of the processes impacting it necessitate the compilation and concentration of data on marine protection. This information should be available to both public and private bodies. The Environment Minister should establish rules on data collection and on the means of distributing this information to interested parties and to the general public. This may require mapping of the natural, landscape and heritage values of the marine environment, mapping of concession areas, plans and existing uses, and mapping of free passageways to the public.

Additional principles which are included in the proposed law for the protection of the coastal environment relate to the integration of these principles and guidelines in the considerations of planning and licensing authorities. Moreover, it is proposed that the Marine Pollution Prevention Fund, which operates within the framework of the Prevention of Sea Water Pollution by Oil Ordinance, will include an additional objective, namely protection of the coastal environment. This will provide for the financing of activities to protect the coastal sand including coastal restoration. For this purpose, the Minister of the Environment may decide to impose fees for the protection of the coastal environment on owners or operators of marine installations which damage the coast or interfere with the free flow of sand.

It should be noted that the Israel Union for Environmental Defense, a non-governmental organisation, has also prepared a draft proposal entitled Law for the Protection of the Mediterranean Coastline which was presented as a private bill by over 30 Parliament members. It is anticipated that the two proposals will be promulgated as one integrated coastal law which will embody the main principles and obligations which are included within the two draft bills.

Covenant on the Protection of the Marine Environment

The proposed Law for the Protection of the Coastal Environment expresses the principles of coastal zone management in legal terms. In recognition of the importance of the coast as a national resource, Israel's nature protection organisations drafted the following covenant within the framework of Nature Protection Week. The covenant is being distributed to organisations, the general public and students and has already been signed by myriad organisations and individuals. It expresses, in clear terms, the commitment of the public and its representatives to the preservation of the coastline:

The sea and shoreline constitute one of humankind's most important ecosystems, both because of their central role in the formation of life and because they are the cradle of human civilisation.

In Israel, processes which have occurred throughout the years have damaged the marine environment, as reflected in the following areas:

- Coastal areas which are open to the public are dwindling, sand beaches retreating, kurkar cliffs collapsing, and quarrying threatens the few remaining sand dunes.
- Natural systems are facing extinction and some have totally disappeared.
- Coasts are being "trampled" by massive building and are closed to the general public by private developers who promote residential initiatives and facilities for "tourism" for a fee.
- Marinas are taking over public spaces and are disturbing the fragile balance of longshore sand transport necessary for beach nourishment.
- Sewage and litter pollute the sea and its environment and damage the ecosystem, health and wellbeing of vacationers on the coast.
- Uncontrolled fishing reduces fish stocks and harms the ecosystem.
- Polluted streams flow into the sea and contaminate its waters.

Therefore, we, as public representatives, environmental organisations, government authorities and citizens of Israel, who view the marine environment as a natural asset which is important to us and to future generations, do hereby commit ourselves to utilise every means to stop coastal destruction and to protect marine resources by:

- Declaring the sea and its coasts as a public asset for the welfare of the general public.
- Promoting the Law for the Protection of the Coastal Environment.
- Requiring coastal and territorial water development to be implemented according to the principles of preliminary planning and integrated coastal zone management (ICZM) while considering present and future needs.
- Utilising best available technologies to protect, preserve and rehabilitate the natural marine environment.
- Advancing educational and information activity among all sectors of the population in order to acquaint them with coastal and marine resources and their importance to humankind.
- Establishing databases which are accessible to the general public and encouraging research on the subject.
- Implementing activities to preserve coastal cleanliness.
- Preventing coastal degradation by irresponsible activity by field and all-terrain vehicles.
- Implementing activities to prevent river pollution and to rehabilitate and restore river life.

The coastal environment is a valuable asset to all residents of Israel. It is our responsibility to care for it and to preserve it for our own benefit and for the benefit of future generations.

APPENDIX

Directory of Marine and Coastal Reserves in Israel

Israeli Mediterranean Marine Nature Reserves

No	Nature Reserve Name	Area (ha)	Shore line (m)	Status	Comments
1	Yam - Rosh HaNiqra	446.2	2,825	proposed	limestone and kurkar rocks
2	Yam - Akhziv	217.1	1,367	"	kurkar (eolinite) ridges
3	Yam - Bustan haGalil	46.8	2,649	"	kurkar (eolinite) ridges
4	Yam - Shiqmona	163.4	630	"	kurkar and limestone rocks
5	Yam - Atlit	33.8	1,479	"	kurkar ridges and sandy beaches
6	Yam - Newe Yam	85.3	3,951	"	kurkar ridges and sandy beaches
7	Yam - Dor - Habonim	532.0	1,510	"	kurkar ridges and sandy beaches
8	Yam - Ma'agan Mikha'el	455.3	9,768	"	kurkar and sandy beaches
9	Yam - Gador	65.0	2,100	"	kurkar ridges and sandy beaches
10	Yam - Mikhmoret	29.9	1,489	"	kurkar ridges and sandy beaches
11	Yam - Poleg	119.6	1,611	"	kurkar ridges and sandy beaches
12	Yam - Yavne	58.8	1,761	"	sandy beaches
13	Yam - Evtah	137.0	4,527	"	sandy beaches
14	Yam - Shiqma	102.9	4,653	"	sandy beaches
	Total	**2493.1**	**40,320**		

Source: Ortal, R. 1998. Marine and Wetland Conservation in Israel. Internal Report. NNPPA.

Israeli Mediterranean Coastal Nature Reserves

No.	Nature Reserve Name	Area (ha)	Shore line (m)	Status	Comments
1	Hof Rosh HaNiqra	23.0	1,641	proposed	limestone rocks and kurkar b.
2	Hof Bustan haGalil	20.0	2,220	proposed	kurkar (eolinite) beaches
3	Shefekh ha Na'aman	34.2	583	proposed	oligohaline stream and sandy b.
4	Holot Hamifraz	12.2		declared	kurkar ridge and limestone r.
5	Hof Shiqmona	4.5	630	proposed	kurkar ridges and sandy beaches
6	Hurvat Qarta	13.7	100	declared	small stream and kurkar ridge
7	Hof Atlit	43.0	3,734	proposed	kurkar ridge and sandy beaches
8	Hof Newe Yam	30.2	3,040	proposed	kurkar ridge and sandy beaches
9	Hof Dor-Habonim	42.3	4,825	declared	kurkar ridge and sandy beaches
10	Hof Ma'agan Mikha'el	67.2	5,791	proposed	sandy beaches
11	Shefekh N. Daliyya	37.2		proposed	oligohaline stream and sandy b.
12	Nahal Tanninim	32.6	75	declared	oligohaline stream and sandy b.
13	Hof Gador	73.3	2,073	proposed	sandy beaches
14	Hof Mikhmoret	3.0	500	proposed	kurkar ridges and sandy beaches
15	Nahal Poleg	50.0	1,271	declared	small stream and sandy beaches
16	Holot Rishon leZiyyon[1]	800.0	4,300	proposed	sandy beaches
17	Holot Yavne[1]	600.0	5,500	proposed	sandy beaches
18	Holot Nizzanim	765.0	2,103	proposed	sandy beaches
19	Holot Ziqim	286.0	1,843	proposed	sandy beaches
20	Holot Nativ ha'Ashara	698.9	1,631	proposed	sandy beaches
	Total	**36,363.3**	**41,860**		

Source: Ortal, R. 1998. Marine and Wetland Conservation in Israel. Internal Report. NNPPA.

Protected Mediterranean Natural Asset Belts

No.	Name	Area (ha)	Shore line (m)	Width at sea (m)	Status	Comments
1	Yam Rosh HaNiqra - Akhziv	590.0	5,964	1,120	declared	limestone rocks and kurkar ridges
2	Yam Dor - N. Me'arot	600.0	9,615	1,000	declared	kurkar (eolinite) ridges
	Total	**1,190.0**	***15,579**			

Source: Ortal, R. 1998. Marine and Wetland Conservation in Israel. Internal Report. NNPPA.

*8,700 m are also included in proposed marine nature reserves.

Mediterranean Islet Nature Reserves

No.	Name	Area (ha)	Status	Comments
1	Iyyi Hof Rosh HaNiqra	31.1	declared	kurkar islets and nesting sites
2	Iyyi Hof Dor and Ma'agan Mikhael	2.1	declared	kurkar islets and nesting sites
	Total	**33.2**		

Source: Ortal, R. 1998. Marine and Wetland Conservation in Israel. Internal Report. NNPPA.

Israeli Mediterranean Islets

No.	Name	Area (ha)	Status	Comments
1	Tekhelet	0.40	proposed	Yam Rosh – HaNiqra NR
2	Shahaf	0.60	declared	Iyyi Hof Rosh - Ha Niqra NR
3	Nahlieli	0.80	"	Iyyi Hof Rosh – Ha Niqra NR
4	Akhziv	0.30	"	Iyyi Hof Rosh – Ha Niqra NR
5	Segavion	2.30	"	Yam Akhziv NR
6	Atlit	0.75	-	not included
7	"Melah 1"	0.62	proposed	Yam Newe – Yam NR
8	"Melah 2"	0.50	"	Yam Newe – Yam NR
9	"Melah 3"	0.25	"	Yam Newe – Yam NR
10	haMelah	0.80	"	Hof Newe – Yam NR
11	"Newe Yam 1"	0.25	"	Yam Newe – Yam NR
12	Newe Yam	0.75	"	Hof Newe – Yam NR
13	Tamnun	0.15	"	Yam Newe – Yam NR
14	Shehafit	0.75	-	not included
15	"Me'arot 1"	0.22	-	not included
16	"Me'arot 2"	0.32	-	not included
17	"Habonim 1"	0.50	proposed	Yam Dor – Habonim NR
18	"Habonim 2"	0.12	"	Yam Dor – Habonim NR
19	"Habonim 3"	0.70	"	Yam Dor – Habonim NR
20	"Habonim 4"	0.32	"	Yam Dor – Habonim NR
21	Dor	1.30	-	not included
22	Tefet	0.60	-	not included
23	Hofmi	0.60	declared	Iyyi Hof Dor and Ma'agan - Mikha'el NR
24	"HaYonim 1"	0.16	proposed	Yam Ma'agan Mikha'el NR
25	HaYonim	0.50	declared	Iyyi Hof Dor and Ma'agan - Mikha'el NR
26	"HaYonim 2"	0.50	proposed	Yam Ma'agan – Mikha' NR
27	"HaYo3"	0.16	proposed	Yam Ma'agan – Mikha'el NR
	Total	**15.22**		

Source: Ortal, R. 1998. Marine and Wetland Conservation in Israel. Internal Report. NNPPA.

Supplementary Environmental Legislation Related to the Coast

- *Maintenance of Cleanliness Law, 1984:* This law forbids littering or disposal of waste, building debris and vehicle scrap into the public domain. The law prohibits the disposal of any refuse in public areas, including litter left on the beach or thrown overboard from a vessel into the sea within Israel's territorial waters. The law holds the skipper and owner of a vessel responsible for violations, and fines are imposed on them. The law establishes a Cleanliness Fund to finance a broad range of environmental activities. The major sources of the fund are fees imposed on manufacturers and importers of disposable beverage containers and fines imposed on violators of several environmental laws. An important and innovative enforcement feature of the law provides for the appointment of voluntary inspectors and cleanliness trustees, empowered by the Minister of the Environment to report on littering offenses.
- *Water Law, 1959*: This law establishes the framework for the control and protection of Israel's water resources. It states that all water sources are public property and that every person is entitled to use water, as long as such use does not cause the salination or depletion of the water resource. The law prohibits the pollution, or any act that is liable to cause pollution, of freshwater. The Water Commissioner is responsible for prescribing norms for the quantity and quality of water and for promulgating regulations concerning "protective strips" around water sources.
- *Local Authorities (Sewage) Law, 1962*: This law prescribes the duties of local authorities in matters concerned with the design, construction and maintenance of sewage systems. It requires local authorities to properly maintain sewage system and to have new systems approved by District Planning and Building Commissions and by health and environmental authorities.
- *Streams and Springs Authorities Law, 1965*: This law authorises the Minister of the Environment to establish authorities for the management of specific streams, springs or other water sources. Among a long and varied list of duties, a stream or spring authority is responsible for the protection of the stream and its banks, prevention of pollution, and reclamation, development and management of rivers and riverside parks. Two coastal river authorities, for the Yarkon and Kishon Rivers, were set up under this law.
- *Hazardous Substances Law, 1993*: This law provides for "cradle to grave" supervision and management of hazardous substances. The administrative enforcement means established by the law include a permit requirement for any premise dealing with a hazardous substance. In recent years, courts have imposed maximal penalties on individuals and corporations which have discharged toxic chemicals into water bodies.
- *Licensing of Businesses Law, 1968*: The law empowers the Minister of the Interior, in consultation with the Minister of Health and the Environment, to designate and define businesses requiring licenses in order to ensure proper environmental conditions including appropriate sanitary conditions and prevention of nuisances. Special environmental provisions may be imposed within the framework of the license.
- *Abatement of Environmental Nuisances (Civil Action) Law, 1992:* This law enables private citizens to bring environmental law suits on behalf of themselves or non-profit organisations of which they are members, in cases of environmental

pollution or nuisances, including marine and water pollution. The law places three types of legal remedies at the disposal of the citizen: restraining orders, prevention of recurrence orders and corrective orders. In addition, the law allows, for the first time in Israel, the use of class actions in environmental law suits.

EIA Guidelines: Herzliya Marina

Project-Specific Guidelines (June 1983)
(The guidelines are presented in condensed outline form for the purposes of this report)

Chapter I: Description of the Environment without the Proposed Activity

1. Mapping
2. Physiography
3. Hydrographic Regime and Wave Climate
4. Sedimentation Regime
5. Hydrology
6. Flora and Fauna
7. Land Uses
8. Noise
9. Visual Resources

Chapter II: Reasons for Preference of the Proposed Site

Chapter III: Description of the Activities Resulting from Implementation of the Proposed Plan

1. Plan Description
2. Stages of Construction
3. Operation and Maintenance

Chapter IV: Assessment of the Anticipated Environmental Impacts and of the Means Necessary for the Prevention of Negative Impacts

1. Impacts on the topographic and bathymetric structure of the coastal region in the area of the proposed activity and its environs (levelling of the area, stabilisation of slopes and cliffs, infilling, marine and land dredging)
2. Impacts on Waves, Currents and Sea Levels
3. Impacts on Drainage
4. Impacts on Marine and Water Pollution
5. Impacts on Flora and Fauna
6. Solid and Hazardous Waste
7. Noise
8. Visual Impacts
9. Land Uses
10. Prevention of Possible Impacts of Failures and Emergencies
11. Follow-up Plan

Guidelines for a Supplement to the EIA on the Herzliya Marina (February 1989)

Chapter I: Completions

Chapter II: No Supplementary Material

Chapter III:
1. The marina and its accompanying services
2. Tourism, Recreation and Sport (Excluding Marine Sport)
3. Pedestrian Traffic and Transportation
4. Landscape Planning
5. Infrastructures
6. Stages of Implementation

Chapter IV: Completions on Marine Pollution, Noise, Impacts on Appearance and Landscape.

Chapter V: Proposal for the Regulations of the Plan
Regulations based on the description of activities presented in Chapter III and the measures to prevent nuisances enumerated in Chapter IV, in addition to the following:
1. Regulations for development and operation of the marina
2. Regulations for the development of regional recreation and tourism
3. Regulations for conservation, designs and landscape rehabilitation
4. Regulations to ensure implementation of open public areas and pedestrian pathways
5. Regulations to ensure implementation of infrastructures for sewage and waste systems.