



### Marine Protected Areas

The ocean is essential to human survival. It covers 71% of the Earth's surface, drives climate, supplies us with food, supports livelihoods and is also a source of enjoyment. However, the world's oceans are threatened by human activities which often result in habitat destruction, pollution, overfishing, climate change, and the introduction of invasive species. In an effort to combat these threats, over 5,000

Marine Protected Areas (MPAs) have been established worldwide. Despite this, less than 1% of the world's oceans are protected, with only a tiny fraction of these offering full protection as no-take marine reserves. (Figure 1)

Early on, The Bahamas recognized the need to protect and preserve our important natural resources. In 1892 our first protected area, The Sea Gardens, was created off the northeastern coast of New Providence, paving the way for today's MPA system.

The 176 square mile Exuma Cays Land and Sea Park was established in 1958 and was designated as a no-take



zone in 1986. It is the first protected area to include both terrestrial and marine environments in the western hemisphere. By 2013, seventeen MPAs had been established in The Bahamas, with conservation agencies and government authorities actively working together to protect additional areas in order to meet The Bahamas' conservation goals.

> Marine Protected Areas of The Bahamas BAHAMAS REEF ENVIRONMENT EDUCATIONAL FOUNDATION

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#### What is an MPA?

A Marine Protected Area (MPA) is an area of the ocean in which human activity is restricted to varying degrees to conserve the natural environment, and any cultural or historical resources that may require preservation or management.

Activities that can be regulated or prohibited within an MPA typically include:

- Fishing or collecting wildlife
- Mining, drilling, or dredging
- Dumping, or discharge of any material into MPAs
- Boating, anchoring or mooring
- Tours, snorkeling and scuba diving
- Feeding, touching or otherwise disturbing wildlife.



The Exuma Cays Land and Sea Park, managed by The Bahamas National Trust, is an example of a No-Take MPA in The Bahamas. A No-Take Area is a type of MPA in which an ocean or coastal area is protected from fishing and other extractive or harmful uses. This protection allows some activities and restricts others, while still offering substantial benefits to biodiversity conservation and fisheries management.



There are many different kinds of MPAs which may have different designations. MPAs can be designated as no-take/fully protected zones, national parks, wildlife refuges, marine sanctuaries, fisheries closures, conservation areas, marine reserves and preserves.

In The Bahamas MPAs managed by the Department of Marine Resources with a primary goal of fishery replenishment are designated as 'marine reserves'. Marine or land & sea 'national parks' can help to increase fish stocks and may also be established to achieve a variety of other goals e.g. recreation, ecosystem or species protection, safeguard cultural heritage, etc. These national parks are managed by The Bahamas National Trust. Conservation forests under the Forestry Act may include coastal wetlands that are important nursery habitats for marine species.

## MPAs of The Bahamas

The territorial area of The Bahamas spans over 100,000 square miles. By 2013 two million acres (3,000 miles²) of the terrestrial and marine environment had been included in the MPA network, with a conservation goal of protecting at least eleven million acres (7,000 miles²) by 2020.

**Supporting legislation:** – The following Acts enable the creation of protected areas and the sustainable use of natural resources.

- Fisheries Jurisdiction and Conservation Act provides for the conservation and management of fishery resources.
- The Bahamas National Trust Act provides for the establishment of national parks.

- The 2010 Forestry Act provides for the management and control of forests, the conservation of wildlife within forests, and creation of forest reserves, protected forests and conservation forests. Forests in The Bahamas include pine forests, coppice forests (locally known as bush) and mangroves.
- The 2010 Planning and Subdivision Act provides for protection and conservation of the natural and cultural heritage of The Bahamas, focusing on land use planning for the entire country through tools, such as zoning and land use designations as well as regulation of activities that impact the land, such as quarrying, road construction and subdivision development.

#### MPA **Network**

MPAs are an important part of The Bahamas' strategy for ensuring sustainable use of our marine resources for the benefit of current and future generations. A network of MPAs is far more beneficial in protecting our marine resources than a single MPA. The MPAs in the network should include the full range of marine habitats, should be large enough and well-connected to protect marine populations. For MPAs to work, they should also have the support of the community.





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#### The Process of establishing an MPA Network







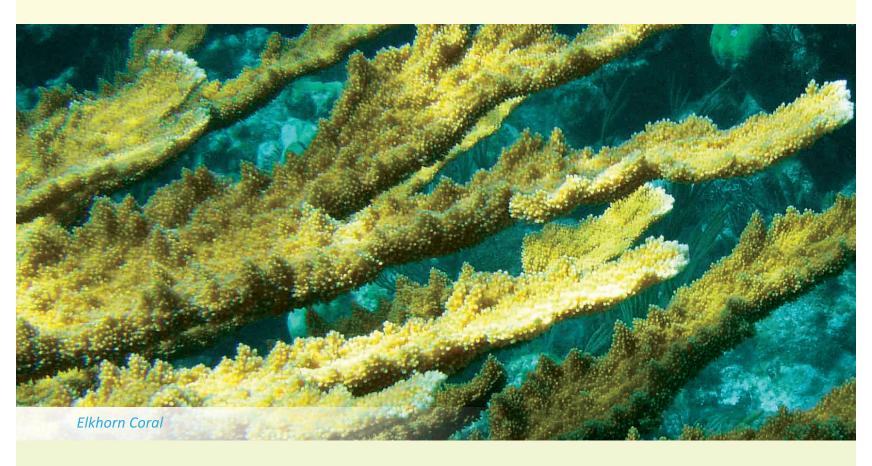




- Site Selection
- Scientific Review
- Community Consultation
- Data Collection
- Government Approval

The process of establishing an MPA network involves several main steps including: site selection with community consultation, scientific assessment to determine boundaries, the development of a management plan, further community/stakeholder consultation, government approval and boundaries gazetted.





#### Existing MPAs include:

Northwestern Bahamas - Walker's Cay National Park, Crab Cay Marine Reserve, Black Sound Cay National Reserve, Fowl Cays National Park, No Name Cay Marine Reserve, Pelican Cays Land and Sea Park, Andros North Marine Park, Andros South Marine Park, Andros Westside National Park, Bonefish Pond National Park, South Berry Islands Marine Reserve

**Central Bahamas** - Exuma Cays Land and Sea Park, Moriah Harbour Cay National Park, Conception Island National Park, The Exuma (Jewfish Cay) Marine Reserve **Southern Bahamas** - Little Inagua National Park, Union Creek Reserve

# Future plans for the Expansion of the MPA Network

Through The Bahamas 2020 Declaration, the Government of The Bahamas has committed to effectively conserve at least 20% of the near-shore marine resources across The Bahamas by 2020. Since then the South Berry Islands and the Exuma (Jewfish Cay) Marine Reserves were established in 2009 with the Crab Cay and No Name Cay Marine Reserves located in Abaco in 2010. Sites in Bimini and South Eleuthera and a second site in Exuma are proposed. Conservation organizations, through scientific exploration and community consultation, are identifying additional suitable areas throughout the archipelago to achieve the 2020 goal.



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# Designing an **MPA Network**

#### **Figure 3: Habitat Connectivity**

Source: Fredrik Moberg, Carl Folke, Ecological goods and services of coral reef ecosystems, Ecological Economics, Volume 29, Issue 2, May 1999, Pages 215-233, ISSN 0921-8009

A well-designed network of MPAs is guided by five main principles:

## 1. Representation

The design of a marine protected area network should take into consideration what is already protected and what is in need of protection. The protected areas in the network should represent the natural composition of the marine environment and should cover the full range of species and *habitats*.

Since many organisms use more than one type of habitat during their *life cycle*, all habitat types should be represented within an individual MPA and then replicated throughout the network. For example, Nassau groupers spend their early lives in mangrove creeks before moving offshore to shallow patch reefs in sea grass beds.

As adults, they live on deeper reefs. During their reproductive season, they migrate over long distances to *spawning aggregation* sites near the edge of reefs and banks. From these sites the fertilized eggs and *larvae* float in the open ocean until the juveniles settle into nursery areas, such as mangrove creeks. If any of these habitats are degraded, the Nassau grouper would not be able to complete its life cycle, resulting in population declines. There are many other species that use multiple habitats like the Nassau grouper, which will be affected by habitat destruction.

For MPAs to ensure the protection and restoration of biodiversity, and the enhancement of sustainable fisheries, they must include *critical habitats;* such as breeding/spawning grounds, and nursery areas.

## **Habitat** Types

Mangroves are salt tolerant trees that are found in the transition zone between the land and the sea. They form an important habitat for many juvenile fishes (they are a nursery for about 80% of commercially important fish species) and for other animals, such as lobsters, land crabs, bats, and birds. Mangroves serve as a filter, trapping sediments and thereby protecting coral reefs. They also act as a sink absorbing flood waters and buffering strong winds.

**Tidal/Sand flats** are areas that may be under water at high tide and exposed at low tide. They are important habitats for sand-dwelling species such as conchs, which, as juveniles, bury themselves for almost a year to feed and grow.

**Seagrass** beds are areas of submerged grasses that provide habitat and nursery grounds for recreationally and commercially important fish and other animals, including turtles and conch. Sea grasses help to trap sediments from the land and stabilize the sea floor.

Coral reefs are formed by a variety of corals and other animals and plants. Though reefs cover less than 1% of the Earth's surface, they have the highest biodiversity of any marine ecosystem. Coral reefs provide shelter and food for spiny lobsters, groupers, and thousands of other marine animals. These "rainforests of the sea" are extremely important to The Bahamas as a source of food, for recreation, and tourism.

The **open ocean** is called the pelagic zone. Here larvae and other tiny organisms are distributed. The open ocean is a major "roadway" for migratory species like turtles, whales, and dolphins.









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#### 2. Replication

Rather than investing in a single MPA that protects only one specific area of The Bahamas, we must have several areas protecting similar habitats distributed throughout the entire archipelago. This will ensure that we do not put all of our eggs in one basket, solidifying the protection of habitat types within the network if a catastrophic event were to occur in a particular area (e.g. disease outbreak, hurricane, oil spill, etc.) In this way, a network provides a broader "insurance plan" than any single MPA can.

#### 3. Connectivity

The design of an MPA network should incorporate ecological connections among the sites to facilitate movement of organisms between habitats and encourage larvae dispersal on ocean currents (*Figure 4*). This ensures that each protected area can be reseeded with larvae, juveniles and/or adults.

For example, some species require certain habitats e.g. wetlands and coral reefs, to be close enough so that individuals can move between them as they grow. Other marine species like crawfish and coral have larvae that disperse over long distances; they may only be protected if the distant sites at which their larvae settle have healthy habitats that are also protected.

#### 4. Adequacy

A network should cover enough area to provide sufficient protection for habitats and species, and to benefit communities. Studies conducted by scientists suggest that networks should protect at least 20% of an entire marine area to allow for sufficient conservation benefits while leaving ample area outside of their boundaries for fishing or other human uses. The actual size and number of individual areas in a network depend upon the species to be protected and the level of protection desired.

## 5. Efficiency

A network balances costs and benefits. Along with the adequacy principle, efficient network design should consider current and future threats to biodiversity and ecosystems; social, political, and economic opportunities for establishing MPAs; and the costs of ongoing management and enforcement. Given these factors, network design must be flexible and practical so that conservation objectives can be met along with acceptable social and economic outcomes (maintaining livelihoods).



Figure 4: Ocean Currents

Source: Arthur J. Mariano, Edward H. Ryan.

"The Florida Current." Ocean Surface Currents





# Benefits of Marine Protected Areas

Around the world, fishermen and fisheries managers have seen a dramatic decline in fish stocks due to multiple factors: overfishing, illegal fishing, pollution, habitat destruction, invasive species and climate change. Globally, stocks of large fish, (groupers, sharks, swordfish, tuna, etc.) have declined by 90% in the last 50 years, due primarily to overfishing. This is because advances in fishing technology have enabled man to fish further away from shore, stay out to sea longer, and locate and harvest increasingly large amounts of fish from the shallow to the deepest areas of the ocean.

mechanism to protect our fisheries. By focusing already limited resources for monitoring and enforcement, it becomes more feasible to effectively address threats, such as habitat destruction, poaching, and climate change. A well-managed MPA can ensure protection of our cultural heritage and economy for future generations.

MPAs can work! They have been established around the world to help troubled fisheries in the United States, Belize, New Zealand, The Philippines, and South Africa. When used along with conventional management tools such as closed seasons, size limits, and fishing gear

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In the 70's when I used to dive, you could go in there and get as much conch as you want. You can't do that now. You have to search. They used to say that conch would never run out. That's just how much there used to be, but they're running out and fast too. — Freddy Delancy — fisherman

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MP/

The Bahamas' marine resources are considered to be healthier than other countries in the region. This is demonstrated by the fact that we still have a conch and grouper fishery while these species are considered to be commercially extinct in much of the region. However, our fishermen report that they have to go out further or stay out longer to catch sufficient, often smaller sized fish to meet their needs. This along with the high cost of seafood indicates that our fisheries are in decline.

To address these problems, MPAs are being established as an important conservation

restrictions, MPAs will help to ensure the future of our oceans and our way of life in The Bahamas.

#### **Maintaining fisheries**

The fishing sector plays an important role in the economy and culture of The Bahamas. Healthy fisheries provide employment, food and recreation for locals. The local sale and export of fish, and inedible marine products (such as sponge and helmet shells) brings in ~\$90 million to the economy annually. Fisheries support restaurants, the dive and hotel industries as well as many other sectors of the local economy.

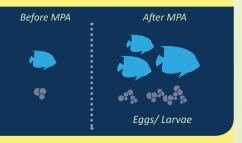


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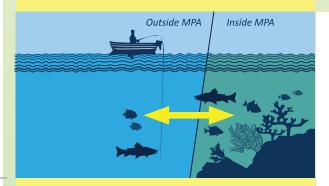
How Spillover Works: Since fishing activity is restricted within MPAs, the biodiversity in the area will increase helping to maintain the ecological balance. This healthier environment and protection from fishing will result in an increase in fish populations.



As the fish in a No-Take MPA are not harvested they can grow to a larger size. These larger fish have a higher egg/sperm production capacity than smaller fish. The abundant eggs and larvae produced from spawning inside the MPA will float on ocean currents, seeding adjacent fishing areas.



Since there are no physical barriers around these areas, fish will move outside of the MPA, replenishing adjacent fishing areas.



The movement of individuals and larvae from an MPA to reseed a fished area is referred to as *spillover*. It is the way in which MPAs benefit subsistence, commercial, sport fishermen and other consumers!

# Conserving species and habitats

MPAs protect habitats and provide the opportunity for different species to thrive and recover from fishing pressure. The resulting healthy ecosystems will ensure that we continue to benefit from the important ecosystem services they provide, such as shoreline protection, recreation, food and employment. Healthy ecosystems also provide an opportunity for scientists to study and compare environmental processes inside and outside of MPAs, thereby improving our understanding of biodiversity and the function of Bahamian ecosystems.

#### **Insuring against uncertainty**

MPAs provide a refuge and a buffer against some of the uncertainties in traditional conservation and fisheries management that sometimes

lead to population crashes (e.g. fluctuations in species reproduction rates, prey and predator population changes, and environmental changes). Historically, areas that are protected from the pressure of fishing and other human activities have healthier habitats and can recover from catastrophic events such as hurricanes and coral bleaching more quickly than areas that are not protected.

#### **Boosting the economy**

The principal commercial fisheries in The Bahamas are crawfish, conch, shallow water scale fish (groupers, jacks, snappers, and grunts), sponge, stone crab, queen helmet shells, and deep-water scale fish (red snappers). MPAs will replenish these resources in nearby fishing grounds, helping to sustain our third largest industry.

"When a fisherman makes money everyone makes money. When fishermen don't make money everyone suffers."

Hardy McKinney – fisherman

MPAs can also provide economic empowerment for locals who take advantage of the entrepreneurial opportunities in *eco-tourism*. Community members can provide services for domestic as well as foreign visitors to MPAs; snorkeling, diving, wildlife viewing/tours, small hotels, restaurants, and shops. Locals can also be employed to manage MPAs as wardens, managers, etc.

# Providing recreational areas and educational opportunities

Bahamians and tourists alike enjoy a clean and healthy marine environment for recreational activities such as picnicking, snorkeling, and diving. The healthy environment of MPAs, provide ideal locations for these activities. Protected areas also provide safe pristine areas for educational activities for the public, e.g. school field trips and eco-tours.

## Case study

**Exuma Cays Land and Sea Park** — **Birthplace of Millions!** - Exuma Cays Land and Sea Park was established in 1958 and designated as fully-protected (fishing prohibited) in 1986.

Studies show that the Exuma Cays Land and Sea Park plays an important role as a replenishment area for species that are exploited in surrounding waters. The concentration of conch inside the Exuma Park has been estimated to be 31 times greater than outside the park. Spillover of adult and larval conch provides several million conch for fishermen to harvest outside of the park boundaries each year. Crawfish spawned in the park could be repopulating areas all around The Bahamas. Groupers tagged in the park were found to swim to spawning aggregations off Long Island – 150 miles away!

More recent studies show that although the Exuma Cays
Land and Sea Park is providing a source of conch larvae
to replenish adjacent fishing grounds, the park is not being
effectively reseeded. To achieve this, we need a well-planned
network of MPAs that are connected to each other by the
movement of adults and larvae. This way MPAs can replenish each
other, working together as self-sustaining units while also replenishing
our fishing grounds.





## You Can Help!

MPAs are an important management tool for ensuring a healthy environment and its continued benefits to local communities. Support marine conservation in The Bahamas by:

#### Learning about your environment

- Be familiar with the different marine habitats and their functions in order to make informed decisions about their use.
- Spread the word. Spread your knowledge and interest in the marine environment to encourage others to learn the importance of marine conservation.

#### **Supporting sustainable fisheries**

- Know and obey fishing regulations.
- Don't use harmful or prohibited chemicals.
- Respect closed seasons. They protect species while they are breeding.
- Don't take or buy juvenile fish, conch, or lobster.
- Foreign sport fishermen should respect catch limits.
- Report illegal fishing to your local fisheries or law enforcement officer.
- Corals and other marine life can be easily damaged by boat anchors. Be careful, anchor in sand or use a mooring buoy.
- Be an informed consumer. Consider carefully the fish and marine products that you buy or sell.
   Have they been sustainably harvested? (Caught in a way that considers the future of the species and the health of the ocean? Is it too small? Is it out of season? Is the fishing method used to catch it damaging to the environment?)

#### **Participating in MPA establishment**

- Participate in the designation of marine protected areas near you by attending public meetings and sharing your knowledge.
- Respect the boundaries and regulations associated with existing MPAs.
- Call on your representatives to support MPAs.

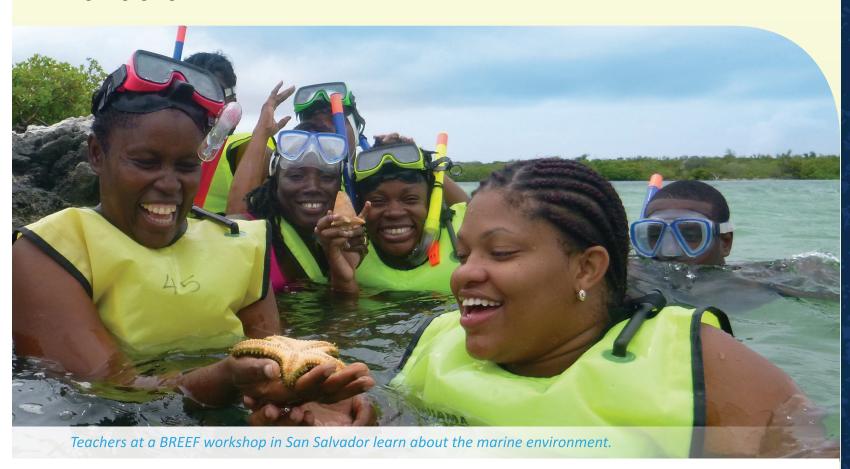
#### Take action in your community!

- Become a member and support local conservation organizations that help to protect our marine environment.
- Reduce waste by practicing the 5Rs rethink, refuse, reuse, recycle, reduce.



- Participate in beach and wetland clean- ups, such as The Ocean Conservancy's International Coastal Cleanup that takes place every year in September.
- Use biodegradable products and re-usable bags, containers, plates, cups, and utensils. The majority of debris collected on our beaches are plastics from picnics.
- Start your own waste reduction and recycling efforts by composting your biodegradable waste and reusing non-biodegradable items. Less garbage going into the landfill means less waste

- carried into the ocean or seeping into the ground and reaching the marine environment.
- Pump your septic system regularly. If septic systems are not maintained properly they can contaminate our groundwater and the ocean.
- Limit your use of chemical pesticides and fertilizers. These products end up in the water table and degrade the marine environment.
- Report illegal dumping activities. Environmental enforcement cannot be everywhere, and your involvement can make a big difference.



"In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we have been taught." — Baba Dioum



# Glossary

Biological diversity, or *biodiversity*, refers to the variety of life in all of its forms. Coral reefs contain very high levels of biodiversity. People are only beginning to understand the potential value of many of these plants and animals to humans, and to maintaining healthy ecosystems. We are also only beginning to understand the threats to this biodiversity and the importance of protecting it.

A species is considered to be *commercially extinct* when their populations have declined to the point where fisherman cannot catch enough of that species to earn a profit.

**Critical habitat** is a particular habitat that an organism must have in order to successfully complete its life cycle.

An *ecosystem* is a natural area in the environment consisting of living organisms and their physical environment interacting as a unit e.g. coral reef, wetland, sea grass bed, tidal flat.

**Ecosystem services** are the benefits to humans from natural processes within an ecosystem such as food production, water filtration, flood control by wetlands, and natural protection for shorelines provided by barrier reefs.

**Ecotourism** is "responsible travel to natural areas that conserves the environment and improves the well-being of local people." — The International Ecotourism Society

A *habitat* is a place where an animal or plant lives. This "home" has all the necessary environmental conditions for its survival.

A *larva* is the immature, free-living, form of most marine invertebrates and fish. Did you know that crawfish larvae can float in the ocean for up to a year, traveling several hundred miles before they settle to the bottom as juvenile crawfish?

A *life cycle* is the series of stages an animal or plant passes through during its lifetime.

Spawning aggregations refer to large gatherings of a species of fish, at a particular place and time, for the purpose of reproducing. Many commercially important fish species in The Bahamas form spawning aggregations. These include several species of snapper and grouper, such as the Nassau grouper and mutton snapper, and also bar jacks. Spawning aggregations account for a large percentage, if not all, of the reproductive activity of these fishes.

**Spillover** occurs when populations of animals inside MPAs increase over time, causing some animals to eventually move into less crowded neighboring areas where they can be caught by fishermen.

**Seeding** occurs when larvae spawned in an MPA drift out and settle in other areas. These young animals boost populations in surrounding waters. Through the processes of spillover and seeding, MPAs can replenish nearby fishing areas.

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This booklet was produced to inform the public about the importance and need for Marine Protected Areas. It was produced by The Bahamas Reef Environment Educational Foundation (BREEF) with the support of The Nature Conservancy (TNC) and the WAITT Foundation.

We gratefully acknowledge the following people and organizations for their contributions:

Agnessa Lundy, Casuarina McKinney-Lambert, Charlene Carey, Eleanor Phillips, Shenique Albury-Smith, Stacey Moultrie, The Bahamas National Trust, The Department of Marine Resources.

Photography by:

Bahamas National Trust, BREEF, Sandra Voegeli, Stuart Cove's

Adapted from *Fully–Protected Marine Reserves For The Future Of Our Oceans*, written and edited by Meg Domroese and
Christine Engels, BREEF © 2004

Designed by Karma Design
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Made possible by a grant from the Waitt Foundation to The Nature Conservancy

