

Topic 1: Opening of Conference and Conservation issues of Bermuda

This section includes the opening of the conference by the Premier and the welcoming address by the Minister of the Environment, as well as an introduction to Bermuda's environment and conservation issues by a team from the Bermuda-based organisations of the organising team. An integral part of that introduction was a visit to some key areas of Bermuda. On this page are illustrated some of the images and issues of that day, as well as a supplementary visit.



The boat trip to Nonsuch Island across Castle Harbour passed some very expensive housing, including a site where construction material had been dumped on a supposedly protected area for endemic plants (MP, BP).



Jeremy Madeiros checks cahow nestlings in artificial nestboxes on one of the few small eroding islets where intensive repair work is needed each year to help this rare bird avoid extinction. David Wingate shows the conference nest boxes on Nonsuch, where it is hoped eventually to attract the birds to recolonise (MP).



Participants were excited by the caves at Walsingham, whose value certainly warrants the standing of a Wetland of International Importance under the Ramsar Convention (MP, BP, BP, EC).



Spittal Pond provided another valuable range of ecosystems, so that David Stroud could not resist taking further notes for the formal Ramsar site description, before delegates returned to the conference hotel, enthused for the indoor conference sessions (MP).

Official Opening by the Premier of Bermuda

The Hon. Jennifer M. Smith, JP, DHumL, MP



It is with great pleasure that I welcome you to Bermuda to share in this historic conference. This is the third gathering that has been held to focus attention and share ideas on approaches to the conservation of the unique natural treasures that are supported by the Overseas Territories of the United Kingdom.

I am especially pleased to be here to celebrate the realisation of the dream of Mr Wayne Carey of the Bermuda National Trust, who proposed that Bermuda host such a meeting during the “Breath of Fresh Air” conference that was held in London in 1999. It is wonderful that this suggestion met with the enthusiastic support and encouragement of the delegates at that conference, and that the idea was so fully embraced and promoted by the leadership of the United Kingdom Overseas Territories Conservation Forum.

It is abundantly clear that you, the delegates, feel that this meeting of the minds is critically important in furthering your work. This is most dramatically evidenced by the commitment that many of you have made to travel such long distances to be here. I understand that some of you have been travelling for over a month – that is remarkable and I am truly humbled by your commitment. Although this meeting has not even begun, it is obviously a success. Here with us today are

representatives from 14 of the 19 Overseas Territories and Crown Dependencies and they are joined by representatives from other small island states in the Caribbean as well as the United Kingdom, the United States, France and South Africa. Over 50 overseas participants have committed to this conference. Knowing how much you value this experience, and recognising the remarkable level of participation of the invited parties, I anticipate that you will make great strides in forwarding your collective mission.

Bermuda is proud and honoured to be able to host such an important conference, we are happy to be able to share our experiences in attempting to conserve our natural heritage and we look forward to learning from the experiences of you, our respected colleagues.

I wish to give due recognition to the many collaborating organisations that made this conference possible:

Hosting and organising this conference are -

- The United Kingdom Overseas Territories Conservation Forum,
- The Bermuda Government’s Ministry of the Environment
- The Bermuda Audubon Society
- The Bermuda National Trust
- The Bermuda Zoological Society,
- with logistical support provided by Select Sites

Sponsorship was kindly provided by –

- The Bermuda Government
- The Government of the United Kingdom
- The Bank of Bermuda Foundation
- The XL Foundation
- Fidelity Investments
- Capital G

Ladies and Gentlemen, it is again my distinct pleasure to welcome you here to the lovely Isles of Bermuda. I look forward to reviewing the final conference notes. Enjoy the conference and enjoy the hospitality of our island home. I now declare this conference “**A Sense of Direction**” officially open.

Welcome Address

Minister of the Environment, the Hon. Dennis Lister, JP, MP



Mr Chairman, Cabinet Colleagues, distinguished guests, delegates, ladies and gentlemen.

I am pleased to have the opportunity to bring a warm welcome on behalf of my colleagues in Government and the people of Bermuda, to all of our overseas visitors attending this landmark conference on the environment. We are very happy that so many of you have travelled so far to attend this meeting and I am confident that the people will extend to you the traditional Bermudian hospitality for which we are so well known.

It is a particular honour for me to welcome again, our distinguished guest, Dr David Suzuki, who brought us a brilliant but sobering message last evening as the keynote speaker for the official opening. I feel we have scored a major coup in securing Dr Suzuki for this event. Few scientists come as eminently qualified to speak to us on environmental issues. Dr Suzuki is the face of the environment movement in Canada. He is a leader in the field of conservation awareness and education. He is a visionary who, decades ago, recognised potential threats to the environment and used the mass media to alert the world.

I am sure that you have been inspired by what he had to say. Today, however, I would like to remind the delegates gathered here that all of you are visionaries in your own right. By your presence at

the conference, you are demonstrating your commitment to preserving the environment through your work in your own countries. Many of you have made a long trek to be here. This tells me that you recognise the importance of meeting with like-minded individuals to further your collective mission. I encourage you to take inspiration from the reservoir of knowledge and experience that Dr Suzuki has passed on to you. In time, you too will make your mark in your endeavours to promote issues concerning the environment.

Yesterday, you had an opportunity to tour Bermuda. We prayed for sunshine so that you could see us at our Bermudaful best! From all accounts, this was an enjoyable and enlightening tour. As you travelled, you would have witnessed Bermuda's pristine beauty, its limited land, its traffic and some open space. You could see evidence of careful residential planning and recent commercial development. You also had an opportunity to visit areas of conservation research that are carefully managed.

Bermuda has a history of conservation dating back to the 1600s and our present environmental awareness is a result of this history. We have benefited from visionaries who saw the need to act swiftly, let me share some examples. The Premier last night mentioned: the Turtle Legislation of 1620 (this is the oldest known environment legislation in the western world); the motorcar act that restricts the ownership of cars to one per household; the anti franchise act that prohibits the establishment of overseas restaurants in Bermuda. Now in the 21st century, we face the enduring challenge of balancing the need to preserve our natural treasures with the need to develop for economic growth. I am sure that this week will bring new insights for us in this regard.

During the week, there will be many conservation issues that we have that are common to all small island territories. This conference will provide a forum for sharing such issues. There are likely to be a divergence of views that generate lively debate among you. This conference will allow you the freedom to express your views. Among you there is a genuine desire to address the uncertain future of our shared natural environment. This conference will give you the opportunity to propose realistic solutions together.

The Ministry of the Environment is grateful for the productive working partnership we share with so many non-government agencies that support Bermuda's environmental concerns. This conference will also give us the opportunity to demonstrate how this partnership has played a key role throughout our history of careful attention to conservation initiatives.

I hope that during your stay, you will have the opportunity to enjoy this beautiful location, the Elbow Beach Hotel with all its amenities, including one of the best beaches in Bermuda. We want you to feel at home, to get to know the people of Bermuda and your fellow delegates. After all, we are all partners in the common cause of protecting and preserving the good health and well being of the earth.

The Ministry of the Environment is proud to host this conference. It is one of the most ambitious projects we have undertaken to discuss issues of the environment. I am looking forward its success, and I trust that you will gain valuable insight from being here. Work hard, but enjoy yourselves.

In closing allow me to thank those persons who have worked tirelessly on behalf of the Ministry to

make this conference a success: Mr Jack Ward, the Director of the Department for Conservation Services; Ms Amanda Outerbridge, from the Bermuda National Trust; Dr Annie Glasspool, representing the Bermuda Zoological Society; Mr Andrew Dobson, representing the Audubon Society; and Mrs Starla Williams

Thank you.



Dr David Suzuki (left), who gave the opening address at the opening dinner, here with Andrew Dobson, who introduced the speaker

Amanda Outerbridge, Andrew Dobson, Jack Ward (who appears elsewhere in these Proceedings not hidden by water-bottles and microphones!) and Wayne Carey start the conference presentations



Introduction to Bermuda's environment and conservation issues

Amanda Outerbridge, Executive Director, Bermuda National Trust; Andrew Dobson, Vice-President, Bermuda Audubon Society; Wayne Carey, Vice-President, BNT; and Jack Ward, Director, Dept of Conservation Services

Outerbridge, A., Dobson, A., Carey, W. & Ward, J. 2003. Introduction to Bermuda's environment and conservation issues. pp 19-31 in *A Sense of Direction: a conference on conservation in UK Overseas Territories and other small island communities* (ed. M. Pienkowski). UK Overseas Territories Conservation Forum, www.ukotcf.org

Amanda Outerbridge, Bermuda National Trust, PO Box HM 61, Hamilton HM AX, Bermuda. aouterbridge@bnt.bm

Andrew Dobson, Bermuda Audubon Society, Warwick Academy, 117 Middle Road, Warwick PG01, Bermuda. adobson@warwickacad.bm

Wayne Carey, Bermuda National Trust, PO Box HM 61, Hamilton HM AX, Bermuda. wcarey@belco.bhl.bm

Jack Ward, Bermuda Conservation Services, PO Box FL 145, Flatts FL BX, Bermuda. jadward@ibl.bm

Good morning and welcome to Bermuda and *A Sense of Direction*, our conference on conservation in UK Overseas Territories and other small island communities. I am Amanda Outerbridge, Executive Director of the Bermuda National Trust, and a member of the conference organizing team. On behalf of this team, I would like to say how very pleased we are that you were able to attend. Some

of you have travelled far to be here – and in these uncertain times, that takes courage and patience. We are very pleased to see you.

As you will have noted from your conference programme, you have a busy four days ahead of you. Today is our opportunity to introduce you to Bermuda, a scenically beautiful island with diverse flora and fauna,



a unique built heritage



– and a number of conservation issues resulting from the density of development.



Our aim this morning is to give you an informative overview of our island, warts and all. The list of delegates in your conference package will give you some idea of the many agencies and organizations, governmental and non-governmental, working in

the field of conservation in Bermuda. And we are getting better and better at collaborating to address our most challenging issues, to which this conference is testimony. Of course, we still have much work to do.

Our speakers this morning, appropriately enough then, represent public and private sectors.

First, Andrew Dobson will talk about Bermuda's terrestrial features. Andrew is a member of the conference organizing committee, a passionate bird watcher, teacher and vice-president of the Bermuda Audubon Society. He has written a book on birds of Bermuda and will be happy to sell one to you at a special conference rate!

Jack Ward is the hard working Director of the Government's newly formed Department of Conservation Services. He is a marine biologist, has worked at the Bermuda Biological Station for Research, and was most recently Head Curator at the Bermuda Aquarium, Museum and Zoo. He will talk about the Islands' marine features.

Wayne Carey is Vice-President of the Bermuda National Trust, which has worked for more than 30 years in conservation, through its stewardship of natural and built heritage, as advocate for the environment, and as educator. Wayne is also Director, Energy Supply at the Bermuda's electrical utility company. This morning he will review the environmental impact of man on Bermuda.

I will now hand you over to our speakers, beginning with Andrew Dobson.

Bermuda's Terrestrial Environment, by Andrew Dobson

Bermuda is located at 32° North, the same latitude as Savannah (Georgia), Dallas (Texas) and San Diego (California) in North America and Baghdad (Iraq) in the Middle East. At 64° West, Bermuda has the same longitude as Halifax, Nova Scotia to the north, and Puerto Rico and the Virgin Islands to the south. The closest landfall to Bermuda is Cape Hatteras, North Carolina, some 570 miles (917 km)



to the west. Many people think that Bermuda is part of the West Indies, but the Caribbean Sea is about 1000 miles (1600 km) to the south.



The name 'Bermuda' comes from the Spanish explorer Juan de Bermudez, who is credited with discovering the islands in about 1505. 'Las Bermudas' appeared on a chart of 1511, but although some mariners may have set foot on land during the next 100 years, most feared the islands and its reefs. In 1609, the British ship *Sea Venture* ran aground on the reefs. All 150 on board got ashore and remained on the island for some 10 months before continuing their journey to Virginia. Only three people stayed and were joined by settlers who arrived in 1612 to form a permanent settlement, claiming the islands for Britain. Bermuda has the distinction of being the second most isolated inhabited island in the world. The resident population of Bermuda is now well over 62,000. The suburban nature of Bermuda is hardly surprising, as it is one of the most densely populated countries



in the world, with over 3,000 people per sq. mile (over 1,000 people per sq. km). About 14.0% of the island is covered in concrete. Bermuda's economy is centred on International Business and Tourism. About 500,000 tourists visit Bermuda annually.

Bermuda's climate is considered sub-tropical, thanks to the moderating influence of the Gulf



Stream, which helps to produce mild winters and less hot summers than would be the case at similar latitudes in North America. The Gulf Stream actually flows

north much nearer the East Coast of the United States but numerous eddies branch off and reach Bermuda.

A volcanic eruption on the Mid-Atlantic Ridge formed Bermuda about 110 million years ago. Further volcanic activity took place as the seamount moved westwards, passing over a volcanic 'hot spot' about 35 million years ago. Today, Bermuda sits on the edge of the largest of three volcanic seamounts. Challenger Bank and Argus Bank are submerged seamounts that lie 12 and 20 miles to the southwest. The Bermuda seamount has experienced several rises and falls in sea level, caused by alternating ice ages and interglacial periods during the Pleistocene era. During low sea stands, exposed coral died and was eroded into sand, which built up into dunes that eventually cemented into hard limestone rock (up to 300 ft [about 100m] thick). As Bermuda's exposed rock is porous limestone, there are no streams or rivers but



there are some marshes and brackish ponds. The soil is strongly alkaline and very shallow, varying from a few inches to two or three feet [1 m] in the inland valleys. The landscape is undulating with elevations only rising to a maximum of 260 ft (79 m). Approximately 150 islands comprise Bermuda for a total land area of about 21 sq. miles (55 sq. km). The seven largest islands are joined together by causeways or bridges. The fishhook-shaped group of islands is about 20 miles long, averaging about one mile wide.

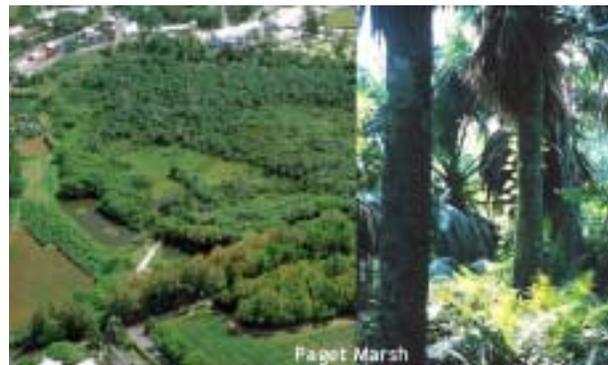
Bermuda Cedar



Bermuda Palmetto



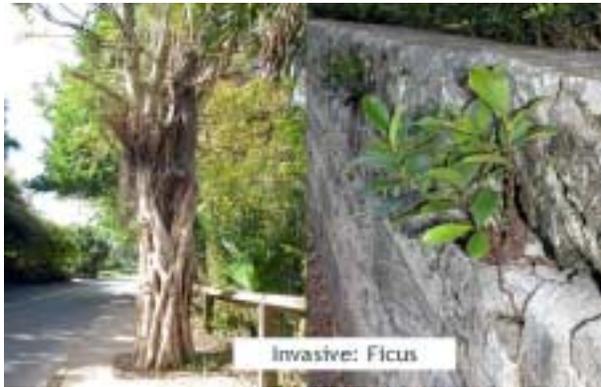
Prior to man's permanent arrival in the 17th century, Bermuda's vegetation was dominated by the endemic Bermuda Cedar, Palmetto and Olivewood Bark. The endemic Bermudiana is abundant – Bermuda's national flower. Few examples of the pre-colonial landscape remain: Paget Marsh



– a nature reserve owned jointly by the BAS and BNT provides a glimpse of the past, but even here, the centuries old cedars are dying due to saltwater inundation, the probable effects of global warming. In the 1940s and 50s most of Bermuda's cedars died as the result of a scale insect accidentally brought into Bermuda. Many skeletal cedars still



remain. Nonsuch Island, which you will visit later today, has been restored to illustrate the flora of pre-Colonial Bermuda.



However, today, about 95 percent of Bermuda's flora has been introduced, much of it now naturalised. Many of the plants, such as Ficus are invasive and a threat to native flora. Others, such as the naturalized casuarinas, do enormous damage to the limestone coastline as they are easily uprooted in storms, eroding the rocks in the process.



Invasive species are not confined to plants. There are a number of feral animal populations causing considerable problems. An estimated 10,000 feral cats are not only tolerated but actively fed by the



Feline Association. Feral chickens are also numbered in their thousands. Feral pigeons are a growing menace. Red-eared Terrapins, absent about 15 years ago, are now found in every pond in Bermuda. The effect of these species on Bermuda's biodiversity must be enormous.

The variety of native fauna is quite limited, something that is not unexpected for an isolated oceanic island. Although some 365 birds species have been recorded in Bermuda, only 20 species are permanent residents with a further three species visiting to breed. Bermuda is best known for its Cahow



(Bermuda Petrel), a species thought to be extinct for 300 years until its rediscovery in 1951. The national bird is the Longtail (White-tailed



Tropicbird) – which you should see today around Nonsuch Island and in the mornings along the coast outside the hotel. Native bluebirds, introduced



night-herons and kiskadees are likely

to be seen around the hotel grounds. There are few native land animals – but you have every chance of seeing a humpbacked whale this week as they move along South Shore outside the reef line during their spring migration. You may well encounter the two species of naturalised amphibians – the fist-sized giant toad and the whistling frog – which will be heard at night. The endemic Skink is Bermuda's



only native reptile which you may be fortunate enough to see on Nonsuch, but you will see one or more of the three introduced species of Anolis lizards. The major threats to all these species of fauna are loss of habitat and invasive species.



Bermuda has a magnificent limestone cave system – the 150 known caves makes it one of the highest concentrations of caves in the world. Once again, in a small island community, the threats are very real. Over the centuries, caves have been used as garbage dumps or destroyed by quarrying and urban development. Remaining caves hold a high proportion of Bermuda’s endemic species – but



they are still at the risk of pollution and collapse from the proximity of quarrying and construction activity.

Bermuda’s natural coastline, picture postcard perfect in many parts of the island, is under threat



from development: an affluent society that demands docks and marinas for water craft; sea walls that protect coastal properties. The greatest threat to beaches comes from the erosion caused by tropical storms and storm surge – this is the same house during and after Hurricane Gert in 1999.



Rural Bermuda is now characterised by small-scale market gardening in isolated fields. Locally produced crops include potatoes, carrots onions, tomatoes and strawberries. These fields are being increasingly eaten into by further urban development.



A large area of Bermuda is covered by golf courses - satisfying the demands of tourists and residents alike. They do pose a potential threat to the water lenses that are found below Bermuda’s surface – the threat of pollution by fertilisers and pesticides used on the courses.

Bermuda also has a number of marshes, mainly in the central parishes. These vital eco-systems were where Bermudians traditionally disposed of their



garbage. Many of these areas are now protected nature reserves, but the marshes are still under threat from illegal dumping and industrial development. Waste disposal is a problem for Bermuda as it is in most islands of the world. Until the opening of the incinerator in the 1990s the Pembroke Dump landfill not only filled half of Pembroke Marsh, but

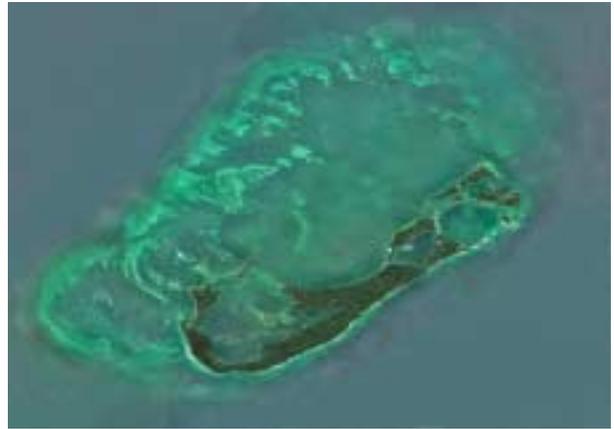


had created a sizable hill. Today, there are still problems of disposing of glass, paper, metals and hazardous waste.

On a positive note, new reserves are still being acquired – this one, just to the west of Coral Beach, was opened last month.



Bermuda's Marine Environment, by Jack Ward



The flattened top of an extinct volcano, the Bermuda Platform supports approximately 1,000 square kilometres of fringe reefs and shallow water habitat. A ring of protective reefs follows closely to the south shore of the Island and extends offshore approximately 15 km to the north, enclosing a shallow sandy lagoon.



The Gulf Stream which passes to the West and North of the Island moderates the Bermuda's weather and brings warm tropical waters to the area thereby allowing Bermuda to support the northernmost coral reef system in the world.



Bermuda supports a depauperate Caribbean coral reef species assemblage with only approximately 50% of the coral and fish species of the Caribbean having successfully colonised this northern outpost (picture: coral cave with snappers).



An oasis of life in the oceanic desert known as the Sargasso Sea, Bermuda's reef system is dependent upon the efficient capture and recycling of scarce nutrients (picture above: coral polyp).



Whilst the fringing reefs are dominated by sturdy dome-forming corals, the protected inshore reefs support many more of the more delicate branching growth forms, such as this fire coral (above).



Very hard reefs formed from the shell of vermetid snails cemented together with calcareous algae break the surface marking the outer perimeter of the rim reefs. With the surge crashing over these reefs they are said to "boil", hence their name.

The south shore of the Island is occasionally exposed to extremely high energy, hurricane conditions (top of next column).

The northern coastline (here, in next column, at low water) is far more protected. The tidal range is



limited to approximately 1m creating a very small intertidal zone.

In keeping with Bermuda's limited intertidal zone, the species assemblage supported by this habitat is similarly limited. One notable creature is the West



Indian Top Shell which was successfully re-introduced to Bermuda in the 1980s.

Bermuda supports the northernmost mangrove stands in the world. However these stands are quite limited and threatened by sea level rise and in-



creased hurricane activity. (The previous picture is Hungry Bay, one of the study sites used for the management planning exercises during the conference.)



Bermuda's sandy beaches (e.g. above at Nonsuch) once supported large colonies of nesting sea turtles. These were lost to over-harvesting.



Formed as a depression between dunes, Harrington Sound once supported a large fresh-water marsh before being inundated with sea water approximately 6,000 years ago.



A unique habitat rings Harrington Sound in the form of a sub-tidal notch, which cuts back into the rock several metres. Created by the boring action of sponges and bivalves, this notch supports one of the most diverse sponge communities in the west-central Atlantic.

Whilst there is only one surface connection between Harrington Sound and the surrounding ocean, numerous caves (this being Green Bay



cave) form submarine connections and support a unique fauna including many of Bermuda's endemic species.



Hundreds of thousands of years ago, when the sea level was much lower, huge dissolution caves formed in the area of Harrington Sound, particularly in the Walsingham formation. Spectacular calcareous formations decorate these caves, such as this Crystal Cave (above).



A large sink hole in the Walsingham area, Walsingham Pond forms a protected marine habitat where endemic species including the killifish and a rooted *Sargassum* can be found.

One of the Island's largest nature reserves, Walsingham, borders Castle Harbour the site of the massive land reclamation project that created the airport. Corals in this area were decimated during this project and heavy siltation continues to limit recovery. This aerial picture (top of next page)



shows the causeway and dredging scars.



Used somewhat as a flagship species for marine conservation, Green Turtles are common and fully protected locally.

Despite protective



legislation there are regular negative interactions between the numerous humans living on Bermuda and our protected species. An example is this young turtle that was hit by a fast moving boat. "Split Pea" Green Turtle with split carapace is in rehabilitation at the Bermuda Aquarium, Museum and Zoo.

Once the mainstay of the local fishery, the larger



grouper species have declined in abundance and many species such as this Nassau Grouper (above) are now economically extinct.



With the decline of the large groupers, fishermen shifted effort to other species such as the coney (a small grouper species).



Once relatively rare locally, the Bermuda Chub has become much more abundant in recent years, possibly as a direct result of the declining abundance of the larger predatory grouper species.



This cruise ship photographed from the air shows the huge plumes of silt stirred up as it is taken away from the dock. Ship traffic in Bermuda's harbours cause regular impacts through re-suspension of bottom sediments. The industrialisation of Bermuda's harbours has caused significant declines

in environmental quality.



The tanker Tifoso aground on Bermuda’s northern reef. Marine traffic poses an ongoing threat to Bermuda’s marine resources. After a spate of ship groundings in the 1980s, the International Maritime Organisation established a 30-mile radius around Bermuda as an “area to be avoided” by ships not bound for Bermuda and Bermuda erected large beacons with active radar transponders to alert mariners to the threat of shipwreck.



To end, a picture of a school of jacks in a tank at the Bermuda Aquarium, the site of the conference banquet.

Man and Environment Interface in Bermuda, by Wayne Carey

This portion of our introduction to Bermuda’s environment focuses on the interface between man and environment. Official Bermuda Government documents often feature a crest with the words “Quo fata ferunt” underneath. This caption is latin for “Whither the fates lead us?”, and aptly reflects the spirit and context of this conference, i.e. a need

for a sense of direction.

How has Bermuda attempted to confront issues related to biodiversity conservation? There are four basic approaches:

- legislation;
- institutional action;
- community action,
- individual effort.



This brief paper will outline certain aspects of the legislative and institutional framework in support of biodiversity conservation in Bermuda.

Early Environmental Legislation in Bermuda

- 1620 → An act against the killing of over young tortoises (turtles)
- 1630s → An act against the waste of cedar
- 1659 → An act against the exportation of cedar
- 1791 → An act against the use of fish pots (traps)

Here are examples of some of the early environmental legislation in Bermuda. In 1620 an Act was passed by the Bermuda Assembly “against the killing of over young tortoises (turtles).” This is thought to be one of the earliest pieces of conservation legislation in the New World. Other Acts addressed conservation pertaining to the waste and exportation of cedar. Notably, in 1791 an Act was passed against the use of fish pots (traps). These examples serve to highlight the early recognition of a requirement to conserve natural resources.

Legislation for Protected Species and Areas

- 1930 → The Agriculture Act
- 1966 → The Coral Reef Preserves Act
- 1972 → The Fisheries Act
- 1975 → The Protection of Birds Act
- 1976 → The Endangered Animals and Plants Act
- 1986 → The Bermuda National Parks Act
- 1990 → The Fish Pot Ban (again)

The environmental legislative record reflects a shift from legislation targeting single species to legislation addressing broader aspects of conservation

such as the Coral Reef Preserves Act and the National Parks Act. It is also evident that legislation has addressed not only exploitation of natural resources (Fisheries Act) but biodiversity as well (Protection of Birds Act and the Endangered Animals and Plants Act). History repeated itself in 1990 when a fish pot ban was again introduced to stem the overexploitation of fish.

Private Acts for Protected Areas

- 1937 → The Walsingham Trust Act
- 1960 → The Bermuda Audubon Society Act
- 1964 → The Heydon Trust Act
- 1966 → The Coral Reef Preserves Act
- 1969 → The Bermuda National Trust Act



One of the important features of environmental legislation in Bermuda is the use of private acts to foster conservation of privately held land “in trust” for use by future Bermudians. The primary examples of this form of legislative instrument are the Walsingham Trust Act, the Bermuda Audubon Society Act, the Heydon Trust Act, and the Bermuda National Trust Act.



A testament to the value and success of this conservation mechanism is the fact that apart from the Bermuda Government, the Bermuda National Trust is the largest owner of land and open spaces on the island. Between them, the Bermuda Government, the Bermuda National Trust and the Bermuda Audubon Society are the principal nature reserve owners on the island. This is a good example of collaboration between Government and environmental NGOs.

Not surprisingly, the regulation of development has received considerable attention in Bermuda. As early as 1947 an Act was passed that limited the

number of private cars to one per dwelling unit. However, as pioneering as that piece of legislation was, it has all but succumbed to the pace of development in modern Bermuda, where the number of private cars has more than doubled in the last 30 years. The main statutory instrument to control development is the Development and Planning Act 1974. This legislation is supported by the Bermuda Plan, a key document which contains specific zoning regulations that provide direction to land development and the protection of natural amenities. Despite the existence of this legislation, it has been estimated that Bermuda has lost open space at an average rate of about 90 acres per year over the last 30 years. This highlights the strong development incentive that exists and the obvious threat to biodiversity.



Here we see a slide showing bumper-to-bumper vehicular traffic in the City of Hamilton. This congestion persists for significant portions of the day, and contributes to airborne pollution as well.

Bermuda, like other countries, has also enacted pollution control legislation that promotes the protection of habitat quality. Examples are the Prevention of Oil Pollution Act 1971, the Water Resources Act 1975, the Waste and Litter Control Act 1987 and the Clean Air Act 1991. The policy directives on hazardous waste have been somewhat successful in controlling waste, but there is a need for stronger legislation to embrace the polluter pays principle so that a higher level of protection is afforded to habitat conservation. Perhaps the recent restructuring of the Ministry of the Environment that has resulted in the creation of separate Departments of Conservation Services and Environmental Protection heralds a new focus on strengthening environmental policy and legislation.

The protection and conservation of biodiversity is increasingly coming under the auspices of interna-

tional treaties and conventions. Some of the more important international agreements that are relevant to the Bermuda situation are:

- 1966 International Convention for the Conservation of Atlantic Tunas (ICCAT)
- 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- 1971 Ramsar Convention on Protection of Wetlands
- 1973-8 Convention on the Prevention of Marine Pollution from Ships (MARPOL)
- 1982 Convention on the Law of the Sea (UNCLOS)
- 1987 Montreal Protocol on Substances that Deplete the Ozone Layer
- 1992 United Nations Framework Convention on Climate Change
- 1992 Convention on Biological Diversity
- 1997 Kyoto Protocol on Greenhouse Gases
- 2001 Environmental Charter (UK Overseas Territories)

Some of these require local enabling legislation and/or policy measures in order to have full force and effect.

There exists a plethora of environmental non-governmental organizations in Bermuda. The more prominent of these are listed here:

- Bermuda Audubon Society
- Bermuda Biological Station for Research
- Bermuda Botanical Society
- Bermuda Zoological Society
- Bermuda National Trust
- Keep Bermuda Beautiful
- Save Open Spaces
- Friends of Fish
- Bermuda Underwater Exploration Institute
- Bermuda Eden Project

It cannot be emphasized enough the important role that such institutions play in biodiversity conservation. What is probably required, though, is a greater level of cooperation and partnership be-

tween organizations.

As we look ahead, what are the principal threats to biodiversity in Bermuda? Here we have much in common with other small island communities. An increasing state of overdevelopment lies at the heart of threats to biodiversity conservation. At nearly 3,000 residents per square mile, Bermuda has one of the highest levels of population density in the world. Other threats are inextricably linked to overdevelopment: e.g. waste proliferation; recreational and commercial overfishing; pesticide bioaccumulation, and commercial shipping. One of the key threats to biodiversity in Bermuda is climate change. It is also clear that lack of awareness of the need for biodiversity conservation is still a threat.

Is the present legislative infrastructure sufficient to address future threats to biodiversity? There is a strong sense that the aspect of legislative infrastructure that needs most attention is enforcement. However, there are several areas where new and strengthened legislation is required. Some of these include:

- seagrass protection;
- pesticide use;
- bottle bill;
- environmental impact assessments;
- waste dumping, and
- recreational fishing.

It is difficult to escape the conclusion that Bermuda is on an unsustainable path, heading towards what some call an “island city”. Its future requires a bold vision, a new paradigm. Perhaps this conference will help to create **A SENSE OF DIRECTION**. It is perhaps even more crucial now to ask the question: *Quo fata ferunt?*

Thank You.

Principal Threats to Biodiversity

- ◆ Over development of land
- ◆ Recreational & commercial over-fishing
- ◆ Pesticides
- ◆ Waste proliferation
- ◆ Species introductions
- ◆ Commercial shipping
- ◆ Global warming
- ◆ Lack of awareness



A SENSE OF DIRECTION

A Conference on Conservation in the UK Overseas Territories and other small island communities
Bermuda 22nd - 27th March 2003

The Bermuda Audubon Society (poster display)

Andrew Dobson

Dobson, A. 2003. The Bermuda Audubon Society. p 32 in *A Sense of Direction: a conference on conservation in UK Overseas Territories and other small island communities* (ed. M. Pienkowski). UK Overseas Territories Conservation Forum, www.ukotcf.org

Andrew Dobson, Bermuda Audubon Society, Warwick Academy, 117 Middle Road, Warwick PG01, Bermuda. adobson@warwickacad.bm

Founded in 1954, the Bermuda Audubon Society exists to protect the natural environment of Bermuda. It has a particular focus on the protection of birds and on the restoration of wetland habitat. The society has thirteen nature reserves – including ponds, marshes, small islands and upland coast.

The display at the conference featured two major projects run by the society:

1. Bluebird Nest Boxes. Due to the loss of natural nesting habitat, the native Eastern Bluebird *Sialia sialis* is now totally dependent on the provision of nest boxes for breeding success. The society has championed this campaign for many years and is always experimenting with new styles of boxes in

an effort to keep House Sparrows out.

2. Longtail Igloos. The cliff-nesting habitat of the White-tailed Tropicbird (Longtail) *Phaethon lepturus* has been severely reduced by building development and storm damage. Feral pigeons are also a problem in nest sites. The artificial nest-site 'igloo', a styrofoam dome, was introduced quite recently in an attempt to provide additional Longtail nest sites. The igloos have already met with considerable success.

For further information on either of these projects and information on the Bermuda Audubon Society - please visit www.audubon.bm

