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Progress with environmental sustainability in Barbados in 50 years of independence

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ABSTRACT

Progress with environmental sustainability in Barbados in 50 years of independence[1]

Barbados is heavily dependent on the service provided by its natural assets. This is especially so for the coastal and marine ecosystems that support tourism, but fisheries for food, supporting services such as coastline protection, and aesthetic and cultural services are also highly important. The ecosystems that provide these services are under threat from pollution, overexploitation and destruction of habitats. Barbados is well connected with global initiatives for sustainable use of ecosystems and has done well with strategic and sectoral planning as well as legislation. However, implementation has been weak in some very prominent areas: coastal and marine ecosystems, illegal dumping and littering, and development of parks and protected areas.

All stakeholder groups – Government of Barbados, private sector, NGOs – have a collective part to play in addressing this situation; as do all Barbadians as individuals. Specific recommendations for each of these groups are provided. The national notion that this is a 'government responsibility' must be dispelled. Most notably, the Government of Barbados does not appear to be providing the holistic vision and leadership that is needed. A guiding mechanism that involves stakeholders of all types is needed.

If there is any country in the world that has the potential to fully incorporate environment into sustainability, it is Barbados. Small size can work to our benefit; it makes comprehensive planning and monitoring much more feasible. We have the intellectual capacity, knowledge and implementation skills to achieve this goal. Once we get enough people to realize that this is a job for everyone, not just the Government of Barbados, we will have the critical mass to make full use of those capacities.

[1] This report is based on the lecture 'These Fields and Hills beyond Recall': Barbados and environmental sustainability, given at the University of the West Indies, Cave Hill Campus on October 8th, 2016

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Cover photograph: Ragged Point lighthouse, St. Philip.

1 INTRODUCTION

This report examines progress with environmental sustainability in Barbados after 50 years as an independent country. This is a big topic, with implications for virtually every aspect of life in Barbados. So how can this topic best be tackled? I will start with some context, by looking at several global processes and ideas that have had significant bearing on the way that environment and sustainability has been addressed in Barbados. This is to ensure that we are all starting out on the same page. Then I will look more closely at why we need to be concerned about the relationship between environment and sustainability – what does the environment do for us here in Barbados? I will then examine what we have been doing toward sustainability and how well we have been doing it. Based on this, I will try to identify the major gaps in our efforts. Finally, I will close with some ideas for what we need to do to fill those gaps.

2 WHAT IS THE GLOBAL CONTEXT FOR ENVIRONMENT AND SUSTAINABILITY?

In reflecting on trends and accomplishments in environment and sustainability since Barbados gained independence in 1966, it is clear that most of the thinking globally on this topic has evolved since then, or even in the last 30 years. This is not to say that there was no attention to natural heritage and the environment before that. From as early as 1878, for example, Barbados had a law in place to conserve sea eggs. There are actually several earlier laws that sought to conserve or at least protect the environment for human use – so this is just one example. As pointed out by Carmichael (1996) in his review of progress with sustainability in the first 30 years of independence, conservation was practiced in many ways, both pre- and post-independence, simply out of economic necessity. Soil conservation is a prime example, with khus khus grass bordering most sugarcane fields. However, in this report I will focus on the last 20 to 30 years in which there has been a major series of developments at the global level that have influenced our approach to sustainability.

The beginning of concerted global attention to environment and sustainability is often taken to be the landmark 1972 - United Nations Conference on the Human Environment (United Nations 1973). It gave rise to the United Nations Environment Programme (UNEP). A decade later in 1983 the World Commission on Environment and Development (Brundtland Commission) was established and resulted in the publication of "Our Common Future" in 1987, which popularized the term "sustainable development" (WCED 1987). This is where we get the classic definition of sustainable development as being: "development which meets the needs of the present without compromising the ability of future generations to meet their own needs".

These developments led to the 1993 United Nations Conference on Environment and Development (UNCED), also known as the Rio Conference, out of which came Agenda 21, the Convention on Biological Diversity (CBD), the Framework Convention on Climate Change (FCCC) and the Convention to Combat Desertification (CCD), as well as ideas such as taking a more holistic ecosystem approach to sustainable development. The follow-up World Summit on Sustainable Development, 10 years later in South Africa (Rio+10), gave us the Millennium Development Goals (MDGs), based on the Millennium Ecosystem Assessment (UNGA 2000; MEA

2005). These goals, with a focus on eliminating poverty, were to guide sustainable development through to 2015. Globally, we did not do as well in achieving the MDGs as we might have wished, but we did recognize the importance of having agreed global level goals and targets and setting the global agenda. So much so, that in 2014, there was Rio+20, the United Nations Conference on Sustainable Development, at which this approach was renewed. This gave us the 2030 Agenda for Sustainable Development and 17 Sustainable Development Goals (SDGs) with associated targets that are to guide us to 2030 (United Nations 2016). Barbados participated fully in the development of these and has accepted them as its guiding goals.

In parallel, we have had the three global conferences for Small Island Developing States (SIDS): in Barbados in 1994, Mauritius in 2005 and Samoa in 2015. These gave us the Barbados Programme of Action for the Sustainable Development of Small Island Developing States (BPOA), the Mauritius Strategy for the further Implementation (MSI) of the BPOA and the Samoa Pathway (UNGA 1994; 2005; 2014; Figure 1). These have provided direction that is specific to the needs of SIDS.

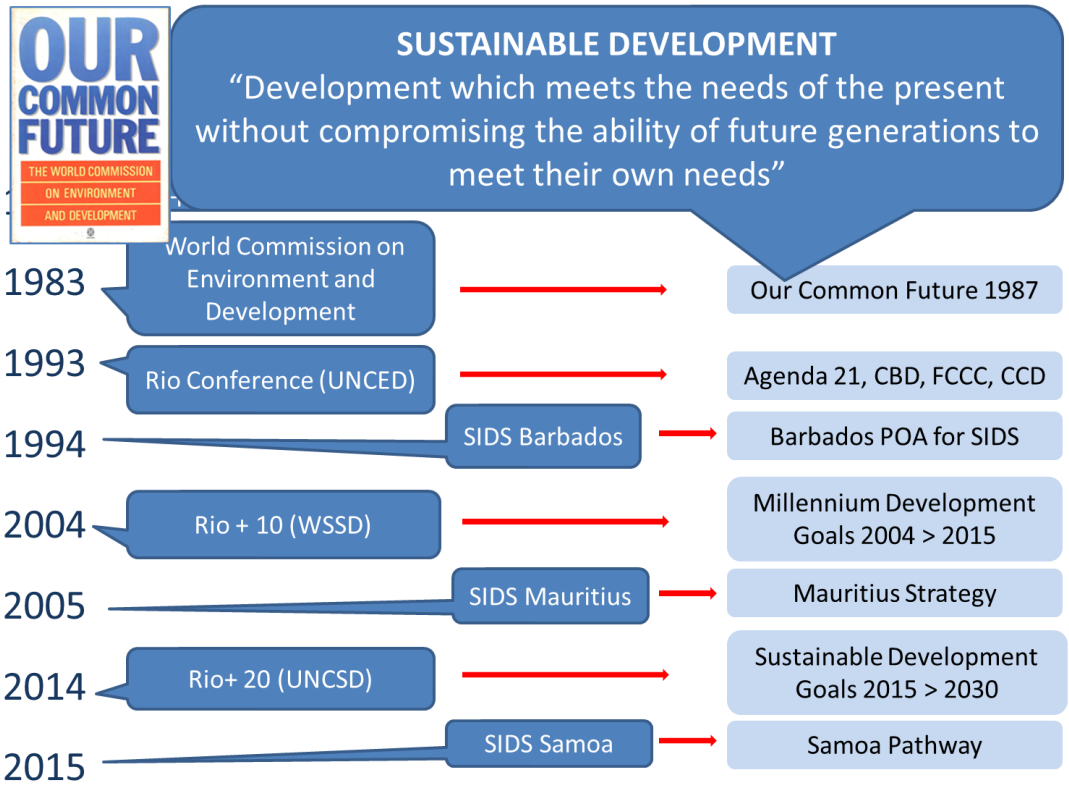

Figure 1: Major milestones in the global approach to sustainable development

All of this historical perspective is to make the point that the development of policy for sustainable development in Barbados is taking place in a structured global context that gives all countries access to a wide range of concepts, information and implementation support. What we have seen over this time is that thinking about the environment has shifted from being about

conservation for its own sake, and seeing environmentalists as anti- any kind of development, to seeing it as an essential component of human well-being and consequently, critical for sustainable development. This recognition is embodied in the idea that there are three pillars of sustainable development, all of which must receive serious attention and must be dealt with in an integrated fashion, as illustrated by Figure 2 (Kates et al. 2005).

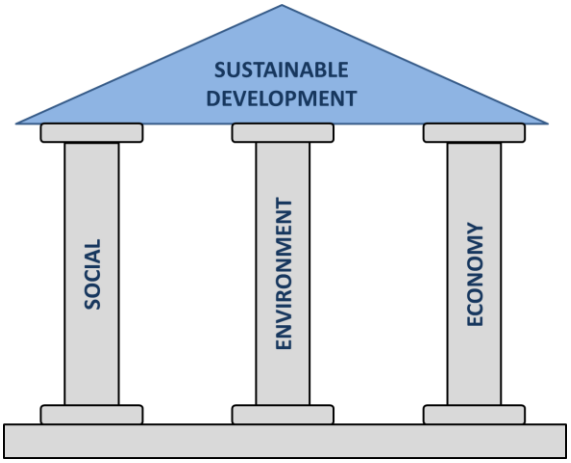

Figure 2: The three pillars of sustainable development: social, economic and environment

This was a major step forward, but operationalizing it has been challenging for most countries. The tools have been evolving, but the job is far from complete. Economic considerations and indicators of development continue to dominate the discussion. However, quality of life as the ultimate goal, not pure economic growth, is gaining increasing attention around the world. Perhaps, as many writers are currently saying, it is time to say goodbye to Gross Domestic Product (GDP) as a measure of development and adopt indicators that more fully reflect our values and aspirations (Costanza et al. 2014). We need much more discussion on this question in Barbados. This will not be the main focus of this report, but it is fundamental to where Barbados may want to go, as a country, with respect to sustainable development. We also need to think about where and how we have this conversation so that it includes everyone.

3 ECOSYSTEM SERVICES

The connection between environment and sustainable development has led to a global focus on why the environment is so important to sustainability. In addressing this question, the concept of Ecosystem Services has emerged. This way of looking at the environment is relatively new and is further explained in Figure 3. It is really a product of the global Millennium Ecosystem Assessment (MEA) which was completed in 2004 (MEA 2005).

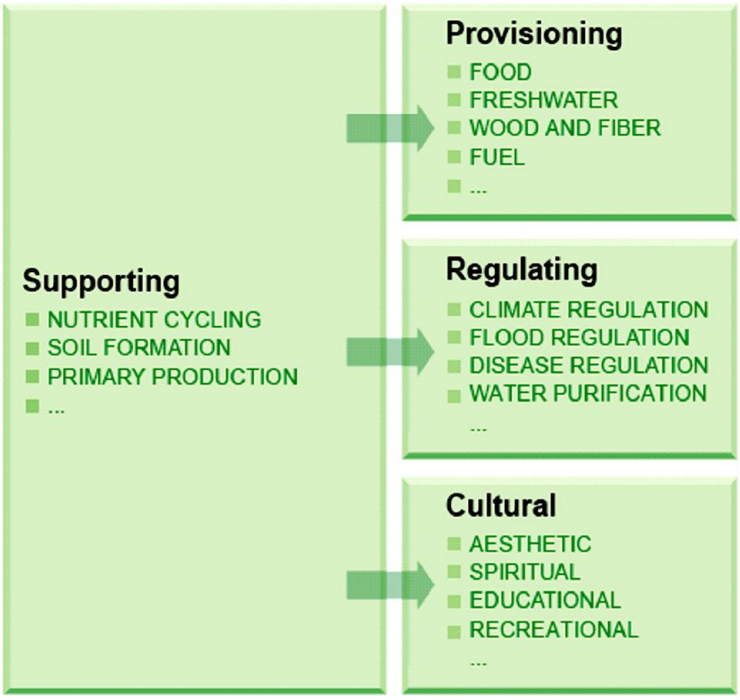

Figure 3: The Ecosystem Services perspective has become an important aspect of sustainable development (Source: Millennium Ecosystem Assessment 2005)

The general formulation of ecosystem services shows four categories: supporting, provisioning, regulating and cultural. All are important to Barbados.
Some of the critical ecosystems services for Barbados are:

- Supporting – Ecological functions such as soil generation, nutrient cycling and pollination that underpin ecosystem function;
- Provisioning – This is the most obvious one, mainly fisheries, potable water and wild plants;
- Regulating – These are less obvious functions such as beach protection by reefs and beach vegetation, filtration of runoff by coastal habitats, and uptake of nutrients by vegetation before they get into drinking or coastal waters;
- Aesthetic – These are places where we take visitors to show off Barbados, or go to ourselves to enjoy iconic views such as Culpepper Island and Ragged Point, St. John's Church and North Point (Figure 4);
- Educational – This is where we go and take our children to learn about nature - Folkestone Marine Park, Graeme Hall and Welchman Hall Gully; and so on (Figure 5);
- Recreational and Spiritual – These are the places where we go to relax and regroup in natural surroundings; places like Bath, River Bay, Folkestone or just the coast anywhere on the island.

Figure 4: Aesthetic ecosystem services, iconic views in Barbados (a) Culpepper Island, (b) the east coast from St John's Church

Figure 5: Educational ecosystem services: (a) Folkestone Park and Marine Reserve, (b) Graeme Hall, (c) Welchman Hall Gully

A lot of thinking and research has developed around the idea of ecosystem services: questions like how do we quantify their value and how to incorporate them into national accounting? For example, what happens if you destroy a coastal wetland and replace it with a marina so that it no longer protects the reef from sediment and pollution in runoff, and then the reef degrades allowing the waves to erode the beach?

Sometimes we can replace these services; but there is a cost to replacing them. For example, we can build a breakwater to protect the beach. The cost of the breakwater is easy to estimate, but what about cost of any losses to fisherfolk due to the degraded reef? This is more difficult to estimate. Then there is any loss of recreational or aesthetic value to locals and visitors with implications for tourism revenues. This is difficult to estimate but a very real consequence. Then, there is the question of who bears these costs? In the case of a development, the developer could be asked to bear at least some of them. Otherwise, if the government pays for them, the developer gets a free ride at the expense of the taxpayer. I am not going to go any further into these questions, but I raise them to illustrate how thinking is changing due to the ecosystem services perspective. It is how we must think about our ecosystems and the services they provide if we are to fully integrate environment into sustainable development.

4 WHAT ARE THE THREATS TO THESE ECOSYSTEM SERVICES?

Keeping ecosystem services in mind, let us turn our attention to what is threatening the ecosystems that provide them. The three major categories of threats – overexploitation, pollution, and habitat destruction – are all present in Barbados. I do not have time to cover them in detail, and I suspect we are all familiar with them; but I will have a quick look at some of the most prominent ones.

4.1 Overexploitation of natural resources

Regarding overexploitation of natural resources, we are referring primarily to marine resources. The main offshore ones that we harvest – flyingfish, dolphinfish, kingfish – are not currently overexploited, and the others, tunas and billfishes are largely out of our hands as they have oceanwide distribution and are managed by the International Commission for the Conservation of Atlantic Tunas (ICCAT) (Mahon and McConney 2004). However, we do still need to play our small part in managing them.

Where we do have cause for considerable concern regarding overexploitation is our coastal resources, mainly reef species that are harvested for food. These resources are known to be severely depleted (McConney 2011). They have been depleted for a long time by a range of fishing practices: spearfishing and the use of fish pots and seines (Simpson et al., 2014) (Figure 6). Some of these practices are destructive or inappropriate. The practice of 'chubbing' where seine nets are set over live coral bottom is particularly damaging. 'Chubbing' catches large numbers of small fishes, especially parrotfishes and surgeonfishes which are critical to reef health (Maharaj et al. 2011). It also destroys the sea life on the sea floor (Figure 7).

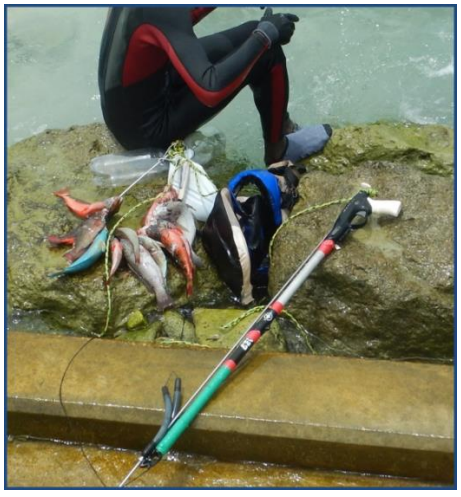

Figure 6: **Spearfishing is uncontrolled and removes many small fishes including parrotfishes**

While these destructive practices are serious, the real problem is simply that there is too much fishing and removing more fish than the marine ecosystem can support. This is a problem for small and large-scale fisheries worldwide. Reducing the amount of fishing is a major challenge.

There is also the practice of harvesting of corals and other sea life for sale as curios. Corals are slow growing and cannot sustain high levels of harvesting. Despite it being illegal to harvest corals, they can be seen on sale quite openly, for example on the beach behind the Holetown Police Station, St. James, and on the roadside in St Lawrence Gap, Christ Church (Figure 8).

Figure 7: 'Chubbing', the use of a seine net often over live coral bottom removes many small individuals such as the surgeonfish shown inset, and also destroys the sea floor (photo by Corrie Scott, inset by David Gill).

Figure 8: Corals and other sea life are illegally harvested for sale to tourists and are openly on display.

One major success story with regard to overexploitation is sea turtles. Thanks to the joint efforts of the Barbados Sea Turtle Project here at The University of West Indies (UWI), Cave Hill Campus, and the Government of Barbados, hawksbill sea turtle nesting populations have recovered considerably. There are still significant threats to nesting habitat on beaches due to beach erosion and beach lighting. However, things are moving in the right direction (Horrocks and Browne, 2015).

4.2 Pollution

Ecosystems are threatened by pollution in all its forms. This includes groundwater contamination by nutrients, chemicals and waterborne diseases, which is always a threat of major concern. Groundwater is monitored quite intensively. Therefore, I will not deal with groundwater further. Air pollution is largely a localized problem, except when we experience African dust storms (which are beyond our control), or extensive fires which occur in the dry season, burning vegetation and with it a lot of accumulated plastic, releasing some very toxic substances such as dioxins in unknown concentrations and with unknown impacts. This is a solid waste management problem. Also of concern are effects of agricultural chemicals - chiefly pesticides - on terrestrial ecosystems. They impact biodiversity in general and also specifically beneficial plants and animals, such as bees. We know very little about these impacts, and they are not monitored.

In contrast, we know a lot about pollution of coastal water systems by inputs from agriculture, domestic wastewater, sewage and surface runoff. Much of this ends up in our gullies and man-made drains, from where it goes into the sea. The Gully Ecosystems Management Study found widespread discharge of liquid waste into gullies. For example, instances where animal pens on gully slopes simply drain into the gully are commonplace (Figure 9).

Figure 9: An animal pen that drains directly into a gully

To further illustrate how serious this problem is, I will refer to three studies conducted by UWI at (1) Long Pond, St. Andrew, (2) in the Conset Bay, St. John watershed and (3) at Oistins, Christ Church, which suggest that it is quite significant, not only for ecosystem health, but for human health as well (Gosine and Mahon 2014; Sutherland 2009; Alleyne et al. 1999). At all three sites, total fecal coliform bacteria counts were well in excess of acceptable standards. In Conset Bay, nutrients were also at unacceptably high levels. In Oistins, an urban setting, where watercourses are mainly concrete drains; there were additional problems such as a direct release of commercial laundry water and a lot of solid waste entering the sea at five outfalls in the immediate Oistins area (Figure 10). Pollutants and nutrients also end up in the shallow groundwater near the coast largely through domestic soakaways and suck-wells from where it is carried into the sea by freshwater fluxes. The implications of these pollutants for coastal ecosystems are enormous, resulting in everything from localized death of marine systems near outfalls, to damage from the overgrowth of algae and smothering by sediments.

Figure 10: Multiple drains in Oistins (above) take runoff with solid (below left) and liquid waste (below right) straight into the sea.

This brings us to the problem of disposal of solid waste. This is a chronic problem ranging from massive illegal dumpsites in gullies and other out-of-the-way places, to the discarding of small

quantities of domestic garbage on roadsides, vacant lots, and so on, to widespread littering. The Gully Ecosystems Management Study found 369 solid waste dumps sites in gullies across the island (Figure 11). These are especially prevalent where communities border gullies and at bridges where roads cross them (Figure 12). I challenge anyone to find a publicly accessible location in Barbados where there is not solid waste of some sort within a 100-metre radius.

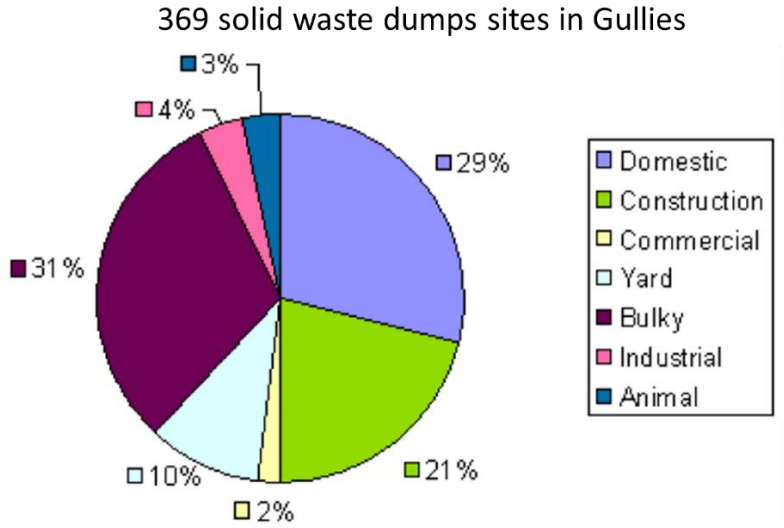

Figure 11: The incidence and types of solid waste in gullies as determined by the Gully Ecosystems Management Study in 2005 (Source: Stantec 2003).

Figure 12: Solid waste is routinely dumped into gullies in Barbados: Jack-in-Box Gully (left), near Lion Castle (right).

4.3 Physical destruction of natural systems

Physical destruction of habitats, primarily in the name of development, is also a serious threat to ecosystems in Barbados. One area that we can say has improved is inland wooded areas. In his chapter in *Preserving Paradise*, Dr Karl Watson gives an excellent account of the changes in our vegetation from early colonization, through almost total deforestation, including gullies, through to the present, where most gullies, steep sloping and under-cliff areas have become reforested (Watson 2011). In this chapter, he wrote that, "There is now more standing forest on Barbados than there has been at any time since 1660." This does not mean that all is well in these areas and that we can forget about them. There are also many threats to these wooded areas -- pesticides, disposal of wastes and inappropriate land use; quantity has been increasing, quality not so much.

The picture for coastal and marine habitats is much less rosy. On the south and west coasts, apart from a few pockets such as Holetown Hole, Graeme Hall Swamp and Chancery Lane Swamp (Figure 13), coastal habitats have been largely obliterated by coastal development; some of it quite recently. And, a few years ago we almost lost Chancery Lane to a large development, if not for a public outcry that caused the developer to reconsider.

Figure 13: Two of the few remaining coastal wetlands: Chancery Lane, Christ Church (left), and Long Pond, St. Andrew (right).

On the west coast, there would have been more than twenty coastal ponds and associated plants and animals, between Half Moon Fort, St Lucy, and Bridgetown, St Michael, one for each watershed draining into the sea. Most have been converted into concrete drains (Figure 14). This has continued until quite recently, for example, at the northern end of Paynes Bay, St James, where the pond adjacent to the Sands development was converted into a covered concrete channel. These drains now take runoff from gullies and surrounding coastal areas straight into the sea, complete with the full range of pollutants (Tosic et al. 2009). The remaining few ponds have been substantially reduced in size. One, however, has been imaginatively incorporated into the landscaping of the Coral Reef Club hotel, and is very attractive and interesting. This loss of coastal wetland systems means we have lost the ecosystem services that they provide: regulation

of the quantity and quality of water entering the sea; the biodiversity that is unique to them, and the simple pleasure of having some natural habitats on the coast.

Figure 14: Most of the small wetlands on the west coast have been converted into concrete drains (left, centre) through which water with pollutants, and solid waste drains directly into the sea adjacent to coral reefs but these can be attractive and interesting natural habitats if incorporated into the coastal landscape as at Coral Reef Club (right).

As regards coral reefs, direct physical destruction is relatively rare. There is no need: we have more or less destroyed them with a combination of pollution and overfishing. There are, however, issues such as anchor damage and some direct destruction due to development, such as at the Shallow Draft Harbour and other coastal developments that extend onto reefs. So, we must be vigilant.

4.4 Overarching threat of climate change and climate variability

To add to these threats, we have the overarching global threat of climate change and climate variability, the effects of which we have already begun to see. We can expect a variety of impacts on our ecosystems. We can expect changes in rainfall patterns that may lead to flooding and drought. We can expect coastal erosion from sea level rise. We can expect impacts on reefs from ocean acidification and coral bleaching. Then there are things that will be unexpected, like the huge recent influxes of sargassum seaweed (Figure 15). I am not going to say more on climate change and climate variability than that we can expect that healthy ecosystems will deal with climate change threats better than stressed and degraded ones.

Figure 15: Sargassum on our beaches is a new and little understood threat to the environment and the tourism industry.

4.5 Are we exceeding acceptable limits to development?

Before I move on from threats, I must touch on a more challenging topic. Not all threats are due to activities that are illegal or even bad. Some of them are the cumulative effect of a lot of small activities that are individually acceptable losses of ecosystem services; within limits. Suppose all the development that could be permitted by the Physical Development Plan took place, would the end product still be within acceptable limits? I use the word 'acceptable' deliberately, because there are no clear and unequivocal answers as to what limits to development should be. These limits should be guided by technical information, but are a societal decision. They should be based on what we as citizens would like to see as the ultimate long-term state of this country. For example, should we have eliminated the last significant area of coastal wetland on the west coast at Six Men's Bay to build the Port Ferdinand Marina (Figure16)?
We should be asking questions such as:

- How much loss of ecosystem services are we prepared to accept in order to achieve a specific level of physical development?
- At what point will we have given up so much that further physical development, does not increase quality of life, but actually decreases it?

I do not think we have addressed these questions adequately with input of the full range of stakeholders. Answers to these questions are fundamental to how we integrate environment into sustainable development. Indeed, I wonder whether we even have the institutional arrangements in place to address such questions transparently. I will return to this.

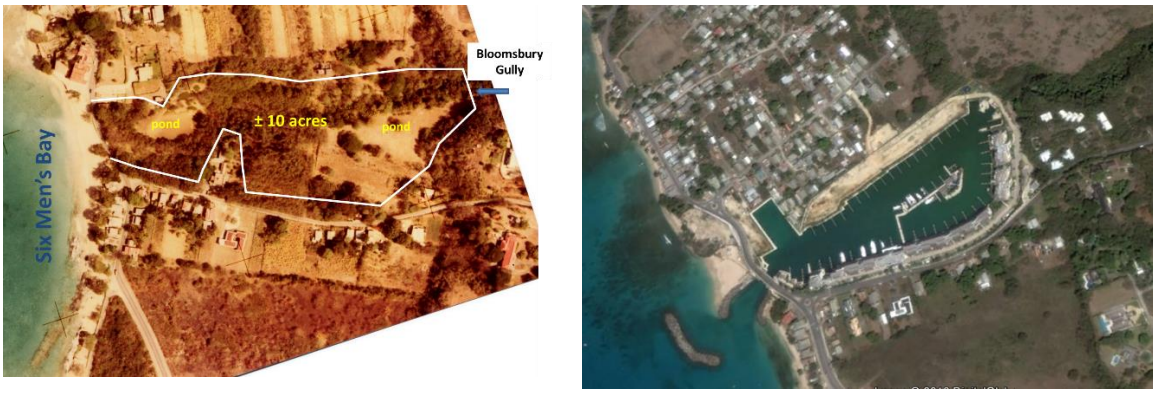

Figure 16: One of the last wetlands on the west coast (left) that could have served to filter and clean water before it enters the sea was dredged out to construct a marina, now Port Ferdinand (right). How much natural capital can be lost before it is too much?

5 WHAT IS BEING DONE ABOUT THESE THREATS?

Next, we need to look at how the overexploitation, pollution and habitat destruction threats that were just described are being governed. By governance I do not mean just government. I mean all the people who are affected and who can affect what happens. We usually think of these in three categories:

- Public Sector,
- Private Sector,
- Civil Society.

Ideally, we would look in detail at what these three categories of stakeholders have been doing. However, I am going to focus mainly on the Government of Barbados, whose mandate it is to ensure that environmental concerns are integrated into sustainable development; and then I will make some brief comments on the other two categories.

5.1 Government

To assess how well our government has done in addressing their mandate, we would want to know:

- Is Barbados engaged with the relevant international agreements and processes?
- Are agreements and other concerns adequately reflected in policies, legislation, plans?
- Are government departments actually implementing these plans?
- Is implementation making a difference?

A full analysis of these questions for all threats is a daunting task. But, it ought to be happening on an ongoing basis, and the question of what institutional arrangements are in place to do this should also be on our minds.

5.1.1 Is Barbados engaged with the relevant international agreements and processes?

Barbados has signed on to twenty-nine international agreements that are relevant to the environmental issues that the country faces:

- Biodiversity
- Marine pollution
- Chemical and hazardous wastes
- Fisheries
- Climate change (Carter and Singh 2010)

This engagement is important because it connects us with global principles and values and provides access for our technical people to current thinking, information, training and support. The Government of Barbados is stretched to participate fully in all these conventions, but for the most part, Barbados is present and respected, and the technical people are well aware of what is going on at global and regional levels.

5.1.2 Are agreements and other concerns adequately reflected in policies, legislation, plans?

National level policies and plans

Barbados has a sound history of strategic and physical development planning. The most recent four of these plans show that the majority of the major threats I mentioned are reflected, to varying degrees. The 1993-2000 Development Plan devoted only five of 277 pages to environmental considerations, but it hit all the critical issues (Government of Barbados 1993). Then, in 2004, the Barbados Sustainable Development Policy was prepared by the National Commission on Sustainable Development (NCSD), established 1997-2002, in response to the Barbados Programme of Action (NCSD 2004). This commission brought together expertise from many government departments, academia, private sector and civil society, in a way that had not happened before and has not happened since for sustainable development. The purpose of this policy was "to provide a definition for Barbados of Sustainable Development to guide all levels of national decision-making." It did this very well, primarily for environmental issues, and in detail. It remains until today the most comprehensive document on integrating environmental concerns into sustainable development in Barbados. In the 2005 strategic plan, environment was rolled into one of six goals 'strengthening the physical infrastructure and preserving the environment'. Interesting bedfellows those two! However, the plan was much weaker than the policy which had been published the year before, and did not refer to it. It has thirteen strategies for achieving environmental sustainability but only five very general targets, such as 'eliminating illegal dumping' and 'a more aware public' (Government of Barbados 2005).

The most recent Barbados Growth and Development Strategy, 2013-2020, refers back to the Barbados Sustainable Development Policy as the basis for transitioning Barbados into a green economy, to be taken together with the recommendations of the Green Economy Scoping Study (GESS) published in 2014 (Moore et al. 2013; Government of Barbados 2013). The GESS provided analysis and recommendations for greening in tourism, agriculture, fisheries, transportation and housing. The Growth and Development Strategy goes on to provide a comprehensive set of sector specific strategies for environmental sustainability.

I want to also draw attention to the 2003 Physical Development Plan, which includes considerable scope for environmental conservation and management (Government of Barbados 2003). Then, there is the treatment of environment and sustainability in the 2011 protocol for the social partnership, which covers a wide range of issues that the partners agreed they should address:

- Public awareness of pollutants
- Reduction of noise and light pollution
- Use of environmentally friendly technology
- Sustainability of the coastal and marine environment
- Efficient land use policy for sustainable development
- Protection of quality and quantity of potable water
- Solid waste management that emphasizes recycling
- Safe disposal of sewage and industrial waste
- Monitoring of chemical and other hazardous substances
- Reduction of wrapping and packaging materials
- Reduction in consumption of fossil fuels
- Enforcement of all legislation and regulations for environmental sustainability
- Research into renewable energy
- Sustainable transport policies (Government of Barbados 2011)

These documents show us that while the environmental pillar of sustainable development may not always have featured on an equal footing with social and economic considerations, it was there with sufficient strength to generate significant expectations.

Sectoral policies and plans

Barbados has also been well served by sectoral plans that address the key threats, and provide considerably more detail than the national level plans There is a series of fisheries management plans (Barbados Fisheries Division 2004) from 1996 to 2004, (but none since, despite being a requirement of the Fisheries Act), coastal zone management plans (Coastal Zone Management Unit 1998; 1999), and site specific plans such as those for Harrison's Cave, Folkestone Marine Park and the Carlisle Bay (AXYS 2000a; b; c). The 2014 Tourism Master Plan is very explicit about the critical importance of environmental sustainability to the continued viability of the tourism industry, with an entire volume of the report series devoted to environment (EPG 2014). There are also a Gully Ecosystem Management Plan (2005) and a National Biodiversity Strategy and Action Plan (2002) (EPG 2005; Government of Barbados, 2002). We have invested a lot of effort

in planning, usually based on good information[2], and done a relatively good job of it. This effort and the high quality of the plans produced lead us to expect that they will be implemented and that benefits will be realized.

Legislation

There are over twenty-five pieces of legislation that are relevant to the sustainable use of natural resources. Responsibility for implementing these is spread among several ministries and statutory bodies. This fragmentation of responsibility is itself an institutional problem that I will return to later. A glaring gap in the legal framework for environment and sustainable development is legislation to address human impacts on our terrestrial ecosystems and biodiversity. In 1998 the Environmental Management and Land Use Project (EMLUP) recommended two Acts to address these problems:

- An Environmental Management Act and
- A National Parks Act (Government of Barbados, 1999)

It provided drafts of these acts. The Environmental Management Act was to give effect to our commitments to the Convention on Biological Diversity and the regional agreement on Specially Protected Areas and Wildlife (the SPAW Protocol of the Cartagena Convention) (UNEP 2016). It addressed key areas such as:

- Discharges into the environment
- Waste management and disposal
- Environmental impact assessment
- Toxic substances and pesticides
- A system of parks and protected areas

This Act would allow the Government of Barbados to address littering and dumping directly rather than through the Health Services Act. The second recommended piece of legislation, the National Parks Act, was intended to address the development of a system of parks and protected areas. These two pieces of legislation have reportedly been working their way through the system since they were first drafted in 1998. Eighteen years for preparation and enactment of legislation that is so critical to sustainable development in Barbados seems a very long time. It suggests a low priority for our environmental pillar.

5.1.3 Are government departments actually implementing these plans, and is implementation making a difference?

Answering these questions is where things become very difficult. I know of no publicly available reports on the performance of the Government of Barbados regarding implementation of

[2] Most policies and plans in Barbados are developed on the basis of substantial studies and information. These studies are generally contracted out to international consulting firms; however these are encouraged to involve local expertise. The University of the West Indies and other local consultants have played a significant role in providing expertise on many sustainable development topics.

environmental sustainability. Indeed, such an evaluation of government departments in relation to their mandates, and of the government overall in relation to strategic plans and policies for environment, would be a very challenging exercise. However, as previously indicated this monitoring should be ongoing and the findings should be public. What can be said, without being comprehensive, is that there is evidence that considerable progress has been made in many areas of environmental management and in the incorporation of environmental considerations into sustainable development.

5.1.4 Three major thematic gaps

As would be expected, among the many successes we can find several areas where implementation has failed us. I am not going to try and enumerate these failures in detail. However, there are some glaring implementation gaps that are large enough, and sufficiently 'in our faces' that they may blind us to all the progress that has been made and lead us, and visitors, to believe that the environment is a not a priority in Barbados. These are:

- Protection of coastal marine ecosystems
- Protection of terrestrial (and coastal marine) habitats by dumping and littering
- A system of parks and protected areas in place

I will say a little bit about what is being done to address each of these gaps before I move on to the Private Sector and Civil Society and two other gaps that are institutional.

Degraded coastal ecosystems

We have seen a lot of effort put into managing coastal development through measures such as setbacks, protecting the shoreline with walkways, groynes and breakwaters. We have also seen action taken to protect reefs, such as, requiring booms during construction to protect them from sediments, fines for vessels that damage reefs with their anchors, relocating corals from areas where construction may damage them, and even the establishment of a marine protected area (Mahon and Mascia 2003). Yet, as mentioned earlier, our coastal marine ecosystems remain seriously degraded by fishing and pollution (Figure 17).

As regards fishing, although the Fisheries Act was passed in 1995, and there have been several fisheries management plans, apart from some very basic regulations when the Act was first passed (trap escape panels, no lobster with eggs, no drift nets, minimum fish pot mesh size, minimum mesh size for a seine net) there has been virtually nothing to ensure conservation of inshore fishery resources. Anyone can fish, virtually anywhere and can take as much fish of any kind and any size as they like. We know from global experience that an open-access unregulated fishery, such as this, is doomed to overexploitation, and this is what has happened. This should not be seen as a reason to vilify fishers. If there are no restrictions, they cannot be expected to stop or decrease fishing on their own.

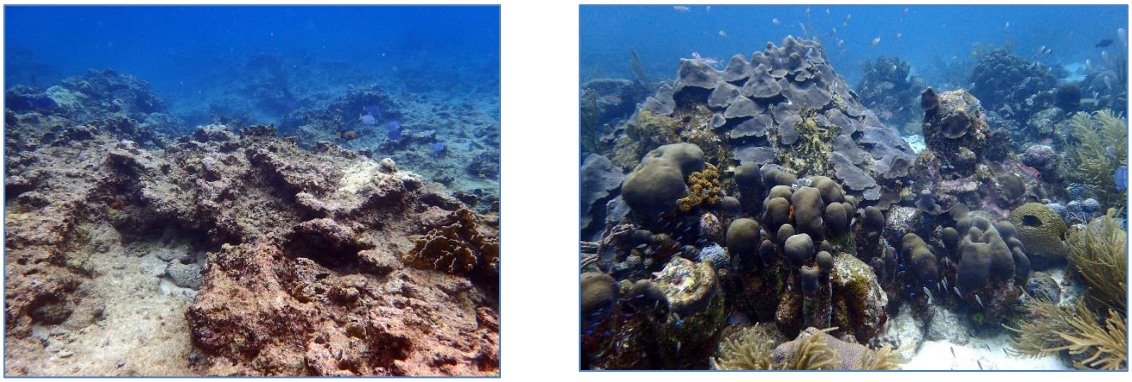

Figure 17: Barbados reefs have been heavily degraded and most fringing and nearshore reefs look like the picture on the left, while they should look like the picture on the right (photos by Hazel Oxenford)

Furthermore, it is important to recognize that the depletion of these resources has contributed to reef degradation. Herbivorous fishes like parrotfish and surgeonfish eat algae and keep it from overgrowing the reef and killing corals or making the substrate unfit for colonization by corals. Other Caribbean countries Belize, Turks and Caicos, and Bonaire, have realized how important it is to have populations of herbivorous fishes on reefs, especially parrotfish and have banned catching them (Mumby and Harborne 2010).

As regards land-based pollution, despite the Marine Pollution Control Act being passed in 1998 with provision for stringent control of what goes into the sea, no regulations have been passed. However, the South Coast Sewerage Project was a huge investment to reduce land-based pollution, especially from soakaways. Subsequently, some recovery of reefs has been seen on the south coast, but surface runoff continues to bring nutrients and other pollutants into the sea. And, in the absence of protection and recovery of the herbivorous reef fishes, recovery of corals and associated marine life has at best been slow and patchy. On the West Coast the sewerage Project is on hold, and runoff from gully outlets, drains, etc. is an even greater threat than on the south coast (Tosic 2007). Essentially, we are pouring fertilizer into the sea while removing all the herbivores. The result of this degradation is loss of livelihoods for fishers, loss of food security and loss of services to the tourism industry. Again, for it to take twenty-one and eighteen years, respectively, for serious provisions to have been put in place to protect such a critical resource for our citizens and our economy seems incomprehensible.

Illegal dumping and littering

Barbados has made considerable progress through the Solid Waste Management Programme (Government of Barbados 1993).[3] We have seen improvements in landfill management and monitoring at the main landfill site. The transition from an open system to a sanitary engineered system has significantly reduced the problems of odours and the frequency of fires. We have

[3] Despite this being an InterAmerican Development Bank funded project, documentation on the project and its outcomes is difficult to obtain.

seen a recycling industry spring up and it appears to be weathering the current global low prices for most recyclables, especially plastics. We have a functioning (but limited) waste sorting and recovery facility at Vaucluse.[4] The upshot of all this is a significant reduction in the quantity of waste ending up in the landfill.

What we have not been able to manage are the two most in-your-face environmental problems that we have in Barbados: illegal dumping and littering. In addition to the variety of potential problems caused by these practices – marine and drinking water pollution, breeding of mosquitoes and rats - the result is just plain ugliness (Figure 18). If, as a UWI study has shown, visitors are willing to pay more for clean beaches and beach access ways, then it stands to reason that a clean countryside matters to them too (Schuhmann 2012). If plans to have a national park with income generating outdoor activities in support of a Green Economy are to be successful, the park must be clean. This is a gap that must be filled urgently by either making the Health Services Act regulations work, or by passing and implementing the Environmental Management Act, or its equivalent, which has been eighteen years in the making.

Figure 18: Illegal dumping is a common sight all over Barbados.

Parks and protected areas

I have mentioned the creeping habitat destruction from development that is stripping the island of coastal terrestrial habitats. And, we have the coastal marine degradation that I just described. One of the ways for a country to address these problems is a network of parks and protected areas. This idea has been on the books in Barbados for decades and is yet to be realized.

[4] Sustainable Barbados Recycling Centre, accessed 24 December 2016 http://www.sbrcinc.com/

The Physical Development Plan (PDP) (Government of Barbados 2003) provides for six categories of open space:

- OS 1 The Barbados National Park
- OS 2 Natural Heritage Conservation Areas
- OS 3 Coastal Landscape Zone
- OS 4 Public Parks and Open Spaces
- OS 5 National Attractions
- OS 6 Barbados National Forest Candidate Sites

All of them have a role to play in protecting our ecosystems and creating environmental awareness. We have several 'National Attractions', and a good number of 'Public Parks'. The Barbados National Park was proposed in 1967 and has been revisited in at least 10 different studies and proposals including the PDP which includes a strategic plan for the national park (Figure 19). In June 2016, we saw the launch of the Barbados National Park, which was a big step and very encouraging. However, the National Park strategic plan is only one part of the overall picture, and it is a very general one since, given its complexity - towns, communities, small business, agriculture – there will be a great deal of detailed work to do to ensure that the vision for the park is translated into reality.

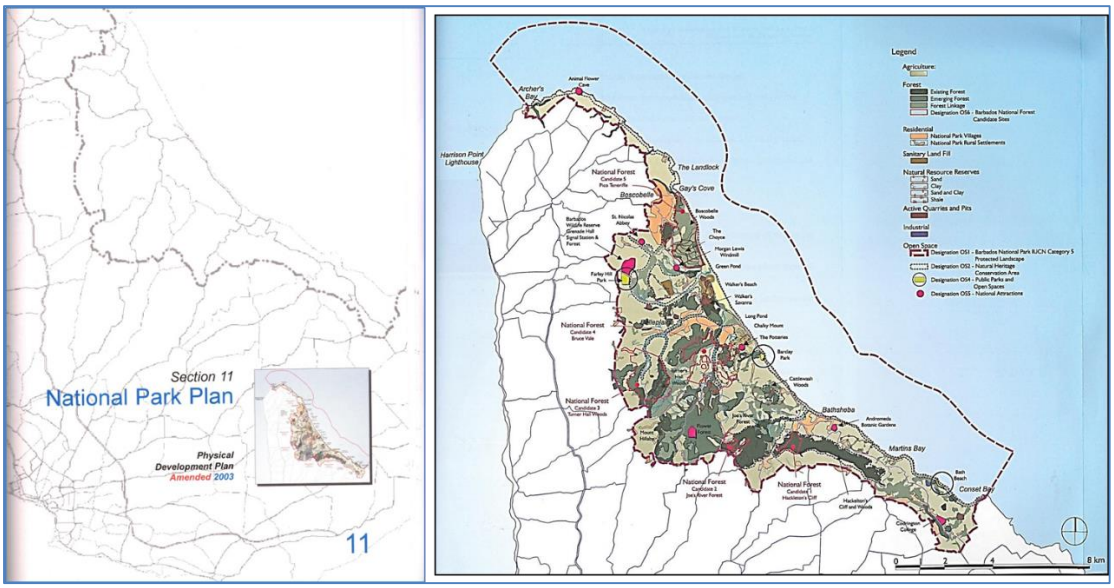

Figure 19: The Physical Development Plan 2003 includes a strategic plan for the National Park.

Regrettably, Barbados still does not have any 'Natural Heritage Conservation Areas' or 'National Forest Candidate Sites', although designation of Turners Hall Woods has been pending for decades. These are the two critical categories for environmental conservation, and also for ecotourism. A national system of parks and protected areas should protect representative areas of all the major types of habitats that are found in a country. Under OS2 and OS6 we need to protect this diversity on land and in the sea, as illustrated in Table 1. These must be protected in

large enough areas to retain the ecosystem functions. The National Parks Act that has been in preparation for eighteen years provides for a National Parks Board and a National Parks Plan, which are essential for a fully functional system of conservation areas.

Table 1: Habitat Diversity in Barbados on land and in the sea

On land	In the sea

• Gullies
  ○ Wet
  ○ Dry
• Undercliff forest
  ○ East
  ○ West
  ○ South
• Coastal forests
• Coastal wetlands
	• Fringing reefs
	  ○ Spur and groove
	  ○ Crest
	  ○ Flat
	• Bank reef
	• Patch reefs
	  ○ Hard
	  ○ Soft
	• Mixed reef hard ground
	• Open ocean

5.1.5 An institutional gap

Now, let us reflect quickly on the institutional arrangements in place for government to integrate environment into sustainability. I have referred to these several times previously in this report. I would argue that the Government of Barbados has not provided for the complexity of this challenge, either at the level of providing overarching vision and policy guidance, or at the level of monitoring performance. Except briefly with the Sustainable Development Commission, the Government of Barbados does not appear to be making full use of the wide diversity of skills and experience that is available in Barbados. This is an institutional gap. There is the need for something akin to that Commission to be established on a permanent basis to provide that integration of thinking, especially for the longer-term, as well as monitoring and reporting on progress.

5.2 Private sector

One of the best ways to conserve natural resources and to promote sustainability is for them to be supporting livelihoods and generating revenues. Private enterprises, large and small, have been active in promoting sustainability. Businesses have developed in areas as diverse as:

- Alternative energy generation
- Solar water heating
- Water harvesting and reuse
- Agroprocessing
- Recycling
- Organic farming
- Environmental auditing

- Workplace and home greening
- Ecotourism
- and more

There are also public-private partnerships for operations such as Sustainable Barbados Recycling Centre (SBRC) and the desalination plant on Spring Garden Highway. We have also seen leadership in sustainable development from the Barbados Chamber of Commerce and Industry and many individual businesses. One could conclude that the private sector is aware of Green Economy opportunities and willing to develop them if they appear feasible. However, we must bear in mind that many of these opportunities depend on ecosystem services, and a Green Economy must be underpinned by environmental sustainability.

5.3 Civil society

Many civil society initiatives in Barbados support environmental sustainability. These range from the long-standing Barbados Museum and Historical Society and Barbados National Trust, to newcomers such as the Coral Reef Alliance (CORALL), established in 2016. In between, we have seen organizations such as the Barbados Environmental Association (1988), the Future Centre Trust (1997), the Barbados Chapter of the Caribbean Youth Environment Network and the Barbados Marine Trust, pursue programmes that have cleaned up coasts and gullies, promoted marine parks, extended awareness of the importance of environment, and much more. Not all have survived, but all have made a significant contribution. Most of the NGOs that have waxed and waned have depended on the vision, energy and efforts of a small number of people who, for whatever reasons, were not able to build the constituency and institutional structure needed for the long-term.

There are also issue specific NGOs, such as for organic farming, noise pollution, fisheries, permaculture, bees, and so on, that address the specific concerns of their members. Finally, there are also many valuable contributions from private individuals and groups such as:

- Woodbourne Shorebird Reserve
- Arbib Nature Trail
- Graeme Hall
- Be the Change Barbados
- Slow Food
- and more

There is a lot going on in civil society. Yet, despite all this activity, there is a significant gap here also. Most civil society organizations with an interest in environment, focus on awareness and projects aimed at improving conditions. What we are missing in Barbados is a watchdog NGO that seeks to monitor the performance of the Government of Barbados and private sector in relation to their policies and plans, and to hold them accountable. Yes, we sometimes respond vocally as individuals or groups, and even with some success, to happenings, such as the Greenland Landfill, or the waste to energy plant, but that is more reactive than proactive. We do

not have an NGO that is consistent and proactively monitoring government and private sector, and in my view this is a significant gap that needs to be filled.

6 SUMMARY AND THE WAY AHEAD

I have covered a lot of ground, so before I wrap up, let me try to summarize. The general picture is one of the Government of Barbados having engaged in agreements at the international level; having developed policies and plans reflecting these agreements; having revised or developed much of the necessary legislation - although there are some very serious gaps here. They have pursued implementation through a variety of programmes and activities that I would call a "soft approach". All of this provides a good foundation of progress upon which to build. There are many people in government, private sector and civil society making significant efforts, and those who are responsible for implementation know what needs to be done, and, I believe, how to do it.

What we do not see is a willingness to take regulatory action, and where regulations exist, enforcement action, in several critical areas, even when it is clearly essential. I am talking about preventing individuals from doing things that are clearly not in the best interest of the country. This unwillingness to act suggests that the environmental pillar of sustainable development is not getting the serious commitment that it requires. Given the amount of time that has elapsed without regulatory action or enforcement by the Government of Barbados, I think we can conclude that it will not happen if left entirely to them. Filling the two institutional gaps that I flagged might help with this:

- A multi-stakeholder 'environmental sustainability mechanism' for guiding and monitoring progress with environment and sustainable development
- A civil society body to promote accountability

It would take many more pages to reflect adequately on why these gaps exist. There are the usual candidates:

- Insufficient
    - human resources
    - financial resources
    - political will
- and others

Yes, we can always use more and better trained people, and more money, but the nature of the gaps is such that this cannot be the whole answer, or even the main answer. Political will must ultimately come from the people. When the people of Barbados demand that ecosystem services are sustained, not just in documents, but in reality, we will see the major gaps filled. Therefore, as the saying goes, when we point the finger of blame, in this case at political will, there are three fingers pointing back at us.

6.1 Responses

So, to wrap up, what do we need to do? There is no silver bullet. The problem is complex and requires a diversity of responses from all the stakeholders. Following are some suggestions for the major players.

6.1.1 Government

To the technocrats, keep the programmatic activities going and growing, they are making a difference; but, push to get the critical legislation and regulations in place and acted upon. To the decision-makers, establish an "Environmental Sustainability Mechanism" to promote and monitor the incorporation of environmental considerations into sustainability that engages the full range of governmental, non-governmental and private sector actors.

6.1.2 Private sector

Take up the Green Economy challenge; monitor and reduce the environmental footprint; invest in the 'Environmental Sustainability Mechanism' and, if Government of Barbados does not take up the recommendation, take the lead.

6.1.3 Civil society

Continue building on the productive activities already in progress, and also building the critical mass needed for environmental stewardship to become a part of Barbados' culture. Invest in the 'Environmental Sustainability Mechanism' and, if neither the Government of Barbados nor the private sector take up the recommendation, take the lead. Establish an NGO that monitors and challenges the Government of Barbados on its performance.

6.1.4 Individuals

Monitor and reduce environmental footprint; choose green. Engage. Dare to expect and to challenge when expectations are not met. Remember, as Alice Walker said, "the most common way that people give up their power is thinking they don't have any"[5].

7 CONCLUSION

If there is any country in the world that has the potential to fully incorporate environment into sustainability, it is Barbados. Small size can work to our benefit; it makes comprehensive planning and monitoring much more feasible. We have the intellectual capacity, knowledge and implementation skills to achieve this goal. Once we get enough people to realize that this is a job for everyone, not just the Government of Barbados, we will have the critical mass to make full use of those capacities.

[5] Accessed 24 December 2016 https://en.wikiquote.org/wiki/Alice_Walker

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