
WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

PITONS MANAGEMENT AREA (SAINT LUCIA) ID N° 1161

1. DOCUMENTATION

- i) **IUCN/WCMC Data Sheet:** 5 references.
- ii) **Additional Literature Consulted:** IUCN, 2003. **Global Strategy for Geological World Heritage** (Draft); World Heritage Committee Information Document, 2000. **Synthesis report on the Seminar on Natural Heritage in the Caribbean**, Suriname. 17pp.; Putney, Allen 1999. **Potential Natural Sites in the Caribbean**; Sullivan Sealey, K and G. Bustamente 1999. **Setting Geographic Priorities for Marine Conservation in Latin America and the Caribbean**. TNC; Wilkinson, C. 2002. **Status of Coral Reefs of the World**. Reefbase; World Heritage Centre 2002. **Proceedings of the Marine Biodiversity Workshop**, Vietnam; Landmark Environmental Consultants 2001. **St. Lucia: The Pitons Management Area Landscape Analysis. Report to the St. Lucia WH Committee**, 22pp.; Wood, C. 2002. **The Geological Significance of the Proposed World Heritage Site in Saint Lucia. Report to St. Lucia WH Committee**, 24pp.; Lindsay, J. et al. 2002. **Volcanic Hazards Assessment for St. Lucia, Lesser Antilles**. 46pp. and Scientific Supplement. 34pp. **Reports to the Government of St. Lucia, University of the West Indies Seismic Research Unit.**; Bloom, A.L. 1998. **Volcanoes**. Chapter 6 in, *Geomorphology: a Systematic Analysis of Late Cenozoic Landforms* (3rd. edition), pp. 92-115. Prentice Hall; Francis, P. 1993. **Volcanoes: a Planetary Perspective**. Oxford Univ. Press; Simken, T and Siebert, L. 1994. **Volcanoes of the World (2nd edition)**, Smithsonian Institution **Global Volcanism Program**. Geoscience Press Inc., Tucson, Arizona; www.volcanoes.si.
- iii) **Consultations:** Five external reviewers. Government officials of Ministry of Physical Development, Environment and Housing, Ministry of Agriculture, and Departments of Lands, Forestry, Fisheries, Tourism and Education; National Office for UNESCO; Members of the St. Lucia World Heritage Committee, Pitons Management Area Advisory Committee, and Soufriere Regional Development Foundation; Soufriere District representatives, local fishermen, estate owners, and private sector tourism operators.
- iv) **Field Visit:** Paul Dingwall and Jim Thorsell, January 2004.

2. SUMMARY OF NATURAL VALUES

St. Lucia is an island of 617 km², located between Martinique and St. Vincent in the Lesser Antilles Islands of the Eastern Caribbean. The Lesser Antilles form a volcanic arc, 700 km long, overlying a tectonic plate subduction (under thrusting) zone. The nominated area is the Pitons Management Area (PMA), 2,909 ha in extent, located in the south-western region of St. Lucia near the town of Soufriere. Dominating the mountainous landscape of the PMA are the Pitons, two steep-sided volcanic spires rising side by side from the sea. Gros Piton (770m) is 3 km in diameter at its base, and Petit Piton (743m) is 1 km in diameter and linked to the former by the Piton Miton ridge. The volcanic complex in the PMA, known as the Soufriere Volcanic Centre, is the remnant of one (or more) huge collapsed andesitic stratovolcanoes. The Pitons are degraded dacitic cores of two lava domes formed on the flanks of the volcano. They tower above a caldera-like formation, produced by a gigantic gravity slide or structural collapse and forming the arcuate Qualibou Depression, 7 km in

diameter. Near the centre of the depression are the Sulphur Springs, an active, high-temperature geothermal field (or solfatara) with sulphurous fumeroles and hot springs. The Pitons occur with a variety of other volcanic features including cumulo-domes, explosion craters, pyroclastic deposits (pumice and ash), and lava flows. Collectively, these fully illustrate the volcanic history of an andesitic composite volcano associated with crustal plate subduction.

The Marine Management Area within the PMA is a coastal strip 11 km long and about 1 km wide. It comprises a steeply sloping continental shelf with fringing and patch reefs, boulders and sandy plains. The coral reefs, which cover almost 60% of the nominated marine area, are healthy and diverse. A survey to a depth of 20 m revealed 168 species of finfish, 60 species of cnidaria including corals, 8 molluscs, 14 sponges, 11 echinoderms, 15 arthropods and 8 annelid worms. Hawksbill turtles are seen inshore, and whale sharks and pilot whales offshore.

The dominant terrestrial vegetation is tropical moist forest grading to subtropical wet forest with small areas of dry forest near the coast and on steep slopes, and areas of wet elfin woodland on the summits. On the Pitons especially, small undisturbed natural forests remain, preserved by the steepness of the land. At least 148 plant species have been recorded on Gros Piton and 97 on Petit Piton and the intervening ridge. Among these are several endemic or rare plants, including eight rare species of tree. Some 27 bird species, including 5 endemics, are known from Gros Piton, along with 3 indigenous rodents, 1 opossum, 3 bats, 8 reptiles and 3 amphibians.

The PMA is a multiple use management area (IUCN Category VI) where agriculture, artisan fishing, human settlement (1500 residents) and tourism (4 large hotel developments) are allowed. About half the area is privately owned and about one-third of the total area is a defined conservation core zone.

3. COMPARISON WITH OTHER AREAS

The nomination document notes four distinctions of the PMA which it proposes are of universal value. These are:

- The Soufriere Volcanic Centre contains an assemblage of all the structures, landforms and rock types typical of a large collapsed stratovolcano. The great variety of its diagnostic volcanic features is of considerable scientific interest, according to volcanologists from the University of the West Indies.
- It demonstrates the character and history of this and many other andesitic volcanic systems in an island arc above a tectonic plate subduction zone.
- The stratovolcano is associated with a gigantic gravity slide (or sector collapse), forming the 7 km-diameter Qualibou Depression.
- It has two adjacent eroded lava domes - the Pitons - that are remarkably comparable in size, shape, structure and origin. In the opinion of the head of the region's Seismic Research Unit this is a phenomenon "found nowhere else in the world".

The nomination further states that "as volcanic landforms there appears to be nothing quite like them anywhere . . . they are the best formed landforms of this (lava dome) type in the world", and as such they are "of high value to geological science". The purpose of this section of the evaluation is to compare and review these claims from a global perspective.

3.1 Volcanic geology

Volcanism is a ubiquitous global phenomenon and volcanoes come in many shapes and sizes depending on their composition and mode of eruption. This makes generalisations and comparisons very difficult as every one of the world's 14,000 volcanoes is distinctive in some respect. However, for World Heritage comparative purposes it is helpful to use the dual classification that volcanologists use to distinguish the two most common forms of volcano – basalt domes and composite cones (e.g. Francis 1993). Basalt domes, also known as shield

volcanoes, are formed almost entirely from outpourings of viscous basalt lavas. Usually found at hot-spots especially on mid-oceanic ridges, with gently sloping topographic profiles, they are among the highest volcanoes in the world. The Hawaiian Islands (USA), rising almost 9 km above the ocean floor, are classic shield volcanoes, as are the smaller Icelandic shields, the Galapagos Islands (Ecuador) and Mt Etna (Italy). Composite cones, or stratovolcanoes, are formed by a combination of flow and explosion creating alternating layers of lavas and pyroclastic (ash) materials. Overwhelmingly andesitic in composition, and located either in young continental mountain chains or forming island arcs at tectonic plate boundaries, they are the world's great steep-sided volcanoes. Classic examples are Japan's Mt. Fujiyama; Italy's Mt. Vesuvius; Mt. Mayon in the Philippines, often cited as the world's most beautiful volcano; and Popocatepetl in Mexico.

The Qualibou volcano of the PMA belongs in this latter specific class of volcanoes. It is one of 18 stratovolcanoes in the 700 km-long volcanic island arc of the Lesser Antilles, on the boundary between the Caribbean and the under thrusting North American tectonic plates. In establishing the significance of the PMA in global volcanism it is appropriate to begin by limiting the comparisons primarily to andesitic volcanic systems and secondarily to those having their genesis in oceanic volcanic arcs at tectonic plate boundaries.

3.2 Comparison with other World Heritage Volcanic sites

A comparative analysis of other volcanic World Heritage sites provided with the nomination identifies 21 natural or mixed sites in volcanic terrain, a finding essentially consistent with the draft IUCN geological World Heritage strategy report (Rapa Nui/Easter Island is also identified but it is inscribed under cultural criteria only). Despite the presence of significant volcanic values, 8 of these volcanic sites are not inscribed on the World Heritage List under geological criteria. Nevertheless it is still appropriate to compare them to the PMA of St Lucia. This group of sites includes some globally important volcanic systems, including:

- Kahuzi-Biega National Park, DRC [criterion (iv)];
- Ujung Kulon National Park, Indonesia (incl. the famous Krakatoa volcano) [(iii) & (iv)];
- Komodo National Park, Indonesia [(iii) & (iv)];
- Mt. Kenya National Park, Kenya [(ii) & (iii)];
- Kilimanjaro National Park, Tanzania [(iii)];
- St. Kilda, UK [(iii) & (iv)];
- Gough Island Wildlife Reserve, UK [(iii) & (iv)]; and
- Lord Howe Island Group, Australia [(iii) & (iv)].

It is also apparent from the comments of specialists cited in one of the nomination documents (Wood, 2002) that dome structures are, in fact, quite common (and all slightly different) elsewhere (e.g. in Kamchatka - Russia, Tongariro - New Zealand, Kuriles Mt. - St. Helens, Morne Trois Pitons - Dominica, and Yellowstone - USA). Gravity collapses too are found elsewhere (e.g. Lesser Antilles and Hawaii).

The other 13 volcanic World Heritage sites are inscribed for their geological values either under criterion (i) or pre-1994 under criterion (ii), and are more directly comparable with St Lucia's PMA. This group includes four sites that are either basaltic shield volcanoes or volcanoes at oceanic hot-spots, viz: Hawaiian Volcanoes National Park (NP), the world's iconic shield volcanoes; Galapagos NP; Central Eastern Australian Rainforest; and Heard and Mc Donald Islands (Australia). A further six sites are large andesitic composite volcanoes, volcanic massifs or volcanic complexes in continental or large island settings. They are usually situated at major crustal discontinuities, either in mountain chains or rift valley systems. These six sites are: Sangay NP in the Ecuadorian Andes; the Volcanoes of Kamchatka in Russia, a serial site containing more than 300 volcanoes along with geothermal features, covering some 3.3 million hectares; USA's Yellowstone NP, a volcanic complex containing over 10,000 volcanic and geothermal features (including several dome structures) extending over almost one million hectares; two African volcanic massifs at rift valley sites – Ngorongoro Conservation Area (Tanzania) and Virunga NP (DRC); and New Zealand's Tongariro NP. Two of the remaining sites exhibit very specific volcanic features, viz: the

U.K.'s Giant's Causeway, which is a columnar basalt lava flow, and Italy's Aeolian Islands which display principally 'strombolian' volcanism, i.e. explosive bursts of basaltic material.

The World Heritage site of Morne Trois Pitons (MTP), 200km to the north of the PMA in Dominica, closely resembles the PMA in its volcanic character and origin, and in its geological and geographical provenance. MTP is a significantly larger (7000ha) and more intact area, has a single management agency, boasts associated biodiversity values, as well as containing a greater variety of volcanic features such as 5 volcanoes and a boiling lake. MTP has also attracted the attention of several hundred scientists based at the Archbold Research Station. Cumulo-domes are also found in MTP (at elevations twice as high as the PMA) but do not rise as abruptly out of the sea as they do in the PMA. PMA differs from MTP in three ways, viz: it has a marine component; the volcano is associated with a major caldera-forming structural collapse; and it contains twin cumulo domes, the Pitons.

Thus, of all the major World Heritage volcanic sites, MTP compares closely with the PMA of St Lucia but contains significantly greater associated natural values. The PMA still, however, differs in some details of its geological history, volcanic features and physiographical make-up.

3.3 Comparison with other island sites in the Caribbean and other world islands

In examining this nomination, IUCN has undertaken a regional and world-wide review of island sites in order to determine the full significance of the PMA.

Within the Lesser Antilles island group the Smithsonian Institution volcano database lists 16 volcanoes with the greatest concentration in Dominica. A high proportion of eruptions in the region have produced cumulo-domes including the PMA and many are of similar age and structure. Other important protected areas in this region centred on volcanic features include Mont Pelee (Martinique), Kick-em Jenny (Grenada), and the currently active volcano in Montserrat. All of these have been informally discussed as other potential volcanic site nominations in the region.

The 2003 UN List of protected areas records 953 sites in the insular Caribbean region. Three sites are natural World Heritage sites – Morne Trois Pitons NP (Dominica), Desembarco del Granma NP (Cuba) and Alejandro de Humbolt NP (Cuba). Comparisons with MTP are discussed above in Section 3.1. The latter Cuban site has no similarities with the PMA but the former is located on highly scenic coast with spectacular cliffs bordering the western Atlantic. Three additional natural World Heritage sites in the western Caribbean contain outstanding coral reefs, tropical forests and wetlands, but there are no volcanic features similar to the PMA.

Other volcanic islands which may also have significant global value (geological and scenic) exist in many areas including White Island in New Zealand, the Marqueses in French Polynesia, the Kuriles in Japan/Russia, Reunion and the Comores in the western Indian Ocean, Iceland, Palau, Alaska and Japan. La Palma in the Canary Islands is another example where 20 protected areas have been established to preserve the wide range of volcanic features found on the island. Once again, several of these have been discussed for potential World Heritage nomination and several are on the Tentative List of the relevant States Parties.

In terms of World Heritage natural sites occurring in small islands, 25 of these (17 % of all 144 natural WH sites) have been inscribed (see Table 1 below). In addition, island and coastal features also occur in 22 other natural sites that exist on larger islands (eg. Lorentz in Irian Jaya, SW Tasmania and SW New Zealand) and on continents (e.g. Kamchatka (Russia) and Atlantic Forest Reserves (Brasil). Many of these have been inscribed for both their volcanic and scenic values.

Table 1: Natural World Heritage sites on / with small islands

ISLAND / SITE	COUNTRY	VALUES
Lord Howe	Australia	volcanic scenery, species
Fraser	Australia	geological processes
Heard and McDonald	Australia	volcanics, geology
Macquarie	Australia	geological features
Fernando de Noronha/Atoll das Rocas	Brazil	landscape, species
Cocos	Costa Rica	biological processes
Desembarco del Granma	Cuba	geology, coastal scenery
Morne Trois Pitons	Dominica	volcanic features, species
Galapagos	Ecuador	all 4 natural criteria
Cape Girolata, Corsica	France	geology, scenery, species
Ujung Kulon, Java	Indonesia	landscape, species
Komodo	Indonesia	landscape, species
Aeolian	Italy	volcanic values
Sub-Antarctic	New Zealand	biology, species
Tubbataha	Philippines	biology, scenery, species
Madeira Laurisilva	Portugal	species
Aldabra	Seychelles	geological/biological
Valle de Mai, Praslin	Seychelles	all 4 natural criteria
E. Rennel	Solomon Is.	biological processes
Garajonay, Gomera	Spain	biological processes
Giant's Causeway, N. Ireland	UK	geological values, scenery
St. Kilda	UK	landscape, species
Henderson	UK	natural phenomenon
Gough	UK	coastal scenery, species
Hawaii Volcanoes	USA	geological processes
Halong Bay	Viet Nam	geology, scenery

3.4 Significance in terms of scientific research

Many other volcanic sites have been very productive for their record of scientific research (e.g. Krakatoa in Indonesia, Aeolian Islands in Italy, Tongariro in New Zealand and the Hawaii Volcanoes). In contrast, very little research has been conducted in the PMA which may be an indication of its relatively limited importance to science. Indeed, as one of the nomination documents notes, the formation of the Qualibou depression and previous activity of the Soufriere Volcanic Centre are in dispute and the theory of the origin of the depression is far from resolved (Wood. 2002). Further, as Wood (2002) notes, the mode of formation of the Pitons "has never been the subject of dedicated study." Indeed, "the Pitons could be the remnants of one of the three different types of volcanic features: cumulo-dome, plug dome or volcanic neck." Further, "if the Pitons are exhumed volcanic necks or plugs, then there are examples elsewhere in the world that are equally as spectacular...." (Wood, *ibid*). The level of scientific uncertainty is significant as the level of applicability of natural criterion (i) depends, in part, on clarification of the origin of the site. Several of the claims made in the nomination could thus be challenged and thus require further study before verification, and further consideration under this criterion.

3.5 Natural beauty and aesthetic importance.

Although it is difficult to make comparisons on the subjective values of scenery, these aspects found in the PMA commonly occur in other island and coastal regions of the world. For instance, the Lord Howe Island Group (Australia) has the two summits of the eroded remnants of a shield volcano (Mts. Gower and Lidgbird) rising up to 875M from the sea as well as the spectacular scenic feature of Ball's Pyramid. This island is also covered by tropical and sub-tropical forest and surrounded by coral reefs. Similarly, the islands that make up the St. Kilda World Heritage site (UK) are eroded volcanic remnants (as are the great majority of the world's oceanic islands) and could also be judged as having more outstanding scenic features than the PMA, as well as having a more natural setting. The same could be said of

other World Heritage island and coastal sites such as Galapagos, Kamchatka, Lorentz, SW New Zealand, Fernando de Noronha, and Heard and McDonald in Australia. Other non-World Heritage island areas with geological and scenic values listed above would also surpass those found in the PMA.

In sum, IUCN concludes that the scenic qualities of the PMA nomination, as well-known as they are in the Caribbean, are significant at the regional level but are secondary to other island/coastal settings found in other areas of the world.

As the site has not been nominated for any biological values (these are present but have been considered of national rather than international significance), no comparisons of these features are undertaken in this evaluation.

In summary, the World Heritage List has a number of volcanic sites with a wide representation of features in most regions of the world. In addition, there are a number of other important volcanic sites both in the Caribbean region and elsewhere around the globe that have been the subject of much greater scientific interest and contain a much wider variety of volcanic features than the rather narrowly focused ones found in the PMA. Within the global perspective where 14,000 volcanoes exist and where many from all regions of the world are on the World Heritage List, the PMA has some natural values but these are seen as very specific and secondary to those found elsewhere and have not been studied to the point where there is clear scientific agreement on their mode of origin. The PMA, at least with the current information available, is thus rated at the regional level of significance rather than at the international level.

4. INTEGRITY

4.1 Geological integrity

A major consideration in defining the boundaries of the PMA was the intention to include the greater part of the Soufriere Volcanic Centre, or so-called Qualibou Volcano. This would provide protection for the full evolutionary geological provenance of the area's two outstanding volcanic features – the Pitons and the Sulphur Springs. The entire landform assemblage displays the remains of one or more huge, collapsed andesitic stratovolcanoes, whose history is revealed in structures and deposits developed over 5-6 million years. Also encompassed in the PMA is most of the extensive, arcuate Qualibou Depression, formed by either a giant landslide or structural collapse some 300,000 years ago. Thus, the PMA has justifiable boundaries which encompass an extensive range of volcanic features and rock types typical of andesitic volcanism in an island arc overlying a tectonic plate subduction zone.

4.2 Site and management integrity

4.2.1 Boundaries and land tenure

The landward boundary of the PMA is a mix of natural and artificial elements, including land contour, river courses, roadways and land tenure boundaries. The outer marine boundary, located about 1km offshore, is the 75m depth contour, which circumscribes the coral reef. Boundary definition was refined during preparation of the nomination. The terrestrial component of the PMA was initially confined to a smaller core area centred on the Pitons and immediate surrounds. A 2001 landscape analysis (Landmark Environmental Consultants 2001) suggested creation of an environmental protection area as a buffer zone on the landward margin. Following the recommendations of a 2002 geological study (Wood 2002), the boundary was further extended to encompass a greater part of the Soufriere Volcanic Centre, thereby incorporating a wider range of volcanic features and rock types including the Sulphur Springs geothermal field, several small lava domes, explosion craters and pyroclastic deposits. While the townsite of Soufriere was excluded, the expanded area included a greater proportion of privately owned and rural residential land, resulting in the need for internal zoning of the PMA.

Overall, 53% of the PMA is Crown-owned land and 47% is in private ownership. In terms of IUCN classification, the PMA is a Managed Resource Protected Area (Category VI), managed for its long-term protection while providing for sustainable resource uses and the needs of a resident population. In respect of its traditional human settlement pattern and high scenic qualities, it also has many characteristics of a Category V Protected Landscape/Seascape.

4.2.2 Legal status and institutional framework

The PMA has a very recent legislative basis to govern a multiple use area which is almost half private land. Formalised by Cabinet decree in December 2002, the PMA is gazetted under the Physical Planning and Development Act 2001. Within the PMA, the Soufriere Marine Management Area (SMMA) was established in 1994 under the Fisheries Act 1984. There are some ten other statutes applying to conservation of the PMA covering, among others, agriculture, forestry, fisheries, soil and water conservation and wildlife protection.

Overall management of the PMA is directed by the PMA Management Plan, a statutory document approved by Cabinet in June 2003. An operational management plan, intended to augment and implement the management plan, is currently in preparation and is expected to be approved by Cabinet in mid-2004. The management plan is administered by the principal State conservation agency, the Ministry of Physical Development, Environment and Housing. Among the other Crown agencies responsible for managing resources and activities in the PMA are the Forestry Department, Crown Lands Department, Department of Fisheries, Ministry of Agriculture and Ministry of Tourism. A multi-sectoral co-ordinating body, the Pitons Management Area Advisory Committee (PMAAC), is established for management oversight of the PMA. It has ten members representative of Government agencies, NGOs, and community and commercial interest groups. Key among these is the Soufriere Regional Development Foundation (SRDF), a private company responsible for fostering community economic, social and cultural development on the basis of sustainable resource conservation. The PMAAC is chaired by the permanent secretary of the Environment Ministry and reports annually to Cabinet through the Minister of Planning. The SMMA is administered by the Soufriere Marine Management Association, under a formalised agreement for integrating the objectives of eleven Government, NGO and community agencies and interest groups. Both the PMAAC and SMMA have a scientific advisory committee to guide research and monitoring programmes. Established with international aid, the SMMA has also received recognition in marine conservation from UNEP and from the British Airways Tourism for Tomorrow Award (for the special protected areas class administered jointly with IUCN).

The policy framework for the PMA, though interim in some aspects, is comprehensive and based on extensive consultation. Nation-wide policies and plans exist for forestry, agriculture, lands, tourism (including heritage tourism), coastal zone and marine management, education and cultural heritage. The Pitons Charter, signed by the Governor-General in January 2003, on behalf of the Government and people of St Lucia, affirms the country's commitment to the protection of the Pitons and surrounding area as key elements of the country's heritage. Policies for management of the PMA are contained in the PMA Management Plan which incorporates an interim Land Use Plan.

To assist management of the diversity of environments, land types and tenures of the PMA, three internal management zones are designated, *viz*:

- Terrestrial Conservation Area: 467ha (16% of the total area of the PMA), three quarters of which is Crown-owned. Two such areas are designated, one focused on the Pitons and intervening high ground, the other a 60ha area including the Sulphur Springs.
- Terrestrial Multiple Use Area: 1,567ha (53%) of which 80% is privately owned.
- Marine Management Area: 875ha (30%), comprising five sectors – marine reserve, fishing priority area, yachting area, multi-purpose area and recreational area.

The Government has set a priority on either acquiring private lands or establishing stewardship arrangements over them in the Conservation Areas, which are the core protection zones of the PMA. The Government is currently budgeting for the costs of this and discussions are in progress. Activities in all zones must comply with the prevailing statutory

provisions and the policy guidelines of the management plan. A compulsory environmental impact assessment process applies to all new developments, and there are provisions for restriction and prohibition of developments. Guidelines for Buildings and Physical Development are enforced to minimise the impacts of any new buildings, physical developments such as roads, and forestry or farming operations.

On the 16 February, 2004 the Cabinet of the Government of St. Lucia agreed to the acquisition of targeted private lands on Gros Piton, subsequent to negotiated proposals with the respective landowners by the Chief Surveyor. The Cabinet further agreed to the valuation, where necessary, of other private lands within the Reserve Uplands linking the Pitons, and the related negotiations with the respective land owners and the submission of a final report on necessary land acquisitions to Cabinet.

4.2.3 Residential population

The marine zone and terrestrial conservation areas, accounting for some 46% of the total area of the PMA, have essentially no permanent inhabitants. The terrestrial multiple use zone has a residential population of about 1,500 persons in some 400 private households. This low-density settlement (approximately 1 person/ha) comprises primarily small-holder agricultural properties, though there are some moderately-sized estates. The rural population in the PMA is declining, with agriculture on the wane. Heritage and eco-tourism activities are growing and have considerable scope for expansion.

4.2.4 Agriculture and forestry

Agriculture in the PMA is largely confined to small hill-farms, though there are a few commercial estates managed mainly for cocoa and coconut production. Activities are declining rather than expanding. Impacts are generally low, except for a minor problem with feral goats, and there is a small fire risk. Forestry is a minor activity. Small-scale charcoal production occurs sporadically, and there is some timber extraction from private lands in the vicinity of Gros Piton, though Crown acquisition will halt this. There are no forest reserves and no plans to create them. Sufficient legal, planning and regulatory provisions and procedures are in place (although they have not always been enforced) to control any incompatible developments relating to land clearance, sub-division, roading, building construction, earth movement and drainage.

4.2.5 Fishing

A thriving local fishery is based in Soufriere. Despite its initial misgivings, the fishing community now has a good working relationship with the SMMA and strongly supports the marine management regime. Fishing regulations are carefully monitored and strictly enforced, and few problems are encountered. The marine reserves have proven beneficial over the past eight years, with stocks of some species trebling in numbers. For some species, such as tuna and dolphin, population numbers have increased, counter to trends elsewhere in the region.

4.2.6 Marine sedimentation and pollution

Soil erosion and runoff from adjacent watersheds have increased sedimentation in the near-shore zone, which is badly affecting the coral reef environment. Measures are being introduced to reduce the impacts, particularly from road construction and associated quarrying operations. Solid waste management remains a major problem in the coastal area. The Government has taken action to combat this through preparing a World Bank-funded waste management plan, and introducing legislation for re-cycling of products such as glass and plastics.

On the 16 February, 2004 the Cabinet of the Government of St. Lucia agreed to direct the Ministry of Communications, Works, Transport and Public Utilities to a programme of sediment abatement measures, including bio-engineering and "environmentally-friendly" slope stabilisation works. This should minimise sediment displacement to the coastal areas of the PMA from the on-going road re-development works.

4.2.7 Mining, power generation and communications

Mining of fine aggregate from river courses and estuaries in the PMA is prohibited, as are new pumice mines. A small existing pumice mine is located just inside the boundary of the nominated site. The operation is subject to stringent environmental controls. On the 16 February, 2004 the Cabinet agreed to the re-definition of the south-eastern boundary of the PMA to exclude the Pumice Mine at Etangs.

Assessments have been undertaken of the potential for geothermal energy production at Sulphur Springs, but the results suggest power generation would be uneconomic. The effect of any such development would however almost certainly be damaging to the environmental quality of the area. One or two cellphone transmission towers exist in the PMA. Also on 16 February, 2004 the Cabinet requested relevant Ministries to seek a solution to the problem caused by the location of cellular phone towers within the PMA.

4.2.8 Tourism developments

The PMA is a major national tourist destination and, with 200,000 visitors annually, the Sulphur Springs is the most visited site in St Lucia. Current visitor numbers are well within management capacity, however. Substantial existing tourism development in the PMA is confined to four resort hotels in the multiple use zone. They appear to be managed sensitively and one has Green Globe certification. For the most part the resorts are unobtrusive, though one has a private jetty and helicopter landing pad on the shoreline. Noise impacts from helicopters are intrusive in the Pitons area and require addressing through re-routing of flight paths. The St Lucia Cabinet has agreed that meetings will be held involving relevant Ministries and the owners of helicopters that fly between the Pitons to resolve the issue of noise pollution.

IUCN was informed that one hotel in the nominated area is planning a substantial expansion, but recent correspondence from the Saint Lucia World Heritage Committee has noted an understanding that the proposed expansion of the hotel has been cancelled. However a key 15 acre section of land between the two Pitons is currently being advertised for "exclusive development" on the local real estate market. Either of these proposed developments would require approval from the PMAAC and would be subject to EIA procedures and restricted by enforcement of the Design Guidelines and related planning codes. On the 16 February, 2004 the Cabinet agreed to direct the Ministry of Physical Development, Environment and Housing and the Development Control Authority not to approve any major development within the PMA until a comprehensive "Limits of Acceptable Change Study" is completed, and approved by the Cabinet of Ministers.

4.2.9 Staffing and facilities

The SMMA appears adequately staffed for administrative and field roles with a manager, two part-time administrative officers and four rangers. The nominated area, however, is inadequately staffed, having only an acting liaison officer at present, but it is intended to appoint a manager, two administrative officers and two rangers. This is a minimum requirement. While it is probably adequate to meet current demands, more staff capacity will be needed soon. The PMA lacks an office, though one is planned. There is an excellent visitor centre and well-staffed visitor programme at Sulphur Springs, and a small interpretation centre on the Gros Piton trail. Walking trails and other visitor facilities are rudimentary and in need of improvement. Research has been very minimal to date and monitoring programmes have only just begun. Expertise is available from the University of the West Indies, including its Seismology Unit, for geological research, and from the Caribbean Natural Resources Institute (CANARI). Support is also available from a range of Government agencies and from the country's largest non-Governmental conservation group, the St Lucia National Trust.

4.2.10 Financing

Funding levels for the PMA are inadequate at present. The Government recognises that more funds are required for staff and resources. It is intended to augment Government funding from revenues generated through fees derived from visitor use, research and tourist concessions, and from sales and donations. The SRDF generates revenues through visitor tolls in Soufriere.

In summary, apart from the SMMA, which has operated successfully for eight years, the PMA is still very much in its early stage of implementation and as noted by one reviewer "... its future cannot be predicted with certainty". As discussed above, there are several major concerns regarding management integrity. All of these would appear capable of eventual solution or mitigation by existing regulations. The rapid response provided by the Cabinet of the Government of St. Lucia to a number of these management issues is a positive step in the right direction to addressing a number of these issues. Nevertheless, until these and other actions are effectively taken to address the management issues at the site, including in relation to provision of necessary funds for staffing and management, IUCN would conclude that the Conditions of Integrity in the Operational Guidelines are not satisfied at this point in time.

5. ADDITIONAL COMMENTS

It is noteworthy that in terms of the global economy St Lucia is a small-island Developing State whose natural resources are vital to sustaining the country's society and economy. Most of the island is inhabited by people whose livelihood depends upon their ability to access and use the resources of land and sea. Undisturbed natural areas on the island, and within the PMA, are very limited in extent. The PMA, which occupies about 5% of St Lucia, is a typical multiple use protected area (classified as IUCN Category VI), with a low-density rural population and a range of uses from strict protection to sustainable use. In this respect it has some affinities with UNESCO/MAB Biosphere Reserves, though it lacks a clear distinction between buffer and transition zones and may not be extensive enough to include a mosaic of regionally representative ecosystems.

The Pitons have acquired very significant associations in the cultural traditions and history of the island's inhabitants through the ages. These are recorded in mythology and sacred lore, and manifest in pre-historic archaeological evidence such as cave and camp sites, petroglyphs and midden, though these are not yet well researched or documented. For modern St Lucia the Pitons are national icons, deeply embedded in the cultural, social and economic fabric of the country. The associative values of this site could well support a nomination as a cultural landscape.

6. APPLICATION OF CRITERIA / STATEMENT OF SIGNIFICANCE

Criterion (i): Earth's history and geological processes

The PMA contains the greater part of a collapsed stratovolcano contained within the volcanic system, known to geologists as the Soufriere Volcanic Centre. Prominent within the volcanic landscape are two eroded remnants of lava domes (or possibly volcanic necks or plugs), Gros Piton and Petit Piton. IUCN notes that the scientific uncertainty regarding the origin of the site is an issue which constrains consideration of the site under criterion (i). As concluded in the comparison section, similar features are found in many other areas including existing World Heritage sites (such as including the nearby World Heritage site in Dominica). The two eroded lava domes (if that is indeed what they are) of the Pitons are an impressive feature but that would be a very narrow basis on which to justify inscription under this criterion. Given the scientific uncertainty regarding the origin of the site and because any potential inscription of this site depends on this interpretation, consideration of whether or not the site meets criterion (i) is premature. Without further in-depth geological study of the site and the processes that led to its formation.

Criterion (iii): Superlative natural phenomena or natural beauty and aesthetic importance

The nominated property derives its primary visual impact and aesthetic qualities from the Pitons, two adjacent forest-clad volcanic pinnacles rising abruptly from the sea to heights greater than 700m. The Pitons predominate over the St Lucian landscape, being visible from virtually every part of the island and providing a distinctive landmark for seafarers. However,

as discussed under section 3.5 the scenic qualities of the PMA are significant at the regional level but are secondary to other island/coastal settings found in other areas of the world.

IUCN considers that the nominated site does not meet this criterion.

Finally, as noted in section 5 above, the nominated site has only recently been established and is facing a number of management issues. Thus IUCN considers that the Conditions of Integrity in the Operational Guidelines are not satisfied at this time.

7. RECOMMENDATION

IUCN recommends the Committee to **defer** the nomination of Pitons Management Area under natural criterion (i).

IUCN notes that the Committee has, since 1992, inscribed a number of remarkable landscapes under the cultural landscape category. Although the lead for cultural landscapes lies with ICOMOS, IUCN believes that the associative values of this site may support a nomination as a cultural landscape.

IUCN also notes that the site has potential to be developed as a Biosphere Reserve under the UNESCO Man and Biosphere programme. The State Party may also wish to consider an alternative way of securing international recognition for the site's earth science values through recognition under the emerging Geoparks initiative, supported by UNESCO and the international earth science unions.

Notwithstanding the recommendation above, IUCN:

- advises the Committee to commend the State Party for developing strong support among the local residential and commercial communities for the establishment and management of the Pitons Management Area.
- recommends the State Party to:
 - i) Provide adequate staff and budget for the PMA;
 - ii) Complete the process of acquiring additional private lands within the PMA;
 - iii) Complete the operational plan; and
 - iv) Ensure that power generation is not developed in the Sulphur Springs Area.