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REPORT OF THE WORKING GROUP ON APPLICATION OF THE WORLD HERITAGE CONVENTION TO ISLANDS OF THE SOUTHERN OCEAN

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IUCN
The World Conservation Union

To: Jim Thorsell, Senior Adviser Natural Heritage, IUCN

From: Paul Dingwall, Working Group Convenor

Date: 30 November, 1992

Subject: Report of the Working Group on Application of the World Heritage Convention to Islands of the Southern Ocean

With pleasure I attach herewith a copy of the report of the Working Group on Application of the World Heritage Convention to Islands of the Southern Ocean.

While the Group has made some good progress, it has not yet completed all its set objectives.

In the limited time available it has been difficult to bring to completion the work of a widely scattered group of busy people, some of whom have spent considerable periods of time during the course of the work in remote island locations. Thus, it has not yet been possible for all members of the Group to make a fully effective contribution to the task. Moreover, while there is general agreement among Group members with most of the findings in the report, full consensus has not been achieved on all matters.

Notwithstanding the above qualifications, I hope that the report is helpful both to IUCN and to the World Heritage Committee in their understanding of the complex issues involved in applying the natural criteria of the World Heritage Guidelines to islands of the Southern Ocean.

I am also hopeful that the Working Group can continue with its task and complete all its objectives.

Paul R. Dingwall

APPLICATION OF THE WORLD HERITAGE CONVENTION TO ISLANDS OF THE SOUTHERN OCEAN

BACKGROUND

The SCAR/IUCN Workshop on Subantarctic Island conservation, convened in Paimpont, France in 1986, recommended that national authorities consider which islands might be proposed for international designation as World Heritage Sites (Walton, 1986). This was supported by IUCN's Commission on National Parks and Protected Areas, at its 29th Working Session, held in New Zealand in 1987, which considered that IUCN should take the lead role in deciding on the most appropriate candidate sites (Dingwall, 1987).

The call to nations to consider World Heritage nominations for their Subantarctic islands was repeated in Recommendations of the 18th Session of the General Assembly of IUCN, held in Perth Australia in 1990. IUCN's Antarctic Conservation Strategy (IUCN, 1991) went further in suggesting that the Governments concerned should consider a joint review of the World Heritage potential for all islands in the Subantarctic belt, as a basis for concerted conservation action. Subsequently, a second Paimpont SCAR/IUCN Workshop on Subantarctic Island conservation, in April 1992, supported the need for a comparative basis for assessment of World Heritage nominations among Subantarctic islands, and resolved that IUCN should establish a Working Group to assess the natural values of the islands in accordance with World Heritage criteria (Dingwall and Trehen, 1992).

No Subantarctic islands have yet attained World Heritage status. In 1985 Gough Island was placed on an indicative list of sites which the British Government proposed to nominate as World Heritage sites, and a management plan for the island is currently under preparation as a precursor to possible formal nomination. A preliminary case for considering World Heritage status for the five New Zealand Subantarctic island reserves was presented in 1990 (Molloy and Dingwall, 1990).

The Australian Government nominated Heard and McDonald Islands for World Heritage Listing in 1990, and Macquarie Island in 1991. Deferral of the former nomination was based partly on the grounds that, as currently formulated, the proposal did not clearly establish the uniqueness of Heard and McDonald Islands in comparison with other Subantarctic islands. The latter case is still under consideraton.

The work reported here is intended to assist IUCN and the World Heritage Committee in making the desired comparisons.

OBJECTIVES OF THE WORLD HERITAGE CONVENTION

The objective of the World Hertitage Convention, with respect to Natural Properties, is to identify and protect those natural areas which are so unique, or of such "outstanding universal value", that they form part of the heritage of all "mankind" (*sic*).

In order to be inscribed under the Convention, Sites must satisfy one or more qualifying criteria, summarised as follows:

(i) Be outstanding examples representing major stages of earth's evolutionary history.

(ii) Be outstanding examples representing ongoing geological processes, biological evolution and "man's interaction with his natural environment" *(sic)*.

(iii) Contain superlative natural phenomena, formations or features.

(iv) Contain the most important and significant natural habitats for survival of threatened species of animals or plants of outstanding universal value.

Areas must also fulfill certain conditions of integrity, which, in essence, require that sites contain most key interrelated elements; are of sufficient size to be self-perpetuating; possess ecosystem integrity, with the necessary habitat requirements for species survival; and have adequate legal protection and management.

Several difficulties arise in applying these criteria, not the least of which is due to their imprecise definition. This may be deliberate on the part of those who drafted the guidelines, and intended to retain a desirable degree of scope and flexibility in overall evaluation of natural values. In practice, however, it dictates that judgements must rely heavily on an element of subjectivity. Indeed, criterion (ii) relating to assessment of superlative phenomena and exceptional beauty is inherently a subjective issue.

The guidelines have also been criticised for the undue weight given to protection of threatened species and lack of attention to conservation of biological diversity (Synge, 1991).

Some of the conditions for integrity may be unrealistic, particularly when applied to oceanic islands. For example, the requirement to include sufficient habitat to ensure survival of key species would seem to rule out any island Site nomination that failed to include a substantial zone of feeding habitat for seals and seabirds that breed on the islands - and these zones often extend well beyond the boundaries of national jurisdictions.

Further discussion of these and other problems, together with possible solutions, are found in the approach which is outlined below.

PRINCIPLES FOR ASSESSMENT OF SOUTHERN OCEAN ISLANDS

It is suggested that evaluation of the Southern Ocean islands for their potential as World Heritage Sites be approached by agreement on a series of principles, which are set out below along with explanatory notes.

1. That the islands under consideration be the 19 oceanic islands or island groups in the Southern Ocean, listed in Table 1.

This selection excludes islands and island groups within the Antarctic Treaty Area, i.e. south of latitude 60 S, which are subject to international jurisdiction. It does, however, include islands that are the subject of disputed sovereignty, i.e. The Falkland Islands, South Georgia and the South Sandwich Islands, but they are under British administration and management. Definition of the Southern Ocean is after Holdgate (1967), and has as its northern limit the Subtropical Convergence.

2. That, given their diverse physical and biological composition and the vast geographic scope of their oceanic setting, the islands be assessed for their World Heritage values in comparison with islands of similar biogeographical character, as categorised in Table 1.

The island lie within the Insulantarctica Province in a global biogeographical scheme designed specifically as a basis for conservation management planning (Udvardy, 1975). There is general agreement in the conservation and scientific communities

(Clark and Dingwall 1985; Smith and Lewis Smith 1987), endorsed by Udvardy (1987), that three distinct zones can be identified in this Province, as follows:

* **Cool-temperate** - situated between the Subtropical and Antarctic Convergences;

* **Subantarctic** - in the vicinity of the Antarctic Convergence; and

* **Maritime Antarctic** - well south of the Antarctic Convergence.

Details of the climatic and vegetation characteristics of islands in each zone are contained in the references cited above.

It must be appreciated, however, that, as currently formulated, the World Heritage Guidelines allow for nomination of islands on grounds that are essentially unrelated to their location in the Southern Ocean biogeographical realm.

Thus, the Australian Government has argued a very convincing case for the World Heritage listing of Macquarie Island, based almost exclusively on a very literal translation of citerion a(ii) in the Guidelines, *viz* . . "outstanding examples representing ongoing geological processes." A similarly strong case could be made for Heard Island, based on the presence of the spectacular 2745m high peak Big Ben, which is outstanding as one of the world's southernmost active stratovolcanoes. Further, the Auckland Is., Campbell Is. and Antipodes Is. are linked by a pattern of migrating volcanism in the late-Cenozoic, and as such are of outstanding scientific importance for unravelling the volcanic history associated with continental plate tectonics in the S.W. Pacific.

It is questionable, however, whether inscription of these islands as World Heritage Sites on scientific grounds alone is justified according to the philosophical basis and conservation objectives of the Convention - a matter addressed further under Principle 6 below.

3. That either an entire island group or individual islands within an island group may be considered for World Heritage standing.

Island groups are often composed of many islands and islets of diverse size, physical character, biological composition and degree of human modification. In some cases it is this diversity which determines the scientific significance of an island group. Moreover, the conservation values of an island group also may relate to an holistic appreciation of the diversity of existing natural phenomena and conditions.

In some instances, particularly where one or more large islands exist with a variable number of smaller islands, there may be strongly contrasting conservation values within the island group. At the Auckland, Campbell, Kerguelen, Crozet, Prince Edward, Tristan and Falklands Groups, for example, dominant islands bear the marked imprint of human occupation, while offshore islands display varying degrees of modification and some remain essentially pristine.

4. That islands or island groups may be considered as potential World Heritage Sites in combination with other biogeographically related islands or island groups.

This is intended to encourage investigation of the opportunities for designating single World Heritage Sites over several islands or island groups within the same biogeographical zone.

Such combinations may be particularly appropriate where islands or island groups co-exist under the same national jurisdiction and a common management regime. An obvious example is the series of five New Zealand islands - Auckland, Campbell, Antipodes, Bounty and Snares Islands - which are all declared National Reserves, are managed collectively as Nature Reserves under common legislation and administration, and are subject to a uniform management planning process for achieving common management objectives. Similar approaches may be possible using combinations of all or parts of Tristan and Gough Islands, and of the French administered islands (noting that the latter fall within two separate biogeographical zones).

There is also the prospect of promoting international co-operation in World Heritage conservation by forming single World Heritage nominations through combination of islands or island groups under separate national jurisdiction. An example, already suggested (Molloy and Dingwall 1990), is that which would link Macquarie Island with the five New Zealand groups in an Australasian World Heritage Site. These islands are all located in the same sector of the Southern Ocean,they have some biological affinities (especially Macquarie and Campbell Islands),and there is probably a fair amount of shared foraging grounds for seabirds and seals in the waters between the islands, around the western edge of the Campbell Plateau. They have also experienced a closely linked history of human contact, including a shared legacy of biological change induced by a diverse group of introduced animals, now subject to active control programmes.

In addition to fostering joint action between Governments, combined nominations, by allowing collective assessment of the complementary natural attributes and values of islands, may serve to enhance the relative standing of individual islands as potential World Heritage Sites.

5. That in considering World Heritage nominations for islands where marine wildlife is a principal element among outstanding conservation values, careful evaluation is made of the extent to which the marine realm is included within the proposed Site and/or management measures are in effect to protect the critical marine habitats of island wildlife.

Included among the essential integrity criteria for World Heritage Site assessment is the requirement to include key ecosystem elements for survival of biota.

The islands under consideration are by definition oceanic with shared climatic, landscape and biological characteristics shaped by the dominant influence of the sea (Wace, 1977). The islands support enormous populations of marine birds and mammals, which feed and spend most of their lives at sea, coming ashore only briefly to rest and breed. They may also have a profound influence on soil and vegetation development by importing nutrients from the sea. Account must be taken, therefore, of the ecological interdependence between the land and the sea.

Currently, there are no comprehensive provisions for protecting marine environments around Southern Ocean islands, and there are no formally declared marine reserves. A comprehensive marine reserve proposal for Macquarie Island has recently been prepared, and there is a proposal to establish a sanctuary for the Hooker's sealion at the Auckland Islands. In some instances, island reserve boundaries include the intertidal zone, and protection measures may extend to a limited territorial zone offshore. However, because most pelagic seals and seabirds forage outside Territorial waters, and especially during the non-breeding season even beyond 200 nm economic fisheries zones, the absence of a surrounding marine reserve cannot be too prejudicial in assessing and island's case for World Heritage listing. Some regulation of human activities in marine areas may, never the less, be an important conservation reqirement.

There are instances of regulation of human activity in waters surrounding islands which are intended as an indirect means of island protection. Thus, controls on mooring of vessels exist primarily to prevent illegal entry into reserves and accidental introductions of alien biota, particularly rodents.

There are also examples of limits on commercial fisheries, notably around the New Zealand and French islands and South Georgia. Seven of the island groups lie within the CCAMLR region (bounded approximately by the Antarctic Convergence), which regulates the exploitation of marine living resources on the high seas, and includes provision for designation of special protection areas - though no such areas have yet been designated.

6. That, in considering which islands or island groups may merit World Heritage status, emphasis be given to assessment of their comprehensive value to science and global heritage conservation.

The focus of the World Heritage Convention is on features which are symbolic of the whole of nature (or culture). The emphasis is thus on matters of broad scale and universality, not on the scientifically narrow, specific or obscure. Ideally, then, islands or island groups attaining World Heritage status, and thus rated as of "outstanding universal value", will satisfy more than one of the criteria used to measure natural value.

The Operational Guidelines specify that properties proposed for World Heritage listing need to meet at least one of four criteria. This does not necessarily imply that those meeting more than one criterion are more significant. Nor does it suggest that those meeting only one will consequently be regarded as of World Heritage quality. Conditions relating to the integrity of proposed sites will clearly play a vital role in these decisions.

But, above all, the criteria should be interpreted in the light of the objectives and intended purposes of the Convention - and these require that conservation principles and protection status be paramount considerations. It is scarcely conceivable, for example, that an island would merit inscription under an international conservation accord if, notwithstanding its legitimate claim as an outstanding representative of global geological evolution (Criterion (i)), it carried a undistinguished cargo of animals and plants, or had a natural environment degraded beyond redemption by human-induced change.

7. That, to assess which islands may qualify for World Heritage status, a comparative approach be adopted, using means which are objective, qualitative and uniformly applicable among the islands, within the limitations of the Guidelines.

There are many ways in which the criteria might be interpreted to establish the relative World Heritage values of the islands. For example, the means used might be either qualitative or quantitative, subjective or objective, or some combination of these extremes. Given the imprecise and inherently subjective nature of the criteria, as noted earlier, it is likely that a qualitative approach will be more successful than one that is numerical. Ideally, any approach taken will be objective and able to be applied universally.

Some constraints in using the criteria for comparative purposes

Notwithstanding the desirability of a comparative approach, in practice some of the criteria may present considerable difficulties in this regard. **Criterion (i) and (ii),** for example, which relate to evolutionary history and processes, may be impossible to measure in ways that make comparisons possible. Each island is unique in its geological origin and development. The great distances between islands means that their vegetation communities develop in relative isolation, and there is little gene flow among island bird populations.

There is also the difficulty of deciding the scope of each of these criteria. A temporal approach can be taken, with criterion (i) regarded as refering to past evolution and criterion (ii) to ongoing evolution. Alternatively, the former could be regarded more in terms of geological evolution, and the latter more in terms of biological evolution (c.f. Molloy and Dingwall, 1990). Further, Synge (1991) has suggested that a division might be made according to major sectors of natural history such as geology, biodiversity and human interaction.

For practical purposes, each island or island group may have to be assessed on its own merits in its representation of global evolutionary development. It should , however, be possible to establish some key parameters, such as the tectonic setting of the islands, their relation to centres of biological endemism or biodiversity, the differences between island biota and their surrrounding continental areas, and the presence of animals and plants at the extreme geographical or ecological limits of their distribution. There is also the possibility of identifying infrequent cases of geological or biological associations among neighbouring islands, such as the volcanic linkages among the New Zealand islands, which will give a scientific coherence to composite island World Heritage proposals.

Interaction between human societies and nature on the islands is not likely to be a particulary fruitful criterion as most of the islands are uninhabited. Moreover, human contact with the islands is relatively recent by world standards, covers a narrow timespan, and has been transitory and almost universally exploitative and destructive in its impacts on nature.

This is not to suggest that we overlook the special attributes of human adaptation to island settlement and resource use, as at Tristan da Cunha or the Falklands. There are

also some fascinating patterns revealed in the history of human contact with islands, such as at Macquarie Island and some of the New Zealand islands, where human history, in microcosm, closely mirrors that on the neighbouring mainlands. The national significance of these is such that the potential for nominating some islands under the World Heritage cultural criteria, or at least joint natural and cultural criteria, should not be entirely discounted.

Criterion (iii), which relates essentially to natural beauty, is also hard to measure for comparative purposes. Judgements about beauty and other aesthetic values are inevitably personal and involve a complex array of cultural, historical, spiritual and social factors. To search for objectivity in assessing and comparing superlative natural phenomena, and features or areas of exceptional natural beauty is, therefore, likely to be a futile one, and as Synge (1991) suggests an ultimately contradictory approach.

It may be possible only to identify the key paramenters of the landscape and biota to be included under this criterion. Thus, scenic grandeur of high mountainous islands, the strong relief of glaciated landscapes, the presence of ice caps and glaciers, and the text-book examples of volcanic formations and landscapes are examples. A reasonable, but far from exhaustive, guide to outstanding values of island biota, in terms of this criterion are:

* the presence of colonies of countless numbers of birds, e.g. penguins at Macquarie Island;

* the huge biomass of seabirds at some islands, e.g. at the Snares Islands;

* the great diversity of indigenous plant or bird life, e.g. Iles Crozet reputedly host more breeding species (36) of seabird than any other island group in the world;

* a great abundance of birds of one species, e.g. South Georgia has more than 50% of the world population of Macaroni penguin; and

* the presence of rare, endemic, or specially adapted species.

With respect to **criterion (iv)**, which deals with threatened species habitats, there can be little disagreement with Synge's (1991) judgement that this is not a very helpful criterion for assessing World Heritage values in island situations.

There is an inherent flaw in it, which creates a contradiction. Thus, islands with most threatened species and habitats are likely to be those most affected by human contact, either through direct effects or via plants and animals associated with human settlement. Such islands are also bound to be the most degraded natural environments, so will almost certainly fail to satisfy the requirements for ecological integrity.

There is also the difficulty of establishing which species are threatened, and to what degree, despite the listings in Red Data Books. As Johnston (1985) points out, for example, the fact that some island bird populations are extremely small does not necessarily signify that the population is endangered. The Heard Island shag, whose population has remained at less than 100 pairs over at least the past 30 years, appears highly successful. Among rare marine mammals, the entire world population of Hooker's sea lion, which breeds only at the Auckland Islands, is probably less than 15,000 individuals, but it appears to be stable or increasing in size.

It may be more helpful under this criterion to rank islands using some qualitative measure of the degree of modification of natural ecosystems, as is adopted in the directory of Southern Ocean island protected areas (Clark and Dingwall, 1985).

Employing a simple scoring scheme, this assesses factors of human habitation, exploitation of indigenous fauna, and introduced flora and fauna (especially land mammals) to derive a three-fold rating for overall degree of modification. A range of scores denotes an island group with varying degrees of modification among its islands.

Superficially, this may appear a crude and arbitrary measure, but it has some valuable attributes. It is comparative, it treats a number of factors in aggregate, and it is essentially objective, while retaining some degree of subjectivity in keeping with the general approach of the Guidelines.

It also highlights those islands that remain in an essentially unmodified state. In a world where natural ecosystems of the greatest majority of oceanic islands, especially the larger ones, are severely impacted by human settlement and resource use, an argument can be advanced that such unmodified islands are of outstanding universal value. They are worthy of serious consideration for World Heritage status on this evidence alone.

Southern Ocean islands in this category include: Heard and McDonald Is.; outliers in the Crozet Group (Ilots des Apotres, Iles des Pingouins, Ile de l'Est) and the Kerguelen Group (Iles Nuageuses); Antipodes Is.; Bounty Is.; Snares Is.; several islands in the Aucklands Group (Adams I., Disappointment I., Dundas I.); Prince Edward Is.; Inaccessible I. in the Tristan Group; Gough I.; several outlying islands in the Falklands (e.g. Jason I.); South Georgia; S. Sandwich Is.; and Bouvetoya.

Alternatively, or additionally, one could use measures of biological diversity to establish a priority ranking among islands, as Synge (1991) suggests.

This might involve listing for each island the total, indigenous, introduced (alien) and endemic species for each of the main taxonomic groups - terrestrial and marine mammals, birds, macro-invertebrates, and vascular plants. Overall quality of the islands could then be judged according to the totals revealed, which could be qualified by calculating alien and endemicity factors on a percentage basis. Cooper and Brooke (1986) have attempted a similar approach in assessing the conservation status of Marion Island. A preliminary tabulation of island vascular plant species is included below (Table 2) for illustrative purposes.

This is a potentially useful approach, but it is fraught with difficulty and unlikely to be satisfactory on its own. The problems which arise are of at least three kinds - scientific, methodological and management related.

Among the scientific questions -

* The use of statistics implies a completeness and precision in the data which may be unwarranted. Data are incomplete and of varying reliability among the islands for all taxonomic groups - particularly the invertebrates which are probably not well enough known for comparative purposes.

* Considerable taxonomic imprecision remains for some island biota, and there is a need to decide on the appropriate degree of taxonomic distinction to use - species or sub-species. Johnstone (1985) notes, for example, that the evolution of insular bird

forms in isolation creates a complex taxonomy, and an associated tendency to view every island population of a species as taxonomically distinct.

* Simply considering the presence or absence of alien biota ignores the relative significance of their impact on indigenous biota. Some introductions, such as self-introduced passerines, may be essentially benign in their impact. The introduction of mammalian predators and herbivores, on the other hand, is often explosive in its impact on native species. In a realm where the only significant indigenous land predator is the skua, the introduction of any terrestrial predator is likely to be profoundly destructive in its effect on native fauna. Even within faunal groups there is much variabilty of impact - mice generally pose a lesser threat than rats, for example. The history of introduced plants on islands suggests that most introduced species do not become "naturalised" and widespread. For example, the Auckland Is. and Campbell Is. have, respectively, 41 spp. and 81 spp. of introduced plants, but, with the possible exception of Olearia lyallii at the Auckland Is., none is considered a threat to indigenous vegetation communities.

* How do you balance the relative weighting of population size vs number of species supported on an island, and how important is endemicity relative to species diversity? Thus, South Georgia has neither endemic plants nor birds but supports 31 million pairs of 26 different species of seabird.

Among the methodologial questions -
* Is the range of scores among the islands for factors such as endemics and introduced aliens large enough to be of use for comparisons?

* In deriving an overall biodiversity ranking for an island, there is a need to devise a system for relating and weighing the total scores among the various elements. Thus, does the lack of aliens rank higher or lower than the presence of endemics?

* In overall assessment of outstanding natural value, how do you equitably rate those criteria that are scored numerically against those scored on a subjective basis - biodiversity at one extreme and scenic grandeur at the other, for example?

Among the management related questions -
* A simple listing of aliens pays no attention to the implementation and liklihood of success of eradication and control programmes, whether recent, ongoing or planned. There is much activity in this regard. Recently, feral goats and cattle have been removed from the Auckland Is.; sheep and cattle from the Campbell Is.; cattle from part of Ile Amsterdam; and cats from Marion I. Campaigns for eradication or control are underway or planned for rabbits, cats and wekas on Macquarie I. (wekas may have been eliminated); for rabbits on some islands in the Kerguelens; for ungulates from Kerguelen I.; and for pigs and rabbits from the Auckland Is. There has been conspicuous recovery of indigenous vegetation communities at the Campell Is. following sheep removal; and at Macquarie I. associated with rabbit control. At Ile Amsterdam recovery is aided by a plant restoration programme.

* The presence of strict plant and animal quarantine measures, such as at the New Zealand islands and at Macquarie I., are a major influence on the liklihood of new introductions or re-introductions of aliens, and must therefore be taken account of in overall measurement of the value and security of island biota.

These and other management related questions logically form part of the required evaluation of ecological integrity. The World Heritage Operational Guidelines offer little help in providing a consistent means of measuring this criterion.

CONCLUSION AND A POSSIBLE SOLUTION

The principles outlined above provide a useful and generally acceptable basis for considering the World Heritage values of islands of the Southern Ocean. They include a critical assessment of the World Heritage natural criteria as they would apply to the islands, which reveals the inherent difficulties presented, both by the criteria and by the character of islands. More questions arise than answers. While there is some indication of which islands might merit consideration for addition to the World Heritage List, the analysis is still insufficient for identifying appropriate candidate islands.

If we are to attempt to make an objective selection of World Heritage candidate islands, then a ranking system of some kind is required. The basis and methodology for such a ranking system are elusive. The imprecision and breadth of the World Heritage assessment criteria complicate the exercise. Any successful ranking method is therefore likely to be a simple one and based on some form of a comparative point scoring system.

One possible solution is to construct a simple matrix by scoring yes/no responses to questions asked of each island against each of the World Heritage assessment criterion. These questions would require a comparison among the islands, preferably within the biogeographic groupings agreed in Table 1. A total of the "yes" scores would thus provide the basis for selection of W. H. candidate islands. The breadth of experience among the Working Group members should enable sufficient objectivity to exclude undue bias in the result.

Possible framing of the questions could be as follows:

In comparison with other islands in the same biogeograhic group;

(i) is the island under consideration an outstanding example representing major stages of the earth's evolutionary history?

(ii) is the island under consideration an outstanding example representing ongoing geological processes, biological evolution or mans interaction with the environment?

(iii) does the island under consideration contain superlative natural phenomena, formations or features?

(iv) does the island under consideration contain the most important habitats for survival of threatened species of animals and plants of outstanding universal value?

This matrix could be expanded by adding scores derived from the analysis of natural ecosystem modification, as suggested under Principle 7 above. Additional questions could also be posed to score some of the other factors addressed by the principles above, such as - the adequacy of protection of the marine environment; the degree of species endemicity in the island biota; and the implementation of control and/or eradication programmes for introduced alien species.

In keeping with Principle 3, above, the listing of islands might be according to individual selection of all important islands rather than according to island group. An element of subjectivity might be required in reviewing the overall scores, to ensure that no obvious candidate island is unduly underrated, or vice versa.

This method suggested in this approach is not perfect and is untested at this stage. But it may offer the best hope of a solution to a selection process, should one be required. It is worthy of trial at least.

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Table 1. Oceanic Islands of the Southern Ocean

Island (Group)	Biogeographic Category	Sovereignty
Tristan da Cunha Is.	Cool-Temperate	United Kingdom
Gough I.	"	"
Ile Amsterdam	"	France
Ile St Paul	"	"
Antipodes Is.	"	New Zealand
Auckland Is.	"	"
Bounty Is.	"	"
Campbell Is.	"	"
Snares Is.	"	"
Falklands/Malvinas	"	U.K./Argentina
Diego Ramierez Is.	"	Chile
Iles Kerguelen	Subantarctic	France
Iles Crozet	"	"
Heard & McDonald Is.	"	Australia
Macquarie I.	"	"
Prince Edward Is.	"	South Africa
South Georgia	"	U.K./Argentina
South Sandwich Is.	Maritime Antarctic	U.K./Argentina
Bouvetoya	"	Norway

Table 2. Vascular plants of Southern Ocean Islands

Island (Gp.)	Total	Indig.	Introd.	%Introd.	End.	%End.
Tristan	140	40	100	71.4	-	-
Gough	47	35	12	25.5	-	-
Amsterdam	?	?	?	?	?	?
St Paul	?	?	?	?	?	?
Antipodes	63	62	1	1.5	4	6.5
Auckland	231	190	41	17.7	-	-
Bounty	-	-	-	-	-	-
Campbell	218	137	81	37.1	-	-
Snares	20	18	2	10.0	1	5.6
Falklands	355	163	92	25.9	-	-
Diego Ramierez	8	?	?	?	?	?
Kerguelen	36	?	?	?	2	?
Crozet	?	?	50	?	?	?
Heard/McD.	11	15	1	6.3	-	-
Macquarie	45	35	5	12.5	3	8.6
Prince Edward	32	22	10	31.3	1	4.5
S. Georgia	80	?	?	?	2	?
S. Sandwich *	58	58	-	-	?	?
Bouvetoya *	70	70	-	-	?	?

(Note: * Cryptogamic plants)

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