



**PROJECT FOR THE CONSERVATION AND SUSTAINABLE USE  
OF THE MESOAMERICAN BARRIER REEF SYSTEM  
(MBRS)**

Belize – Guatemala – Honduras - Mexico



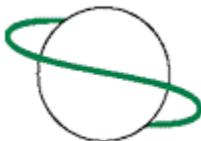
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**Environmental Interpretation Manual  
for Protected Areas in the Mesoamerican Barrier  
Reef System Region**

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## PROLOGUE

**Environmental interpretation** is an environmental education activity which examines and reveals in an attractive way the characteristics of an area and its biophysical and cultural relationships, through direct experiences which generate enjoyment, sensitivity, knowledge and commitment to the values interpreted.

It is an instrument which facilitates the management of sites with potential attractions for visitors (protected natural spaces, archeological sites, etc.) for the purpose of obtaining support from the public for conservation tasks. It seeks to communicate the values of natural and cultural heritage, prevent negative effects, and contribute to the processes of conservation which are being developed in the area.

Environmental interpreters are people (of different ages and a variety of social and educational conditions) who specialize in making an entertaining and critical interpretation of the realities that can be observed in a natural and social area. These interpreters make interesting observations about the ecosystemic, social and cultural dynamics of a place or territory and express them through various communication mechanisms so that visitors can understand these processes globally. Furthermore, they should act as transformation agents for those aspects which are negatively affecting the ecosystems and people who live there.

Environmental interpretation is usually carried out in spaces or routes which facilitate knowledge about nature and the relationship between society and nature in a specific location or region. The creation of Interpretive Centers or Trails or the use of already existing ones is an important support mechanism for the environmental education processes and complements educational possibilities in an important way.

Environmental interpretation is a sphere of action and reflection which in recent years has developed considerably. Many experiences developed in different cultural contexts have demonstrated how through strategies based on communicative processes, it is possible to achieve educational, recreational and management objectives for these capital assets.

Faced with the growing demand for professionals trained for working in this field, and given the evidence of the limited existing training proposals, the Mesoamerican Barrier Reef System Project prepared this Manual with the intention of presenting it as a training tool during the first Environmental Interpretation Workshop.

The objective of this Manual and the corresponding Workshop is to train specialists in the sphere of environmental interpretation, combining theory and practice for the purpose of providing students with broad knowledge of this topic and training them to design intervention projects in this area. The participation of different specialists in designing contents with a marine coastal approach further reinforces this educational project.

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## 1. BACKGROUND

The conservation of Protected Natural Areas contains two key elements: conservation and public use - the establishment of guidelines for the maintenance and preservation of areas of natural-cultural interest with a clear content related to social benefit.

At present it is a matter of gaining people's support and participation, based first of all on knowledge and understanding of the problem and consequently awareness for permitting a generalized change of attitude which can be positively channeled for the benefit of nature and man.

The search for creative management plans for natural resources which promote the local population's earning capacity for protecting protected areas, and the creation of economic policies at the regional level which will promote the conservation of these areas as an important national economic resource, have an alternative in tourism in protected natural areas.

Tourism could be a way of increasing the financial resources of the areas and improving their administrative capacity, allowing them to become self sufficient. To achieve these goals it is necessary to use a tool to establish communication between the natural/cultural element we wish to protect and the visitors (receivers of the interpretation) whose level of awareness can be raised in the search for support for the main objective, which is to maintain biological diversity.

In this context Environmental Interpretation is one of the most successful ways of forming conservationist awareness, and it is defined as an educational activity which aims to communicate meaning and relationships through the use of original objects, by direct experience and by illustrative methods, rather than simply communicating real information.

This discipline has objectives designed to guarantee learning, understanding and motivation of the receivers for achieving a change in behavior and support which will facilitate fulfillment of the management goals of protected areas for the conservation of their resources; furthermore it can provide considerable benefits for these areas.

This is why we consider that our society, in order to conserve nature, needs to achieve the involvement not only of the entities which are directly or indirectly linked to the use of the natural resources, but also of the whole population who in general can contribute to the maintenance of our biological diversity.

In this context, Environmental Interpretation can contribute to gaining a considerable number of benefits which would otherwise be difficult to achieve. This Workshop is an effort to achieve these goals in ecosystems with high natural values; the Mesoamerican Barrier Reef System and its objectives are: to study aspects related to Environmental Interpretation for their subsequent use in projects, revising and synthesizing the existing information on the area of study with a view to using it in the interpretive sphere and implementing an interpretive trail project *in situ* as a case study for the Workshop.

## 2. ENVIRONMENTAL INTERPRETATION

### 2.1 What is Environmental Interpretation?

Many people are familiar with the word interpretation; however, this word can have a broad range of meanings for different individuals, varying with their education, training or professional experience as interpreters (Veverka, 1994). Many authors have presented their criteria on Environmental Interpretation, so there is no single definition, but many exist, each with a different approach.

Freeman Tilden (1957): "Interpretation is an *educational activity* which aims to bring meaning and relationships through use of original objects, by firsthand experience with the resource or by illustrative media, rather than simply to communicate factual information." (Use of the phrase "educational activity" has led to a lot of confusion, even becoming controversial for decades. Freeman Tilden himself stated later, shortly before dying, that if he were to revise his book again, he would start his definition with: "it is a recreational activity...")

Don Aldridge (1973): "Interpretation is the art of explaining man's place in his environment, for the purpose of enhancing visitor awareness of the importance of this interaction and awakening the desire to contribute to the conservation of the environment." (Aldridge is considered to be the pioneer of interpretation in the United Kingdom and the rest of Europe.)

Yorke Edwards (1976): "Interpretation has four characteristics which make it a special discipline: it is attractive communication, it offers concise information, it is presented in the presence of the object in question, and its objective is to reveal a meaning." (A very convincing definition and not at all rhetorical, adopted by many professionals in Canada.)

Bob Peart (1977): "Interpretation is a communication process designed to reveal meanings and relationships of our cultural and natural heritage to the public through first hand involvement with an object, artifact, landscape or site."

Hammitt (1981) also emphasizes some fundamental components which sometimes fail to be explicit in the definitions. The recreational element, for example, should be prominent in all interpretive approaches; the inspiring experience should be offered, collating cognitive and affective components, since the latter will notoriously influence the former.

Paul Risk (1982): "Interpretation, either through talks or other methods, is exactly what the words mean: the translation of technical and often complex language of the environment into a non-technical form –without losing meaning and precision- for the purpose of creating sensitivity, awareness, understanding, enthusiasm and commitment in the visitor."

According to Morales (1983): "interpretation aims to explain rather than inform, reveal rather than show, and awaken curiosity rather than satisfy it. It is a way of educating without the public feeling that they are the object of an educational activity, and it should be sufficiently suggestive to stimulate the individual to a change of attitude or the adoption of a specific position. Furthermore, Environmental Interpretation should be recreational: to ensure that there is no initial rejection of the interpretive proposal."

According to Sharpe (1988): "interpretation is a service for visitors to parks, woods, refuges and similar recreational areas. Although visitors come to these areas to enjoy rest and inspiration,

they might also wish to learn about the area's natural and cultural resources. These resources include geological processes, animals, plants, ecological communities, history and prehistory of man. Interpretation is communication which links the visitor to these resources."

Chaverri (1988) indicates: "Environmental Interpretation is a means of human communication and at the same time an art which tries to translate and explain the characteristics of the environment to man," taking into account that not only does it refer to natural characteristics, but also historical, archeological, cultural and others, so it is applicable in other non natural environments, for example, museums, historical cities, etc.

Sam Ham (1992) proposes that EI involves the translation of the technical language of a natural science or related area into terms and ideas that lay people, non scientists, can easily understand, and it involves doing so in a way which is entertaining and interesting to them.

Veverka (1994) emphasizes the fact that interpretive communications do not only consist of presenting a series of coherent data, but in developing a specific communication strategy for translating this information for other people, thus converting specialist technical language into the ordinary language of the visitor.

Rideout-Civitarese, Legg and Zuefle (1997): "Interpretation is a communication activity designed to improve the quality of the visitor's recreational experience and agreeably inspire a greater appreciation of the resource."

Environmental interpretation is not simply information, it is a communicative process through which direct contact with the resource and other media and the use of techniques aim to awaken the interest, change the attitude, and achieve the visitor's understanding and enjoyment in relation to the resource being interpreted, establishing direct contact between the visitor and the resource.

However, from all these definitions we can conclude that in essence, environmental interpretation could simply and clearly be: "*translation of the language of nature into the language of human beings*".

## **2.2 The Origin of Environmental Interpretation**

Environmental Interpretation is not completely new, although the use of the term interpretation is more recent, according to Aldrige (1975). In 1919 the US National Park Service started to develop a certain type of guided activities for visitors. At the same time, in South Africa, the first maps and guides for visitors to the National Parks were produced. In the 1930s, interpretive programs were already established in the National and State Parks of the USA, supported by conservationist organizations and by administrators. After the Second World War, the idea and philosophy of interpretation gained impetus and started to become official in newly created North American parks (Weaver, 1982).

After the publication and dissemination of Freeman Tilden's work, "Interpreting Our Heritage", in 1957, Environmental Interpretation flourished. Interpretation is, however, an act of cultural transfer which may be as old as humanity itself, since in many cultures we can find examples of its application, although it was only defined and named as such less than one hundred years ago.

It was not until the 1960s that interpretation flourished in Latin America, when considerable progress was made in planning. The first knowledge was applied by North America in the Galapagos Islands, and subsequently Latin American public officials who received training and began to implement this discipline.

Currently the development of the interpretive philosophy and techniques have involved not only those related to natural areas, but also the whole range of cultural, artistic, historical and social aspects which make up the heritage of a place, region or country and which are worth conserving for future generations.

### 2.3 Objectives of Environmental Interpretation

During the planning and design of any interpretive project, one of the most important stages of the planning process is frequently forgotten or ignored, although it is the most important aspect of planning. This aspect is the development of objectives that the project has to fulfill. Without objectives, the “success” of a project cannot be guaranteed, since this is directly linked to the fulfillment of project objectives and not to the number of users or visitors.

An interpretive objective describes what one expects the visitor to learn, feel or do as a result of the program or activity. The establishment of interpretive objectives is the “aim” of its responsibility to the visitor. One should remember that objectives need to be “measurable” (for example, 80% of the visitors will be capable of naming three types of habitat after completing the self-guided interpretive trail) (Veverka, 1994).

#### **Types of interpretive objectives:**

Learning objectives – These are things that the visitor would be able to make a note of, identify, etc. For example: “The majority of visitors will be capable of describing the biodegradation process of three articles commonly found in trash (a soft drink can, aluminum foil, paper) (Veverka, 1994).

The essence is to give the visitor pleasure and education (Moore et al., 1989). Interpretation should help to make the visit a rich and pleasing experience (Sharpe, 1988), to increase the visitor’s enjoyment so that a better understanding of the place will increase the pleasure derived from the visit (Moore et al., 1989).

In this regard:

“The purpose is not to sell places, but to offer rich and satisfying experiences ...” (Tilden, 1977).

“The task of the interpreter is to help ... to inhale freshness and vitality in our appreciation and our knowledge of the world around us” (Steve Van Matre; quoted by Quinn, 1995).

Behavioral objectives – These are the “amortizing” objectives ... the real purpose of the project, for example:

The majority of visitors will not throw litter on the ground.

The majority of visitors, who find trash in the picnic area, trail, etc, will pick it up (Veverka, 1994).

Interpretation creates an awareness of conservation in those on the receiving end (Moore et al., 1989).

Emotional objectives – It will not usually be possible to achieve the behavioral objective without achieving the emotional objective. The visitor has to feel that this behavior is important to him, that he understands and accepts the reasons for this behavior or change of attitude. An example of an objective of this kind could be the following: the majority of visitors will feel that trash reduces the level of enjoyment (or that of his children) of the resource and that throwing litter on the ground is a repugnant act (Veverka, 1994).

Management objectives – These can facilitate the fulfillment of management goals. In the first place, interpretation can encourage the appropriate use of recreational resources by visitors, helping to reinforce the idea that Parks are special areas requiring special behavior. This objective is especially sustained by the previous ones. And secondly, it is very important that interpretation be used to reduce human impact on resources to a minimum, guiding people outside fragile areas or areas which have deteriorated through use, to areas which can resist use better (Sharpe, 1988).

Any intention to provide interpretation implies having a very clear goal, one which is common to other management activities of an area: the conservation of its natural resources. This conservation can be achieved mainly through respect and citizen participation, which is what interpretation, seeks to achieve (Aldrige, 1973; quoted by Morales, 1992). Here it is evident, in accordance with Veverka's proposals (1994), that the most important objective that the planner should consider is the behavioral objective, and in this context he asks ... if you are not interested in obtaining a change of attitude or behavior (so visitors will "use" the knowledge that is being shared with them), why are you implementing this project?

## **2.4 Principles of Environmental Interpretation**

Authors such as Freeman Tilden (1977; quoted by Quinn, 1995) and Steve Van Matre (s.a.; quoted by Quinn, 1995) have defined the principles of Environmental Interpretation. They indicate: interpretive activities should be related to something in the visitor's personality or experience. In relation to this, Aldrige (1975; quoted by Morales, 1992) argues: the individual is not prepared to understand and be motivated by everything the interpreter or media communicate to him. Explaining natural processes through an individual's relations with human history can be a way of getting him to understand a topic, thus managing to motivate someone who is not especially attracted to nature and getting him to somehow identify with the place.

Although it is true that information is not interpretation, it is also true that interpretation includes information and is in fact a revelation based on information.

Interpretation is an art which combines many arts and the best interpretation is that which is done in an atmosphere of directed discovery, managing to give a tangible and concrete description. The names of plants and animals should be visualized as part of the audience's participation and not as the cause of their participation. It should also be done by adding some "meaning to life" for the audience at the beginning and at the end.

Rather than instruct, it has been said that interpretation should stimulate, awaken curiosity and reveal what at first appears to be insignificant. It should be directed to each type of public and not be, for example, for children a diluted version of the adult presentation. Interpretation should in turn be a presentation of the whole, rather than of separate parts.

## **2.5 Benefits of Environmental Interpretation**

Some benefits might be the following:

- 1- Direct contribution to enriching the experience of visitors.
- 2- Giving visitors an awareness of their place in the environment and facilitating their understanding of the complexity of coexistence with this environment.
- 3- It might reduce the unnecessary destruction or degradation of an area, also resulting in lower costs for maintenance or restoration on stimulating the concern and interest of visitors.
- 4- It is a way of improving institutional image and establishing public support.
- 5- It will instill in visitors a sense of pride in the country or region, their culture or heritage.
- 6- Collaboration in the promotion of an area or park where tourism is essential for the economy of the zone or country.
- 7- Motivation of the public to take actions to protect their environment in a logical and sensitive way.
- 8- It might generate funding for management activities in protected areas.
- 9- It might create employment for local communities in the visitor centers, as Interpretive Guides, in trail maintenance, the production of handicrafts, souvenirs, etc.

## **2.6 Interpretive techniques**

In the context of environmental interpretation, technique is understood as “the application of an idea which can be used to increase the public’s awareness and understanding through a less tangible method than the use of the specific communication media; usually the technique is associated with several of the communication media and might include several combinations of these media” (Pennyfather, 1975; quoted by Morales, 1992).

Perhaps attractive techniques should be used to channel the desires of the public towards developing some activity related to our interpretation programs, since we should not assume that the visitor to natural areas is seeking something similar to interpretation as a preconceived activity; so some effort should be made to instill the value of Environmental Interpretation in the public’s desires for activity (Morales, 1992).

There are some techniques which with a little imagination can be put into practice in any environmental context, whatever the media used for interpretation. Some of the most common techniques, according to Pennyfather (1975; op.cit.), are described below.

### **Encouraging participation**

In this case the interpreter and the media used stimulate the public – generally accustomed to glass cases in museums or texts in a panel – to touch, handle or use the objects in an exhibition. It is the opposite of the well-known “do not touch” and should be interactive. This is not only valid for objects on exhibition in a museum: any natural object in its original context should be an incentive to participate or to “do something”. If certain aspects of trees are being explained, the individual should be encouraged to touch and smell the bark of the trees. The visitor should be invited to listen to birdsong or the sound of a stream, and even to drink the water from it. It is evident that this technique – learning by doing – is one of the most successful resources in the learning process.

### **Provocation**

This does not mean irritating the visitor. It consists only of making him feel a little uncomfortable, obliging him to reflect on a situation and persuading him to provide his own solutions to the problem of conservation.

The use of mirrors is common in exhibitions, strategically placed in a certain context and in specific themes, and the individual is surprised when he suddenly comes face to face with his own image; the explanation at the bottom of the mirror reads: “The most dangerous animal on earth”, “What would I do if ...” etc.

The use of single phrases, or in combination with provocative photographs (fur coats, an animal in a trap, animals who have died because of pollution, etc.), or phrases or objects (copies of a poisoned animal) can have a notorious impact on the public, causing people to commit to the conservationist cause or adopt a definite attitude.

This technique can also be applied through asking questions, for example, the interpreter – or the media designed by him – might ask: “What would you do with 50 hectares of natural forest?”, or “What do you think this place would look like without trees?”

Foley and Keith (1979; quoted by Morales, 1992) warn however that provocation cannot just leave the visitor in the air; it should be followed by a minimum of information for guiding the person after provoking him. Environmental Interpretation should instruct in some way and provide information about how and where to obtain more details to satisfy the curiosity which has been awakened.

### **Significance for the visitor**

The ideas and principles of conservation are transmitted better if they can be illustrated with facts the public is familiar with. The technique basically consists of making analogies or referring to the presence of the visitor when something is being explained about the place.

In all interpretation reference can be made to human life; ultimately interpretation is carried out because of man ... and for man. Even natural processes can be analogous to human processes. One can say of a leaf that it is the real “sugar manufacturing industry”, of a volcano that it is “like a pimple on our skin”, and “if the earth were like a football, its crust would be as thin as a sheet of paper”, etc.

### **Thematic approach**

The “thematic” procedure can be a technique if it incorporates part of the weight of the interpretation. In this case, everything should be related to a central idea which gives cohesion to the parts and reinforces the message, as well as permitting it to be easily related to the visitor’s personal experience (Beckner, 1974; quoted by Morales, 1992). On selecting the theme in the initial planning stages, the real interpretive capacities of a place or event should be considered, and themes should not be forced that might be place doubt on it or question it.

In the case of the “thematic” technique this will have to be presented in a novel, inspiring and especially clear way, so it should be attractive right from the beginning.

### **Graphic representation**

Graphic techniques make it possible to give a visual image of the interpretive content to better illustrate the information. Combinations of colors, types of letters and systems of graphic representation should be attuned to the theme and the characteristics of the place. Aesthetics should play a functional role here, so that illustrations do not conceal the message; it should be noted that graphic representations are not an end in themselves, but rather the means for fulfilling this stage of the process.

### **Use of humor**

Humor is always a particularly effective tool because of the enthusiasm with which it is received by the public. Even though it is not easy to transmit great ideas in a jovial way, the interpretive planner should consider the use of humor at least on a small scale and with subtlety, although one should bear in mind that this may be difficult.

Some opportunities can be found to include humor in small details which clarify the global idea and a whole topic can even be dealt with using humor. But the important thing is to remember that people tire of humor and it could be misinterpreted. In small doses and with good advice, we can resort to it when appropriate.

Other elements mentioned as techniques are: sequences, the creation of an adequate climate, analogy, irony, suspense, mystery, melodrama and surprise.

## **2.7 Forms of Environmental Interpretation**

According to Ham (1992) and Stewart (1981; quoted by Morales, 1992), interpretive forms can be divided into two large groups: personalized or guided, and non-personalized or self-guided, both names being used interchangeably by different authors. The first group, the guided form, is developed in direct contact between the public and an interpreter or guide. This form includes: talks, excursions (such as guided trails and excursions to sites), live interpretation and the mass media (educational events, formal and informal community education programs). The second group, the self-guided form, will develop without the intervention of any member of the staff, but rather through different objects and resources. It includes exhibitions which can be outdoors or in the Visitor Center, excursions on trails where interpretation will be through pamphlets, signs or audio equipment; it also includes publications and audiovisual programs.

## 2.8 Interpretive potential

Characteristics with interpretive potential are defined in the initial stages of a planning process and interpretive preparation is better done in the same place where these characteristics can be found (Spangle and Putney, 1974, and Stanfield, 1981; quoted by Morales, 1992). The interpretive characteristics are all the objects, processes, phenomena or concepts which are worth being interpreted or which have interpretive importance (Morales, 1992).

The interpretive potential exists when a variety of important features and environments can be seen. If there are no changes, it is often boring. Trails which lead people to places with special or outstanding features have even more interpretive potential (Ham, 1992). These features might inspire people to name them (for example, "The Solitary Tree Mystery", "Two Cave Trail") (Ham, 1992). According to Sharpe (1982; op. cit.), an interesting feature could be used to lure people into visiting the trail, and so increase the number of people that can be reached.

### Significant features for interpreting

<p><b>Bodies of water</b>  <b>Geological formations</b>  <b>Waterfalls or springs</b>  <b>Endemic species</b>  <b>Fauna observatories</b></p>	<p><b>Sites affected by natural disasters</b>  <b>Unusual or significant habitat in the region</b>  <b>Fossil outcrops</b>  <b>Historical events</b>  <b>Beauty spots</b></p>
<p>Not all the sites will necessarily have a really outstanding feature. The important thing would be perhaps to fulfill the objective for which the interpretive project was created, finding the interpretive potential in ordinary situations.</p>	

It is important to emphasize that an interpretation away from the site can be successful, awakening in the public the desire to conserve the area, but it will also surely awaken the desire to "go and see", and this could be counterproductive if it increases pressure on vulnerable areas (Aldrige, 1975; quoted by Morales, 1992).

One should also bear in mind that interpretation should be carried out where needed and not just anywhere, since many places do not require any type of interpretation, as in the case of certain landscapes whose aesthetic components speak for themselves and any kind of interpretation here could be very intrusive. Fernández and Morales (1981) illustrated this, "... to stand on the edge of the Grand Canyon in Colorado is to feel a spiritual elevation which would reject any human description of this huge abyss". Neither should one interpret, unless *in situ*, places which are ecologically fragile or delicate from the historical or archeological viewpoint; this could lead to an increase in visits and thus accelerate their degradation (Morales, 1992).

Finally it is a fact that the public will continue to visit places without taking into account their fragility or resistance, so if taken into consideration beforehand, interpretive planning can be useful for solving serious and acute problems of human pressure in an area (Aldrige, 1975; op. cit.).

### 2.8.1 Criteria for evaluating interpretive potential

For interpreting large areas, some evaluation criteria for the interpretive potential of the sites should be organized, so that it will be possible to establish operational priorities later. Badaracco and Scull (1978; quoted by Morales, 1992) propose a "matrix for evaluating interpretive

potential” (Table 1). This relative value can show where to direct priority actions (Morales, 1992).

Table I. Matrix with modifications for evaluating interpretive potential according to Morales and Herrera (1986.)

Criteria	Good	Moderate	Bad
. <b>Uniqueness</b>			
. <b>Attractiveness</b>			
. <b>Resistance to impact</b>			
. <b>Access to a diverse public</b>			
. <b>Current influx of people</b>			
. <b>Instructional representativeness</b>			
. <b>Coherent subject matter</b>			
. <b>Seasonality</b>			
. <b>Facility of infrastructure</b>			

**Uniqueness** – This refers to the frequency with which the feature or value appears in the area or park. Uniqueness indicates the level of intrinsic importance of the place – or feature – in relation to the whole area. Normally the more unique or significant the site, the greater its interpretive potential.

**Attractiveness** – The capacity of the resource or site for awakening the curiosity and interest of the public. The more interesting the site in the eyes of the visitor, the higher its score.

**Resistance to impact** – The capacity of the resource or site to resist pressure from visitors and use. This capacity depends on the substrate, on the ecological characteristics of the site and on the fragility of the resource.

**Access to a diverse public** – This refers to the physical possibility the place offers for a wide variety of visitors. Certain places, for example, the steepest ones, fail to permit access to the elderly, children and the physically disabled. So the interpretive potential would be directly affected by this reduction of the possibility for direct access.

**Current influx of people**- This is the number of estimated visitors concentrated at any particular time in the resource or immediate surroundings, either due to the interpretive feature itself or for other reasons.

**Instructional representativeness** – Facilities offered by the place for explaining to the visitor in understandable, graphic and schematic terms.

**Coherent subject matter** – The place should offer the opportunity to deal with subjects or content in accordance with the general themes of the park or area, and these themes can be inserted into a general program.

**Seasonality** – This refers to the time or period when the feature is available to the visitor throughout the year. This can be due to climate, biological or conservationist factors.

**Facility of infrastructure** - Facilities offered by the site for adapting to visitors, considering its current state of access, conservation and information.

### **2.8.2 Selection of the type of interpretation**

According to Sharpe (1982), the interpretive planner should choose what interpretive form or method to use: Interpretive Center, Interpretive Trail, Publications, etc. This decision can be more effective and appropriate after answering these questions: What has our traditional policy been in relation to type of interpretation? Who will our public be? What can we expect with regard to security of the infrastructure or equipment used (environment, vandalism)? How much money do we have for the interpretive media? Will signs be intrusive in this site? Do we feel it is important to provide a souvenir of the Park? And others.

### **3. INTERPRETIVE TRAILS**

According to Morales (1992) the interpretive trail or itinerary is a service for the public in general, for the casual visitor to an area, whether it is natural, rural or urban. Its use is generally linked to some type of services, such as Visitor Centers, recreational parks, etc. It is often part of a network of educational services, of protected natural spaces or centers for the conservation of the natural, historical or cultural heritage. The interpretation trail is a means and not an end and as such we should consider it and develop it. The trail becomes one of the most effective means of interpretation. It is especially valid for outside presentations or for those in which real objects or processes can be shown.

A trail is a small path or track which makes it possible to easily and safely go round a specific area. This can be on foot, in wheelchair, on horse, bicycle or, exceptionally, in a motor vehicle.

The trails are one of the best ways of enjoying a protected area at a pace which makes it possible to have an intimate relation with the surroundings. And frequently these are the only means of access to the protected areas.

According to the National Forest Service Manual (1974), the following possibilities exist:

#### **Thematic or Narrative Trail**

A narrative or theme provides coherence to the trail and a point of reference for the visitor to have throughout his visit. However, the trail should respond to obvious questions, so sometimes it is necessary to diverge from the theme.

#### **Miscellaneous trail**

This type of trail interprets different characteristics, but without trying to establish a relation between them. Although it is justified in some sites, it should not be designed until planning indicates if there is any other possibility.

#### **Natural trail**

The purpose is to identify characteristics by means of signs or a pamphlet. It provides professionals or those interested with a study opportunity. Perhaps it would be more appropriate to develop this type of activity as an "area of natural study" rather than as an itinerary. In any case, responses will always be subject to the planning process.

### **3.1 Environmental impacts of trail building in protected areas**

The building and use of trails might imply important modifications to the natural surroundings and affect the conservation objective of the Protected Area. Alterations will depend both on the fragility of the natural environment as well as on the number of visitors and their distribution over time and space. The most common impacts of visitor presence are:

**Impacts on the physical environment and landscape:** the compacting of soils in areas of movement, changes in the drainage network, an increase in erosion, disturbance of river beds, fire risk, the accumulation of garbage and the loss of the landscape's visual and acoustic quality.

**Impacts on fauna:** displacement of species sensitive to human presence, alteration in the reproductive cycles of vulnerable or endangered species, alteration of natural behavior or diet and an increase in species which feed on waste and feral domestic animals.

**Impacts on flora:** specific damage to vegetation in areas of movement, changes in the communities because of the introduction of exotic species, the extraction of firewood, flowers, fruits and seeds, and impacts on species or communities of reduced distribution or on unique trees.

Only with an adequate design, building and maintenance of the trails will it be possible to minimize these risks for nature.

### **3.2 Self-guided Interpretive Trail**

Although the term “self-guided trail” is used for an excursion following a trail or path, self-guided excursions can also be offered in many other places. Just as with guided visits, usually people are directed through a preplanned sequence of stops, each of which presents part of the theme. Self-guided visits are commonly used to show people things they would not otherwise see, or that untrained eyes would not notice (Ham, 1992).

The self-guided trail is an interpretive activity in a circuit with a system of signs (indications, explanatory posters) which permit the visitor to go round alone and at the same time get information on the themes which form part of it (Da Re and Lechter, 1983). It is important to emphasize the fact that people in these trails are autonomous; they are free to move and look round at their own pace (Morales, 1992).

#### **3.2.1 Advantages and disadvantages**

##### **Advantages of management**

- It is possible to attract a larger number of visitors.
- It can lead people to an area which is able to accept very intensive use and therefore it can divert pressure from other areas.
- It serves as orientation for people who are lost.
- It is established with a relatively low budget.
- It does not require the permanent presence of personnel.

##### **Interpretive advantages**

- It allows the visitor to go round at his own pace and convenience,
- It can be an alternative activity for those who do not like to participate in organized groups.
- Ideal for families, permitting parents to explain to children aspects they are interested in and that are at their level of understanding.
- When established in remote areas which are not well-known and have limited personnel, it contributes to visitors' appreciation (Da Re and Lechter, 1983).

##### **Disadvantages of management**

- The cost of maintenance might be higher than expected.
- There will always be a greater risk of vandalism.

**Interpretive disadvantages**

- It is difficult to incorporate attractive communication techniques.
- It fails to respond to spontaneous events.
- It should be directed to the average visitor since it cannot satisfy the demands of special groups (children, disabled, visitors with greater knowledge, etc.)

**3.3 The Guided Interpretive Trail**

One should take into account that when choosing this general option it is because the trail has features which require that visitors be accompanied in order to perceive and enjoy everything the trail can offer. Another possibility, as we will see later, is the use of guides as a strategy for using the experience of local inhabitants and thus generating income for the community, reducing pressure on the natural resources we aim to conserve.

**3.3.1 Basic guide techniques**

These are the procedures used by the interpreter to lead a guided walk on a trail, during which the interpreter will transmit –through communication techniques and through interpretation - the message selected for the trail. With the help of the interpreter, the visitor will be able to observe more and better understand the observations on being shown the way in which the protected area operates as a natural system or the way it relates to current problems and why this is important. The guide should take advantage of the visitors' prior experience, thus adding value to the visit.

Some references are described below for successfully guiding a walk:

**Before**

Establish a direct visual relationship with each visitor.

Generate a friendly and interactive environment for active group participation.

Get to know the interests, experiences and expectations of visitors, offering only real possibilities.

Show interest in the problems of visitors, including their origin.

Prepare the environment.

**During**

Encourage visitors to ask and explore new ideas.

When a question is asked, see if anyone in the group can answer it.

Encourage visitors to work on solving problems or answering questions.

When questions are asked, only part of the information should be given, let the group use its imagination to answer the rest.

If there is a delay, ask the group to help to decide how to cover the rest of the activity.

Be open to non verbal indications of the interest or boredom of the audience. Adjust the style according to the circumstances.

Maintain direct eye contact with group members, the guide always speaking in front of the group and into the sun if possible, always providing the possibility of having the shade behind them.

Take advantage of unique situations, such as the presence of rare animals or events which can be used and incorporated into the subject.

Have a "plan B" available in case of any setback, such as rain.

Never make comments or start conversations in relation to adverse climatic conditions.

**At the end**

Summarize the theme.

Challenge visitors to accept some kind of responsibility related to matters presented during the visit.

Conclude the activity with a final memorable phrase or idea.

## **4 GUIDELINES FOR ESTABLISHING INTERPRETIVE TRAILS**

### **4.1 Design**

The design and building of trails is a fundamental tool in the effective development of a Protected Area, channeling the flow of visitors to certain sectors and limiting access to others of greater value or fragility.

For the trails to fulfill this important function there are certain technical requirements necessary for their layout, design and operation. The application of these requirements will make it possible to prevent the trails from becoming a factor contributing to the degradation of Protected Areas, thus contributing to the conservation objective.

The design of interpretive trails requires prior knowledge of the philosophy, techniques and interpretive principles, and others; so we should keep the above recommendations in mind.

The ideal interpretive trail does not exist, for several reasons: each resource or place is different in its nature, size and quality; the people it is intended for vary a great deal; and there is no design model which is the best one for any specific circumstances (Sontang, 1971; quoted by Morales, 1992).

The design of the trail's physical components is not therefore governed by a strict methodology and recommendations only exist for distances, layouts and other design considerations. It is important to emphasize that the best variables to choose are those which increase visitor preference and acceptance of the trail elements.

#### **4.1.1 Number of stations**

Sam Ham (1992) states that there is no agreement among authors about the ideal number of stations or stops on a trail. Some have recommended 15 to 18 stops on an 800 meter trail, others suggest between 20 and 30, and others believe that 12 is the ideal number. In general terms there should not be over 15 stops, including only those stations which are related (or for which a relation can be established) to a specific theme. According to Ham (1992), if this is done and each stop is kept simple, clear and short, the best advice would be put into practice without taking into account the number of stops on the trail.

It is also recommended that the majority of stops be located during the first half of the trail and that the first one is visible from the introductory sign. There is no evidence from the many researchers who support this recommendation, but if signs are used to interpret the trail, it makes sense that if the visitors can see the first stop, they will be curious to find out what it says.

For a trail with a pamphlet, visitors will have the text in their hands and of course it does not matter if they can see the numbered posts or not. Furthermore, it makes sense to place the majority of stops at the beginning, since visitors at the beginning might be curious to know what the trail contains, their curiosity might be greater and their period of attention longer.

#### **4.1.2 Length of trail**

One should keep in mind that on a Self-guided Interpretive Trail the visitor is usually in a strange environment and depends on trail signs for safe guidance and to be able to return to the point of departure; this is why these trails should be less than 1600m long, 800m being the right

length, because the average visitor can start and finish the trail in no more than half an hour walking at a comfortable pace. It is recommended that the trail not require more than 45 minutes to complete, since a long trail could represent difficulties for the average visitor and he would be there for a longer period of time, without this necessarily meaning that he has enjoyed the visit more.

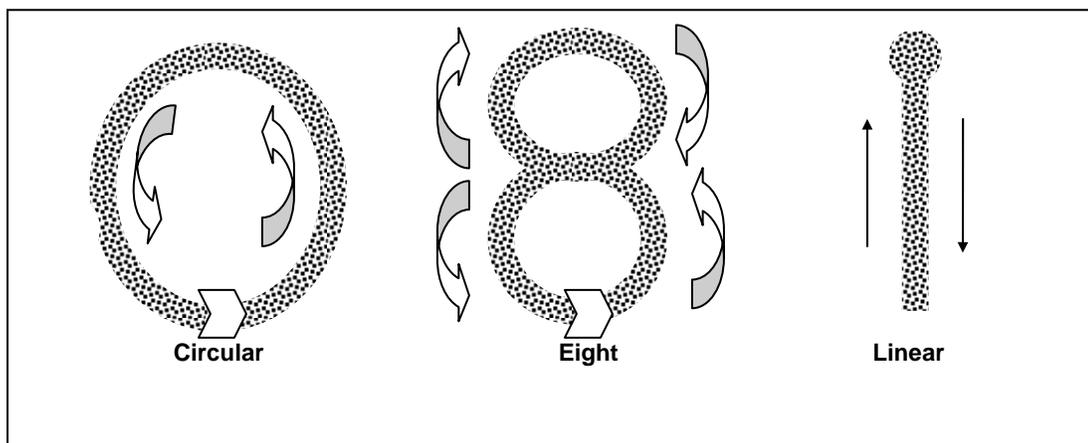
According to Ham (1992), one should keep in mind that the fundamental purpose of a trail is to stimulate interest in the local environment; the idea is to keep the level of interest high and fatigue low, so that even those people who do not like walking are happy to be on the trail.

### 4.1.3 Types of layout for self-guided trails

The most common layout for a trail is circular, starting and finishing at the same place. Generally these are one way routes and this is an advantage for visitors who can go round the interpretive stops without bumping into other people. This is why one way trails appear to have fewer people than two way trails (Ham, 1992). Sharpe (1982) names this type of design a loop trail and emphasizes the fact that because the beginning and the end are in the same place, or very close, the visitor is not delayed and can return to the exit point easily.

Some trails are in a figure eight (Fig. 2). The advantage of these is that people can return after completing the first circle, without having completed the whole route, or they can continue to the second part, as they wish. The topics of both circles could be related (although with different themes) or they could be about a set of different ideas (op. cit.).

According to Ham (1992), the least common design is linear in which people go and come back on the same trail and traffic is two way. This type of trail is not usually used, but sometimes it is necessary in order to avoid physical obstacles such as rocks, the edges of hills or bodies of water, which prevent any other type of design and sometimes this type of trail is not very long for interpretive purposes.



Types of trail design, according to Ham (1992).

It is also recommended that an interpretive trail not have any contact with or cross a road, railway line, cliff, or other type of danger, because children, for example, might take the path by mistake or out of curiosity.

#### **4.1.4 Other recommendations for trail design**

Some studies have shown that people prefer trails with curves instead of straight ones. Curves create in the visitor a sense of curiosity, due to the impossibility of observing what is ahead, so a climate of mystery is established in the trail and this makes it more interesting. This is why straight trails are not very attractive, because they provide most of the information right from the beginning (Ham, 1992).

According to Ham (1992), the trail should be appealing, due to the fact that a lot of people who visit it do not know the area and might feel lost in it. This could interfere with the educational experience and it could also take them to fragile and dangerous areas trying to find the trail. Arrows should be used to indicate the correct direction and if necessary more conspicuous marks.

Another important element that should be taken into account to meet the desires and needs of people is that there should be a car park and if necessary latrines and garbage bins to avoid the accumulation of garbage and serious damage or impact because of this.

## **4.2 Texts and scripts**

According to Moore (1987) the texts should be correct, interesting, brief and easy to understand. However, they should be more than informative: a simple label with the name of a tree is not interpretation but information. It is necessary to explain, for example: What is the origin of the common name of a tree? What birds and animals depend on it for food or shelter? Is the tree common or rare in this place? Why? One should try to provoke and stimulate the visitor into thinking, so it is useful to show him the relationships, processes and associations which occur in nature.

All self-guided trails, apart from the signs and pamphlets will have an introductory sign, and according to Morales (1992) and Ham (1992), this should attract attention right away and get people to want to explore the environment; this can be achieved with a sign which is attractive, well-organized, artistically pleasing and of course with an imaginative name.

The introductory sign should indicate the theme, and advise the visitor on the trail's theme, attractions along the path, it should provide information about the approximate time necessary, the distance and if possible a sketch so visitors are informed about where the exit is.

### **4.2.1 The theme**

All interpretive trails should have a single theme so users can take advantage of the activity, focusing their attention on one aspect which can be absorbed and which will be a conductor for the content of the message (Kneidsen y Sontag, 1971; quoted by Morales, 1992).

According to Moore (1987) the theme should be general and should guide interpretation, for example "mangroves", "the life of a wetland", "soil formation", etc. The themes of the points to be interpreted will be related to what can be observed on the trail, and will be aimed at: explana-

tions of natural processes (watershed formation, seed dispersion), explanations of natural history (birds' nests), geomorphological formations (shells, geological faults), associations and dependencies of fauna and flora, explanations of relationships that seem insignificant but are very important in the ecosystem, explanations of human impact on the ecosystem and the trail area (species introduced, deforestation).

When appropriate, attention should be drawn to how what is observed on the trail influences management of the protected area; and finally the messages presented should be aimed at instilling conservationist messages.

#### **4.2.2 The thematic map**

It is important to draw a map (or sketch) of the excursion route, with the location of details of importance and interest. This map can help to decide on the stops that should be included in the visit once the theme has been chosen. It will also make it possible to continue working on ideas for the trail even when you cannot be in the field (Ham, 1992). On this map it will be possible to see how features come together physically and perhaps perceive how to create a story (joining these elements), which can develop logically as the visitor moves from station to station (Sharpe, 1982).

On the land, mark the location of the trail with tape, never mark trees on the route with paint or axe marks. This disfigures the trees and exposes them to disease. Furthermore, if later on you decide to change the location of part of the trail, these marks will be a serious problem. A trail with these marks fails to inspire respect and might be an invitation to vandalism.

Once the theme for the trail has been decided on, the stops can be chosen using the map prepared beforehand and keeping in mind that even though there are a lot of interesting details, one should only select those which support the theme. So the most interesting and stimulating title theme is determined for each stop and a new map can be drawn with the stops selected, writing down the trail theme and the title theme for each stop. It is necessary to show that title themes really support the general themes, checking this at each stop. Also the sequence should be analyzed to see if it is appropriate or if the order should be changed, bearing in mind that some features are repeated in another part of the trail, thus giving flexibility to the sequence (Ham, 1992).

#### **4.2.3 Name of the Trail**

Once the general location of the trail and the type of trail have been decided on (general or special theme), a name should be chosen. The trail should have a name which will stimulate the imagination and represent some outstanding feature or characteristic on the trail (Moore, 1987). Moreover, something of interest should be added to the attractiveness of the trail. Trails with descriptive names are easier for visitors to identify. If the trail has a specific feature which distinguishes it, this feature should become part of the name (Sharpe, 1982).

### 4.3 Methods

#### **Explanatory panels**

This is a practical method due to its relatively low cost and the fact that it is easy to change or improve without altering the rest of the trail. You should begin with this system on establishing a new trail (National Forest Service, 1974).

#### **Pamphlet**

The text in the pamphlet is accompanied by several corresponding numbered posts on the trail. This makes it possible to have a more detailed interpretation and is also useful as a souvenir because it can be taken home. This is especially useful for trails which can become crowded, making it difficult to have access to a panel (Morales, 1992).

#### **Exhibitions**

Used mainly indoors, even though it is also possible to use them outdoors (classified rock samples, tree trunks, shells, etc.).

#### **Audio**

Basically the module with an integrated audio device.

The advantages and disadvantages of each of these methods may have a quantitative relation to each other.

We have included a table to help to choose the method, in which the values introduced will be in accordance with each region's characteristics, resulting in the method that should be used (the highest number).

Elements to consider	Pamphlet and panels	Exhibitions	Audio
Initial cost			
Vandalism			
Potential of the methods for becoming litter or garbage			
Potential risk of site deterioration			
Aesthetic intrusion			
Value as a souvenir of the area			
Maintenance problems			
Illustrative progression			
Easy to modify			
Duration of visitor attention			
Factor of pace or speed of walk			
Total			

Scale					
Worst	1	2	3	4	Best

### 4.3.1 The pamphlet

Trails using this type of interpretation are introduced in a pamphlet that can be carried by the visitor and contain explanations about the numbered markers on the trail (Sharpe, 1982). These numbered stations and the pamphlet fulfill the same function as the signs, but more information can be included in the pamphlet (Moore, 1987).

According to Da Re (1983); *a pamphlet is a brief publication which combines texts, diagrams and/or photographs, providing instruction for informative and/or interpretive purposes.*

The quality of the pamphlet is important if the intention is to make it into a souvenir and if the aim is for the interpretive message to be well received. A poor quality pamphlet can create a negative attitude to the trail. In this context good illustrations play an important role in improving the pamphlet and relieving the monotony of the texts. They can also help the visitor to understand the resource and increase his interest in it (Sharpe, 1982).

#### **Advantages**

- The existence of a simple numbered post on the trail reduces the probability of vandalism.
- The combination of pamphlet and posts is less intrusive.
- The pamphlet can be a souvenir and it can be used as a guide if the quality is good.
- Guided tours can be led on the trail and visitors can more easily overlook posts than posters, so there is less interference and distraction on a path with posts if they are also used for guided walks.
- Total interpretive costs for this type of trail are usually lower.

#### **Disadvantages**

- Funds for producing pamphlets might not always be available.
- A significant change in the trail cannot be immediately corrected in the pamphlets.
- There is a possibility of the pamphlets contributing to litter on the trail.

### 4.3.2 Distribution of pamphlets

According to Ham (1992) and Moore (1987), pamphlets can be distributed in several ways: at the beginning of the trail in a box which will protect contents from the weather and with an introductory sign, or if the area has controlled entry stations and the threat of vandalism prevents leaving the pamphlets unattended on the trail, they can be given out as people enter the area. This can be done in three ways:

- 1) Giving away the pamphlet free of charge (asking for it to be returned at the exit),
- 2) Selling it at a low cost, or
- 3) Asking for a deposit which can be returned when the pamphlet is given back.

It is important to emphasize that people pay more attention to things they pay for. A pamphlet which is given away often ends up in the garbage.

### **4.3.3 Signs**

These refer to notices, posters, signs or marks necessary for guiding the user during his visit to the trail; it is also possible to give out information about the attractive or outstanding elements on the path, altitude, distance to points of interest or a description of flora and fauna. The important thing is that it provide relevant information and the exact location on the trail so it can be used correctly. Some points are presented below related to the production of signs:

The number and type of marks and posters necessary will depend on the purpose and type of trail. Markings should be sufficient for the user to go round without unexpected difficulties. Short trails and those for inexperienced users should be marked better and more carefully than remote ones for hikers.

#### **A good principle**

The starting point of a trail should be marked with a poster indicating the length, average time needed for the visit, appropriate rules, security measures for potential dangers, and any information considered necessary in a simple and concise way.

#### **Intersections**

These should be clearly marked with posters or signs with directions. And distances should always be indicated at intersections and other appropriate points, without being excessive.

#### **Association**

In addition to the name there is usually a symbol associated with the word, or a color which can be used to mark it as simply as possible. Aesthetic considerations are always important.

#### **Integration**

Signs should not distract or “clash” with the natural environment. The design should also be the same for all signs and they should adapt to weather conditions and the surrounding landscape. Signs are frequently made of wood and letters are in low relief because they are less intrusive.

#### **Visible**

Signs should be clear, the same size, and they should be placed at the eye level of a person standing – whenever possible - or where they will be easily seen.

#### **Keeping attention**

The general rule is that a person should never walk for more than 100 meters without seeing a sign in front of or behind him.

### **4.3.4 Maintenance**

On an interpretive trail maintenance also includes removing fallen trees, weeds and the maintenance of any infrastructure, including drainage and other work done directly on the ground. A daily inspection of the trail should be made to collect litter and locate any evidence of vandalism or inappropriate use of the trail. Evidence of people taking short cuts should be eliminated with barriers and plants. All damaged signs or posts should be changed immediately. The trail needs to be patrolled without fail every day so that this can play a role as an interpretive instrument. Facility of maintenance is another reason why the path should measure less than 800m in length.

#### 4.4 Visitor Centers

In Visitor Centers indoor interpretation does not normally use real objects. “Representations” of reality are usually presented; for this reason interpretation should make it possible to have contact with the real object outside, in the surrounding Park. The opportunity for the visitor to have this contact with the real object is what gives meaning to the interpretation of resources.

The case of museums is different, because they will probably have original objects, and depending on the type of museum, it will be necessary to clarify to the visitor what the context (space, time, function) of the exhibits are.

The simplest exhibitions are the most effective. Very often spectacular ones conceal the message.

One should keep in mind that on average the public will spend only one minute in front of each stand or exhibit, so the message has to be understood quickly. We have to attract the visitor's attention and then keep it so that he has time to understand the whole message (or the levels of understanding he chooses).

If the exhibition aims at being interpretive, it is necessary to have volume, contrast, some degree of dynamism, and parts which can be manipulated (when relevant.) The public should interact physically and/or intellectually with the exhibition. And if it is well conceived, a guide will not be necessary for explanation.

The room containing the exhibitions should have a name using the title theme concept explained above.

Each panel should develop the message with themes and sub themes; in the titles and subtitles the public should obtain information or “news”.

Each exhibition requires specific illumination which should not interfere with the lights in the rest of the room. One should also avoid reflections from glass or reflective surfaces.

The public is free to choose which way to go round, so we should not subject the understanding of the message to a specific sequence. We can suggest a sequence and a direction, but it will always be the visitor who will decide what to see, how much to see, and where. (Remember that this type of communication is not specifically for school groups but for the public in general in their free time.)

##### 4.5.1 Dramatization

Theater, animation, festivities, short stories, puppets, talks and demonstrations. These are possibilities which are not used much, but they all have tremendous advantages in interpretation: they are implemented by people, the best system for interpreting heritage.

Consideration of these and other very simple aspects will make a presentation of heritage to the public *interpretive*. And as has already been explained, interpretation should be done more in relation to the visitor than to the heritage being presented. Interpretation is a strategy of *social intervention* in order to gain understanding, attitudes and an appreciation of the fact that at the end of the day it will all result in improved conservation of the biophysical, social, historical and cultural medium that we consider to be our heritage.

Interpretation is so simple that at times pure common sense can show us which steps to follow. However, this discipline has a broad tradition of knowledge. Methodologies exist and the technical personnel to apply them.

Furthermore, interpretation does not have to mean costly investments. If a specialist is available (from the planning stage), the cost of investments might be significantly lower than directly hiring a company to set up an exhibition. Later, all kinds of concrete service providers might participate (audiovisuals, posters, trails, exhibitions, printed material, etc.), but supervised by the interpretation technician.

Interpretation can involve the use of many techniques, but it also depends on the art of those who implement it, and key elements are the language used and the understanding of techniques, but especially the art of seducing and reaching the hearts and reason of the people.

## 5. TRAILS FOR THE DISABLED

Generally interpretive trails have been built for a type of average visitor, but without considering disabled people, who have needs and limitations which very often prevent their access to and contact with protected areas.

This chapter briefly describes some specific considerations that should be taken into account for facilitating the access of disabled persons to protected areas so that all sectors of the public can visit the trails.

Currently there are many examples of trails which have been built specifically for receiving disabled persons so they can have access to trails and overcome obstacles, and the value, knowledge and importance of natural resources can be made available to them, enabling their interaction with protected areas.

When designing a trail for the disabled, one should consider that not everyone has the same physical conditions, and not just because of age. This means that not all visitors will have the same agility, physical resistance, height, weight, strength and skills, so trail design should facilitate use of the trail by all people and not just those who adapt to a standard pattern of physical conditions.

A trail for people with special needs should guarantee:

- The inexistence of barriers: of attitude, social, transport, architectonic or environmental, of access to information.
- The *in situ* enjoyment and understanding of natural resources.
- Paths which respect the safety and integrity of individuals.
- The interpretive media which will make it possible to understand the natural and cultural relationships presented.
- Satisfaction of the many needs and situations of people.
- Maximum autonomy for visitors, avoiding dependence.
- Observation of the dignity of individuals.
- Trained personnel for attending the needs of different sectors of the population (people with disabilities, the elderly, etc.)

### 5.1 Recommendations for trail design

This phase makes it possible to analyze land conditions to determine the feasibility of building a trail without any architectonic or environmental barriers to affect the *in situ* enjoyment and understanding of biodiversity and other natural resources, guaranteeing the safety and integrity of visitors.

#### **Soil**

The firmer and harder the surface of the trail, the more confidence people will feel during the visit.

#### **Slope**

It is important to make sure the average slope on the trail is equal or less than 10 degrees. If there are any steeper slopes, hand rails should be installed.

**Width**

To guarantee comfortable access, the trail should be a minimum of 1.5m wide and in some parts the minimum width should be 2.5m for return areas and rest places.

**Permanence of access**

Avoid elements which limit trail use during certain periods of the year.

**Distance**

Maximum trail length should not be greater than 400 meters and the car park should be at an equal or shorter distance.

**Five senses**

For this type of trail interpretation should seek to use all five senses: taste, touch, sight, hearing and smell.

**5.2 Selection of audiences with different interests and needs**

Traditionally, for selecting the audience it has been considered fundamental to have data about potential users, including: age, sex, origin, interests, educational level, annual income, duration of vacations, recreational activities, and others.

This has led to the identification of the “average public”, the target population for interpretation. However, on directing efforts towards the disabled public, it is of paramount importance to consider the elements which will facilitate the access of disabled persons to *in situ* enjoyment and understanding of biodiversity and other natural resources, and these elements are the challenges of communication and movement.

Interpretation activities should be aimed at satisfying the needs of different sectors of the public with difficulties in communication or mobility, taking into account the different sectors of the population based on gender, culture, disability, etc.

**Mobile persons**

These are people who experience difficulties walking safely and who may require a walking stick or crutches to help them to keep their balance. Their limited physical capacity means that they walk slowly and unstably. They all have problems, for example, going up and down stairs, walking on slippery surfaces, sitting down or getting up from a chair, and going on long walks. This group also includes the elderly.

**Persons using wheelchairs**

This includes people who cannot walk and have to use a wheelchair to get around. Depending on their physical state, they may need the help of another person to move the wheelchair. This group includes people with a physical disability and those with brain damage which affects their ability to walk, as well as people who choose to use a wheelchair temporarily, such as the elderly who might use one to avoid getting tired.

Some difficulties include dealing with abrupt slopes or changes of level, narrow spaces, following the trail, moving the wheelchair on non paved spaces, maneuvering in small spaces, observing signs placed too high, manipulating objects, etc.

**Temporary needs**

This group is made up of all those people who have special needs related to mobility and communication during a transitory or temporary period of their lives. It includes:

Pregnant women, small children, people who have had accidents or who have some disease and who cannot move freely because of their physical condition.

**Sensory impairment**

It includes all people who have a partial or total visual or hearing impairment. The type of difficulties faced by people with a visual impairment includes communication (reading), orientation (recognizing a route or manipulating an object), safety (inability to detect dangerous areas in their path, and mobility).

People with a hearing impairment have problems in situations of communication and interpretation of context. On occasions there are people with multisensorial impairment, which is a combination of visual and hearing disorders, known as deafblindness, and results in communication difficulties.

**Mental backwardness**

A group of people with intellectual development different to others of their age. These people sometimes have difficulty communicating, making themselves understood, getting their bearings in unfamiliar situations, or their behavior might not be that expected of people of their age. They are distinguished by lower than average intellectual capacities and limitations associated with communication and language and in some cases mobility.

**Multiple disability**

These are people of all ages who require extensive and continuous support in more than one of the main activities of their lives in order to participate fully in community settings and enjoy the quality of life that other citizens have.

**Emotional and behavioral disorders**

A group of people with limited development of social interaction and communication, with a reduced repertoire of activities. Fundamentally behavioral or emotional disorders are marked by a significant communicative challenge, reiteration of the message, and lack of interest in new activities, among others.

**Cerebral paralysis**

This includes people with irreversible damage in the central nervous system which affects the motor centers of the brain, making it difficult to have voluntary control over some parts of their bodies. This can be associated with other conditions, such as visual and auditive limitations, and communicative and cognitive challenges.

**Psychomotricity**

A group with special conditions in general body coordination, locomotion and certain specific motor skills, which have repercussions on the individual's intellectual area and social performance.

### **5.3 Special characteristics of interpretive methods**

#### **Signs**

For people with partial visual impairment large letters should be used on contrasting backgrounds and a light producing perspective. For those with total sight impairment high relief is recommended. It is important to create a touch or auditory mechanism to indicate to these visitors that they are close to a sign or mark.

#### **Audiovisuals**

This group includes: films, automatic device programs, listening posts, transportable tapes and all unattended audio visual presentations. All audiovisuals should be translated into the VGS (Visual Gestural System), into the local sign language or the one used in the place of origin of the majority of visitors. If the tapes are for the visually impaired and they need to be activated at each station, the places for doing so should be indicated through touch and metric measurements, or if they are accompanied by a guide or interpreter, he will use the VGS language.

#### **Guided visits**

When there are people in the group with a hearing impairment, one should –at least- make sure that the guide or person accompanying knows GVC (Gestural Visual Communication), the local sign language or that used by the majority of people visiting the area.

#### **Visits in motor vehicles**

These are especially for people with mobility difficulties. It is necessary to make sure that the vehicles have enough space for transporting wheelchairs or that the seats are appropriate for guaranteeing the stability of passengers.

#### **Visits in non motor vehicles**

These are visits by groups of cyclists or horse riders, visitors in canoes, rowing boats, etc. It is necessary to guarantee the physical safety of visitors by using special supports (lifejackets, adequate seats) and also space for wheelchairs.

### **5.4 Guide techniques for people with different interests and needs**

For guiding on the trails, it is necessary to take into account that each disability produces different needs as a result of completely different personalities, just like with any other group; so to treat people appropriately one should adapt to each specific case. There are some special recommendations that should be taken into account when preparing guided interpretation for people with special needs.

#### **Don't underestimate**

Don't make the disability of the visitor evident unnecessarily; or do it in a natural way.

Always avoid drawing attention to the special needs of clients.

Let people do what they can for themselves. The majority of people can do a lot of activities and like to do it on their own.

Never help them without first asking.

Always ask them in a natural way if they would like help, what kind of help, and wait for an answer. Don't get offended if the help offered is not accepted. When it is accepted, give it discreetly, without drawing the attention of people nearby, without haste or commotion. Don't make a big thing of helping, or adopt an attitude of being a "super protector".

### **Behave naturally**

Behave naturally in personal contacts. Remember that they wish to be treated the same as other people.

Don't feel embarrassed about talking to them; don't demonstrate excessive concern or care.

Under no circumstances express compassion for their state. If the subject arises, you may talk about the disability in a natural way.

Don't fall into a tense silence or into an inadequate verbal explosion.

Always treat them like any other person of their age, never like "children"; they would be surprised at this type of behavior and it might upset them.

Don't give advice unless asked for. In general they know very well what they need and want and they will somehow express this.

Talk directly to the individual, not to his or her companion.

Demonstrate understanding and tolerance of their possible susceptibility. Do the same with all trail users. It is natural that a person will feel unhappy if their needs and expectations are not met.

### **Specific recommendations**

#### **People with difficulty in moving**

Adapt to the length and speed of their pace.

Protect them from the movement of the crowd.

Offer help going up or down stairs.

They might sometimes need help carrying backpacks.

Offer them a seat so they don't have to stand too long.

Don't remove technical aids, because these are aids without which they cannot move on their own. It is convenient to avoid them walking more than necessary.

Make sure there are no architectonic or environmental barriers.

Always stand in front of them when speaking, never behind or in a position which forces them to turn.

Stand at a distance which does not force them to raise their heads. Ideally you should sit down in front of them so you are at the same level.

If you are pushing the wheelchair, make sure you don't bump into anybody.

Push the wheelchair slowly, especially on slopes. Some wheelchair users don't have good balance and they feel unsafe if they are pushed rapidly.

#### **People with a hearing impairment**

Some people use sign language and others read the lips of the person speaking to them. So it is important to have trained staff who can guide the group along the trail and guarantee safe and fluent communication.

Due to the fact that some people have difficulties expressing themselves orally (volume, accent), sometimes they prefer not to do so. So encourage them to participate, but respect their final decision.

Always demonstrate interest in facilitating communication, especially when there is no interpreter available.

Use a normal tone of voice, shouting is useless. Speak normally, not fast or slowly, so those who read lips can understand what you are saying.

The face of the person speaking should be well illuminated; don't cover your mouth with your fingers or your lips with a long moustache or cigarette. Remember that people will only be able to read lips if they can see them or interpret the signs they can see.

Use short grammatically correct phrases. Vocalize well, but without exaggerating or making unnecessary faces. You can be expressive, but don't gesticulate excessively, you might look ridiculous and this may upset people.

If the information is not understood, find different simpler words and repeat everything necessary. Always resort to written information when communication has not been sufficiently clear or there are doubts.

## **6. DESIGN OF WATER TRAILS**

Water trails are designed for movement in surface waters, for snorkeling, as well as deep waters using scuba diving equipment. These are useful for access, interpretation of resources, monitoring and surveillance.

They are different to land trails because instead of being restricted to a narrow route, the field of action is broader and somewhat more flexible.

Interpretive water trails require strict guidelines for their design, building, safety and maintenance, keeping in mind the modality of access and movement required.

### **6.1 Coastal trails**

Coastal trails are those which show coastal resources, such as beaches, coastal dunes, shallow coastal lagoons and cliffs. These are very similar to land trails, since movement and access is on foot, but taking into consideration the fact that these ecosystems are more fragile, the impact of visitors can be more aggressive. Alternative trails or paths should therefore be designed to give the opportunity to restore the trail or close it when environmental conditions are adverse.

It is very common to use these trails for observing marine turtles nesting, so sometimes visitors might come at night as well as during the day. In this case it is recommended that for safety reasons groups be no larger than eight people, because it is more difficult to establish and maintain direct contact with each visitor when also doing other important work. Very precise monitoring is necessary to avoid nesting sites being affected.

Signs on these trails should have very different characteristics to the ones on land, because environmental conditions are key factors and the duration of any signs will be severely reduced. The use of a combination of untempered wood and synthetic materials is recommended for the production of marks and posters. The structure could be of wood and the area with the information of a long lasting and resistant synthetic material. In this way it is possible to obtain better integration with the surroundings, greater durability and they will be more attractive to the visitor.

### **6.2 Surface trails**

This type of trail includes many different activities which can be carried out on the surface of the water and/or in a boat. Coastal lagoons, reef zones, mangroves, wetlands, rivers, canals, etc. can all be perfect places for a trail.

Normally this type of trail should have a mix or combination of activities to avoid the visitor getting bored or paying more attention to the sun or the movement of the boat. Bird watching in mangroves or wetlands can be combined with swimming in reef zones, and this will make it possible for the visitor to cool down after the bird watching activity, etc.

On these trails or activities there should always be another guide on board as well as the captain or boat owner because it is not possible for one person to interpret and sail the boat well and safely at the same time. One guide is recommended for every eight visitors in order to guarantee safety and good interpretation both inside and outside the boat.

On many occasions these trails have small boats or two seater kayaks which permit greater mobility and independence for the visitor. In this case each group should be accompanied by a motor boat to help anyone falling behind or any other unforeseen circumstances.

It is very important to indicate from the time each visitor gets on the boat that they should put on the lifejacket, even when they are going to use snorkeling equipment and they are expert swimmers. This consideration is important to guarantee that the visitor will not go under and accidentally damage the reef.

A great deal of care should be taken when determining sites for the snorkeling trails that the depth is never less than 2.5 meters, so that when the visitor is floating vertically he will not accidentally kick a reef or coral formation. This depth will also make it possible to have good visibility and be close enough to the reef. Remember that because of the effect of the water on our vision, objects seen in the water are 25% closer and 33% larger.

### **6.3 Deep trails**

This type of submarine trail is in the reefs, underwater sea grass and other environments on the continental platform, including shipwrecks.

The visitor must be a certified diver and the guide a certified Dive Master or Instructor. Before boarding the boat a description should be given of what the visitor will observe and also considerations and recommendations about the use of the diving equipment and plan. Gloves, knives or razors should not be allowed.

In designing the trail care should be taken to maintain a compulsory exit point and not to stay too long or go too deep.

For reasons of safety visitors or divers should not swim at a distance of less than 1 meter from the bottom or the depth limit indicated.

### **6.4 Aquatic signs**

Signs for this kind of trail make use of buoys and floating or fixed posters, which can be submerged or on the surface.

Buoys with a diameter of 1 meter are used for delimiting and indicating the location of the starting point of the trail, the position of each stop or station and the exit point. These buoys should be marked with a different color to the ones used for navigation and they should have a cable or line approximately 3 meters long with a small float. Boats will be able to tie up to these. No more than three boats should tie up to a single buoy.

When the trail design is circular or linear, it is necessary to plan which direction the visitor should swim in initially; this should be against the sea current so that the return will be less tiring.

Other smaller buoys (30cm.) can be used for forming the line of buoys, "rosaries", which will facilitate the delimitation of restricted zones. These should be accompanied by posters explaining the reasons and importance of the regulation.

Posters can be installed at each place requiring interpretation. The posters should be made with synthetic materials and attractive and contrasting colors, avoiding the use of blue, green and grey. Posters can float in a structure supported by posts or securely fixed in the ground or rock.

Any type of equipment will require very continuous maintenance because it can get covered by sediment, algae, etc. in a very short period of time.

For this type of trail it is very helpful to have pamphlets and exhibitions available before beginning the visit, so the visitor will already have information and it will be easier to interact with him.

**6.4.1 Manual diving signs**

It is very important for the Guide and Park Ranger of the protected area to know and use the signs used in recreational diving.

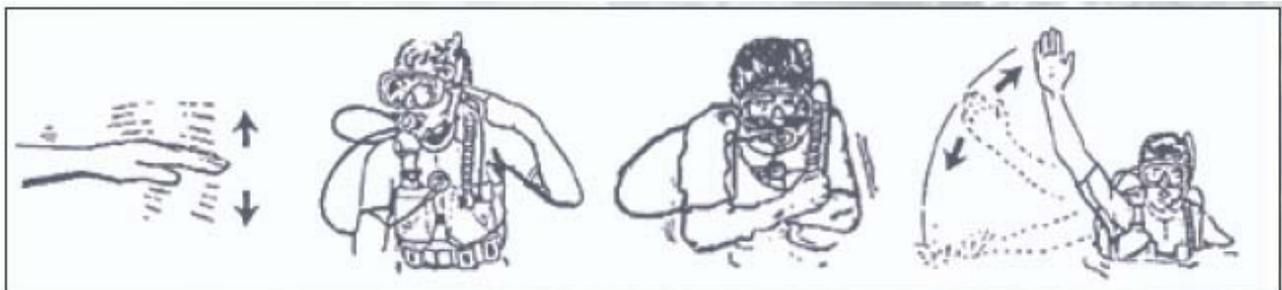


Low on air

Out of air

Share air

Come here



Slow down

I can't clear my ears

I'm cold

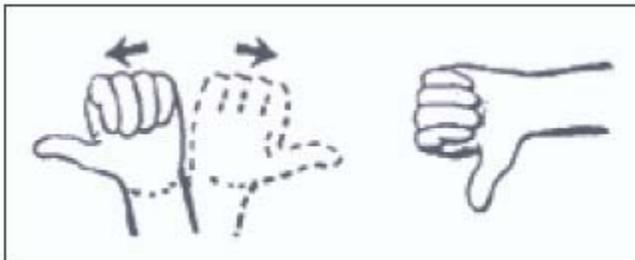
Help



**Down**

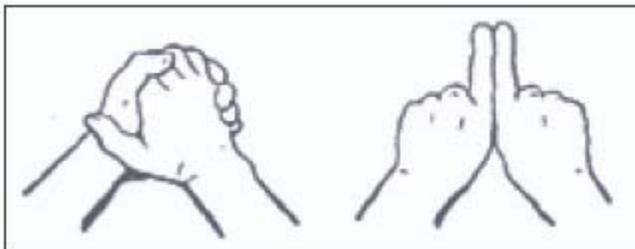
**This way**

**Go up  
I'm going up**



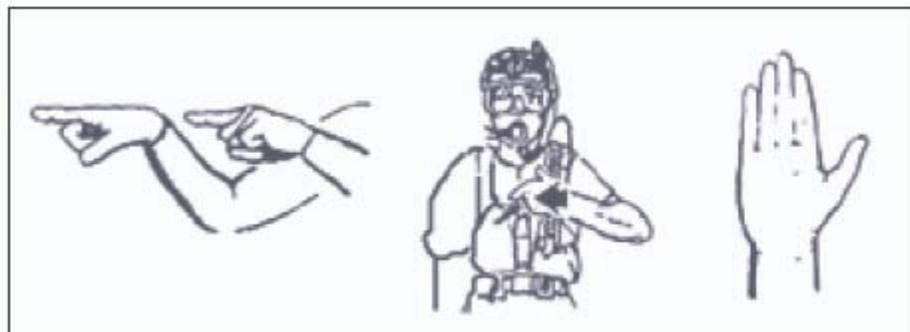
**Which way?**

**Go down  
I'm going down**



**Hold hands**

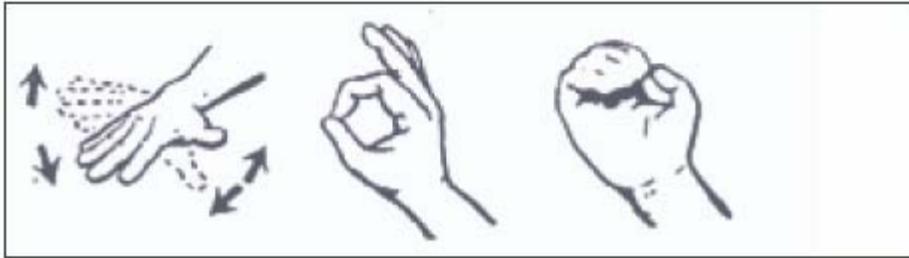
**Join your buddy**



**You go first  
I'll follow**

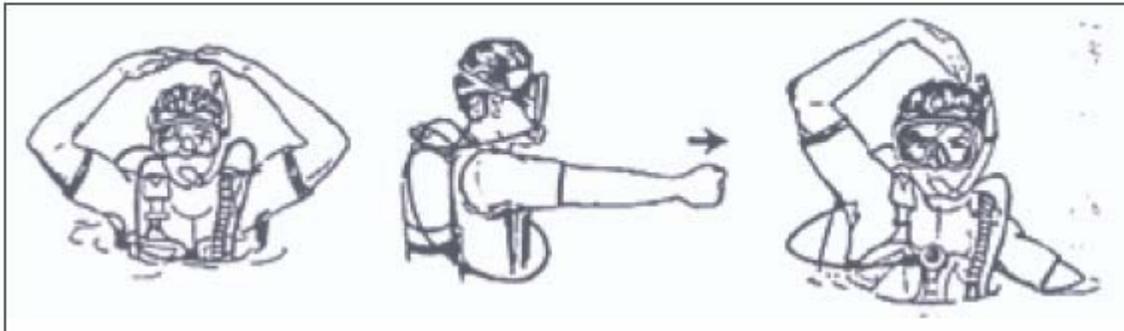
**Me  
Look at me**

**Stop  
Wait there**



**Something's wrong  
I feel bad**

**Are you O.K.?  
I'm O.K.**



**Are you O.K.?  
I'm O.K.  
on the surface**

**Danger  
in this direction**

**Is everything O.K.?  
Everything is O.K.  
with one hand occupied**

## **7. DEVELOPMENT OF INTERPRETIVE PROJECTS**

Institutions that carry out interpretation will at the same time be making an investment which will be profitable in the short and long term. Immediate profit will be the result of an improvement in management: better use of space by the visitor and therefore less impact on the resource; less vandalism; better awareness and better attitudes during the visitor's stay at the site, and probably more appropriate behavior towards the place.

Short term profit from interpretation and everything related to it can also be seen in the management of some concessions (private and social) which conscientiously carry out their work, applying professional communication criteria with the public, and complying with stipulations in this regard in the contract and technical prescriptions. However, when interpretation is made directly by the protected area, normally the concept of interpretive trail in the majority of cases just generates more expenses rather than income (vehicles, materials, wages for guides and monitors, insurance, etc.).

Of course interpretation alone is not directly profitable, just like the health service or public education system. It could be a factor contributing to the economic impetus of a zone due to certain collateral services such as cafeterias, the sale of souvenirs, and transport; and, in general, it is an incentive for local trade if this is accompanied by an increase in demand from tourism. We also consider that this discipline provides dividends for a large number of professionals who work in different areas.

Long term profit will result because of an improvement in the public image of the institution; this has been demonstrated in the case of the National Parks in North America. Why shouldn't we feel the desire to congratulate and be grateful to a network of parks or the administration of historical sites, if we have been well attended on our visit? If we are treated with sensitivity and deference, if our personalities are taken into consideration, if our intelligence is taken into account for developing the interpretation, and the essence of the site is presented in a pleasant, precise, brief and honest way, and if the guide or the posters invite us to think and feel surprise, why wouldn't we think "how well the Reserve is doing its job!"

On the other hand, if we visit a Park and are given no guidance (about where we are, how we can best use our time); if the guides or people presenting the information attend us as if they were doing us a favor (if there are any personnel available even); if the texts of the exhibitions are illegible (containing over a hundred words!), with very small letters, the contrast of colors between text and background is unattractive; and if we only leave with sand in our heads ... why wouldn't we think that the institution is being irresponsible with our taxes and, in some cases, wasting public money on expensive installations and "interactive" instruments (pressing buttons) which are poorly maintained and ineffective.

We all know that the majority of visitors make flattering comments, in spite of the fact that services might not be adequate. But their contact with natural resources may only have been through photographs, lying on a beach or climbing up a dune; and this might be all the meaning that has ever been revealed to them.

Long term profit from interpretation is also based on citizens who understand and appreciate the importance of their protected areas. Not all citizens obviously, but a considerable number of them can enter into contact with interpretive programs or services while enjoying their free time in these places.

The growing increase in the flow of visitors to Protected Areas is accompanied by the need to guarantee the sustainability of resources, popularizing the clamor to establish limits, define rules and apply special rules which will permit a profitable tourist activity to be maintained, without deteriorating the resources it depends on (Cifuentes, 1993). Interpretation and its techniques can be directed perfectly well with a business approach, as part of the tourism industry. The consequent impact, both positive and negative, should be faced, giving important weight or special emphasis to the use of EI as a tool for visitor management, as compared to others types of punitive or price measures (Crosby *et al.*, 1994).

To conclude we can quote Crosby *et al.* (1994) when he proposes that interpretation due to its nature is designed for planning and designing “win-win” situations in which visitors “win” because they have a marvelous recreational learning experience (vacations), the resource or location “wins” because visitors can appreciate it more and therefore treat it with greater care, and the institution wins because it can better fulfill its mission.

## **7.1 Incorporation of Local Communities**

The support that environmental interpretation can provide for the economy of a country with the promotion of an area where tourism is essential for the economy of the zone or country is enormous, as well as the economic alternative provided for local communities, permitting the employment of many people as interpreters on trails, visitor centers, excursions to sites, and the earnings obtained from an interpretive service of which a percentage should remain in the hands of the institutions responsible for promoting the protected area, thus contributing to funding management and maintenance plans for the area.

When incorporating the peripheral communities into the environmental interpretation program, giving them the opportunity to develop trails for environmental interpretation together with the institution, or to build visitor centers on community land, we can guarantee that these communities will appreciate and support the conservation objectives of the protected area as being beneficial to the communities. Their participation in the planning and marketing of ecotourism, in conservation and in the improvement of their quality of life, will be key factors contributing to sustainable development.

It is very important that before starting to build any interpretive project the following steps be taken as requirements:

### **7.1.1 Socioeconomic Study**

To establish the most pressing needs, the activities that should be developed, the way they can be organized by activity, the funding system for the activities, the location of the activities, the execution of training and awareness raising plans, and others.

There are many activities required in the communities for ecotourism, especially the creation of micro enterprises providing lodging, handicrafts, typical restaurants, practical guides, recreational activities, folk groups, ethnobotanic micro businesses, nurseries, and others.

They should also be incorporated into environmental education programs, surveillance programs, restoration campaigns and other activities which will reinforce the protection of the protected area.

### **7.1.2 Environmental Impact Study**

An ecotourism approach, unlike a mass tourism proposal, implies a responsible attitude about nature itself and the volume of tourists to be received, which should be reflected in the management of visitor flows in space and time according to the specific type of trail and resource. Management of the different forms of environmental impact caused by tourism requires well structured and well applied administrative measures.

The first of these measures should be the realization of Environmental Impact Studies prior to the development of any development program or project. Environmental Impact Studies are one of the most effective methods to determine when a project will be sustainable, and if so, to develop the measures to guarantee its continued sustainability.

Correctly applied, Impact Studies are able to minimize the deterioration of natural resources and environmental and social degradation which normally accompanies any development.

The process includes comprehensive and detailed studies of the development proposed and the environment within which it will be carried out. Subsequently, the Impact Study will be incorporated into traditional planning, development and project implementation activities, and will include alternatives for long term follow-up and monitoring.

Since the implementation of an Impact Study depends on the specific conditions of the program or project being evaluated and on the natural and cultural environment in which it is being developed, it is not possible to develop a complete specific methodology here, a situation which in any case is outside the objectives of this work. So only a brief reference is made to the different environments in which impact evaluation should be carried out in the section on methodology.

#### **Studies of Biological Impacts**

Obtain baseline information on the biological communities that might be affected by the development; it is also necessary to make a complete project description. It is important that this information be as exact and complete as possible, because otherwise it will be extremely difficult to evaluate impacts. As the project develops and after it is implemented, it is necessary to have adequate impact monitoring methods for making sure that these are maintained within the agreed limits.

#### **Studies of Impacts on the Community**

Historically, unplanned tourism development has frequently had negative social and economic impacts on the communities. This evaluation should open the project and its planning to be revised by local inhabitants and NGOs. Communities adjacent to the proposed Project might require contracts for covering agreements to provide employment, training, the use of water sources and electricity, the visit of tourists to the community and support for the community by the project. Likewise it may be necessary to establish agreements with the local communities in order to protect the project, defend natural areas and wildlife and provide services, supplies, etc. and an evaluation of the impacts on economic resources.

This evaluation would require the developers to provide information about work opportunities, explaining where the profit would go and what economic benefits would be provided for the local, regional and national communities.

### **7.1.3 Market Study**

This is a group of variables which will make it possible to quantitatively and qualitatively determine the markets for the trail or interpretive project marketing policies. The Market Study should form an integral part of a Marketing Strategy for the project (publicity, pamphlets, videos, positioning, etc.).

The Market Study consists of the collection, classification, analysis and interpretation of variables which should be used for an adequate solution to problems related to the transfer and sale of the tourist product, from the supplier to the consumer, in this case the tourist, for the purpose of satisfying the client's expectations at the same time as increasing the net profit of the company or organization.

Finally, it is necessary to specify that market determination and analysis (market study) is one of the many functions of market research, an activity which studies the characteristics, causes and effects of different marketing problems, including who to sell a product or service to. As a result of an investigation of this kind, target markets and consumer profiles are obtained, which are a detailed description of the general characteristics of the consumer groups identified.

Once the evaluation has been finished and the marketing strategies applied, it is necessary to implement monitoring and control systems in combination with studies of carrying capacity.

## **7.2 Laws and Regulations**

This section refers to all the legal aspects the project should fulfill for complying with existing laws and regulations, at the local, national and international levels.

Here the laws and regulations should be considered which directly affect the area and its category as well as connected areas which could affect or be affected by the development of the project. For instance, health and security laws and regulations, insurance, operation permits, labor issues, international treaties and agreements, etc.

Also of fundamental importance is the legal status of the land on which the project will be implemented and the possible need to sign cooperation agreements or treaties with other private, community or governmental entities.

Revision and observance of regulations related to the rescue and appraisal of historical, archeological and cultural heritage should be given special attention as well as the protection of indigenous peoples.

Furthermore it is necessary to establish controls for all the activities and personnel involved in the interpretive trail or project. Regulations will be established for zoning, the number of visitors, researchers, personnel in the conservation area, tour operators, transport personnel, guides and the other services offered.

Without effective regulations it is impossible to develop any interpretive or ecotourism project and therefore it is not feasible to speak of sustainable development.

## 8. CARRYING CAPACITY

Carrying Capacity in a recreational context is defined as *the maximum number of visitors an area has room for and still maintain high levels of visitor satisfaction and few negative impacts on the resources* (Boo, 1989).

According to Cifuentes (1992), basic criteria exist that need to be taken into account before adopting a procedure to determine the CC. In the first place, it is not the solution to visitor problems in a protected area, but just a planning tool which supports and requires management decisions. It should also be emphasized that the CC is relative and dynamic because it depends on variables which are appreciations which might vary depending on the circumstances.

Any determination of the CC should be based on the objectives of the protected area. These objectives define the management category and limit the uses that it might have in the area, the tourism activity being more or less permitted depending on whether the category is more protective or more open to multiple use.

The CC of a site depends on its specific characteristics and this is why it has to be determined for each public use place separately, and the simple sum of all the sites cannot be taken as the CC for the PA. It seems that it is better to consider “visits/time/site” rather than “visitors/time/site” (Moore, 1987; op. cit.), because it is the presence of a person at the site at any given time which is really of interest as a way of preventing or measuring impact. The same person visiting a site repeatedly, for a specific time, will also cause a repeated effect (Cifuentes, 1992).

Even though it appears to be just a matter of semantics to speak of visitation to a PA, it is better to refer to “visitors” and not tourists. A visitor to a PA should understand that from the beginning he is subject to different conditions, rules and parameters to those applied to ordinary tourists, especially in relation to the provision of services and comforts.

Each site has a different physical condition, so certain objectives can be complied with, and it is subject to different rules of use. Likewise each site has a supply of specific resources. It is necessary to understand the quality, quantity and state of the resources, as well as evaluate their fragility and vulnerability. Each site suffers the influence of physical, social and management factors which modify or could modify its condition and supply of resources.

The identification of influential factors is extremely important since as we will see later the real CC of the site depends on these.

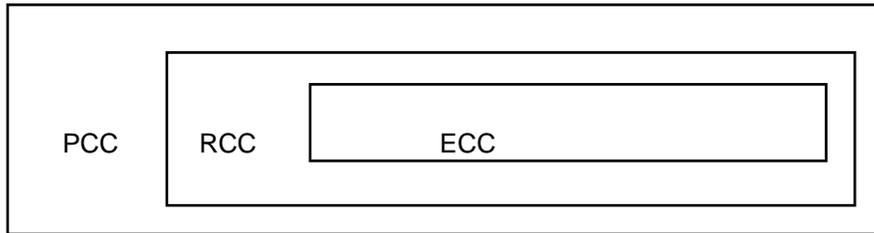
### 8.1 Determining the carrying capacity for each public use site

It is only possible to determine the tourist carrying capacity site by site and not for the whole protected area.

Three levels of carrying capacity are considered:

- Physical carrying capacity (PCC).
- Real carrying capacity (RCC).
- Effective or permissible carrying capacity (ECC).

Each of the following levels, in the order mentioned, is a corrected capacity for the previous one. The relationship between the levels can be represented as follows:



The PCC will always be greater than the RCC, and this will always be greater or equal to the ECC (PCC> RCC, RCC>= ECC).

**Physical carrying capacity (PCC)**

This is the maximum limit of visits that can be made to a site with a defined space, in a specific time. It is expressed with the following general formula:

$$PCC = V/a \times S \times t$$

where : V/a= visitors/ area occupied.  
 S= surface available for public use.  
 t = time necessary for the visit.

**Real carrying capacity (RCC)**

This is the maximum limit of visits, determined on the basis of the PCC of a site, then submitted to the correction factors defined in relation to specific site characteristics. The factors are obtained taking into consideration the physical, environmental, ecological, social and management variables.

The RCC can be expressed with the following general formula:

$$RCC = (PCC - CF1) - \dots \dots \dots CFn$$

where CF is a correction factor expressed as a percentage.

Therefore, the calculation formula would be the following:

$$RCC = PCC \times \frac{100 - CF1}{100} \times \frac{100 - CF2}{100} \times \frac{100 - CFn}{100}$$

It should be observed that each site evaluated will be affected by a group of correction factors which are not necessarily the same as in other sites. These factors are closely linked to the specific conditions and characteristics of each site. This means that the carrying capacity of a PA will have to be calculated site by site.

The correction factors are expressed in terms of a percentage and for calculating them the general formula used is:

$$CF = \frac{IM}{tM} \times 100$$

where: CF= correction factor.  
 IM= limiting magnitude of the variable.

tM= total magnitude of the variable.

**Effective or permissible carrying capacity (ECC)**

This is the maximum limit of visits which can be permitted given the capacity for keeping them in order and managing them. The ECC is obtained by comparing the RCC with the Management Capacity (MC) of the administration of a protected area. It is necessary to know the minimum essential management capacity and determine what percentage of it the existing MC corresponds to. The general calculation formula is as follows:

$$ECC= RCC \times \frac{MC}{100}$$

where: MC is the percentage of the minimum management capacity.

The MC is defined as the sum of conditions that the administration of a PA needs in order to fully comply with its functions and objectives. The measurement of the MC is not an easy task, since there are variables involved which are not measurable.

In order to have an acceptable approximation of the MC, measurable variables can be taken, such as: personnel, equipment, infrastructure, installations (premises) and funding, to obtain a figure for the minimum essential management capacity.

Consultations on management plans and deliberations with directors and technical personnel of the area evaluated will help to establish this minimum management capacity.

The MC is a primary consideration because it is one of the chronic and critical problems of PAs in developing countries and in Latin America in particular. Here the concept of "acceptable use limit", AUL, is introduced, because the only way of guaranteeing the permanence of the PAs and their minimum deterioration is accepting those elements for which the real capacity exists to put things in order and control them. As the MC increases, the AUL can also increase, thus giving rise to a flexible and dynamic ECC which can be adjusted to changing circumstances in PA management.

## **9. OTHER METHODOLOGIES**

The majority of methodologies developed for visitor planning and management in protected areas has been prepared and applied in developed countries and inland national parks with problems, legislations and socioeconomic characteristics different to those in the MBRS region. This does not mean that they cannot be applied in coastal and marine areas in the region; on the contrary, we consider that contributions from more than one of them can be applied and adapted to prevailing conditions in the region. This is why we have included a matrix with the main characteristics of each of the following methodologies, which will make it possible to produce a possible method adapted to the needs and requirements of the specific protected area and interpretive project.

- a. Recreation Opportunity Spectrum (ROS), Brown et al (1978).
- b. Conceptual reference framework for determining Carrying Capacity, Shelby and Heberlein (1984).
- c. Limits of Acceptable Change (LAC), Stankey et al (1985)
- d. Visitor Impact Management (VIM), Graefe, et al (1990).
- e. Tourist Carrying Capacity, Cifuentes M. (1990)
- f. Visitor Experience and Resource Protection Reference Framework (VERP), USDA-National Park Service (1997).

<b>Visitor planning and management methodologies</b>					
<b>Methodology</b>	<b>Process</b>	<b>Applications to which they can best be adapted:</b>	<b>Relationships:</b>	<b>Strengths:</b>	<b>Weaknesses:</b>
<p><b>Limit of Acceptable Change LAC</b> This was designed by researchers from the United States Forestry Service in response to concern about impact management for recreational activities. It determines the appropriate and acceptable conditions of resources and of the social surroundings and the actions necessary to protect or achieve these conditions.</p>	<p>The process consists of nine stages, normally represented in a circular way: 1. Detect PA concerns and threats. 2. Define and describe the types of opportunity (based on ROS). 3. Select indicators for the condition of the resources and for social factors. 4. Make an inventory of existing conditions of resources and social factors. 5. Specify standards related to environmental indicators and social conditions for each type of opportunity. 6. Detect alternatives in relation to providing different types of opportunity. 7. Detect management activities for each alternative. 8. Evaluate and select the preferred alternatives. 9. Put into practice the measures selected and supervise the resulting conditions.</p>	<p>The process is an appropriate vehicle for deciding on the conditions related to adequate and acceptable resources and social situation in natural spaces. It has been used for rivers which conserve their natural state and represent important landscapes, historical sites and areas of tourist development.</p>	<p>The process incorporates types of opportunity based on the ROS concepts as a means of analysis and synthesis. It is supported by the VERP framework of the USNPS.</p>	<p>The final product is a strategic and tactical plan for the NPA based on the limits of acceptable change defined for each type of opportunity, with change indicators which can be used for supervising ecological and social conditions.</p>	<p>The process focuses on problems and threats which guide tasks after the collection and analysis of data. It is possible that they will fail to provide strategic and tactical direction for management issues when there are no problems or threats.</p>
<p><b>Visitor impact management (VIM).</b> Prepared by researchers from the USNPS and the Conservation Association. The process deals with three basic issues related to impact: problematic conditions, possible causes and potential management strategies.</p>	<p>The process consists of eight stages: 1. Study the data base as a prior evaluation. 2. Review management objectives. 3. Select key indicators. 4. Select controls for the key impact indicators. 5. Compare controls with existing conditions. 6. Detect probable causes of impact. 7. Determine management strategies. 8. Apply them. For each indicator a control is established based on the management objectives which specify acceptable limits or adequate levels of impact.</p>	<p>It is a flexible process, parallel to the LAC, which can be applied to a broad spectrum of surroundings. It uses a similar methodology to evaluate and detect existing impact and particularly the causes.</p>	<p>As with the LAC, this process has been incorporated into the VERP system.</p>	<p>The process permits the balanced use of scientific and subjective considerations. It especially emphasizes an understanding of causes for determining management strategies. It also provides a classification of management strategies and a matrix for evaluating them.</p>	<p>The process does not use the ROS, even though it could do. Its design aims to deal with current conditions of impact rather than evaluating potential impact.</p>
<p><b>Carrying Capacity.</b> Prepared by Miguel Cifuentes for PAs in Costa Rica. It is a numerical method in three phases which determines maximum visitor capacities in specific sites.</p>	<p>Three levels of carrying capacity are considered: a) Physical carrying capacity (P.C.C.) b) Real carrying capacity (R.C.C.) c) Effective or permissible carrying capacity (E.C.C.). Each of the following levels, in the order in which they are mentioned, represent a corrected or reduced capacity of the previous one: <math>P.C.C. &gt; R.C.C. \geq E.C.C.</math></p>	<p>It applies to certain sites inside the PAs as a specific complement, especially for sites with a large number of visitors.</p>	<p>The process can be complementary to general planning for the Protected Area through the use of LAC, VIM and VERP</p>	<p>It makes it possible to assign maximum visitor density at specific sites that require this.</p>	<p>It represents a numerical calculation with value elements or judgments.</p>

<p><b>Recreation opportunity spectrum. ROS.</b> Response of the Forest Service and the Territorial Management Office of the USA to concerns about the demand for recreation and conflicts over the use of scarce resources, taking into account planning for natural resources from an integrated and global perspective. The process includes 6 types of territory for understanding physical, biological, social and management relationships and to establish parameters and guidelines for managing recreation opportunities.</p>	<p>1. Make an inventory and prepare a map of the three perspectives which affect visitor experience: the physical component, the social component and the management component. 2. Make a complete analysis: a) detect incoherence in the environment, b) define types of recreation opportunity, c) participate in forestry management activities, d) identify conflicts and recommend mitigation. 3. Program. 4. Design. 5. Execute projects. 6. Supervise. The final product is a definition of the opportunity for experiences expected from each environment (six types of territory, from wild to urban), of the indicators of the experience and of management parameters and guidelines.</p>	<p>This process can be used in any multiple use protected area with tourism activities and in nearly all exercises of Territorial Zoning (POET). However, the nature of the spectrum, the indicators and their criteria depend on the purpose of the NPA, on the organization's mandate and on the management responsibilities.</p>	<p>This management matrix has been incorporated into the LAC system and can be used with the VIM and recognized in the VAMP.</p>	<p>It is a practical process with principles which oblige directors to rationalize management from three perspectives: a) Protection of the resource. b) Opportunities for public use. c) The capacity of the organization to achieve pre-established conditions. It links supply to demand and can easily be incorporated into other processes. It guarantees a whole range of recreational opportunities for the public.</p>	<p>The spectrum of recreational opportunities and their environmental indicators and criteria should all be accepted by managers before other options or decisions can be adapted. Any difficulty will affect the rest of the planning program. ROS maps should refer to the physical and biophysical characteristics of each NPA.</p>
<p><b>Protection of visitor experience and VERP resources.</b> Created by the USNPS, related to Carrying Capacity in terms of the quality of resources and visitor experience. A prescription for the future conditions of resources and the social environment desired, and it defines what level of use is appropriate, where, when and why.</p>	<p>1. Form an interdisciplinary team for the Project. 2. Prepare a public participation strategy. 3. Formulate declarations on the purpose of the NPA, its significance and the main themes of interpretation; determine planning mandates and restrictions. 4. Analyze PA resources and existing visitor use. 5. Describe the potential range of visitor experiences and the condition of resources (zoning). 6. Assign potential zones to specific enclaves in the PA. 7. Select indicators for each zone; prepare a supervision plan. 8. Supervise resource indicators and social factors. 9. Adopt management measures.</p>	<p>Protected Areas with multiple uses. Sites with important management capacity for monitoring impacts.</p>	<p>As with the VIM and LAC models, elements from this method can be used to adapt to the specific conditions of each PA.</p>	<p>It is a flexible method which permits adaptations or modifications through the monitoring of indicators.</p>	<p>The "experience" is not defined and there are no indicators in this sense, other than the examples of some National Parks in the USA. It is also necessary to verify the will and capacity to carry out supervision sufficient to provide the information necessary for guiding management actions.</p>
<p><b>Conceptual reference framework for determining Carrying Capacity by Shelby and Heberlein (1984).</b></p>	<p>1. Organize and evaluate the information. 2. In general terms, identify the type of opportunity for the experience being offered. 3. Identify important impacts. 4. Collect information on agreements or disagreements about the type of experience to be offered; establish evaluation standards and existing conditions of current impacts. 5. Develop management alternatives. 6. Select a management strategy. 7. Monitor impacts.</p>	<p>It is versatile because of its descriptive and evaluative approach; permits the establishment of carrying capacities under specific conditions.</p>	<p>Similar to the VIM. Places more emphasis on variables related to level of use, and assumes that different carrying capacities will exist for offering different experiences.</p>	<p>1) It refers to the descriptive component, focusing on the relationships between specific conditions and the impacts associated with these conditions. 2) It incorporates value judgments about the acceptance of several impacts.</p>	<p>The main ecological variables refer to users' perceptions about environmental characteristics.</p>

## **10. VISITOR IMPACT MONITORING STRATEGY**

A methodology should be designed for establishing indicators, measuring them and defining evaluation standards. The monitoring program should include a classification of visitor impacts of physical, biological, social and psychological kinds (visitor satisfaction). It is clear that from the viewpoint of environmental management, only the measurement of environmental impact should provide the elements necessary for decision making; however, from the perspective of integral MPA management, other thematic indicators should be measured. The indicators chosen should be easy to measure, low in cost and objective in nature. A measurement method should be established and the frequency or time period for monitoring. Finally, maximum permissible standards or thresholds should be established for the indicators selected.

The definition of standards will reflect the maximum impact scenario permitted, better defined as the "limit of acceptable change" in the methodology with the same name (Stankey et al, 1985). This is the threshold on the basis of which management decisions should be taken to reduce the level of impact. It is defined in the following way:

The limit of acceptable change is the "Determination of intensity of use and usable volume of natural resources on a specific surface, through a process which takes into account desirable conditions in relation to the level of environmental modification as a result of the intensity of environmental impacts considered tolerable, in the context of objectives of conservation and use, under specific management measures. It includes a permanent monitoring and feedback process which will permit the adaptation of management measures for maintaining desirable conditions, when modifications exceed the limits established".

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