PLANNING THE MANAGEMENT OF
National Parks

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This essay forms a part of the requirements for degree of M.Sc., from the Department of Forestry of the Australian National University.

It does not refer to any specific 'National Park' or the 'National Park System' of any particular nation. Instead, it reviews the definitions of the term 'National Park' prevailing in various parts of the world and then high-lighting the degree of variability, attempts to derive a 'functional definition'(i.e. the basic functions which an area to be named as 'National Park' is expected to perform.) Keeping these functions in view, essential features of any such area have been isolated, in order to provide a common axis along which all the units of the 'National Parks System' throughout the world could be oriented. These common features turn out to be spaciousness, uniqueness, national significance and wilderness. It has, therefore, been concluded that the wilderness-areas, not including distinctively unique features of national significance and which nor are spacious enough to support a viable ecosystem enveloping the 'type-habitat' of rare flora or fauna, should better be administered as recreational areas for general picnicking and camping and not as 'National Parks'.

The planning process and management-techniques have, therefore, been discussed and analysed with respect to these carefully-selected units and not to any specific national park. However, certain common management-problems like overcrowding, car parking, road and buildings within the park, fire-control etc. have been discussed in addition, as these concern the managers of all such areas alike.

In writing this essay, the available published literature, mainly in the departmental and the main libraries of the Australian National University, had been banked upon, without undertaking any field study. In this respect, I most sincerely thank Dr. L.J. Carron, Dr. R.G. Florence and Dr. I.S. Ferguson, who were kind enough to have shared their experiences and advised about the references, whenever approached. Miss V. Gurr was, indeed, exceptionally kind in having gone through the draft and pointing out the loopholes, with such a ruthless frankness, which only a well-meaning friend will prefer to do. I wish there are librarians in every department like Miss. Paula, who never pretend to be too busy to rush to the student lost in the jungle of books and assist him in locating the desired reference.

To save these learned gentlemen and friendly ladies from any embarrassment whatsoever, I must admit that it is only me who is responsible for the remaining shortcomings and unplugged loopholes and no one else.

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CHAPTER-1

1. INTRODUCTION.

1.1. HISTORICAL BACKGROUND OF THE NATIONAL PARK MOVEMENT.

The concept of setting aside wilderness areas and protecting them in their natural state was in practice in India and China centuries ago. "In the case of India, it was as early as the third century B.C. that the need for complete protection of certain areas and animals was realised and put into practice" (Talbot-1962).

The Kautilya (321 B.C.), in his book 'Arthashastra', while outlining the duties of the 'Forest Superintendent' in the reign of the 'Maurya', specified the need of establishing the areas called 'Abhayaranya' defined as, "areas, where beasts could roam about without any fear of man."

The modern concept of wilderness preservation could be traced back to 1858, when a portion of the Forest Fontainableau to the South of Paris was declared legally protected, on the initiation of a group of painters (Adams-1962). However, the words 'National Park' came into official use, for the first time, on 1st March 1872, when President Grant of U.S.A. signed a bill containing the words, "..... regulations shall provide for the preservation from injury or spoilation of all timber, mineral-deposits, natural curiosities or wonders within the said National Park (YELLOW STONE), and their retention in their natural condition." (Chittenden-1949).

The philosophy behind the words 'national parks' since then gained popularity. The need for providing special type of recreation associated with specifically set aside and protected...
wilderness areas was felt all over the world. In Africa, the first National Park to be established was the 'Kruger N.P.' in South Africa, in 1892. This was followed by the 'Albert National Park' in Congo, in 1925. In Europe, the 'Swiss National Park' in the Lower Engadine, was created in 1914. In Canada, the oldest park is that of 'Banff' established in 1887. The 'Royal National Park' of Australia, becoming a public reserve in 1879 and being dedicated a park in 1886, was the first of the continent and probably the world's second national park. (Adams 1962).

In India, the words 'national parks' came into use for the first time in 1935, when 'Hailey National Park', subsequently named as 'Corbett N.P.', was constituted.

The basic objectives behind all the measures taken to establish national parks and nature-reserves were two; preserving the beauty of the natural landscape along with the flora and fauna therein; and providing the people the chance to enjoy the same in hours of leisure.

A third objective, later on, assigned to these areas was the ecological and scientific study of the natural forces in an undisturbed environment. "Curiously enough, this idea of carrying out carefully planned scientific studies in such areas was discussed one evening in 1919, at the same 'Yellowstone National Park', where 49 years before, the concept of national parks had been born. Among those engaged in the conversation were King Albert of Belgium, two American Zoologists (John. C. Merriam and Fairfield Osborn, Sr.) and Victor Van Straelen". (Adams 1962)

This introduced the concept of 'Habitat-Sampling' by preserving specimens of various ecosystems prevailing in the region for the methodical studies. Finally it received international
appreciation with the establishment of a coordinated, world-wide network of biosphere for the conservation of natural areas and the genetic material they contain, as one of the major objectives of UNESCO'S 'MAN AND BIOSPHERE' Programme (Brabyn 1974).

1.2 MODERN PHILOSOPHY BEHIND NATIONAL PARK'S CONCEPT

Historically, the movement for the creation of national parks was conceived, at first, purely as an isolated event. However, with growing industrialisation and communication it was soon observed that the value of these areas spread beyond this limited framework and the steps were taken at the national-level, particularly in the field of legislation, to coordinate their creation and management. Finally, the advent of U.N.O. provided a common platform to policy-makers of various nations to stand together and benefit from each other's experiences, mistakes and achievements. In the process the 'national parks' movement also received the attention of the world-body, which finally culminated in the establishment of the 'International Union for the Protection of Nature' in 1949, which in 1956, at its Fifth General Assembly in Edinburgh was altered to 'International Union for Conservation of Nature and Natural Resources.' However the growing importance of national parks was finally recognised at the Union's Sixth General Assembly in Athens in 1958, at which I.U.C.N'S Committee on National parks was established to ".....Strengthen international cooperation in matters relating to national parks and equivalent reserves in all countries throughout the world."

This internationalisation of the national-park movement and attempts on the part of conservationists, ecologists, administrators and naturalists to devise a commonly agreeable code for park planning and management constitute the basic element of
the modern philosophy. Interestingly enough, the unanimously-resolved theme of the First World Conference on National Parks (1962) was—"National Parks are of international significance." (Adams-1962).

It was during the same conference that suggestion came from the U.S. Secretary of the Interior, "We must, if we are wise, establish an exchange programme of conservation, thinkers and planners.... One measure towards our goal is the fact that we have started a new section within the National Park Service to handle international coordination and this function will be increasing in responsibility."

Clawson & Fisher (1962), going a step further, put forward the idea of establishing an international system of national parks interlinking various national systems, and observed, "An international park system can have further benefit of drawing people and countries together in a common interest, which, in general form, finds few opponents. Conceiving and planning such an undertaking can itself be a rewarding venture in international cooperation, however modest the beginning may have to be ......."

The basic idea behind the emphasis on international aspect is to constitute a complete living museum of the ecological spectrum of our planet. And national parks will obviously be the units of this spectrum.
CHAPTER-2

2. ESSENTIAL FEATURES OF A NATIONAL PARK

2.1 REVIEW OF THE VARIOUS PREVAILING DEFINITIONS:

It is not simple to define the words 'national park', as it might at first appear. Numerous attempts have been made, taking into account the functions, size and other factors, but there is still no generally acceptable definition of the term available.

The difficulty arises in the first place because different countries have applied the concept in different ways, so that there are as many definitions of 'National Park' as there are legal systems. Secondly, framers have often tried to state not so much what a 'N.P.' is as what they think it ought to be. (Yapp-1966)

In U.K., the multiple use concept was the motive behind creation of national parks and was clearly stated in the Parliament while passing the 'National Park and Access to Country Side Act' of 1949, "It is essential and I think very desirable too, that in our National Parks the ordinary rural life, such as farming, rural industry and afforestation should continue to function. This is as a small country and we cannot afford, as can the United States, to set aside large areas solely for the purpose of public recreation, or of establishing a museum."

Later on, to accommodate the growing recreational demand, a new 'Country Side Act' was passed in 1968, to regulate the public access to National Parks for 'Open-air-recreation.' Thus multiple use concept, aiming at preservation of beautiful landscape of country side is still the motive behind the National Parks in U.K. (Yapp-1966).
Like the U.K., in most of the European countries the population-density and industrial development rule against establishment of large size national parks, specifically for recreation and preservation. Where such areas do exist practical compromises must generally be made in their administration to local conditions. For example in the case of France, a country with a long history of land management the concept has been defined as, "Consisting of tracts of landscape which present an association of interesting biological constituents and balances of which the present proprietors retain ownership but which are amenable to specific conditions appropriate to each individual case. Limited areas in the interior of parks could further be managed as strict reserves exclusively for scientific purposes, so that the evolution of various natural components or complexes can be studied without human interference. Finally a 'buffer zone' or 'green-belt' could surround a park in the interests both of providing the proper conditions for study and for sojourn in these for those who wish to avail themselves of the park, and also of contributing to the economically depressed areas, since it is in such areas that national parks will mostly be established". (Fontaine-1962)

In U.S.A., where the idea of national parks was born and where land resources abound, the definition adopted could be quoted as the most widely accepted and referred definition. According to the U.S. National Parks Service, "National Parks are areas set aside by statute containing regions of outstanding natural beauty, characteristic of the finest scenery in different parts of the country, nature's curios, relics of historic interest, native fauna and flora to be maintained for ever as closely as possible to the
unspoiled original state and dedicated to the people for their enjoyment, education and benefit.

The Canadian National Park Service has adopted the same definition.

Similarly, in Japan along with the wilderness areas, national parks system also include the areas meant for preserving historical relics, arts and archeological pieces of national importance. Where as in most of the African and other Asian countries archaelogical and historical sites are generally administered by organisations distinct from these concerned with faunal, floral, geological and scenic interests.

In the case of Australia, the concept varies from State to State. Thus, although called national parks, they do not fall technically in that category. Administrative philosophy of these areas also varies widely, ranging from emphasis on public outdoor recreation to careful protection of natural interests (Brockman-1962).

However, lately the Federal Government has started taking interest and a national image of these areas is becoming clearer.

"...... in the close of the third quarter of this century the Australian Government had taken steps to establish a national agency and to provide financial assistance for nature conservation......" (Mc Michael-1975).

The "Indian Board of Wild Life", in the case of India, has defined "National Park" as, "An area dedicated by statute, for all time to come, to conserve wildlife therein and to provide for the enjoyment of future generations with such modification as local conditions may demand." (Raghvan-1969).

This, to a great deal, is similar with the U.S. definition, but still the difference exists. However an useful attempt
was made by Bourdelle (1943) in his work "Attempt to unify the Nomenclature in the Field of the Protection of Nature". He classified 'nature reserves' into three types; managed nature reserves, strict nature reserves and national parks.

The first covers the forested areas managed to produce timber, but their status as wood-land is guaranteed by the law of the land. The second types are areas set up for the purpose of ecological and scientific research and to which access, absolutely forbidden in principle, is provided to trained scientists or government officials only. The third type of areas are those to which access to public for enjoyment is provided but natural features including flora, fauna, water is preserved in original form.

From this classification it was made clear that public accessibility is an essential element of areas called 'national parks' and that is how these differ from 'Strict nature reserves'.

The similar point of view was advocated, much earlier by Petit (1937): "The scenic point of view, which is an inherent part of the concept of national park, is here (i.e. in the case of strict nature reserves) superseded by the solely biological point of view; in a strict nature reserve, nature is left to itself, under no circumstances will the ranger be tempted to indulge in reforestation even by means of species borrowed from the reserve itself; under no circumstances, he attempts faunal restocking, even with individuals of indigenous species. Understood in this way, the nature reserve is an ideal centre for biological observations."

These attempts, to a certain extent, tried to resolve the conflicts between various definitions attributed to the
words 'N.P.' However, later on, efforts at regional and international levels also were made to evolve a standard definition.

A note-worthy attempt was made in London (1933), at a 'International conference for Protection of Fauna and Flora of Africa'. The term 'national park' was defined as, "(a) Area placed under public control, the boundaries of which shall not be altered or any portion be capable of alienation except by competent legislative authority (b) set aside for the propagation, protection, and presentation of objects of aesthetic, geological, prehistoric, historical, archeological or other scientific interest for the benefit, advantage and enjoyment of the general public (c) in which the hunting, killing or capturing of fauna and the destruction or collection of flora is prohibited except by or under the direction or control of the park authorities"......

"in accordance with the above provisions, facilities shall, as far as possible, be given to the general public for observing the flora and fauna in national park".

The definition adopted at 'Pan American Convention on Nature Protection and Wild Life Preservation in the Western Hemisphere (1942)' was-

"(a) Areas established for the protection and preservation of superlative scenery, flora and fauna of national significance which the general public may enjoy and from which it may benefit when placed under public control. Facilities will be provided for public recreation and education. The resources shall not be subject to exploitation for commercial profit.

(b) The boundaries shall not be altered, or any portion be capable of alienation, except by the competent legislative authority."
(c) Hunting, killing and capturing of members of the fauna and destruction, or collection of representative of the flora is prohibited except by or under the direction or control of the park authorities, or for duly authorized scientific investigations.

The marked change towards increased public use of national parks is noticeable in this definition, which applies to most North American countries. And recreational use of national parks has greatly expanded in U.S.A., Canada and Mexico, within the past few decades.

These regional attempts, though, narrowed down the range of variability, but still no single definition of universal applicability could be evolved.

The problem can be solved, if we look towards the functions or purposes which National Parks are serving all over world and then achieve the common denominators of what a national park should be, to be able to serve these functions.

2.2.1 THE FUNCTIONS WHICH NATIONAL PARKS ARE EXPECTED TO PERFORM.

The areas, declared as national parks, all over world, in general are expected to perform following three functions-

(i) Recreational
(ii) Conservational and
(iii) Ecological or scientific.

Both recreational and conservational aspects are now universally accepted roles of the national parks and have been dealt in detail in proceeding chapters.

The ecological role has been attributed to national parks only lately, because the importance of their well preserved
ecosystems in understanding the basic laws of evolution gained universal recognition quite late. Initially it was thought that due to the element of human visitation associated with national parks, these cannot fulfil the role of 'control-specimens' of nature. But soon it was felt that "... in this era of radioactive fall out and widespread use of toxic chemicals, it is doubtful if any truly primeval areas remain with no human interference." (Ovington-1969). From this angle, national parks are perhaps the only places where no destruction of unknown values take place or at least such destruction is theoretically avoided. Thus the fact is gaining ground all over the world that national parks are not only of aesthetic, recreational or conservational value but also are indispensable reserves of biological raw material to be used for the retracing of man's ecological steps. Such retracing is essential to determine the viability limits of various ecosystems. In the absence of the knowledge of these limits of resilience of the natural world, we might disturb nature, though unknowingly, in such a way that irreparable damage is caused.

The ecological investigations of biotic communities have been lacking a planned study for many decades, and national parks and equivalent reserves provide perhaps the only 'standard-environments' for such research. Thus, the rapid expansion of the new science of ecology, with its manifold practical applications has now conferred upon the national parks a third role that of absolutely irreplaceable outdoor laboratories. (Bourliere-1962).
2.2.2 ESSENTIAL FEATURES OF A ‘NATIONAL PARK’:

Keeping in view the above mentioned functions of the areas termed as ‘national parks’, it is easy to work out the common denominators, for relative identification, at an international level.

Garrison (1962), in an attempt to derive one of these denominators, observed, "The simplest definition is that national parks must contain features of truly national significance. This one measurement of excellence of natural beauty, scenery or scientific interest identifies national parks".

In a more thorough analysis Stanley (1964), tried to isolate other such denominators. He viewed national parks as spacious land-areas, essentially of a primitive or wilderness character, containing scenery and natural wonders of such an outstanding quality that their preservation intact for the benefit, enjoyment and inspiration of the people is a national concern.

Thus factors like spaciousness, uniqueness, national significance, wilderness could be considered essential features of areas to be declared as National Parks.

UNIQUENESS:

Generally, the areas, including features of unusual quality or of rare occurrence, not found elsewhere in the region and perhaps in the country, are classed as national parks. This uniqueness could be either from a scenic point of view or scientific one. The significant scenic beauty will make it useful for the special kind of wilderness experience, whereas significance from a scientific angle will stem from its being the 'type-habitat' of rare flora and fauna.

Every country has such areas that qualify, from this angle, to be declared as national parks. And this, to a great
extent, explains the inclusion of historical sites in U.S.A. and wildlife habitats in the African countries to the same category. "Although there are differences in their legal status and their principal features of interest, various areas of the National Parks System possess a common characteristic i.e. each is nationally unique and significant, either from a geological, biological archaeological, or historical viewpoint. For example, the historical events that occurred at Gettysburg National Military Park are as significant to Americans as are the geological and biological wonders of Yellowstone, Sequoia, and Grand Canyon National Parks or the evidences of early man in the United States, as noted in Mesa Verde N.P. and other archaeological sites. This ability of National Park Service areas to portray in dramatic, inspirational fashion some significant chapter in the story of our country serves as the matrix which unifies them under the same administration and qualifies them for a similar type of management" (Brockman-1959).

While categorising areas from this angle one has to be careful not to be misled by local or regional sentiments. A country wishing to establish a park system or to expand the one it already has, should ask certain questions about its potential national park areas, "To what extent are these areas really unique by national or world standards? There is little point in establishing, protecting and managing such an area, if it has few or no unusual qualities." (Clawson & Fisher-1962).

NATIONAL SIGNIFICANCE:

The public use of areas included within national parks system are by definition guided by the criteria that are quite different from the managerial objectives of land outside it,
which mostly are subjected to intensive utilisation to serve the material needs of the people. This strikingly differential treatment to areas included in the national park system will not be tolerated by the people till they are convinced that national parks are of national importance and their preservation intact is relatively much more important.

This concept was clearly conceived and recorded in the U.S. National Park Service Report (1932), "A National park is an area maintained by the Federal Government and dedicated and set apart for the benefit and enjoyment of the people". Such Federal maintenance should occur only where the preservation of the area in question is of national interest because of its outstanding value from a scenic, scientific or historical point of view. Whether a certain area is to be so, should not depend upon its nearness to centres of population which would ensure a large attendance therefrom or upon its remoteness from such centres which would ensure its majority attendance from without its State. It should depend upon its own outstanding scientific, scenic or historical quality and the resultant national interest in its preservation.

Once the importance of the area at national level is established, only then would it be possible to deal firmly with local or personal interests. Also, once public is convinced of their national value, it would easily understand that the greatest possible return from their use can be derived only through complete preservation as outdoor museum (Brockman-1959)

The wilderness areas which are not significant of this order should better be administered as recreational areas for general picnicking and camping or other such activities, and not
as National Parks.

SPACIOUSNESS:

The size of the wilderness area plays an important role in deciding whether it could be classed as a national park or not.

Since, in case of a national park, it is one of the fundamental objectives to preserve the natural habitat intact and in perpetuity, it is therefore essential that the area included must be sufficiently large and diverse to envelop whole communities and what is called the ecosystem. (Turner-1968).

In this respect, there could be two approaches. One, to increase the number of protected areas even if each one has to be of reduced size and the other, to select vast areas, may be a few in number but each large enough to include the whole habitat from ecological point of view. Needless to say, the second approach is the right one. "A single park of large size should be preferred to a swarm of 'micro-reserves', mainly because smaller populations of plant and animals are always more vulnerable to accidents or epidemics of various kind. It must not be forgotten that they produce conditions that may further a genetic drift which can quickly modify the hereditary characteristics of the populations." (Bourliere-1962).

One major factor to dictate the minimum size of the national park will be the intrinsic character of the habitat that is to be assured of perpetual preservation. For example, in the temperate regions where, only too often, the biotic totality no longer includes the larger mammals, relatively restricted areas can be adequate. But just as soon as the higher vertebrates enter the picture, and even more when it is a question of more or less
migratory species, the area envisaged must be on a totally different scale. (Verschuren-1962).

Similarly, when it is the question of preserving the threatened species, park area has to be spacious enough to accommodate the entire habitat web of the species in question, that is the predator, their prey species and their prey's grazing ground etc. In this respect developing countries are facing serious problems. Though by virtue of their being industrially less developed, these Afro-Asian countries are in possession of most spectacular wildlife and rare wilderness areas but due to economic pressure, occasionally a very dangerous argument is advocated by the policy-makers. It is argued, for reasons of economy, it would be better to have smaller but well-administered parks rather than big ones which can be controlled.

There are solid ecological considerations to reject such moves. For example, in India very serious efforts are being made to protect the 'Bengal-Tiger' - the Asia's finest animal. A special task-force, 'Project-Tiger' appointed by the Government of India, submitted its report in 1972 and it recommended concentrating all the efforts on nine special tiger reserves, which ultimately are expected to become India's elite national parks. Analysing this report Tinker (1974) observed, "The Project Tiger' report claims that all the nine proposed reserves 'have potential of developing a viable population of tigers', but the criteria on which this potential is based are not made clear. The report quotes with apparent approval the view of Professor Paul Leyhausen (Chairman of the IUCN'S catGroup) that a viable reserve should be a minimum size of 2000 square kilometers. As table 2
shows, apart from the Sunderbans the present size of the existing reserves is no where 2000 Sq. Km. and only the Manas reserve in Assam would reach this size even when extended as planned. Again the proposals state that 'an inner core, a sanctum sanctorum, of at least 300 Sq. Kms.' is essential in each reserve. At present, five out of the nine reserves do not exceed 300 sq. kms. in total area and even when extended to their proposed maximum, three sanctuaries will consist inner core and nothing else."

No doubt, the minimum area limits prescribed for a viable sanctuary will require considerable adjustments if the proposed parks are surrounded by well managed natural forests, still these points raise valid doubts against the thoroughness of the 'Project' from ecological angle.

Thus, areas considered suitable from other aspects for establishing national parks must be subjected to this question as well-is the proposed size more than the minimum area required for the ecological viability of the habitat-type?

In addition to the minimum required size, there should be some additional area to compensate for the 'edge-effects', which are very marked in the outskirts of the park. Numerous disturbing influences appear on the borders (Viz. streams, road, habitation, power-station, agriculture etc.) and only the inner core of the park is safe from these.

The I.U.C.N.-Commission in its attempt to prepare a U.N. World list of the national parks and equivalent reserves, classified these areas, spread all over world, into three categories depending upon their size-Large, Medium and Small.

Areas more than 1,00,000 hectares in size were grouped as 'Large'; between 1,000 to 1,00,000 hectares as 'Medium' and those
less than 1,000 hectares as 'Small', (Monod and Harroy-1962).

Thus, areas including distinctively unique features of national significance and large enough to be able to support a viable ecosystem, only, should be considered suitable for labelling as National Parks. The planning procedure discussed in proceeding chapters, mainly bases on these features and not on the national parks of some specific nation or region.
3. NEED FOR MANAGEMENT

3.1 EARLIER CONCEPT AND ITS LIMITATIONS:

The earliest concept behind the park management could be traced back to the year 1870, when one of the members of the party, surveying the 'Yellowstone River Valley(U.S.A.)' remarked: "It seems to me that God made this region for all the people and all the world to see and enjoy forever. This great wilderness does not belong to us but to America, never to be changed, but kept sacred always, just as it is now, so that Americans always may know how splendid this early America was, how beautiful, how wonderful." (Vowles-1967)

It was this philosophy of leaving the national park area untouched, unaltered, for the people to visit and enjoy, that dominated the scene for a considerable time.

But while encouraging people to enjoy the park environment in all possible ways, nobody ever foresaw that technological progress of twentieth century will provide such an immense leisure and movability that wilderness areas so set apart for all the generations to come, will become 'pleasuring ground' of the affluent society. "There is hardly a square metre of England that has not at sometime been exploited for profit or atleast for the pleasure of the king or a great nobleman". (Yapp-1966)

And in the case of American National Parks: "Situation is nowhere near to that image of unspoiled nature. Park environment now include smog-contained air, noise, long lines of people waiting to enter the dining rooms and motor roads with from four to six lanes, perhaps to reach a spot where nature may be appreciated" (Buchinger-1972).
However, realisation grew slowly and slowly that if not properly managed and directed, people may destroy the very values, the national parks were intended to preserve. Along with the fact that impact of thousands of visitors on soil, plants and animals can be a destructive process of unmanageable proportion, if not controlled and channelised in accordance with a pre-drafted management plan, also the advancement of natural sciences shattered the myth that if left to itself nature can manage its own affairs. With the increasing knowledge of the ecological characteristics of the elements of park biomass, it was observed that very few of the world's parks are large enough to be, in fact, self-regulatory ecological units; rather, most are ecological islands subject to direct or indirect modification by activities and conditions in the surrounding areas. Thus, even if the national parks are left undisturbed within their boundaries, they will need to be managed to counterbalance the possible impacts from external influences. These influences may involve such factors as immigration or emigration of animals and plant life, changes in the fire regime, the alterations in the surface or subsurface water etc. These factors if not duly accounted and treated for, in turn, may put animal populations out of balance with their habitat and threaten to continued-existence of a desired environment. For example in areas where due to some factor predator's population gets reduced, the unwanted explosion in ungulates' population will create problem. Similar situation might arise in cases of animals like elephants, which no other animal prey upon.

Thus, it is obvious that park management is essential not only to provide people the maximum opportunities to enjoy their
leisure in the best possible way but also to protect the very values which their significance originate from.

3.2 MODERN CONCEPT AND ITS SCOPES:

The management could be defined as any activity directed towards achieving or maintaining a given condition in plant and animal populations and habitats in accordance with the conservation plan for an area (Bourliere-1962).

This approach signifies two basic trends: first, park management is an active concept involving resource utilisation and not a passive attitude of locking the resources within park-boundaries and secondly, management in case of national parks like any other resource will require a predrafted plan, if it has to fulfil the desired objectives.

The understanding in this respect, is growing in various quarters of the society. "National parks and reserves are an integral aspect of the intelligent use of natural resources. It is the course of wisdom to set aside an ample portion of our resources as national parks and reserves, thus ensuring that future generations may know the majesty of earth as we know today." (Kennedy-1962).

Clearly enough, the park management has to ensure that the national parks as a resource fulfil the objective of conserving the majesty of our planet.

Another important and closely related aspect is the enlisting of the public participation in planning the management of national parks. This new philosophy might, at first glance, appear ridiculous in the background that the park-management is an expert's job requiring a great deal of skill. But leaving the actual planning to experts, if public cooperation is sought by assessing their aspirations and expectations while defining the management objectives,
a great deal of future-conflicts could be resolved right in the beginning.

Because, "The most difficult management problems usually arise from the relation of visitors or users to the natural environment of the area—how to permit man to use and enjoy, without destruction or impairment? This is where the greatest ingenuity and resourcefulness is required from park-managers" (Clawson & Fisher 1962).

In this context it is worthwhile to note that planning experts and skilled managers at their best may and generally do come out with technically very sound management plan, but if it does not reflect the people's expectations, the existence and the precious qualities of the area may be jeopardized. But since, public support does not arise unassisted, it must be aroused. This can be done, first, by making it a part of the management objectives to educate and encourage the public participation and then surveying—what do the people want parks to be managed for? This does not necessarily mean that desires of the people should be fully decisive. But, "The Park planners and the managers have the responsibility to conceive and carry out park development which they think will be accepted by and rewarding to the people concerned and at the same time be consistent with well conceived standards of use." (Clawson & Fisher 1962).

Shafar (1964) studied visitor's preferences by presenting visitors with photographs of development alternatives with corresponding admission prices. Conventional question-answer & personal interviews with visitors are the most common methods and have been discussed in detail in chapter 5.2.3.1.
CHAPTER 4

4. NEED FOR PLANNING:

4.1. BASIC PURPOSE OF PLANNING A RESOURCE:

The function of planning is to help the decision makers to evaluate the consequences of various possible alternative decisions and then to select the most appropriate one. For this, one needs information, which actually constitutes the raw material for planning. Such information is supposed to arise from planned observation, guided by theory, which however need not necessarily be tied to the controlled experiments. It is in this respect that information required for planning is different from mere data. (Morgenstern-1963).

The procedures involved in the collection, compilation and processing of the information from this angle, have greatly been complicated, since national parks gained reputation as a major resource for feeding the holidaying-industry.

The ever increasing size of the tourism completely rules out any role, whatsoever the personal guestimates of emotion-committed park-managers played in the past. Now the park planning has to be based on reliable information, pooled from both the ends-supply and demand.

There is another purpose which planned-management based on reliable information will serve. It will provide an important tool to justify the establishment of national parks and their preservation, even on economic grounds.

SIGNIFICANCE OF NATIONAL PARKS AS A RESOURCE FOR ECONOMIC GROWTH:

So far the general feeling was that the primary benefits from N. Parks are qualitative and can be measured only in
psychological terms. But universal drive for contact with nature has given rise to the expanded use of national parks as a potent force in economic growth.

In U.S.A., it has become abundantly clear that national parks are not only sound investments but a sound use of public fund as well. (Stoddard-1966).

In other countries too, it is being realised that income from providing services to visitors might surpass whatever would have been from exploiting the parks resources. Though in most countries factual documentation to support the case for n.p. on economic terms lack, but in U.S.A. where considerable efforts have been made, quite encouraging results have been obtained. The recent survey-report of U.S. Department of Interior Bureau, on 'Outdoor Recreation' (1971) observed, "In 1950, 5.8 percent of American's personal consumption expenditure was for outdoor recreation. But in 1969, the proportion had risen to 6.3 percent. The increase is more impressive when stated in absolute terms; from $74 per capita in 1950 to $179 in 1969".

Similarly in many African countries it has been established that a sizable proportion of their national income flow from the foreign tourists who come to see the wildlife in their national parks. And now efforts are being made in other countries as well to highlight the economic aspect of national parks.

Tourist-expenditure can be an important source of revenue to an area for several reasons. While holidaying people spend more than their normal daily earning. Most of them save throughout the year for meeting this expenditure. This is brought into an area from outside. Recreation creates a 'Service Industry', concerned essentially with people. Thus tourism increases the demand of labour
and changes the image of an area.

Recreation is not a luxury trade. As a matter of fact, "Tourism is a new economic resource, which often flourishes best in the areas that are poorest in industrial resources." (Lickorish-1965).

One very important aspect of this trade is that one cannot store the unused recreational potential. It is manufactured and wasted. Hence a delay in entering the trade simply means a loss. No doubt initial investment in building up the infrastructure and setting aside the unique areas as a long term investment in trade, are substantial, but once it is made, there starts the increasingly profitable business of selling the recreation, which is otherwise manufactured and wasted.

While evaluating the park values, the externality effects must be considered. Because money spent by the tourists is spent on:

(i) food and beverage and general purchases,
(ii) accommodation (most of the tourists do not stay within the parks but merely come to visit the park during day and stay in towns bordering the park),
(iii) transportation.

These externalities in turn have got their backward and forward linkages. Each dollar spent by one person requires six or seven person's services.

Thus, it is not the actual entrance fee which should be looked at for proving the importance of national parks as a resource but the overall structure of the economy.

Several methods have been proposed to place dollar values on park recreation. Suitability of these will depend upon the special nature of the park under consideration.
The 'Demand-curve analysis method' is one of the most widely used methods. It was popularised by Clawson & Knetsch (1966).

The basic assumption in this method is that travel costs incurred by an user is a proxy for its price. Basing on this assumption demand curves for that recreational activity can be plotted (between quantity consumed at various travel costs and respective travel costs).

This is gauged from an actual study of users who incur various costs primarily as a result of having to travel different distances in that area to have the recreational experience available there. The 'quantity consumed' can be obtained by multiplying the hours of use of the park value (camping, horseriding, sightseeing etc.) with number of users incurring the same travel cost.

Pearse (1968), suggested a modification to original 'demand curve analysis method' by identifying the dependence of quantity demanded on income variability. Because shape of demand curve could possibly be a function more of income than of the distance (or travel cost). High-income persons may be willing to pay more than low income persons. Thus for a better approximation, while estimating the demand of various recreational activities, one should include 'income' as a variable.

Sinden (1974), in his analysis suggested a modification to the basic assumption of 'constant-tastes' involved in 'demand-curve analysis method.' He introduced an additional variable to account for the intensity of preferences in demand function. This will require a survey of the recreationist's attitude and measurement of their willingness to pay (in terms of additional costs) to visit the most preferred environment over the base environment (that is the one, which they have visited otherwise).
In his study he found significant variation between the tastes of the users, "The quantity of use is more responsive to the preference variables than to the distance. Inclusion of the preference variables in the demand function is one way of including both taste and distance in benefit evaluation". (Sinden-1974).

These methods have been developed and applied to specific sites only and will require separate modelling for different sites. However, these do provide a guide-line to start with.

A word of caution is essential at this stage, while attempting to weigh park values on a scale of dollars and cents. Tourism carries with it many short and long term ill-effects and no method will deserve attention which does not account for these in definite terms.

4.3. IMPACT OF TOURISM ON NATIONAL PARKS:

The ideological philosophy behind declaring an area as 'National park', faced the test of time only after the advent of tourism as an industry. This, on one hand, provided an economic support to the idea and on the other hand gave birth to many such problems which park managers were neither prepared for nor even aware of.

Overcrowding in parks became as frightening as in big cities. "The part of the tragedy is that most of the people who come to the parks do so in the hope of escaping the crowds, they must live most of the year in the cities. As they make the long trek across the continent for a brief vacation, they find themselves too often crowded shoulder to shoulder with other escapees from other big cities." (Smith-1962).

Similar observations were made about the national parks of Japan, "The parks are indisputably as crowded with visitors and
traffic as are busy quarters in cities". (Senge-1962).

The possible direct and indirect impacts of overuse by the modern man forced the managers to go into details. Because there were reasons to believe that, "Concentrated public use of national parks may initiate ecological processes which are far more destructive than are changes due to grazing animals or natural processes." (Darling & Eichhorn-1967).

Vowles (1967), explored the possibilities in another direction, "Whilst motoring age provides increased opportunity for recreation in outdoor surroundings it can cause disastrous degradation of the surroundings. Cars and roads can provide faster travelling, but it is doubtful if the animals and birds in National Parks can adopt to the increase in human traffic and speed of travel".

Buchinger (1972), pinpointed, one of the basic causes of the trouble, "Now that people are accustomed to the comforts of the XXth century, they want to take all the modern technology with them and consequently when one reaches the headquarters of one of the great National Parks in the United States all the advantages of a city summer resort are available and also its disadvantages."

An analysis of the prevailing ill effects of the tourism revealed that most of these are either due to lack of planning or due to a short term superficial planning. "The current environmental problems being encountered in the National Parks can be attributed in large measure to the lack of such a (long term, detailed) management plan" (Ovington et al-1972).

The impact of tourism can not be averted by closing the parks to people, but by thoroughly analysing the problem in depth and then devising strategies to counterbalance the same.
The impact of human-visitaiton on a natural site could be of two types:

(i) Impact on recreational quality.

(ii) Impact on environmental quality.

One of the basic reasons people visit a national park is to recreate in natural surroundings, and relative isolation is a prerequisite for the fulfilment of any such desire. Overcrowding (both physical and psychological) generally goes against this pre-requisite. For example bush-walking or camping in national parks will lose a great deal of its charm, if park is full of noise, cars, tents or even by the people engaged in the same activity. Thus, large number of tourists and consequent facilities required by them (say accommodation, parking place, etc.) clustered around features of interest, obviously will encroach upon each other's feelings resulting in deterioration of recreational experience and quality.

Similarly intensive use of an area by visitors, will make impact on the ecological characteristics of its natural features. Tourists' feeding of wild animals may change their number and habits. Plants and plant communities susceptible to trampling may be reduced in number; tree seedlings may be destroyed so that an area may not regenerate and occasionally alien plants may be introduced inadvertently. Where visitors congregate, soil compaction may result, limiting plant growth. In specific cases, say on steep slopes, soil erosion may result. Trampling of soil may also cause changes in hydrologic conditions, such as reduction in available soil moisture. Also soil aeration might get reduced, affecting tree vigor and making them susceptible host for destructive insects and fungi. Trampling also affects mesofauna of soil, finally affecting the fertility of soil. (Chappell et al-1971).
Again, water being the major source of attraction to tourists, is subjected to pollution. Oil and gas pollution from outboard motors and discharge of human wastes are serious problems producing dark smelly water that is a health-hazard to swimmers, poisoning marine flora and fauna and spoiling beaches and shores (Bird-1969; Lime and Stankey-1971).

In case of streams, problem will not be acute, as contaminants are removed as fast as they are added. But in cases of stagnant water sources (say lakes or ponds) the contamination could steadily increase and more care will be required.

Popularity of a National Park makes it more susceptible to such environmental degradation. As observed by Brooks (1966), "In America some of the N. Parks are actually suffering because they are too popular." An interesting observation was made by R.W. Kalliola of Finland during the VIth World Forestry Congress (1966), "In Sweden, Norway and Finland, where natural landscapes still dominate, it has been said that the worst that can happen to the nature of an area is that it will be declared a national park."

Though extreme, but, to a great deal, overpublicity, given to the quality of wilderness experience provided by the national parks is the cause of overcrowding. "People in developed countries treat it as a status-symbol. As a result the demand for recreational use of national parks increases every year and has increasingly come to dominate park management" (Ovington-1969).

Thus, the fact that tourism is going to stay as the major function of national parks, is quite an established fact. Human beings cannot be expected to preserve some thing for future generations without feeling its advantages themselves. Moreover,
the economic advantages associated with it (as discussed earlier) will generate tremendous political and social pressures upon park-managers to treat tourists and their activities as an integral part of the park-environment and then devise the suitable strategy to preserve the park values in perpetuity.

4.4 Necessity of Planning to Ensure that the National Parks Serve Their Essential Functions and Continue Serving in Perpetuity:

Planning aims at the judicious use of a given resource, integrating both the short and long term requirements.

This concept behind the process known as 'Planning' holds good for the management of any scarce resource and consequently for 'national parks.' Elaborating the specific role of Planning, Garrison (1962) observed, "In national parks, we find planning constitute one of the most effective management tools available. This is generally implemented on the basis of landuse plans, called master plans. For each park, a broad management plan for the preservation and public use of resources is prepared, combining graphic representations such as maps, charts, and drawings, together with narrative documentation. This shows the relationships of various factors to one another and insures that in scheduling development, sacred and highly scenic areas are protected and gaps or overlapping, from piecemeal planning, are avoided."

As discussed in chapter 4.3., conflicts between tourism and conservation are increasing alarmingly with increasing number of visitors. The conflicts arise not only between tourists, conservationists and ecologists but also within these groups, attempting to use the same resource but differently. These could be resolved or at least minimised by way of planning, which in turn
will go through two stages. Firstly identification of conflicts among the three main categories of use (discussed in detail in chapter 2.2.1) and secondly within the each category.

The most practical planning-technique for resolving first type of conflicts could be the zoning of the park into three, one for each type of use. Park areas having the highest user suitability could be grouped under 'recreational zone'; similarly, areas requiring protection or rehabilitational treatment against ill-effects of past use or current level of use could be zoned as 'protected zone' and areas with rare potential for scientific studies as 'strictly restricted zone'. These aspects have been discussed in greater detail in the chapter 5.2.4.3.

The second stage of master planning should aim at resolving conflicts within the each zone. This would require the definition of 'carrying-capacity' for each zone and then the identification and distribution of the facilities to various possible alternative uses within each zone, ensuring that, in no case the carrying capacity of the zone is exceeded.

The selection of the suitable strategy will, in practice be a difficult task and many factors will influence the decision. Still, once it is the question of managing the most valuable areas of our planet, one has to go through the complexities of the process. The 'Seventh World Forestry Congress (1972)', in it's Secretariate Note rightly observed," The planning of park management and development requires careful considerations of the sociological, ecological, economic and, finally, political aspects. One should reflect upon the services produced in the more than 2000 national parks and equivalent reserves being managed in some 130 countries of the world today, and realise that this activity of park management cares for
(33)

some of the world's most valued treasures."

The relative significance and influence of these factors have been discussed in detail in the chapter 5.2.4.2.
CHAPTER 5

5. PLANNING THE MANAGEMENT:

The elements of park planning could be grouped under two stages: macroscopic and microscopic. The difference will be of scale. For example, the basic requirements of planning and management objectives have to be defined in general, for the national park system as a whole, preferably on national or regional scale. This would obviously overlook details, associated with specific sites within the national parks.

Later on these details will require to be considered at a smaller scale, taking the specific park as an unit in itself. For example, identification of the appropriate activities for specific sites, location of carparks or tourist accommodation, selection of the building material or colour etc. will require microscopic considerations on much smaller scale.

Thus each unit of the national park system has to be an integral part of the system, as well as a self-thriving and autonomous system in itself.

5.1. MACRO-PLANNING:

There are certain basic requirements of planning, which would apply to each national park. Referring to these, Ovington et al (1972) observed, "If optimum use of any national park is to be achieved in a rational manner six closely-associated major requirements must be fulfilled-

1) Definition of the boundaries and legal status of the park and the administrative machinery for integrated management.

2) A precise statement of management objectives.
3) The preparation of an integrated management plan, designed to achieve these objectives.

4) The acceptance and implementation of the management plan with adequate funding.

5) Establishment of environmental monitoring to determine the consequences of particular management techniques.

6) Periodical reviews of management-aims and practices to accommodate to changing circumstances."

These requirements will ensure that an area so set aside qualifies for the inclusion into the 'National Parks System' of that country.

Similarly, management objectives could be defined on a wider scale, and to these every unit of the 'System' should be required to abide by. Obviously these general objectives, should provide a framework reflecting every possible diversion. "The essential point is that goals should be carefully and explicitly formulated in advance". (Clawson & Fisher-1962).

Once the objectives for the 'system' are defined, it would be easier for the individual park manager to identify and isolate his management problems, within the general framework.

Many attempts have been made to answer the question—what should the national parks, in general, be managed for?

Garrison (1962), in this respect observed, "Parks are for the understanding of nature and ourselves; they are for the inspiration which comes from lonely commune with nature and the forces which shape our environments; they are for solace for those troubled by the turbulence of modern civilisation. Parks also promote better citizenship as they contribute to healthier confrontation with natural forces and instil strength through the
understanding of them."

This signifies that national parks should be managed to provide a special kind of recreation which comes through understanding of nature. However, lately, many other new objectives have been suggested and a serious attempt was made by Ovington (1969) to categorise these into a comprehensive list. According to him the management objectives of a 'national park system' should be:

1. To provide special outdoor recreational facilities by virtue of a beautiful and unusual landscape.
2. To provide opportunities to see native animals and plants in characteristic outdoor surroundings.
3. To conserve outstanding natural features, rare species and ecosystems.
4. To preserve examples of the history and archaeology of man as part of the national heritage.
5. To encourage interest in conservation and rural activities.
6. To serve as storehouses of biological evolution both at the species and community level.
7. To act as reference points for scientific investigations.

This is quite an exhaustive list and can easily be treated as a valid guide for specific national parks, though in cases, there could be marked changes in the order of priority. For example, if an area contains a rare-ecosystem, the scientific study would become the dominant objective, ignoring the recreational claims altogether. But even in that case, the park manager would be able to draw his list of management
objectives out of this.

5.2. MICRO-PLANNING:

5.2.1. FOUR STAGES OF MICRO-PLANNING:

The planning, at individual park level, will depend on the planner's access to reliable data about the total use of an area, the use of various facilities provided, the nature of park features, their intrinsic characteristics, behavioural pattern and motivations of recreating public etc. (James-1971)

The process of collection, compilation, and processing of desirable information and then decision making in this background has been discussed in detail by various workers. (Clawson & Fisher-1962; Hogg-1973; Ferguson-1974; James-1971)

In case of a national park, process could be modified and studied under our stages:

1. Resource inventorying to compute supply function.
2. Assessment of demand trends.
3. Identification of conflicts between supply and demand functions and selection of suitable management strategy to resolve these.
4. Monitoring and feedback.

5.2.2. INVENTORYING THE SUPPLY FUNCTION:

Statistically speaking, a complete inventory of a resource base is neither essential nor economically desirable. For example, estimates of the mean parameters of a large wood producing forest tract are sufficient for computing annual yield and, needless to say, that sampling is the logical approach for obtaining the reliable estimates of desired parameters. But in case of a National Park, such an approach will not hold good. Mainly because, each recreational parameter will have its specific locational
significance by virtue of being both the point of production and consumption. Estimates of the mean of the parameters of all sites would, in case of park planning, have little value. (Ferguson-1974).

Thus inventorying of park values for computing supply function would involve a great deal of subjectivity. However, since this essay does not refer to one specific park, attempts here will be made to work out a general framework in this respect.

First a list of feasible parameters of park environment, should be prepared to guide the surveyor in the identification of the predominant features. That is, a clear statement of what to look for and by inference what to leave out is therefore important.

Secondly, specifications should be prepared for the evaluation of the suitability of park values for various possible uses. This evaluation will often be required to be done at site.

Basing on these two scales, park features will be surveyed and evaluated. Evaluation will have to be done both from users' satisfaction and carrying capacity viewpoints. Because no matter, howsoever satisfying an area of land is to the user, there will be an upper limit to the total amount of use that could be derived from it without the area undergoing deterioration with a subsequent loss of satisfaction to the recreationists. (Hogg-1973)

5.2.2.1 THE FEASIBLE ENVIRONMENTAL PARAMETERS:

Very often the expression 'wilderness' is used to define a park environment. And, "Wilderness is not a type of landscape, but a congeries of feelings about man and nature of varying importance to different epochs, culture and individuals." (David-1962).

This and other definitions given to wilderness will not help a surveyor in the field. A break-up into the constituents is essential. Various attempts have been made to categorise the

Following four categories envelop various feasible environmental parameters -

i) Biological: Vegetation, wildlife, etc.

ii) Physical: Topography, scenery or landscape, water-resources, climate, soil, geological formations, air-movement etc.

iii) Cultural (or man-made): Roads, communication trails, camping site, bridges, signboards, safety arrangements, waste disposal, etc.

iv) Ecological: Rare ecosystems, food-chains, brush-encroachment, entropication etc.

(i) BIOLOGICAL PARAMETERS:- These are self-regenerating under proper management. The important ones in this category are vegetation and wildlife.

Vegetation- It is the vegetation in all its variety of forms that provides the ever-changing covering of the land which vitalises scenery and through the mosaic disposition of its components transforms the stark skeleton of land-form into the living pattern of the countryside which is to man so great an attraction.

This greatly explains the role of vegetation in park-environment. Moreover plants being rooted in the soil and exposed to daily weather of all seasons, can be treated as an instrument to assess the integrated nature of the environment and ecosystems. The presence or absence of given species, pattern of their distribution, their growth, quality and density, all tell a story which is fundamental for those dealing with environment.
The ecological survey for sound environmental planning must look for following features-

Relation between upper and lower storeys, vegetation quality and density, plant spp., tree-association, percentage of coverage and vegetation growth etc.

Vegetation-cover controls erosion and deterioration of recreational value of a site. Trees as a shelter can create shade and in ski-resorts distribute snow. (Bacon-1969).

Vegetation also influences micro-climate as well as pollutant-level of an area. Increased tree growth means decreased wind. Similarly these act as noise screens at over used sites.

Wildlife: "Wildlife? That is how we refer to the magnificent animals of our jungles and to the beautiful birds that brighten our lives. I wonder sometimes what these animals and birds think of man and how they would describe him if they had the capacity to do so. I rather doubt if their description would be very complimentary to man. In spite of our culture and civilisation, in many ways man continues to be not only wild but more dangerous than any of the so called animals"....

....."Life would become very dull and colourless if we did not have these magnificent animals and birds to look at and to play with. We should, therefore encourage as many sanctuaries as possible for the preservation of what yet remains of our wildlife."

(Jawaharlal Nehru-1964)

Animals are subtle kinds of landscape-enrichment that are chiefly enjoyed by walkers. The aesthetic appeal of animals has been well recognised and the relationship of animals to habitat suggests an interesting harmony between aesthetics and ecology.
Therefore it is essential to evaluate the number of animals in the area, their species, their habits and habitat and attitude towards recreationists.

To provide opportunity to watch wild animals in their natural state should be the purpose of national parks and not their commercial exploitation or caged demonstration.

(ii) PHYSICAL PARAMETERS: These to certain extent are consumable and their importance is two edged. First, these help the evaluation of the suitability of park-sites for various activities and secondly, these define the limits of carrying capacity of an area. Landscape, topography, soil, water, climate, etc. are the various physical parameters.

Landscape is a scenic resource and for user it carries aesthetic value. In business-terms, objective of landscape planning is to facilitate the visual-harvesting of scenic resource. Though it is difficult to quantify this resource, it is certainly possible to select observer's position to enable him to derive maximum aesthetic pleasure because the totality of the landscape (made up of parts like vegetation, hills, rock-system sunrise or sunset, stream, lake etc.) appears differently from different point of observations. Amongst these points lies the position from which scenic resource can best be exploited. Litton (1972), has dealt, quite in detail, with the process of designing 'visual-corridor.'

Topography governs vegetation, water, soil and microclimate. For example an increase in altitude implies a decrease in temperature. Similarly an increase in relative humidity (or decrease in absolute humidity), frequently means in increase in cloudiness and precipitation and an increase in intensity of isolation and radiation and wind-velocity.
Site-steepness is an important factor of topography to be noted while planning intensive use of recreation. Galloway (1969) characterized the relief and site steepness in five classes:

a) Mountains—with average slope exceeding 23% with a local relief greater than 180 metres.

b) Hills—with average slope between 11-25 percent and local relief of 90-180 metres.

c) Rolling terrain—with slopes between 6-14% and local relief between 60-120 metres.

d) Undulating terrain—with average slope between 2-7 percent and local relief between 15-60 metres.

e) Plains—with average slope between 0-2.5 percent and local relief upto 25 metres.

Soil: Suitability of soil for various activities is essential to be evaluated because the movement over a track or virgin-ground by vehicles, animals or people can cause compaction of soil, removal of covering vegetation or physical damage to the soil-surface, all of which can start or accelerate the removal of soil by erosion. Thus, for soil, it is essential to be stable to support the recommended intensity of specific use.

Water: It is the focal point of much outdoor recreation. Because the comfort-level of visitors depends heavily on water. It is needed for cooking, washing, drinking on one hand, and for recreational needs of swimming, boating or fishing on the other. Camping sites, picnic grounds etc. are mostly located near ponds, lakes, stream, river etc.

Pleasure given by water can be immeasurably increased by
bridges, even where they are not needed on any functional grounds. This is really another extension of 'edge-effect', but it also means people can have much closer relationship with the water. A plank across a stream or a small footbridge across a pool means that people can peer at fish, watch birds or just sit dangling their feet in the water. (Beazley-1969).

Thus while surveying, one must keep an eye on possible sites for these developments. Because the infallible lure of water that drives us all, is an important planning tool.

Climate: It dictates the type of recreation a N. Park can provide. Moreover, it, being the major factor in distribution of plant and animal life, also controls the possible utilisation of these factors.

'Indirectly, climate may also materially affect recreational values by causing excessive seasonal concentration of people and so damage the recreational areas'. (Brockman-1959).

While surveying the area for recreational and conservation use, climate should be viewed from two points. First as a factor reflecting the nature of the area and secondly as a factor affecting recreationists' physical comfort.

Physical comfort will require consideration of number of elements of the climate, e.g. temperature, wind-speed, radiation, temperatures of surrounding objects and number of wet-days, etc.

Climate itself is affected by number of other factors. Young(1969), suggested that atleast thirty years' record should be considered a suitable size for averaging the climate of a place. The records should contain-

1) Amount, distribution and frequency of rainfall.
ii) Seasonal and annual average of temperature and frequency of frost, fog, dew and hailstorms.

iii) Frequency of snow, amount, depth, persistence and distribution.

iv) Average-monthly and average-annual occurrence of cloudy periods and clear days and sunshine per day and amount of radiation received.

v) Amount of humidity and evaporation.

vi) Frequency and degree of hazard of drought. Flood and bushfire.

Suitability of climate, changes with the age and the physical fitness of the visitor. Hence it can be used to disperse the seasonal concentration by due publicity.

Microclimatic variations should also be recorded and highlighted, viz. nearness to snowpeaks, hot-spring, air-drainage, exposure, position on the slope, aspect etc.

Air-drainage affects microclimate by controlling fog, humidity, temperature, cooking smoke. Air drainage is normally poor in low places and surrounded with trees. However, very often these are the places preferred for camping. In such case drainage can be improved by creating 'chimney-effect' in the overhead cover to permit better ventilation. (Douglass-1969).

(iii) CULTURAL PARAMETERS: These are man-made features and created to get best use of the other natural features. But while planning for such man-made developments, fact should be kept in mind that national parks, primarily, are established for conserving the uniqueness of the area intact and not making the area suitable for intensive recreational uses. However, since the provision the
for public enjoyment is one of the management objectives, cultural parameters require a careful consideration.

Various aspects of these features have been discussed in detail in chapter 5.2.4.2.

(iv) ECOLOGICAL PARAMETERS: These are of great significance for scientific studies and their presence makes the park a valuable 'outdoor-laboratory' for understanding the laws of evolution and other natural processes.

5.2.2.2. INTRINSIC SUITABILITY OF VARIOUS PARAMETERS FOR VARIOUS USES:

After surveying the park area and mapping out the 'focal points' (or 'sites') on ground and recording the various parameters available, the evaluation of resource parameters for type and intensity of use should follow.

Recreational activities could be divided into two categories, extensive and intensive.

EXTENSIVE USES: - bush-walking, sight-seeing, fishing, bird-watching, driving for pleasure, trail-biking, horse-riding, mountain climbing etc.

INTENSIVE USES: - camping, picnicking, skiing, boating, swimming and other forms of outdoor sports.

Extensive uses do not require specific conditions and developed sites, whereas intensive uses do.

The evaluation of site factors from supply point of view can be done in two ways, extrinsic approach and intrinsic approach.

EXTRINSIC APPROACH: - According to this detailed requirements of various recreational activities in demand is made and then it is
determined to what extent various site-factors meet up these requirements.

INTRINSIC APPROACH: In this case, characteristics of park features are identified first and then their potential for supplying various types of recreational experiences is determined.

The question of which approach is better is difficult to answer. On one hand, one can take the view that the recreational needs of society as a whole are more important and higher priority should be given to the activities, which enable the majority of the population to derive maximum pleasure from its leisure time. This means, favouring the first approach. Whereas on the other hand one can argue that attempt should be made to plan only for those activities which suit the intrinsic & natural properties of the park features, so that no damage is caused to these. It is evident that if taken the first approach, it would involve restricting certain activities which place a heavy demand on resources. Also the first approach ignores the fact that supply creates demand and substitutes have always played an important role in shaping the public opinion and changing the consumer's attitudes.

Thus, if keeping the necessity of perpetual conservation in mind, new recreational activities are innovated and provided, people will start liking those. Hence only intrinsic natural properties of the park features should guide the planner's decision regarding the type of activity to be favoured at specific sites.

The procedure involves, thoughtful planning and selection of the sites for public use, near but not within major scenic
resources. This might, at occasions, require restricting certain activities, even if those were free before-hand. A controversy might arise in such situations, but given facts and information, public cooperation can be won. Garrison (1962), narrates one such experience in the case of Yellow Stone N.P., "One urgent problem suddenly recognised was the accelerating thoughtless impairment of nesting grounds for rare species of water birds by some boats. Terrestrial wildlife was also disturbed, and the air was filled with the racket of motorboats invading professed wilderness areas. Consequently, in the summer of 1959, lake zoning proposals were made public. These would eliminate motorboating from certain portions of the lake. Controversy developed immediately, leading to public hearings involving congressional and other political interests and to strong initial differences of opinion between dedicated conservationists and boaters, public understanding and endorsement of the true nature of the proposal and the problem which led to the need for restrictions came gradually and in the summer 1961, a modified form of lake zoning was included in Yellow Stone N.P. regulations for the first time."

The suitability of park features and its environment for various kinds of scenic and recreational opportunities will depend upon many factors. According to Lloyd and Fischer (1972), these are, space requirements, desirable frequency of contacts among users, objectives of participants, degree of development of facilities and sites required, ease of access and mode of transportation etc.

Depending upon these factors, park sites can be evaluated for various activities or combination of activities. However such an evaluation will not apply to natural features of extraordinary
qualities, because unique natural features and outstanding scenery are preferred by all regardless of the particular type of recreation pursued otherwise. (Ovington et al. 1972).

Hogg (1973), proposed a formal technique of evaluating user-suitability of various features, on a 0 to 10 scale. But even while using such formula-based techniques, he admitted that one has to resort to a great deal of subjectivity in value judgement. This subjectivity is an inherent quality of resources, which can not be measured quantitatively. Park environment is perhaps the leading resource, amongst these.

A general understanding of the people's attitudes can help a great deal in planning. Analysing this aspect Garrison (1962) observed, "The most of the visitors come for simple pleasures of camping, sight-seeing, photography of scenic views, bird-watching short walks in wilderness or just resting in the Quite of the woodland environment". These pleasures, can easily be provided by simple facilities like camp grounds, trailpaths, parking places etc.

Following general discussion about the most commonly sought after activities will help in selecting the suitable activity for available sites.

PICNICING: Mostly the national parks are distantly located from population centres and will not receive much use for picnicking in their own right. But the increasing trend of private enterprises building up hotels on the periphery of parks to provide accommodation to visitors with long vacations, will cause increasing demand of day-picnicking facilities.

Light woodland and parkland on well-drained soil obviously make for ideal picnic grounds. Some of the most successful picnic
places are small areas on the sunny fringe of a wood which takes up to half dozen cars. (Beazley-1969).

An important requirement of the picnic spot is the parking place nearby, because of the reluctance of most people to go far from their cars.

CAMPING: People camp for variety of reasons. In American national parks they vary from primitive sites with drinking water from a lake or stream, pit toilets for sanitation and a ring of rocks for a fire place, to campgrounds with paved roads, convenient water faucets, comfort stations and prepared fireplaces and tables. (Garrison-1962).

In general campers could be divided into two groups. The first, those who prefer to camp in developed and established campgrounds and second, those who prefer adventure camping in the bush. But sense of freedom is a desire common to both the groups. This means getting up when you want, taking meals when you want, informality of dress or no-dress, domestic chores to a minimum etc.

Speaking about camping in national parks, Lykes (1967) observed, "Perhaps in certain parks of the System, it would be advantageous if camping was eliminated altogether and handled by private enterprise on less spectacular or no historic lands adjacent to those which we administer. But so long as we provide camping in national park areas we must limit the space and the time for this activity in order that we observe the mandate—"to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations."
It is desirable for the campsites to get integrated into the landscape. From camper's angle, one has to keep in mind that the instinct to settle on the edge, though primitive, is still in us. In national parks, edge or fringe will be the line where one ecological pattern changes for another or where generally flat terrain is interrupted by a tree or rock, the hedge of woodland, the bank of a stream, the woodland glade etc. These will provide desirable campsites (Beazley-1969).

Light gravely and sandy soils are naturally best suited to campsites. Chalk drains well but, can be slippery if it becomes bald. It is vital to check that a site is not subject to occasional flooding.

A number of associated activities are very often pursued by the campers such as nature-walking, photography, fishing, sunbathing, etc. Campgrounds near the sites with opportunities for these will be preferred a great deal.

WILDERNESS WALKING: This expresses the inner feeling of the man to belong to nature. And as society becomes more and more mechanised simple activities like bush-walking will become highly desirable leisure pursuits.

It requires little skill and specialised equipment, particularly, if pursued over periods of one day or less (which is favoured by old-aged people). They like to stop off on a car-tour to walk a mile or so on bushtrails. Younger people favour extended bush-walking, along unguided routes requiring camping equipment.

Thus construction of walking-tracks, carpark, huts for short overhead shelter etc. can be desirable.
Inspecting and photographing the natural flora and fauna can be an interesting sideline to a bush-walking trip for many people. For others, however, it might be the main object of the trip and any walking that is done will be secondary. Access to areas with such potential, from the camp or distantly located carpark should be available only on foot.

Very simple hiker’s shelters on a Swastika plan have been devised by the U.S. National Parks Service. These provide welcome shelter for long-distance walkers. The protection given would be preferable to most hikers than the open air. (Beazley-1969)

These points cover only few of the simple but very often indulged in activities. However depending upon the special nature of the features of any national park, type and intensity of uses will change. In such cases the only guide will be the ‘carrying capacity’ of the site.

5.2.2.3 THE CARRYING CAPACITY AND ITS VARIOUS ASPECTS:

Carrying capacity has recently become a major concern, as many more people learn to appreciate the benefits derived from park-environment and more and more people visit national parks.

Many attempts have been made to define the term, carrying capacity. Douglass (1969), defined it as: "The amount of use an area can support without permanent long term change in recreational quality of the site."

Boden (1971), also used recreation as basic parameter to assess the carrying capacity of an area, "Recreational carrying capacity is the level of recreational use an area can withstand while providing a sustained quality of recreation."

These and other definitions on same line overlook the fact that it is not the recreationists only which require a
limit but other elements as well. For example, animals and plants. These also can cause deterioration of the site. Fisher and Krutilla (1972), keeping this fact in mind defined it as, "The maximum number of individuals of a species that can be supported by a given habitat under conditions of maximum stress."

This, though covers the ground significantly, but practical considerations make it difficult to put into practice. Hogg (1973) adopted a more practical approach to define it, "The carrying capacity is dictated by point beyond which natural or artificial stabilisation processes cannot keep pace with the damage caused by the users."

Thus the concept of carrying capacity aims at determining the limits of maximum use, within resource constraints. The basic elements, therefore are two—the user and the resource.

First requires the determination of the attitude of users and their distribution in space and time. Where as the second poses physical and natural constraints to restrict the first.

These two will dictate the upper limit to the total amount of use that can or should be derived from the park, without the area undergoing deterioration to a subsequent loss of satisfaction to the present or future users.

The limits so defined, will need modifications on psychological grounds. Because increasing encounter with other user might start diminishing the user's satisfaction before the actual limits posed by physical consideration are touched.

Thus, practically speaking, the recognition of the problem of carrying capacity requires the acceptance and then determination of basic standards of environmental quality against which to judge
the impact of human visitation. (Bardwell-1973).

The difficulty in determining the limit at which benefits to recreationists or environmental quality of the area starts deteriorating arise mainly because decline in environmental quality does not become evident in shorter period. Whereas in other landuses (viz agriculture, forestry, dairying etc.) production per unit area can easily be measured, and therefore the carrying capacity may easily be estimated by declining productivity. Also in case of national park, too great a variation in intrinsic requirements make it more complicated. For example there will be a major difference between a park where wildlife is the main attraction and a park where a geological wonder is the main attraction. In one case presence of human being is disturbing and in the other their presence is comforting. Still it is essential and attempts have been made to assess the carrying capacity of the area under consideration.

According to Hogg (1973), the carrying capacity can be determined by parameters like erosion of soil, exhaustion of natural resources, contamination of water and interference with other landuses. Depending upon the nature of most limiting factor, determination of the carrying capacity could be carried out.

In case the limiting factor is quantitatively evaluable, it will be easier to assess the capacity. For example if physical overcrowding is the limiting factor, a knowledge of space required per tourist will provide measure for carrying capacity. But where direct evaluation of limiting factors (like soil erosion, water pollution or interference with ecological processes of park environment) is not possible, the evaluation of carrying capacity itself will be indirect.
One method could be a close monitoring of the impact of user's activities and consequent assessment of the upper limits, beyond which impact and activities should be treated irreversible. Ovington et al. (1972) observed, "Thus the carrying capacity of recreational areas can be assessed in terms of the degree of environmental degradation suffered 'per unit' of tourist activity. Given sufficient data, relating tourist numbers, tourist activities and environmental change, it becomes possible to set realistic limits on tourists activity."

IMPACT OF CARRYING CAPACITY ON THE CHOICE OF ACTIVITY FOR AN AREA:

Carrying capacity of a site, for different activities, will be different. For example walkers, horse riders and trail bike riders all using the same track the disturbance to surface will be much less by the same number of walkers than that of other two.

This fact provides an alternative tool to the decision maker for selecting the suitable activity for various park sites. This along with the intrinsic suitability of the features of site can be of great value in providing enjoyment to maximum possible number of people. Also management practices affect the carrying capacity of a site to same extent. Though there are limits this, but man-made improvements in few cases can improve the capacity of a site without jeopardising the environmental quality. This aspect and others have been discussed in detail in chapter 5.2.4.2, while analysing the management strategies.

5.2.3. INVENTORYING DEMAND FUNCTION:

Demands placed upon a national park may be many, viz. outdoor recreation, conservation, scientific, educational etc. But the demand for recreational use is increasing rapidly and has come to dominate the management. Also since the recreational demand is
placed by the general public, often unaware of the consequences of over or ill use, the sole responsibility lies upon the park manager to assess it and cater for it in an appropriate manner. Thus 'demand-function' here refers to recreational aspect mainly.

The major problem in this respect comes due to nonavailability of adequate information. "The integration of recreational considerations into the frame-work of national park management is hindered by lack of information on human behaviour in national park" (Ovington-1969).

This requires discovering the background of people coming to national parks, why they visit national parks, the frequency of their visits, their behaviour-pattern whilst in national parks, the response of public to what they have experienced during their visit as well as their complaints and suggestions for improvement.

5.2.3.1. SUITABLE TECHNIQUES FOR MONITORING CURRENT LEVEL OF VISITOR USE:

The suitable techniques in this respect could be grouped under three heads-

i) Self counting: Campground register, permit vending machines etc. (that is where user himself records information).

ii) Direct counting: Television & Camera observations, telephone or mail surveys etc.

iii) Indirect counting: Electronic eye, time lapse camera, water consumption or volume of refuse.

In U.S.A. a computer oriented programme has been devised, R.I.M. (Recreation, Information, Management). This accumulates stores, manipulates, compares and displays information as desired.

James (1971), has discussed the relative utility of the
major techniques. Greig (1974-C), has also dealt with these techniques in detail. Lucas and Oltman (1971), Davidson (1970) and Ferguson (1974), have also analysed various methods and their utility. Thus there is no shortage of published research to seek guidance while designing for the user-survey.

Questionnaires are particularly useful in the case of national parks. A common procedure is to obtain basic data from visitors on site, either in person or more often by voluntary completion of a questionnaire at unmanned registration stations. More elaborate data can then be collected from longer questionnaires mailed to willing respondents. (Bardwell-1973).

In this technique care has to be taken not to sample the one member of the party, say the group-leader. This could not be regarded as the representative of other party members. Wilderness is an essentially personal and individual experience.

Reinforcement of the conclusions drawn from the behavioral-data of original questionnaire should be done by carefully designed follow-ups upto a maximum of four, at 15-20 days intervals. This will help minimisation of the cumulative bias and measurement of response rate. (Lucas & Oltman-1971)

Visitor-use of recreation resources is generally variable, with large fluctuations according to the season, day of the week, time of the day and climatic conditions. It is, therefore, important to use a sampling-frame which provides a continuous and cheap measure of the variation in use. One of the most suitable techniques for obtaining reasonable precision from user-survey is the use of axle-counters (or foot counters). The sample data can be related to the axle counts for the same periods and strata and the
resulting ratios can then be applied to the aggregate counts within the strata. (Ferguson 1974).

Following important points might be of use in designing and carrying out user-surveys.

1. The sampling units and strata to be used must take the variability and peaking of rates of use into account. Stratification in terms of season, day of week and relative importance of access roads should also be considered. Such stratification is also useful for planning the management since investment in additional facilities is normally only justified when peak usage has reached the carrying capacity of the site concerned but further increase in demand can be anticipated.

2. Ideal location of self-registration stations:
   Interior locations have been found more productive than those on the periphery of the study area.

3. Response rate in case of unmanned, voluntary registration stations is essential to ascertain the general utility of the behavioural data so obtained. For example if 10,000 visitors entered the park and only 500 questionnaires are completed, conclusions drawn will not be of general applicability. However, using this as first stage sampling, if further information is obtained by way of mail-surveys, a better approximation would be possible.

4. In case visitor-survey is carried out by manned posts, a thorough training of the staff will be essential, not only for the sake of the results but also for the unfavourable impression created by an untidy interviewer.
5. Interviews at exit are useful to know how people actually spent their time in the park. However questions have to be very much standardised to avoid delay to visitor hurrying back to home.

6. It is better to ask the respondents to rate the importance of given park values rather than to nominate those of their own choice. For example-

Please indicate your opinion about:

(a) Preference for accommodation:-
   more huts, more tents, satisfactory, less huts, less tents.

(b) Entrance fee:-
   (i) It should be made free.
   (ii) Present rate is all right.
   (iii) I wouldn't mind paying more than foregoing the entry.

(c) I am against/for the following developments:-

   Against  For

   (i) Blazed routes to point of interest.
   (ii) Basic sanitary facilities at campsites.
   (iii) Unsealed access roads, fire roads, trail-bike riding.
   (iv) Trough tracts.
   (v) Helipad/air strip.
   (vi) Telephone facilities.
   (vii) Motorised water sports etc.
(d) I visited the park because I wished-

(i) to be removed from civilization in time and space for true enjoyment.

(ii) to see wildlife in its natural surroundings.

(iii) to study flora and fauna of the region.

(iv) to relax in natural surroundings.

(v) to take my family out for a change etc.

(e) If you are on the vacation, does the trip form the most important part of your vacation or does it occupy only part of the time you have available for vacation.

(f) If you are prepared to help us by giving more information, please write your name and address below so that additional questions along with a stamped-addressed envelop for return may be posted to you.

Follow-up:

i) How many nights on your trip did you spend in huts; in tents; under the star?

ii) Which of these you enjoyed most?

iii) Please indicate your activities, in the park in order of importance by marking 1, 2, 3 etc. in the spaces provided.

a) Car activities (pleasure driving, sightseeing etc) ( )

b) Rock climbing. ( )

c) Horse riding. ( )

d) Bushwalking ( )

e) Guarded walk with Ranger ( )

f) Casual short walk ( )

g) Fishing ( )

h) Nature study etc. ( )
(iv) Did you visit the visitor centre?

If yes, please tick any of the following you consider desirable at centre

- Nature study-aids.
- Park maps.
- Ranger-lectures.
- More staff to answer questions.
- Information on weather-hazards.
- Emergency medical-aid.
- Other (please specify)

(v) The list of factors below may have detracted you from your enjoyment. Please indicate your reaction by ticking the applicable state-

<table>
<thead>
<tr>
<th>Did'nt notice</th>
<th>Noticed</th>
<th>Found annoying</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) littered camp site</td>
<td>....</td>
<td>....</td>
</tr>
<tr>
<td>b) difficulty of finding an uncrowded campsite</td>
<td>....</td>
<td>....</td>
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<tr>
<td>c) too few campsites</td>
<td>....</td>
<td>....</td>
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<tr>
<td>d) very large parties</td>
<td>....</td>
<td>....</td>
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<tr>
<td>e) Snakes or other wildlife</td>
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<tr>
<td>f) the noise of motor-traffic</td>
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<tr>
<td>g) the presence of roads in walking area</td>
<td>....</td>
<td>....</td>
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<tr>
<td>h) (please specify)</td>
<td>....</td>
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</tr>
</tbody>
</table>

(vi) What kind of recreational vacation are you planning for next year? Please tick the suitable square-

- (a) Bushwalking
- (b) camping
- (c) Touring by car
- (d) Birdwatching
- (e) Swimming & boating
- (f) (Please specify)
(61)

7. While designing questions two basic points must be borne in mind-

(i) Will the question be understood? Do the respondents have the information necessary to answer the question? Because there is just not the danger of not getting any reply if question is not understood but of getting misleading replies in case of vaguely understood questions.

(ii) Is the question necessary? Is it biased or loaded in one direction? Do the questions follow a logical sequence? As a precautionary measure don't include questions of following types-

(a) Presumptive question. For example-how many cigarettes did you smoke in the park?

(b) Personal questions-e.g. name and age along with the occupation and income. Mostly people would not mind giving correct information about income & occupation but anonymously. However such questions should better be put at the end of the questionnaires to avoid bias.

8. Depth interviews and 'projective-techniques' could be designed to prove the inner feelings of the interviewee by getting him to talk freely in a relaxed atmosphere. 'Motivation-research' of this nature is an important tool to determine and explain psychological 'whys' of user's behaviour (Rich-1970). These techniques borrowed from 'Clinical psychology' (viz-word association tests; incomplete sentence tests; thematic appreciation tests etc) requires highly skilled interviewers and analysts. The important weakness of the motivation research is that the researchers often use or get a biased
sample for interview and then interpret the answers in the light of his own preconceived ideas. Thus before generating hypothesis about the user's behaviour one has to be very careful. For example only well educated visitors offer their services for such depth interviews and they form a very thin minority of the recreationists, as far as likes and tastes are concerned. As observed by Bardwell (1973), while reviewing the findings embodied in numerous publication, "Income, cost of recreation, available leisuretime and length of stay exercised for less influence on people's recreation preferences than had been 'implied'. Education is a more important factor as well as life-style and other socio-economic parameters."

5.2.3.2 ASSESSMENT OF DEMAND TRENDS:

Predicting the nature of future demands upon land in national parks, their volume of use, pattern of use and quality of use is an essential but difficult task. Normally forecasts are based on assumption 'if the present trends continue'. But the fact that even present trends are poorly understood makes things still more difficult.

The first step therefore in this direction should be to understand the present trends. As observed by James (1971), "Management and policy-decisions can be improved greatly if the total planning process is based on reliable and current information."

Also since almost all the techniques available for forecasting the future trends use the current trends as base, it is obligatory to assess these first.

The techniques available for assessing the current level of
uses of various park values have been discussed in the last chapter. Basing on the information so available, following methods may be used for assessing the future trends.

Clawson & Knetsch (1966), Parkes (1971), Hogg (1973), Ferguson (1973) have discussed, quite in detail, the general techniques involved in making forecasts about trends of future demand, based on the current information.

Clawson & Knetsch have suggested five basic approaches, where as Parkes, has grouped these under four heads, but Hogg extended the number to six. In brief, following categories envelop the techniques normally used for the purpose.

1. **EXTRAPOLATION OF TRENDS BETWEEN PAST AND PRESENT LEVELS:**

   This is simple and straightforward. But it suffers from certain drawbacks. First, it assumes that the factors governing the trend between past and present will continue to govern in future, that is the future is dependent on the past. This is not necessarily true. Secondly, this technique is least able to take into account changes in government policy and heitherto unaccounted social factors. A practical difficulty in using this technique is that it requires data for a reasonable period of time in order to construct reliable trend lines. However, if past records and current trends are correctly available, this is the easiest to apply.

2. **EXTRAPOLATING THE TRENDS FROM CROSS-SECTIONAL ANALYSIS USING INTER-REGIONAL OR OVERSEAS DATA:**

   This helps in cases where reliable past records for the specific region are not available. Advantage in this case is taken of the analysis made in other regions or countries, under
the assumption that factors responsible for setting trends in those places may be relevant to the region under consideration. Usually, this technique requires establishing the relationship in demand and per capita income for the known samples and then extrapolating that relationship to the expected level of per capita income of the region under consideration to obtain expected demand.

The basic drawback of this approach is that it assumes that the similarity in per capita income is indicative of the similarity in future trends. Obviously this assumption could be misleading, till the differences in social, geographical, cultural and internal economic factors are duly accounted for. Clawson & Knetsch (1966), have not listed this approach in their discussion. Too much subjectivity involved with park planning, justifies the omission to a great deal.

3. **ECONOMETRICS TECHNIQUES OF FORECASTING:**

This approach seeks to identify quantitatively the factors responsible for shaping the current trends of demand and then to analyse the future trends for these factors first and only then linking these trends statistically to determine the overall expected future demand.

Though tedious but this is obviously the most suitable approach. Hogg (1973), discussed this under two headings- 'Trend extension of casual factors' and 'Relation of demand to socio-economic variables'.
However both casual and 'socio-economic' factors will ultimately be required to be grouped together to establish a surface for demand function of the type

\[ d = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + \ldots \]

where \( d \) denotes quantity demanded per capita in terms of space, time and nature of park value.

\( a's \) denote regression coefficients signifying the relative impact of various factors (\( X's \)).

\( X's \) denote various casual and socio-economic factors, responsible for shaping the demand trends (i.e. gd.). These factors are population (size, age-structure, distribution in space), personal disposable income; cost of recreational facilities (travel cost, entrance fee, accommodation charges); leisure time (total time and distribution over the year); transportation system (number and quality of approach roads, public transport facilities, parking place etc.) quality of park-features; advertising and information services; education etc.

Amongst these, personal disposable income is an important factor in case of national parks. Because if people are poor, they will not visit national parks requiring long or even modest travel reach. Obviously their recreational demand will remain confined within or nearby cities, where people can go at very little or no cost. Where as in richer countries people may be unwilling to satisfy their demands for outdoor experience wholly from nearby areas.

Similarly in case of leisure time, an important factor is the pattern of leisure availability. For example in low income
countries a substantial portion of the population is underemployed and these persons although not working all the time, have little leisure in any meaningful sense. Whereas in high income countries, people are often more actively engaged in offices and industries, still leisure hours per week are confined to last two days and they more actively engage themselves in recreating and recuperating from the strains of fast paced work. Thus amount and timing of leisure will affect demand considerably.

Clawson and Knetsch (1966) listed 'The use of judgement' as one of the basic approaches for gauging the future demand, mainly because it will have the advantage of foreseeing the sudden changes in the factors influencing the demand-trends. For this a high degree of familiarity with the park environment and activities of the tourists will be a foremost requirement. Also since formal planning and prediction of demand trends are a recent phenomenon and in case of national parks, figures over a period of time are not available in most of the countries. Hence use of the second method coupled with the identification of influencing factors as described in third method should provide the base for using 'commonsense judgement technique' to gauge realistic trends of future demand.

5.2.4 IDENTIFICATION OF CONFLICTS AND SUITABLE MANAGEMENT STRATEGY:

5.2.4.1 CONFLICTS BETWEEN SUPPLY AND DEMAND IN LONG AND SHORT RUN:

The situation of conflict will arise only when the level of use exceeds the carrying capacity of the site. Such situations might create either short-term or long-term conflicts.
SHORT-TERM CONFLICTS:— Will arise when the 'additive-effect' of all the activities is less than the total carrying capacity of the area, but the activities are mutually-conflicting.

LONG-TERM CONFLICTS:— Will arise when 'additive effect' of all the uses exceeds the total carrying capacity.

In this case, various uses are coherent in their requirements of space, time and objects, but the sheer weight of all the user's activities can cause deterioration of the environment and it's values.

A special situation can arise in case of self-conflicting activities, where increasing level of the same activity may tend to detract from the enjoyment of the activity itself. In such cases one has to define 'psychological carrying capacity of the area.

Short-term conflicts may also arise due to uneven distribution of the demand function. Such temporal and spatial patterns of the user's activities can cause extreme time-peak of the demand, resulting in short-term physical and psychological overcrowding. These conflicts are generally localised and short lived but may cause serious damage. Boden & Ovington (1973), analysing the situation observed, 'It is at such times that deterioration in quality occurs and conflicts are most likely to arise'. Thus it is essential to study the spatial and temporal variations of the demand-curve.

O'Brien and Roy (1977), have defined the term 'conflict functions' to explain the effect of one activity on the other, over the same area. This they have based on the general observation that use of an area for a recreational activity
often results in a lowering of the value of that area for another activity. However determination of the actual effect of one activity on the other, will involve a great deal of subjectivity and only 'on-the-spot' analysis will be able to provide any solution for resolving such conflicts. Because it is not essential for all the activities to be inter or self conflicting. Occasionally these could be enhancing. For example, "The enjoyment of a picnic-spot beside a river or below a rockface may be enhanced by the entertainment derived from the presence of canoeists on the river or of climbers on the rockface" (Hogg 1973).

The resolution of short-term conflicts will lie in giving way by the various users to each other. Though a basic question will arise, which activity to be given priority?

The answer to this question will depend upon the planning philosophy of the park. For example one can say, prefer the activity for which the carrying capacity is maximum, in order to accommodate maximum number of people; others can say prefer the activity for which demand is highest to ensure that people will actually make use of the opportunity provided. Also another view could be based on the economic considerations and favouring the activity for which expenditure per unit recreational opportunity is lowest (say, bush-walking, wilderness camping, bird-watching etc.).

One generally acceptable philosophy could be, that the activities which create the greatest problem either through widespread conflicts with other activities or through environmental damage should be given very low priority. Among these could be motorboating, four-wheel driver-touring, trail-bike riding.
More and more areas within the park could be restricted to those who want to enjoy nature on foot. Also the activities which cater opportunities for very few, because of either their high cost or their specialised skill requirements, should be given low priority. Still the personal judgement and the insight of the park manager will be the best tool for resolving the conflicts of this nature.

Long-term conflicts normally result from overuse by the otherwise coherent activities. The problem associated with such conflicts are erosion of soil, depletion of firewood or drinking-water, shortage of accommodation, parking place etc. The ill-effects in this case are accumulative in nature and carried over a longer period.

Such conflicts could be resolved either by increasing the carrying capacity or by limiting and channelising the excessive demand towards other sites. Extension of carrying capacity could be a valid solution only in those cases where under-development of site is the limiting factor, for example unestablished tracks or car-parks. But in cases of already developed sites, efforts to create more place by overdevelopment might rob the place of its natural appearance. In such cases and almost in any case, the best solution is to create more parks and reserve more wilderness areas.

5.2.4.2 REVIEW OF PREVAILING MANAGEMENT STRATEGIES AND THEIR APPLICABILITY IN VARIOUS SITUATIONS

Each 'national-park' will have its own specific problems and will require specific treatment. However, there are certain dilemmas associated with the preservation, maintenance and
utilisation of wilderness values, which would be every park-manager's worries. And in this chapter, only such common management problems and various treatments prevailing for those will be discussed.

From this angle, the national parks system of various countries could be grouped in three broad categories (Smith-1962; Kraus-1962).

1. **U.S. TYPE PARKS:** In such systems, recreation is the main purpose and no utilisation for agriculture, forestry or human settlement is allowed. The most common problem is the overcrowding, but as a matter of policy accessibility to public for wilderness experience is encouraged.

Examples are all U.S. National Parks, Swiss N.P., Polish N.P., Gran Paradiso of Italy, Swedish N. Parks a few of the Australian National Parks etc.

2. **GAME PRESERVE TYPE PARKS:**

Most of the African and Asian national parks fall in this category. In these, heavy visitation is not a problem but only due to this a strong public support for their creation and preservation intact is lacking. To cure this, both national and international tourists are being encouraged to visit these areas to watch the most splendid wildlife surviving on earth. Thus ultimately overcrowding is going to be the main problem in these parks as well. But wildlife management will continue to be the special task of the managers in these parks.

Most of the national parks of India will also come under this category.

3. **PARKS LIKE THOSE OF GREAT BRITAIN:**

In these parks, nature preservation and recreational...
visitation have been superimposed on an agricultural and community settlement.

The 'Nature Reserves' of Germany, Austria, Russia, Yugoslavia safeguarded under conservation law can be grouped in this class. Though protected but in some cases limited utilisation, like selective hunting, fishing, woodcutting and grazing is observed, in these areas. Coupled with these, heavy visitation by city dwellers is main problem of these parks.

Thus the national parks all over the world are facing the same problem of overcrowding or overuse. This, in turn, generates manyfold side-problems like requirement of accommodation, roads car parks etc. The best way therefore would be to discuss these common problems and side by side analyse the various techniques in practice all over the world attempting to counter-balance the ill-effects of overcrowding.

4. SUGGESTIONS FOR CONTROLLING THE OVERVISITATION:

The best way to relieve pressure on the existing 'national-parks' is to create more and more parks. But till it happens, efforts have to be made to regularise the use, as "there is growing evidence that the effects of visitor pressure can be minimised through skillful management" (Ovington-1969)

Following methods can be of use in this respect.

a) By limiting the facilities like lodges, cabins, campgrounds etc. and then confining the number of visitors to the existing facilities. This can be easily done by allowing the people to enter with reservation. The desirable side effect of this could be an incentive to private enterprise to provide accommodation facilities on public lands, outside the park.
The number of daily visitors can be controlled on the principle that we don't allow more than a certain number of people in crowded restaurants or theatres. Public cooperation can be sought by advertising the ill-effects of overcrowding.

b) Restricting the length of stay within the park to 10-20 days. This will increase the number of overall visitors but decrease of those who settle down for longer periods.

c) The construction of through roads and circuit roads should be avoided. So that only those who are interested in enjoying the park values should enter and be willing to drive to a dead end and turn around.

d) Entertainment facilities that are not necessary for the wilderness experience should be excluded. This will cut down the number of visitors, who cannot do without these.

e) Organized transport facilities can be provided to cut down or restrict completely the private automobile travel within the park. This will reduce traffic congestion.

Another means of restricting the use of private vehicles is to leave transportation in a underdeveloped state within the park.

(B) SUGGESTIONS FOR MINIMISING THE ILL-EFFECTS OF OVER VISITATION:

(i) DISPOSAL OF CAMPDEBRIS AND LITTER IN GENERAL:

Litter produced by visitors pollutes the park environment on one hand, works as a blot on the landscape on the other hand.

Litter or debris can be of two types. That dropped by the park users, while walking, camping or picnicking (e.g. beer can, newspaper, plastic bag, bottle etc.) and the human waste.
For the first type 'Take-your Litter Home' policy can work very well, if the visitors can be educated about it. But this technique will be of use in case of daily visitors only. Overnight campers will have to be provided place for it. The siting of litter containers is enormously important. Few things are less entertaining than a superfluous litter bin and when provided at the potential sources of litter, prompt arrangements for emptying these is essential. Nothing is worse than an overflowing bin. (Beasly-1969).

At new camp and picnic sites, bin compounds should be constructed. Since campers have their own receptacles in their tents and vans this is practicable. The ground near the compound will be liable to puddle and should be well compacted with gravel or other hard material, marginally higher than the surrounding.

For the second type of litter, lavatories could be provided. Though it is sometimes debated, whether or not lavatories should be provided? Answer would depend upon several factors; the length of time generally spent by the visitors, terrain, the density of people etc.

Obviously they must be provided at campsites, visitor-centre, picnic sites. But in case of hikers, bushcampers it would neither be practical nor desirable. In wilderness areas, where people can easily discover alternative spots, it is essential that wherever provided lavatories should be well designed and clean so as to attract more users.

(ii) SELF-GUIDED TRAILS:

A trail is a planned route from which the significance of various features which are visible from it is interpreted.
to visitors. This is usually done by means of a written guide which refers to numbered points along the trail. (Beazley-1969)

However, self guiding trail booklets need a very careful editing. One of the greatest sins in park interpretation is to say too much that is to say more than the visitors will read. Obviously they are not effective, if they are not used. (Beard-1962).

Care has to be taken not to expose the erodible and otherwise sensitive terrains to crowds. Such trails should be temporarily closed either on seasonal grounds or from conservation point of view. For example, it would be necessary to avoid nesting areas during the breeding season.

Garrison (1962) suggested paving or other surface treatment of the heavily used trails to avoid indiscriminate wandering. "In Mount Rainier National Park, trails in the Paradise area were heavily used, and dust was deep in summer, so that hikers walked beside the trails, thereby temporarily escaping dust but widening the trail greatly. In this situation, an actual lightpaving or other surface treatment of the trail to improve walking conditions serves to enhance visitor enjoyment while improving park protection... Broad walks through the geyser basins in Yellowstone serve the same purpose. These simple walk-ways prevent indiscriminate wandering through dangerous thermal areas and lead visitors to desired scenic and safe viewpoints.

Beazley (1969) suggested trails with blind people in mind," They should not be exclusively for blind, as people do not appreciate being lumped in separate categories. Labels in braille, an emphasis on sound, scent and touch and carefully planned paths, free of hazards are needed."
(iii) CAR PARKING:

Question of cars and carparking is another and perhaps the most difficult single planning problem connected with park management. The vacationists normally don't like to be separated from their cars while camping or picnicking. Once in a car, most of us instinctively want to drive as near to our objective as possible. But few people would suggest to site carparks close to scenic spots, keeping the visual results, the noise and smell in mind. Following factors should be accounted for while deciding for carparks site.

DISTANCE: - The distance a tourist can reasonably be expected to walk from his car depends on what he is going to see and who will be walking. But it is generally recognised that carparks may have to be at a considerable distance from the place it serves if, by sheer magnitude, it is not to swamp the wilderness, people come to enjoy.

In case of camping, a separate carparks and a trolley service to camppitch can help in enhancing the quality of the camp.

ACCESS PATH: - Efforts should be made to make the walk, from carpark to the destination, attractive and cheerful. For example, it is frustrating to see a road leading from the carpark to the objective but only the park manager or the V.I.P's are allowed to drive.

The access path may be chosen to provide local information on geology, flora, fauna etc.
iv) ROADS IN NATIONAL PARKS:

If a park is of modest area it is sensible to completely exclude roads from it and to keep visitor accommodation either outside the park or at least near its perimeter. Within the park a system of carefully located walking tracks can enable the visitor to see the main features of the park. This is a policy adopted in Queensland (Australia) and system works well. (Curtis-1966)

Similar technique has been found useful in the Kaziranga N.P. of India, where the total area though smaller compared to many African and American parks, but a large area of the park is left inaccessible to the visitors. And they can see the spectacular wildlife only from the elephant back. Moreover, the elephant-rides as against road drives have put limitation on the number of the visitors to be permitted at a time to Kaziranga" (Das-1969)

In parks of more than a few thousand acres it is desirable that a planned road and track-system is provided to confine the movements of the visitors to certain channels, preferably without appearing to impose restrictions. Garrison (1962), referring to the advantages, such a system yielded in case of Yosemite N.P. (U.S.A.) observes, "At one time haphazard-driving over the floor of the valley used to cause more damage compared to recently heavily increased traffic but on paved roads, with roadside barriers and gutters."

When new roads are planned or old roads are realigned the interpretative opportunities must be considered. Space for interpretive signs, markers, exhibits, turn-outs and parking
areas must be provided. Beard (1962), has characterised park roads as 'vehicle' for interpretation and suggested that self guiding roadside interpretation may be provided by means of a descriptive booklet, keys to numbered markers on the road side. "It is a less expensive method than signs and exhibits," he concluded.

(v) BUILDINGS IN NATIONAL PARKS:-

As a general rule, buildings in national parks should be regarded an encroachment and their number should be kept to an unavoidable minimum.

The following observations, might be of use while planning for buildings in a national park:-

1) All buildings will have a psychological as well as a purely visual effect on landscape, depending upon their location, design, material, size, colour etc. Attempts should be made to integrate the building with its surrounding landscape. This is a technical job and better services of the landscape architects should be availed. In case of U.S.A., these men form a part of the permanent staff. As Garrison observed (1962)," Another group of professional park employees contributing substantially to successful park administration are the landscape architects whose responsibility is to aid in planning and to guide development and maintenance. Ideally these men achieve these results by softening the strictly utilitarian designs of the engineers and blending the architectural motif of a building with the landscape in which it is framed."
ii) Timber framed buildings can be a good choice. Some of the best camp buildings, lay-by lavatories etc., which have been built in recent years have been in sawn timber, unpainted but treated with preservative, with corrugated asbestos roofs. (Beazley-1969). He further observed, "If there can be any broad generalisation about materials it might be: whenever in doubt consider timber."

iii) The degree of roof pitch should be in sympathy with a fall in the land. Flat roofs are more difficult to merge with the surrounding particularly in hilly terrain.

(iv) Colour, helps in blending the building with surroundings. Suitable colours for wilderness sites are usually 'earth range'.

(v) Refuge-huts, to provide shelter to bushwalkers, long-distance hikers, in remote and normally difficult sites is often considered a valid strategy. However its disadvantages should not be overlooked. For example these encourage localised camping, leading to overuse of areas surrounding them; these may provide a false sense of security, tempting inexperienced walkers towards areas which are beyond their capabilities. Still, if located suitably, refuge-huts could minimise, overnight tourer's load (say tents) and provide safety in bad weathers, particularly
in remote valleys and higher altitudes.

(vi) PARK FURNITURE:-

This, so far relatively-ignored aspect is catching attention. Because fireplaces, tables, benches, drinking fountains, gates, contact stations, car stops, pit toilets etc. when summed up, an image is build up which can ultimately evoke an awareness of the quality of the landscape in which one is standing. Hence attention should be paid to see that furniture selected blends with the landscape and does not spoil the natural image of the site.

(C) SUGGESTIONS FOR IMPROVING CARRYING CAPACITY:

The carrying capacity of an area can be modified by man-made improvements for example by surfacing a track or artificially stocking a trout stream. But in case of national parks which basically are meant to conserve the nature intact, question arises-should attempts be made to modify the natural features for accommodating more visitors?

This is a basic question, which every park manager has to answer for himself while planning the management of the given national park.

In few cases, attempts had been made to enhance the carrying capacity by providing alternative attractions, within the park, but away from the generally sought after spots. The alternative attraction could be natural or artificial. Natural alternative will involve researching and locating heither to unknown spots; linking those with trailing paths and informing the visitors about these. Experience indicates that wilderness users are quite enthusiastic about new sites. This is quite
often due to the tendency for avoiding overcrowded sites. However, this will not apply in case of extraordinary features of the park, which every visitor would attempt to see and enjoy. Though even in such cases, changed user's behaviour can help extending the limits of carrying capacity.

For example the number of people, which could be accommodated in an area will be much, greater if they approach the site on foot than in vehicles.

Another factor, requiring adjustment of carrying capacity is the seasonal variations in visitor-use. Clawson and Knetsch (1966) observed, "The extreme time-peaking of recreation demand is one of the most serious economic and management problems in the whole outdoor recreation field."

Such a time peaking in case of national parks, generally results due to severe social, climatic or environmental conditions, restricting the tourism to a relatively short period of the year. For example the 'Corbett National Park' (one of the best parks of India) is closed every year from June 1 to October 31, mainly due to heavy rains during the period. Even in the remaining period tourists are advised to visit during a specific season only, "In spring time the entire area presents a beautiful panorama with sprouting 'Sheesham' (Dalbergia sissoo) leaves, the gorgeous scarlet flowers of 'Semanal' (Bombex ceiba), the mauve blooms of 'Kachnar, and sparkling waters of the Ramganga which few places can equal any where in the world" (Corbett National Park-1973).

In such cases of seasonal peaking, it becomes desirable at one stage to divert the visitors both in time and space. For
example, in case of Ayers Rock-Mt Olga N.P. of Australia Ovington et al (1972) suggested, "The excessive peaking of tourist numbers at certain times of the year needs to be reduced. Tourists should be encouraged to visit the park other than in August or September by, for example, emphasising the lack of crowding at other times, but eventually some restrictions may have to be placed on entry in May, August & September."

Such marked seasonal, weekly or daily variation in visitor-use and space demand will limit the carrying capacity of an area and management of the park will have to be designed to cope with the period of maximum recreational use. A thorough analysis of such variations is essential and only then a strategy to smoothen the uneven demand curve with respect to time could be designed.

Various techniques in this respect could be summed up as follows (Boden and Ovington-1973; Hogg-1973; Ovington et al 1972). FOR SEASONAL CONCENTRATION:

(i) Attempts should be made to provide attractive facilities for off-season tourists.

(ii) Variable entrance fee, with a higher fee on peak days can also help diffusion of the crowd.

FOR SPATIAL CONCENTRATION:

The uneven tourists' concentration within the park could be eased by providing alternative attraction within the park and informing the visitors about these.
FOR CONCENTRATION IN TIME:

In parks close to big cities this would be a common problem. Most of the visitors will try to visit the park by car, starting in the morning from the home and coming back in the evening. The changing intensity of use will be much more pronounced within a day. Most of the visitors might concentrate within a very short span of time (say 3 to 4 hours) and then disperse.

While designing the appropriate management strategy for encouraging the more uniformly distributed use, an important fact to be kept in mind is that in some circumstances marked peaking of recreation use may be advantageous to conservation interests. For example in a coastal dune area which is breeding ground for sea-birds and where tourism is greatest during non-breeding period.

FIRE AS A MANAGEMENT TOOL:

In case of a national park, the problem of fire is one of the most troublesome to deal with.

Man's manipulation of fire, no doubt, is a potent habitat factor. Left to nature, uncontrolled fire (say due to rolling stones or lightning) may alter or destroy vegetation, soil and watershed; but if a calculated pattern of fire is considered a part of a habitat web, maintaining a given habitat become possible. Similarly complete protection of an area from fire may have as disastrous effect on the existing habitat as overburning it. (Tolbot-1962).

For example, in case of Indian National Parks and Wildlife Sanctuaries it has been observed that planned fire first removes undesirable grasses and weeds and thus keeps the area from
becoming an utterly wildland and disorderly place. Secondly fresh grass seedlings appear very soon after the fires have passed, at any rate not later than the first monsoon showers. Such grass shoots are very highly palatable to the herbivorous inmates of the parks. From the Kaziranga N.P. it is reported that rhino, buffalo and deer frequent recently burnt paths and that they find ashes of some edible value. (Santapau-1969).

Similar observations have been made in other places as well. Biologists are not wanting, who believe that certain open botanical formations in Africa, as well as in other continents, were established by and chiefly owe their continuance to their being regularly overrun by agricultural fires (Verschure-1962).

However, the objection against using fire as a management tool could be, it amounts to deliberate interference with nature and its processes. This, no doubt is a valid objection in case of 'Strict Nature Reserves' which, basically, are established to carry out ecological and scientific research. In such reference areas, fire should not be used to maintain a desired equilibrium state. But, in case of national parks meant for preserving unique flora and fauna, it would not be wise to let adverse natural processes replace these with undesirable species. Highlighting the point Ovington (1969) observed, "Many ecosystems valuable for national parks purposes are there because of fire and stopping of burning in some savannah and prairies areas, for instance, would mean that these would be replaced by forest." Consequently in some national parks, prescribed burning is an acceptable management procedure, but to be well done requires
Identification of Suitable Management Strategy and Preparation of 'Master-Plan'

The suitability of the management strategy will depend upon the intrinsic nature of the habitat, socio economic factors and cultural traditions. For example in densely populated countries like India, Japan or Britain, where land is in heavy demand and only rarely will it be possible to set aside large tracts exclusively for recreation or preservation of landscape. "Multiple-use policy" in such cases could be a suitable course. Whereas for lightly-populated countries, but with immense areas, like Canada, Brazil or Australia, it may easily be feasible to reserve tracts separately for separate uses.

The Need for a Formally-Written Master-Plan:

The necessity for preparing a formal master-plan is to make the park manager think things through. For example, if the park manager is to answer the question in black and white, 'what is the national significance of the area I supervise? how can it be made to provide the greatest service to the nation?'; he will be caused to think and evaluate and finally to know the real value of the park on national scale. (Beard-1972)

It is through master-planning that the conflicts between recreational use and conservation can be resolved. The master-plan is introduced with large-scale maps, showing broad inter-relationship. These are supplemented with detailed development area-maps, which, in turn are augmented with specific-use maps showing, for example, a campground within a development area of the park. Finally, the complete master-plan contains working-
drawings of various detailed elements of developments of such as roads or water. (Garrison-1962).

The master-plan will show not just what development have been or will be taking place, but also where they will not occur. Because when a park is established visitor facilities are of limited extent. As the use of these reaches saturation, further development will be required to be undertaken to accommodate more visitors. This process will need reference to the originally prepared 'Master-Plan' and developments beyond the limits prescribed in it will not be allowed.

Also 'master-plan' should outline the specific problems requiring detailed research for solution. Such a scientific research is vital for the sound long-term management. But even research workers should be obliged to refer to the master-plan. Because if not planned and controlled, researchers can occasionally be more damaging than ordinary visitors. Nicholson (1962), referring to these hazards observed, "Great as are the opportunities for the advancement of science by suitable research under undisturbed natural conditions, it must, therefore, be recognised that the pursuit of such studies involves many dangers and difficulties, and that great harm could result from indiscriminate encouragement, under this pretext, of yet another type of injurious human interference with the rapidly dwindling world reserves of long undisturbed natural habitats".

Thus it is of vital importance for every national park, to have a systematically invented and scientifically planned 'Master-Plan' to refer to, for any proposed activity and development.
THE SUITABLE MANAGEMENT STRATEGY:-

The suitability of management strategy will depend upon the intrinsic nature of the park under consideration, because many kinds of areas eventually get included in the national parks system of a country. Broadly speaking national parks could be to two types-

i) Parks, owing their significance to unusual scientific potential of its habitat, and

ii) Parks, which are unique from recreation viewpoint (it might be due to historical, geological, archeological, natural scenery or wildlife).

Depending upon the type of the national park, management objectives will be ranked in the order of priority. It is this priority list that would normally govern the suitability of the strategy.

Very often the objectives are the following:-

i) to minimise the adverse impact of the tourism on scientific and ecological values of the park and

ii) to maximise the wilderness experiences of the people.

Clearly enough, these two are conflicting objectives. For, the first required that the activities of the visitors be controlled, whereas the second requires the construction of best roads, and other means of access and comfortable stay.

The selected strategy has to resolve the conflicts and meet the objectives. Rather a difficult task?
There are two strategies available to be selected from. First, zoning of each park and the second, zoning of the park system treating each park as one zone only.

ZONING OF EACH PARK:

Belton (1962) suggested that each national park should be zoned into three units:-

ZONE-I 'FOR GENERAL RELAXATION':-

These should be used by the majority of the visitors, who dislike inconveniences and are searching for the greatest possible comfort. These areas should have best means of access, parking lots, campgrounds, hotels etc. Areas with high recreational potential and maximum carrying capacity should be included in this zone.

ZONE-II 'INTERMEDIATE ZONE':-

These would be open to all visitors but would contain no roads for automobiles, parking lots etc. Automatically they would attract fewer visitors.

Areas with unique recreational potential but requiring wilderness surrounding for appreciation and survival should be included in this zone.

ZONE III 'RESTRICTED ZONE':-

This would be reserved exclusively for study and investigation. Admittance will be strictly to duly qualified people only.

Areas with special scientific values or damaged sites requiring rest should be included into this zone.

Robertson (1972), also suggested a similar tripartite division of the wilderness area and provided a more precise
nomenclature: popular, real and scientific zones. But, he suggested that even 'popular-zone' (Zone-I) should not be left in the hands of the 'Tourism-Industry', otherwise due to lack of understanding of conservation, it might destroy the very values which made it popular.

This strategy is very commonly adopted by the national parks systems of various countries. And it is, to a great deal, quite satisfactory for reconciling various conflicting requirements.

The main drawback with this approach is that, it does not ensure that area included within the 'restricted zone' is enough to support a self sustainable 'ecosystem'. This becomes a critical point if some rare wildlife or plantlife is the main feature of the park. Because if the area, so reserved, is not ecologically sufficient to sustain a viable population of the community, it's scientific utility is lost. Thus zoning of each park, in every case, may not prove a valid strategy.

ZONING OF THE 'NATIONAL PARKS SYSTEM':

This provides alternative strategy where entire park could be zoned as one single unit. Mosley (1966), named it 'functional classification' and defined as: "A classified system could include whole park used for a single dominant purpose and other parks containing a number of different zones, the entire system coordinated by a 'State master-plan'."

Few countries have adopted this strategy and it is working quite satisfactorily. As observed by Kalliola (1966), "In Finland we have two kinds of National Parks. The national parks in the proper sense of the word have been established primarily as public displays of Finland's natural beauty. The public-use has
free access. Roads and devices that are necessary for the travel of tourists in the area have been built. The other type are strictly nature reserves, established primarily for scientific purposes. Access is allowed only by special written permission, although in a couple of areas walking along well-marked paths is allowed without such permission. Thus our Finish parks, fully correspond to the international concept of national parks as strict nature reserves such as was stated at the London Conference of 1933."

The suitability of one or the other or a combination of both will depend upon many factors. Countries, still in the process of establishing and organising their national parks, can take the advantage of the experiences and mistakes of others as observed by Brooks (1966), "Developing countries have a unique opportunity to set aside wilderness area of unique natural beauty in advance of industrialisation using the successes and failures of the more developed countries as their guide."

But in such cases, strategy should include the people living in the adjoining areas as well because no amount of legislation and enforcement staff can protect a national park values if the surrounding population remains apathetic. For example in India, most of the National Parks are surrounded by a fairly dense rural population, depending entirely on agriculture which in turn requires maintenance of domestic cattles. And till, winning the cooperation of these people constitutes a part of the management strategy, it's practical utility will be reduced considerably.
The people will have to be taught to ignore the few disadvantages of the restriction imposed on them because of the nearness of the national park for the greater benefit to the country as a whole. The people should be educated to have a sense of pride in a feeling that they have something at their doorstep to attract people from far and abroad. Besides this education propaganda, the possibilities of taking up some development works for the benefit of the surrounding population of a national park by the park authority should also be investigated. (Das-1969).

Similarly the selected strategy has to be politically feasible. In principle it can be assumed that things like conservation of nature should not be subjected to political constraints, but these days nothing is immune to it. Such considerations may arise with land ownership, grazing rights of people in surrounding areas or habitation with in the park boundaries. For example the newly proposed 'Alpine National Park' in Victoria (Australia) is facing a situation conflicting land uses - forestry, water catchment and cattle grazing. As a solution Victorian National Parks Association has advocated a system of multiple use in the park. (Hogg-1973).

This, no doubt is inconsistent with the generally accepted principles of national park management but still a feasible solution to start with. Again the political constraints could be eased by proper education and information. If public is informed in simple and definite terms the long-term effects of various strategies, a favourable opinion may emerge to overcome political restrictions. Thus, in any case, efforts to replace
ignorance with reason and understanding of the values of national parks should form an integral part of the management-strategy.

5.2.5 MONITORING AND FEED BACK:

5.2.5.1 NEED FOR MONITORING:

It is a commonly-observed fact that normal activities of man cannot continue without constant disruption of nature, and park environment is not immune to this universal phenomenon. The increasing impact of modern technology on man's behaviour and consequently on all the places he visits is an accepted fact. Emphasising the point Robinson (1969) observed, "If pollution is an inevitable product of modern technological society, only management can ensure abatement and control. Hence regular monitoring and measurement of levels of pollutants should be an essential part of scientific management of the total environment."

The need for such a monitoring is much more intense in case of national parks, because the entire purpose of park management will be defeated if it does not provide a relatively pollution-free environment to people.

The primary objective of monitoring would be to keep a careful check on what we may call 'man-associated' nature and ensure as far as possible that the disturbance produced remains within reversible limits. (U.S.A.-1972)
It is therefore essential to keep a regular watch on the impact of various management prescriptions to ensure that we do not cross these limits. However the change of a biological environment is a natural phenomenon and will take place even in the absence of man. Hence while monitoring, care has to be taken to discern the changes necessarily due to the park users.

This may require considerably ecological knowledge and certainly requires a detailed understanding of the pre-existing conditions. (Day-1962).

Such information can again be obtained only through regular monitoring. Information so gathered will not only assist in ecological checking up of the park environment but also serve other purposes. For example in:

SUITABLE INTERPRETATION:

The number of such visitors is growing who, along with contemplating the scenery, also show great interest in natural history, intrigued by plant associations and living habits of animals. To meet up the requirement of such visitors, park manager has to have information himself. And only a continuous research and monitoring of the plant and animal species, their habitat can equip him with the desired information.

Also the park visitors, their use of and reaction to the interpretive programmes must be studied continually. (Beard-1962)

The use of such a monitoring and judicious feedback gives vitality to an interpretive programme.
BEFITTING FROM EXPERIENCE:

Since planned park management in many countries is in the early stages hence it is tentative. This necessitates the revision of management plans every five years or even earlier to include the additional information and introduce any new idea in the light of experience gained. The additional information so desired can come through a regular monitoring programme only.

5.2.5.2 TECHNIQUES OF MONITORING:

The study of the effects of different management prescriptions on park values is a technical job and may require the services of specialists. However, in every scientific research the basis is the ability to refer to a given unit of measure. This would apply to the science of ecological monitoring as well.

Once viewed from this angle, quite useful information could be gathered by the park manager using the simple and relatively cheap techniques. For example, "Ground photographs, taken in a standard manner from fixed points can yield valuable biological information and provide critical reference points by which to monitor change. Aerial photographs are also valuable in this respect. (Ovington et al 1972)

These photographs will provide fixed coordinates on a frame with space and time as axes and it will be easy to assess the magnitude and direction of the relative changes. For example if visitation to a particular site has been restricted within an appropriate period, need for complete closer of that portion to visitors could be justified.

Furthermore, the 'restricted-zone' created within the
park to act as a 'control sample' for monitoring and scaling the degree of unnaturalness being caused due to the visitor's use in other areas of the park, provide a valuable tool to fieldstaff for visual observations, which in due course will give them an insight into the matter. To avoid too much of subjectivity, it is essential to study these 'strictly reserved units' by means of both aerial and ground photographs of chosen sites, taken periodically. (Verschuren-1962)

For monitoring the efficiency and sufficiency of the facilities and administrative aids provided to visitors, studies will have to be carried out through surveying and other techniques, which have already been discussed in chapter 5.2.3 quite in detail.

5.2.5.3 FEED BACK AND PERIODIC REVIEW:

The periodic reviewing of the management plan, based on the monitoring results and other observations is to ensure that:

(i) Present level of use of park resources is in accordance with the present objective of perpetual preservation.

(ii) Newly emerging conflicts between resource and users and within various types of users are readily identified and remedied.

(iii) Growing demand of park-values is registered and possibilities of meeting the same are explored.

(iv) The park-management is providing the services required, enabling the visitors to enjoy their sojourn in the park.

Periodic reviewing of the plan will also account for the continuously changing socio-economic factors, avoiding the creation of a communication gap between the society and it's
resource managers. Highlighting the points, the 'Secretariat-Note' of the VII World Forestry Congress-1972 (Argentina) observed, "It is urgent that all National Park programmes explicitly provide for dynamic and periodic planning of the management and development for each park area, and for continuous training and education for National Park personnel at all levels. This requires an analysis of social, economical factors to assure the utility and relevance of the programme to society".

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APPENDIX-I

IMPACT OF OVER ALL FOREST POLICY ON PARK-MANAGEMENT:

The pressure of tourism from national parks due to out-door recreationists can be reduced a great deal by adopting multiple-use policy in other forested areas outside the park, as a good number of visitors come to national parks simply for camping or walking in wilderness areas and the facilities for these activities can easily be provided within any woodland without affecting its timber production.

It is generally alleged that foresters in the field regard recreational use of forests as deplorable and hardly worthy of their time and special skills. This, though not true, nevertheless appears so because foresters always take every pain to quantify the unseen timber famines in future but seldom try to quantify the existing under-satisfied demand of out-door recreation, which they, by virtue of their's being the aged conservators, are expected to do.
The growing misunderstanding between foresters and park managers often comes from the assumption on the part of conservationists that perhaps the national parks are the sole supplier of wilderness experience and forestry is purely an exploitive industry and its practitioners as obsessed with maximising wood-yield and economic return for private industry. For example one may quote the observations made by Coolidge H.J., during the Sixth World Forestry Congress (1966-Madrid)," In my capacity as chairman of the Commission on National Parks of the I.U.C.N., I want to express how gratified I am to find such great interest among foresters in national parks and national park problems." This would have shocked the foresters all the world over. They would have found it difficult to believe that their interest in wilderness-areas and their problems, is a matter of gratification to someone else.

To appreciate the complementary role of national forests and parks we must develop an understanding of 'conservation' in its broadest sense. Only then it would become clear that forestry and national parks are parts of the broad field of conservation. Both meet on common ground in providing permanent cover for many parts of the earth's surface that should never be laid bare and also in providing extensive natural scenery wherein, man can recuperate from the stresses of modern industrial society. (Curtis-1966).

One distinctive requirement for out-door recreation is the natural environment. Carefully managed forests can provide and do provide equally good natural environment for recreation. They offer silence, fresh-air free from dust and
other injurious particles, and opportunity for active recreation like walking, riding, pleasure driving. A normal man hardly cares whether it is a national park or a forest, so far he gets wilderness experience during his week-end-travel or vacation-camping. (B.T.A. 1967). A very revealing observation, in this respect, has been made by Lloyd and Fischer (1972) in his study of the pattern of recreationists' visits to various areas in U.S.A., "Total recreational visits to 'National Forests' increased more rapidly than to 'National Parks' (during 1945-1964)."

Such a trend might be existing in other countries too, but, due to lack of detailed surveying and analysis is not apparent. But if multiple use planning is to be undertaken on a serious basis a continuous inventory system to monitor visitor use will be essential. "The public at large and specially the politicians are unlikely to believe, foresters are serious about multiple use planning if steps have not been taken to monitor past trends and current levels of visitor use" (Ferguson-74)

It is in this respect the foresters have to re-train themselves, to play a positive role in meeting many faced demands of the society. Richards (1974), in this respect observed, "It should not be assumed that where good silviculture is practiced, forests will have no value other than as units to produce cellulose or wood. On the contrary, they have great potential as a recreation resource, which could take much pressure off our national parks, especially in densely populated regions."

There is a growing tendency to divide land for
practicing intensively, either timber or wildlife or recreation or watershed management over separate areas. "In United States we are involved in a forest policy-struggle over allocation of scenic and recreation opportunities between dispersed and concentrated type of uses. Other nations are facing the same issue including Canada, New Zealand, Japan and several new nations in Africa. Still other nations will face the problem in the future." (Lloyd & Fischer-1972)

The idea of compartmentalisation of forestland into its possible multiple uses is being debated all the world over. The advocates of such a 'either-or' policy assume that maximisation of net benefits are possible only under intensive use of land for specific products. This might be partially correct in case of industrial plantations committed to meet the predetermined requirements of specific industry. But in general, forests even under intensive management for timber production can provide a good and often better outlet to recreationists particularly for dispersed recreational activities. It is only for the concentrated-type activities (involving many people in a limited area at one time and requiring developed campgrounds and picnic sites) that the validity of compartmentalisation may be justified.

One very important dimension has been added in favour of 'multiple-use' policy, due to worldwide oil crisis. National Parks and other equivalent reserves, specifically meant for recreational and wilderness experiences are often distantly located and can be approached mainly by cars. The increasing
prices of fuel will restrict the number of long-distance journeys and as a result forested areas, close to population centres will receive more visitors in coming years. "This signals for a radical shift in the management of public forests within 50 to 100 kms of the concentrated habitations" (Ferguson-1974)

Orrom (1968) suggested numerous ways by which wilderness experience could be provided by the forest managers:

1. Consider the provision of carparks at all forests' entrances when normal operations such as road-works and thinnings are carried on near the entrance.

2. Site rides to follow natural contours and features, and never to have straight lines for long distances. This precaution will avoid 'tunnel' effect.

3. Accept relics of the old semi-natural hardwood woodlands along new roads and river sides.

4. Plant not only a mixture of species near rides but start at an irregular distance from the ride-centre.

5. Try to arrange the inclination of the planting rows so that they cease to be obvious from the long view as quickly as possible. This may mean changing direction at contour-rides.

6. Use failed areas, close to ride, for picnicsites.

7. Avoid a totally brashed or pruned edge to compartments so that a ragged edge to a compartment is achieved.

8. Plan clearfelling (if not avoidable) in tiers, leaving the coupe (the strip to be felled) next to the ride to the last and never clearing the roadside (wind firm) line but leaving this as a feature through which to view the new planting beyond.
PROBLEMS WITH MULTIPLE-USE CONCEPT & SOLUTIONS:

Management of areas fulfilling multiple-use functions is necessarily more complex than when a single monoculture crop is being raised. The difficulty of reconciling different interests arises partly through lack of ecological knowledge relevant to the management of semi-natural areas and partly because of the failure to foresee the implications of increased recreational use on regeneration, soil, water resources, wildlife etc. In this respect national park managers can assist forest managers by sharing information about various aspects.

However much work has been done by foresters themselves and practical and perhaps the only way, that conflicts could be resolved is by putting landuses into perspective.

It is widely recognised that water supply for various purposes is the most important form of landuse. Hence every other type of landuse should be oriented to this enduse with reduced priority. In cases, this might even require exclusion of all the recreational uses. Hogg (1973), referring to one such situation observed, "The risks of contamination of Melbourne's drinking water by disease organisms is stated by the Board of works as being the principle reason for excluding recreationists from it's catchments."

In case the area under consideration is not an important source of water supply, timber growing and recreation use may go side by side. Of course, every type of recreation would not be feasible with in the forested areas, for example activities capable of initiating erosion, say recreational four-wheel drive vehicles etc. But activities like picnicking,
pleasure-walking, bird watching can be easily accommodated.

To affect the proper co-ordination of the most logical uses of forestlands, Brockman (1969) suggested the categorisation of areas into the three; Dominant, Codominant and Subordinate. The forest areas where recreation is so important that all other uses are barred, constitute the 'Dominant' group.

Land on which recreation is of approximately equal importance with one or more other uses will be grouped as 'Codominant.'

Land where recreation use is of low priority, either because the area is not inherently desirable for recreation or because other uses warrant first consideration will be categorised as 'Subordinate.'

Thus multiple use concept does not mean all the uses on the every land unit. Priorities have to be fixed, particularly on forest-land where more tangible economic values (water, timber, forage etc.) and their important role in day to day living cannot be overlooked. But, recreation values of woodlands in many cases is a by-product of these uses and if planned properly, could be harvested without loss to these tangible values. For example forest-roads primarily meant for extracting timber, invariably afford striking views and scenic panoramas of interest. Activities like pleasure-driving, horse-riding and even picnicking and camping on strategically located sites along these roads can easily be absorbed without jeopardising the primary role of these areas and roads. Similarly areas more suitable for watershed could be maintained as roadless areas to avoid all
the comfort-seeking recreationists. Such areas, on the other hand can provide ideal environment to those who enjoy exploring the wilderness on foot, and carrying necessary food and equipment on their own.

The need for integrating the park management with other land-using agencies is beneficial to each. Signifying the fact, "Seventh World Forestry Congress 1972)" observed in it's secretariat note, "The most effective efforts to protect national parks often lie in the management of forested areas adjacent to surrounding national parks."

* * * * * *

APPENDIX-II

AUSTRALIA & INDIA-FROM 'NATIONAL-PARKS' POINT OF VIEW:-

AUSTRALIA:

GENERAL:- Australia is an isolated island continent, separated from the rest of the continented landmasses by a sea-barrier. The continent is relatively flat, and dry, with a vast central area where the rainfall is low and irregular. This arid centre is mostly covered with a sparse vegetation, highly specialised for survival in the dry conditions and giving shelter to a fauna that is restricted but remarkably adopted to it's dry environment.

More than a third of country is in the tropics, but during winter there is snow on the south-eastern ranges. Mount Kosciusko, 7300 ft high is the Australia's highest mountain.

Best known native tree genera are the 'Eucalypt' and the 'Acasia'. Eucalypt is found throughout Australia, with more than 600 species ranging from majestic mountain ash which grows
as tall as 100 metres to stunted type in the arid regions. There are more than 600 species of the genus *Acacia* as well and are abundant throughout the continent. (Flowers and Trees of *Australia*-1974).

Australia's very distinctive fauna, including about 700 species of birds 230 of mammals, has evolved during a vast period of at least 75,000,000 years that the continent has been isolated from other landmasses. The majority of the mammals are to be found in the order of marsupials. The best known and most popular are the Koala, Kangaroos, Wallabies and Wombats. The Lyrebird and the Emu are Australia's best-known birds. (Birds and Animals of *Australia*-1974)

**HISTORY OF 'NATURE-CONSERVATION' AND NATIONAL PARK' MOVEMENT:**

Historically speaking, the first Australian National Park was established in 1886. (Adams-1962).

But the beginning of conservation-movement could practically be traced back to 1920's when Myles J. Dunphy initiated the moves to unite nature-lovers to work together as the 'National Parks and Primate Areas Council' and it was in 1932 that the scheme for the creation of 'Greater Blue Mountains National Park' was produced. But the first legal wilderness area in Australia was the 'Kosciusko Wilderness Area' created on 24th November 1967. It is only in the last 10 to 12 years that conservation has become a respectable public issue in Australia. That many parks remained in wilderness state until at least the early 1950's was not due to an appreciation of the benefits of
wilderness areas but to the paucity of funds for their 'improvement', absence of economically exploitable resources and in some cases remoteness from the main centres of population and their forbidding terrain. (Bardwell-1973)

Presently each of the six Australian States plus the Northern Territory, has established its own national park systems, for this is a State rather Federal function.

ADMINISTRATIVE SET UP:

As mentioned above national parks and equivalent reserves in Australia, are State business and in these areas there is diversity not only of geological features, climate and fauna, but also diversity in name, management and security. Hence, only suitable course is to analyse the situation on State basis.

SOUTH AUSTRALIA:- These are controlled by the 'National Parks and Wild-Life Reserves' Commission and include many areas that, prior to 1966, were called wildlife reserves.

TASMANIA:- A 'National Parks and Conservation Board' established in 1969, controls these areas.

VICTORIA:- The national parks are under control of a 'National Parks Authority' (National Parks Service since 1971), with the Premier of Victoria having ministerial responsibility for the National Parks Act.

QUEENSLAND:- The parks of Queensland were under the control of the Department of Forestry, till late 1974, but recently the fauna conservation agency and the national parks agency have been jointly separated out and put under one Ministry for the first time in Australian history of nature conservation.
Queensland's policy is to keep roads out of national parks as far as possible and access to the most attractive features is by goodly graded walking tracks. This has resulted in the preservation of wilderness in unspoiled form suitable for ecological studies.

NORTHERN TERRITORY: The national parks and many reserves are under the control of the Northern Territory Reserves Board, with curators (rangers) at some parks to assist visitors and maintain facilities.

There is also a 'National Parks and Gardens Ordinance' to bring lands under control of the N.T. Reserves.

WESTERN AUSTRALIA: National Parks and Flora and Fauna Reserves of W.A. are crownland and Reserves are classified as Class 'A', 'B' or 'C' depending upon the degree of security and irrevocability of status, 'A' class being the most irrevocable and 'C' the least. National Parks are usually class 'A' reserves, vested in the National Parks Board of Western Australia, which in turn endeavours to preserve and also to provide facilities needed by visitors.

NEW SOUTH WALES:

The 'National Parks and Wildlife' Act, which came into force in 1967, provides for the establishment and control of national parks, nature reserves, and for other aspects of fauna control, by the 'National Parks and Wildlife Service'. Any revocation of national park or nature reserve-land must have the approval of both the Houses of Parliament, like other States.

In some national parks entrance fees are charged and entry to some nature reserves is by permit only.
It is obvious from the above description that there is no uniform standard applicable to national parks and equivalent reserves of Australia. Some State (Queensland, New South Wales, South Australia, Victoria and Tasmania) have the greater part by far, of their protected lands as national parks and a relatively small part in sanctuaries or nature reserves. Yet some of these national parks are in effect, wholly wildlife sanctuaries and flora reserves. They are not tourist attractions and no visitor facilities are provided. For example Simpson Desert N.P. (Queensland), Elliott Price Wilderness N.P. (South Australia).

On the other hand, in Western Australia, the Northern Territory and the A.C.T. (Australian Capital Territory), by far, the greater part of the protected natural environment is in the form of flora and fauna reserves and wildlife sanctuaries and a much smaller area in national parks. Yet some of these attract visitors and could be named national parks. For example Tidbinbilla in A.C.T., Palm Valley in Central Australia and the Dale's Gorge Area in Hamersley Ranges of Western Australia. (Morcombe-1971).

MAJOR PROBLEMS:

The major management problem of Australian parks is precautions against fire. But this seemingly more obvious problem is a part of the overall ecological equation, which in the case of Australia, has yet to reach a balance point. The important point about Australian environment is that its present inhabitants are exotic to it and have yet to become a part of what we consider to be the ecological balance. In other
countries and continents man has been a part of the environment for so long that the present associations are adapted to his presence. But in Australia, even the aboriginal man is thought to have arrived only some 25000 years ago and he never numbered more than 400,000 in a vast expanse of this size. Moreover his impact could never become significant because of his natural customs. But coming of the Europeans with completely different life-style and importation of the rabbit and the sheep, Feral cats, alien weeds and other similar agents started new currents in the prevailing environment. This made Australian flora and fauna peculiarly vulnerable to the impact of man. (Day-1962)

Thus the Australian environment, on the whole, is in the process of adjustment with its habitants and this makes the management problems more fluid in nature requiring continuous evaluation and readjustment.

INDIA

GENERAL:- India is a sub-continent which has varied conditions of climate, geology, soil, topography etc., with equally varied vegetation, ranging from the xerophytic scrub of the arid and dry tracts like Rajasthan to the lofty temperate conifers of the Himalayas and the giant broad-leaved trees of the tropical rain forests in the Western Ghats, Assam and Andamans and Nicobar Islands. This provides the widely varying habitats for wildlife and consequently India is home of some distinct and rare fauna.

There is the largest avifauna, represented by more than 2100 species. There are more than 500 different species of mammals. They include the elephant, the Indian Bison, the largest of existing bovines; the great Indian Rhinoceros, the greatest of
all the Rhinos now inhabiting the earth; the gigantic wildsheep of the Himalayas, probably the largest of their race, the swampdeer; the Thamin; the spotted deer, one of the most beautiful of all deer; and the Nilgai, the four horned antelope and Indian antelope or black buck the only representative of the genera. The beasts of prey include the lion and tiger, the most magnificent of all the great cats and such splendid creatures as the coloured leopard.

HISTORY OF NATURAL CONSERVATION AND "NATIONAL PARK" MOVEMENT:

"Historically, India was one of the few countries of the world where appreciation of man's impact on wild animals and plants came earliest. It was noteworthy that, at least until the 1950's India alone of the world's major land areas had not exterminated a single mammal." (Talbot-1962)

Wild animals and their habitat survived in India due to several factors, among them strong religious opposition to killing animals was the most important. But during foreign rule hunting along with many ills was introduced and popularised as a sport. Though in the British regime there was a fairly tight administration of wildlife conservation measures, but it was mainly question of self-interest for the British administrators who were also sportsmen. (stracey-1969)

For example, "Dunbar Brander I.F.S., (Imperial Forest Service) served in Madhya Pradesh (India) from 1899 to 1923 and retired as conservator. His principle interest was Shikar and as he mentions in his book 'Wild Animals of Central India' he shot as many as 244 tigers" Sagreiya (1969). "Similarly F.B. Simon, author of 'The Sport in Eastern Bengal (India)' accounted for a bag
of 600 tigers during his career of 21 years. However it was not long before that keenness for hunting spread, to the ruling princes and leisured gentry in India. The bag record of 1,116 tigers is held by Maharaja of Surguja (M.P.)."

The second World War further accelerated the process of destruction of wildlife, because of large armies encamped all over India. (Raghvan-1969)

It is important to mention at this stage that a single factor like hunting has rarely been responsible for bringing some species to the verge of extinction. Commonly the modification or reduction of the habitat of a species through human activities brings down the animals number to the point where hunting can become a critical factor. Thus uncontrolled population growth in India during twentieth century, caused unwarranted pressure on wilderness areas. More and more lands were taken up for agriculture, horticulture, habitation, river valley projects etc., on one hand and grazing of livestock with in the remaining wilderness areas on the other tilted the balance against the wilderness conservation. Specially affected were the mammals whose habitat-requirements were more specific in terms of territorial size. Animals like the great Indian (rhinocerosunicornis), Indian lion (panthera leopersica), Bengal tiger (panthera tigris), etc., suffered the maximum and drastic encroachment coupled with illegal hunting and this pushed the animals to the verge of extinction. However, after the attainment of the Independence, conservation of wildlife and its natural habitat gained fresh momentum.
THE CONSERVATION MOVEMENT SINCE INDEPENDENCE:

To a great extent the significance of Indian national parks lies in the protection they provide to one of most spectacular wildlife of the world. And, "The modern era of wildlife conservation in India may be said to have dawned with the post-independence period and the establishment of the 'Indian Board of Wildlife' in November 1952." (Stracey-1969).

The Board, constituted by the Ministry of Food and Agriculture, in the Government of India, is charged with, besides other affairs, "... devising ways and means of conservation and control of wildlife through co-ordinated legislative and practical measures and to sponsor the setting up of National Parks and sanctuaries." (Raghavan-1969). As a result it concentrated with great ardour on the development of sanctuaries and National Parks all over India. At present there are over 131 Wild Life Sanctuaries and 8 National Parks and many more are being developed.

ADMINISTRATIVE SET UP:-

There is no separate department or National Park Service to control and manage the national parks and equivalent reserves. Though the need for a separate organisation has often been voiced but the plea that the Forest Department who in past had been the custodians of wild life and wilderness should continue to be entrusted with the task, always gained acceptance. However the fact, that park and wildlife management requires special skills and training, finally gained ground and a separate branch under a 'Conservator' in the Forest Department of each
State was created specifically for wildlife and wilderness management. Foresters, deputed to this branch are required to undergo six months full-time training at Forest Research Institute of India (Dehradun).

To ensure the uniformity of administrative and planning approach all over India, the 'Indian Board of Wild Life' was constituted by the Government of India in 1952. According to this Board, the main purpose of national parks and equivalent reserves in India is to create conditions for restoration and preservation of the natural habitat and thereby help in survival and rehabilitation of the unique flora and fauna of the land. The recreational role of these areas in a developing country like India would need time to be fully appreciated. But the growing international demand for unique wilderness experience has already been realised and thoroughly understood and now the Department of Tourism of the Government of India has started playing active role in the field.

MAJOR PROBLEMS:

In an over-populated country like India, depending on agricultural economy, the protection of the national parks presents a difficult task because of the demand for more land and other nature resources. These problems are peculiar to the country and are being solved with courage, without encroaching upon the rights of flora and fauna to survive freely. Still the problems prevail and could be cured only in due course of time through education and population control.

The problems, requiring immediate attention arise basically due to the human population within the national parks.
In the periphery or at times even in the centre of Indian national parks there are villages, with numerous domestic cattle heads; the question of controlling the grazing by such domestic cattle is a very serious and pressing social question for the whole of India and demands immediate solution.

**IMPORTANT AUSTRALIAN & INDIAN NATIONAL PARKS:**

<table>
<thead>
<tr>
<th>AUSTRALIA</th>
<th>Size (Sq. K M.)</th>
<th>INDIA</th>
<th>Size (Sq. K M.)</th>
<th>Name of N.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Kosciusko N.P. (N.S.W.)</td>
<td>5348.3</td>
<td>446.6</td>
<td>Kanha N.P. (M.P.)</td>
<td></td>
</tr>
<tr>
<td>2. Simpson Desert N.P. (Qld)</td>
<td>5050.5</td>
<td>184</td>
<td>Hazaribagh N.P. (Bihar)</td>
<td></td>
</tr>
<tr>
<td>3. Salbarri N.P. (W.A.)</td>
<td>1447.81</td>
<td>161</td>
<td>Palamau N.P. (Bihar)</td>
<td></td>
</tr>
<tr>
<td>4. Cradle Mt. Lake St-clair N.P. (Tas.)</td>
<td>1341.62</td>
<td>155.55</td>
<td>Shivrpu N.P. (M.P.)</td>
<td></td>
</tr>
<tr>
<td>6. Blue Mountains N.P. (NSW)</td>
<td>981.65</td>
<td>116.55</td>
<td>Taroba N.P. (Maharashtra)</td>
<td></td>
</tr>
<tr>
<td>8. Wyperfeld N.P. (Vic.)</td>
<td>559.44</td>
<td>257.97</td>
<td>Pench N.P. (Maharastra)</td>
<td></td>
</tr>
<tr>
<td>9. Eungella N.P. (Qld)</td>
<td>492.1</td>
<td>133.88</td>
<td>Navegaon (Maharashtra) (Proposed)</td>
<td></td>
</tr>
<tr>
<td>10. Wilsons Promontory N.P. (Vic)</td>
<td>414.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Bauple Mountain N.P. (Qld)</td>
<td>2.59</td>
<td>90.95</td>
<td>Borivali (Maharashtra) (proposed)</td>
<td></td>
</tr>
<tr>
<td>12. Coalstoun Lakes N.P. (Qld)</td>
<td>0.263</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks:—(i) In the case of Australia last two examples have been quoted only to highlight the degree of variability between the units of the 'National Parks System'.

(ii) In the case of India very strict norms are applied before the inclusion of any area into the 'National Parks System'. Hence very few national parks. Other rare wilderness areas are named as Wildlife Sanctuary which themselves are subjected to very thorough scrutiny before formal declaration. At present there are 131 wildlife sanctuaries in India.

HOW DO AUSTRALIA'S AND INDIA'S NATIONAL PARKS COMPARE WITH THE GREAT NATIONAL PARKS OF THE WORLD?

<table>
<thead>
<tr>
<th>Country</th>
<th>National park</th>
<th>Size (Sq. K.M.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. U.S.A.</td>
<td>Yellowstone N.P.</td>
<td>8992.5</td>
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<tr>
<td></td>
<td>Mt. Mekinley N.P.</td>
<td>7841.7</td>
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<tr>
<td></td>
<td>Everglades N.P.</td>
<td>5439.0</td>
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<td></td>
<td>Olympic N.P.</td>
<td>3626.0</td>
</tr>
<tr>
<td></td>
<td>Yosemite N.P.</td>
<td>3108.0</td>
</tr>
<tr>
<td></td>
<td>Grand canyon N.P.</td>
<td>2349.0</td>
</tr>
<tr>
<td>2. Canada</td>
<td>Banff N.P.</td>
<td>6640.76</td>
</tr>
<tr>
<td>3. Soviet Union</td>
<td>Kronotzk Sanctuary</td>
<td>9647.75</td>
</tr>
<tr>
<td>4. New Zealand</td>
<td>Fiordland N.P.</td>
<td>11691.3</td>
</tr>
<tr>
<td>5. Malaysia</td>
<td>King George V N.P.</td>
<td>4558.4</td>
</tr>
<tr>
<td>6. Tanzania</td>
<td>Serengeti N.P.</td>
<td>14504.0</td>
</tr>
<tr>
<td>7. Rhodesia</td>
<td>Wankie N.P.</td>
<td>12950.0</td>
</tr>
<tr>
<td>8. South Africa</td>
<td>Kruger N.P.</td>
<td>19010.6</td>
</tr>
</tbody>
</table>

(Adams-1962; Morcombe-1971).
LIST OF REFERENCES:


5. Beard, D.B. (1962): Enjoyment and understanding. (as in '1')


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