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# PARKS

AN INTERNATIONAL JOURNAL FOR MANAGERS OF NATIONAL PARKS, HISTORIC SITES, AND OTHER PROTECTED AREAS



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*Front cover:* When it comes to interpreting the world of nature for park visitors no method is quite as effective as person-to-person contact by trained and interested park staff. Many topics can be explored and wide-ranging questions answered. Here the talk is about white-tailed deer in Shenandoah National Park. Can you find the deer tracks in the mud? *Back cover:* From Mt. Katahdin in the state of Maine on the north to Springer Mountain in Georgia on the south, the Appalachian National Scenic Trail traverses 14 states—including several National Parks—and in its 3200-kilometer length offers some of the most spectacular views in the USA. Hiking on the Appalachian and other scenic trails is an increasingly popular recreational activity in North America as in other parts of the world. This scene is in the Shenandoah National Park in Virginia. Photos: Richard Frear.

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Yorke Edwards

## In Park Interpretation, Small Can Be Beautiful

My first interpretation program planned for a park began with establishing a nature centre which I believed necessary as a focal point to attract park users. The lure to the centre was imaginative exhibits which explained the natural history of the park, and a park interpreter (we called him a park naturalist) was there at all times during the day to answer questions, and to interpret the park's landscape so that it had meaning as well as scenic beauty for the receptive visitor. The idea of a focal point worked well in this case, for twenty-five years later there is still a nature centre in a small building functioning successfully on the same site (Manning Park Nature House, British Columbia).

While it is not necessary for a park interpretation program to have a building as a focal point, this particular program with its tent "building" did experience immediate success, and evolved rapidly into offering a series of daily experiences for the public away from the centre: for instance, short walks and long hikes, each with a leader-interpreter who introduced groups of people to the geology, flora and fauna in a variety of life zones in the mountains; and evening talks and slide shows in an open-air theatre. As planned, the nature centre became the logical and

successful meeting place and coordination centre for all interpretation activities. It helped, too, that the centre was located in the best site possible, since both park users and travellers on the through highway were attracted nearby in numbers to the only supply centre selling food and fuel for many kilometers. But as new interpretation programs were established in other parks in British Columbia's park system, many were successful while using only well-placed notice boards as their focal points. Here the notice board was the information centre directing people toward periodic interpretation events, as well as the initial gathering place for people taking part in some organized activities.

The smallest programs had only one interpreter and these were sometimes the best. Take one inspired and informed park naturalist, put him in a park, big or small, that has park users to challenge him and landscapes to illustrate his stories of land and life, and there is no necessity for buildings, exhibits, or slide shows to create good interpretation. One medical student, who came to interpret every summer until his first year of internship, preferred a coastal park where each day he led people on informative walks that featured either heavy forests or intertidal life at the



*"The best communication is still a person talking to people, especially when right among the very things being talked about."*  
USNPS Photo, Gulf Islands National Seashore





*This park interpreter leads a group of visitors on a bicycle tour through Gettysburg National Military Park, easily reaching the various scenes of action during that climactic battle. Photo: USNPS*

edge of a rich sea; and each night his theatre just above the waves was made of driftwood to sit on, and as the sun settled into the sea he told the assembled audience true tales of whales, of waves carving into shores, of passing Indian canoes bent on war, and of early European explorers "discovering" land that other men had called home for thousands of years.

Another small park, little more than a camping ground in a setting of large trees, was interpreted to campers by a man of so many years that a law in British Columbia made it necessary each year to obtain a special government order so we could hire him. Again, a well-located notice board was the coordination centre of the interpreter's program. Children loved him because he had somehow never lost the curiosity and delight in discovery that is part of childhood, and every morning his walk with campers along the forest trails — with frequent stops to talk of plants or animals, stones or clouds — were occasions dedicated mostly to the children present. Yet others enjoyed them too. Everyone is at least a bit of a child no matter how old, and anyway this interpreter's simple yet clever messages were really for everyone. His other walks were for adults; his evening gatherings for families on a circle of benches around a brisk open fire were times for ecological stories partly of his own creation, like the tale of a raindrop making its long journey back to the sea, a yarn of good, sound science made so exciting that all ages hung on every word. As the night grew black, the orange firelight danced on the huge trees enclosing the circle, and those very trees were, of course, part of the raindrop's adventure. The old man was a superb interpreter who always talked about objects or noises or smells that the audience could experience at the time. He *interpreted* what they were sensing.

These one-man programs were run by people with special talent, some of it obtained earlier, but most of it perfected as interpreters by the self-training of simply doing it. Most people have useful knowledge and talent to start on. Add a few days of preparation for a topic, then talk to groups while experimenting with improvements. The only way to learn how to do it well is to do it, and to do it better every time.

One important lesson learned from these small programs was that our modern fixation on the need of audio-visual support may not involve a need at all. The electronic methods of course have their places, but some beginners at interpretation communication, even those afraid at first to talk without the help of electricity, can be put "naked" (as one frightened beginner described his feelings) into an interesting landscape containing a potential audience, and with what they have as normal skills, plus some

science background, plus the things everywhere that illustrate their own stories, plus a few reference books to check the facts, they can evolve an entertaining interpretation program that no canned show could ever equal in accomplishment. I have watched many people create such programs, in the process discovering unexpected powers and talents in themselves. The best communication is still a person talking to people, especially when right among the very things being talked about.

That last sentence is almost my definition of interpretation. The landscape — our surroundings — is constantly sending us messages that our senses can receive, our eyes, our ears, our noses, our sensitive skins. We do not receive most of those messages, for our receivers are turned off. Those we do receive, we often do not understand. Park interpretation, like all kinds of interpretation, explains these messages to us, and of course good park interpretation is also attractively entertaining, because if it is not it will not attract an audience.

Before becoming a park interpreter I was a wildlife biologist in the provincial parks of British Columbia, Canada's mountain province. I worried over the future of those scenic places teeming with wild living things, for few people seemed to know what a park really was. Most park visitors only glanced at the scenery as if it was so much scenic wallpaper, then rushed on. This was use totally without understanding. Without knowing it, such people can in a few minutes trample more living miracles than anyone could fully see and appreciate in a lifetime. Only from some understanding of what is underfoot can there be much appreciation of the drama and excitement in a sweep of mountain scenery. Assuming that those who understood parks would be those most likely to defend them from enemies, I pressed my director for a chance to experiment with park interpretation. After some years I got my chance.

An immediate result of the new interpretation program in British Columbia's parks was increasing numbers of people much more aware of their surroundings, much more able to appreciate and understand what they were looking at, and with far more enthusiasm for the priceless treasure that parks preserve. Almost from the beginning there were more people on their knees seeing the details of flowers, more cameras focused on butterflies, more people using printed leaflets to work out the names of trees and so more people pleased to know that the great tree sheltering them was the famous species called Douglas fir. Even more important, there were more people wanting to do their part to protect and to keep wild these newly-found places that interpretation had helped them discover.





*"Take one inspired and informed park naturalist, put him in a park, big or small, that has park users to challenge him and landscapes to illustrate his stories of land (or seashore) and life, and there is no necessity for buildings, exhibits, or slide shows to create good interpretation." Photo: Acadia National Park, Maine, by Richard Frear*

Interpretation programs need not be expensive. Often they do evolve into expensive buildings, large staffs and sophisticated equipment. These may satisfy the needs of giving information to large crowds, or may seem to enhance prestige, but in doing so such programs can be poor examples of interpretation. Good interpretation must be mostly a grassroots method of taking people into the grassroots. Living land lives mostly as small forms of life. Expensive man-made facilities, in contrast, can lead people away from the insight that good interpretation strives for. Such devices can form a real mental barrier between the audience and nature.

A sophisticated wildlife centre in Canada's Province of Ontario dominated my thinking some years ago. The focus there was on a brick building complete with exhibition hall and theatre. Trails led away from the building to self-guiding nature trails, to a steel tower overlooking a marsh, to an underground chamber with a window into the underwater world of the marsh, and to a floating boardwalk that was a foot trail well out into the marsh. All of these facilities were variously successful, especially the outdoor facilities that enabled new viewpoints into the natural world. Even these, however, had an element of making the observer feel like a stranger looking into the world that had not been really entered. The worst offender in this respect was the brick building. It was necessary, perhaps, for its washrooms and offices, its woodworking shops and a library, but the exhibit hall and theatre in it were to some extent out of place. There was something wrong about bringing people indoors to tell them about the highly interesting mysteries, and wonders, and beauties to be found outside. If "outside" was so interesting, why bring them inside?

It is difficult to know the relative successes of the many approaches to interpretation. Perhaps it is sufficient to know that most of them can be surprisingly effective when used properly with a little wisdom and sensitivity. Some of the success is clearly visible and audible from audience reaction, although the total success never is. The educator never knows how much he affects the future, nor how far his message will go in time and distance.

When there are small funds, however, thoughts of expensive sophisti-

cation are purely theoretical. Looking back at the medical student in the seashore park, I suspect that his program gave the most interpretation with the most influence on the most people at the least cost.

That student's efficiency was perhaps rivalled by the first experimental nature centre in the first park where British Columbia tried park interpretation. For that centre I was given a university student to help, and enough money to buy only nails, paint, and materials for hand-made labels and signs. We salvaged two wooden tent floors from a deserted construction camp, found two discarded tents in the local forestry station, and these we made into the first "Nature House." The local refuse dump yielded treasures like boxes, pails and tubs with repairable leaks, bits of wood for signs, and other free supplies. A distant artist friend sent rough paintings of local birds for an exhibit. We photographed things, made diagrams, created catchy titles, found objects in the wild surroundings, and combined all these into exhibits. Each simple message was somehow illustrated by objects or pictures, and each one featured some aspect of the natural world just outside the tent. Our success was soon apparent. Gratifying numbers of people came to see, and a gratifying proportion of them went to look closely at the green world outside, for this nature centre was planned not as an end in itself, but as an experience which in almost every exhibit encouraged the visitor to go outside to see something interesting for himself.

The first centre got results at small cost because it could afford only to be as simple and as creatively effective as possible. Creative thinking in a garbage heap or in a nature centre need not be costly.

Landscape interpretation has spread around the world as a widely known approach to building public understanding of the land, and of the life on it that makes our living world possible. For some years I have had much pleasure from being able to experiment with many interpretation methods, and much pleasure too from being involved with a dozen interpretation programs in as many kinds of places. I have also experienced numerous programs created by other people. Only recently have these experiences come together into the question: If interpretation can be so effective, why is it not even more widely used than it is? Part of the answer may be that small, effective programs tend to grow into larger, ineffective ones. If this is so, the solution is to favour simplicity in order to sustain maximum results.

There is no doubt that small interpretation programs can have outstanding successes. Small funds often yield high quality successes. Here two thoughts of Fritz Schumacher\*, slightly out of context, sum it all up rather well: "Any third rate engineer or researcher can increase complexity; but it takes a certain flair of real insight to make things simple again;" and "Man is small, and therefore small is beautiful."

*Yorke Edwards is Director of the British Columbia Provincial Museum in Victoria, B.C., and widely-known in the field of interpretation in Canada and abroad. His recent book, "The Land Speaks: Organizing and Running an Interpretation System," was reviewed in the last issue of PARKS.*

\*Both quotations from "Small is Beautiful" by E. F. Schumacher, published 1975 by Sphere Books, London.

Richard A. Meganck

# Planning for Ecodevelopment in the Chihuahuan Desert

The IUCN World Conservation Strategy identifies the "failure to integrate conservation with development" particularly in "rural areas of developing countries" as one of the main obstacles to maintaining ecological processes, preserving genetic diversity and ensuring the sustainable utilization of species and ecosystems on a world-wide basis (IUCN, 1980). In a word, the Strategy is aimed at resource management on an "ecodevelopment" basis. Wallaceana (1977) defined this concept as the search for a way to integrate both economic and social objectives while protecting and at times enhancing the environmental support systems. Its application is most urgent in arid and semi-arid regions of the Third World, where a myriad of environmental problems threaten not only the resource base, but the continued existence of many peoples. That does not mean that these systems have little or no value; to the contrary, they are capable of supporting certain types and levels of activities which can contribute to the improvement of the quality of life. But since efforts at development built exclusively upon experiences in other areas have commonly failed (UAAAN-OAS, 1979), project objectives must be biologically, sociologically, and politically indigenous in order to render the maximum benefits to the community.

The underlying principles of ecodevelopment were well served with the formal establishment of Latin America's first national park in 1898: El Chico. Situated near Mexico City, it was set aside in order to insure forest integrity and productive capability of the watershed for human use (Melo Gallegos, 1975). Today Mexico has 23 areas recognized by the IUCN: 14 national parks, 6 fauna reserves and 3 biosphere reserves (IUCN, 1980). However, representation of arid and semi-arid biogeographic provinces, which comprise more than 50 percent of the country, is incomplete. Five island reserves are situated in the Sonoran province and one in the Californian zone. One national park, "Constitution de 1857" is found in the mainland portion of the Californian zone, but no reserves are recognized in the Tamaulipan province. In the largest arid land province, the Chihuahuan, only one low-lying area (1100-1350 m) situated in the point formed by the boundaries of the states of Coahuila, Chihuahua and Durango has been nominated as part of the global network of biosphere reserves. Set aside largely to protect habitat of the endangered desert tortoise (*Gopherus flavomarginatus*) the largest reptile in the Chihuahuan system, the "Bolson de Mapimi" includes nearly 20,000 ha of scattered public and sizeable private lands managed under agreements with local ranchers.

Tropical and coastal areas have also been largely ignored, while development of many of these fragile areas is occurring at unprecedented rates. As the map indicates, reserves have yet to be established in the Yucatecan, Central American or Sinaloan provinces, while the Guerreran and Campechean provinces are represented with only a single area in each. It is understandable therefore why the IUCN has designated nearly all of the Mexican tropical coast as priority areas for reserve establishment (1980).

## The Necessity for Ecodevelopment

As part of the continued effort to disperse industry and population from Mexico City, the Federal Government has embarked upon a program to

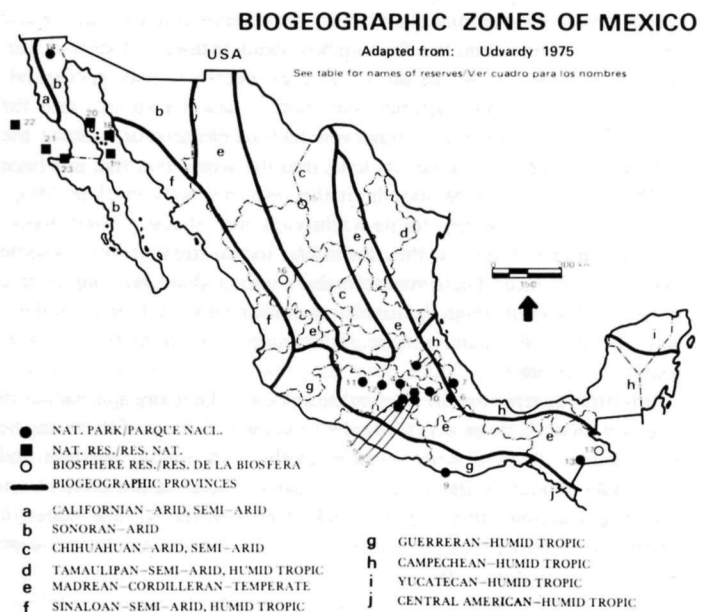
develop industrial activities centered around the cities of Monterrey and Saltillo. Stimulated by a variety of tax incentives, automobile and steel plants are being constructed in Saltillo and the population of this town of 300,000 is expected to double before 1985. When development of this nature occurs, an integrated and regional approach to planning, ecodevelopment, becomes mandatory since demands on all resources increase.

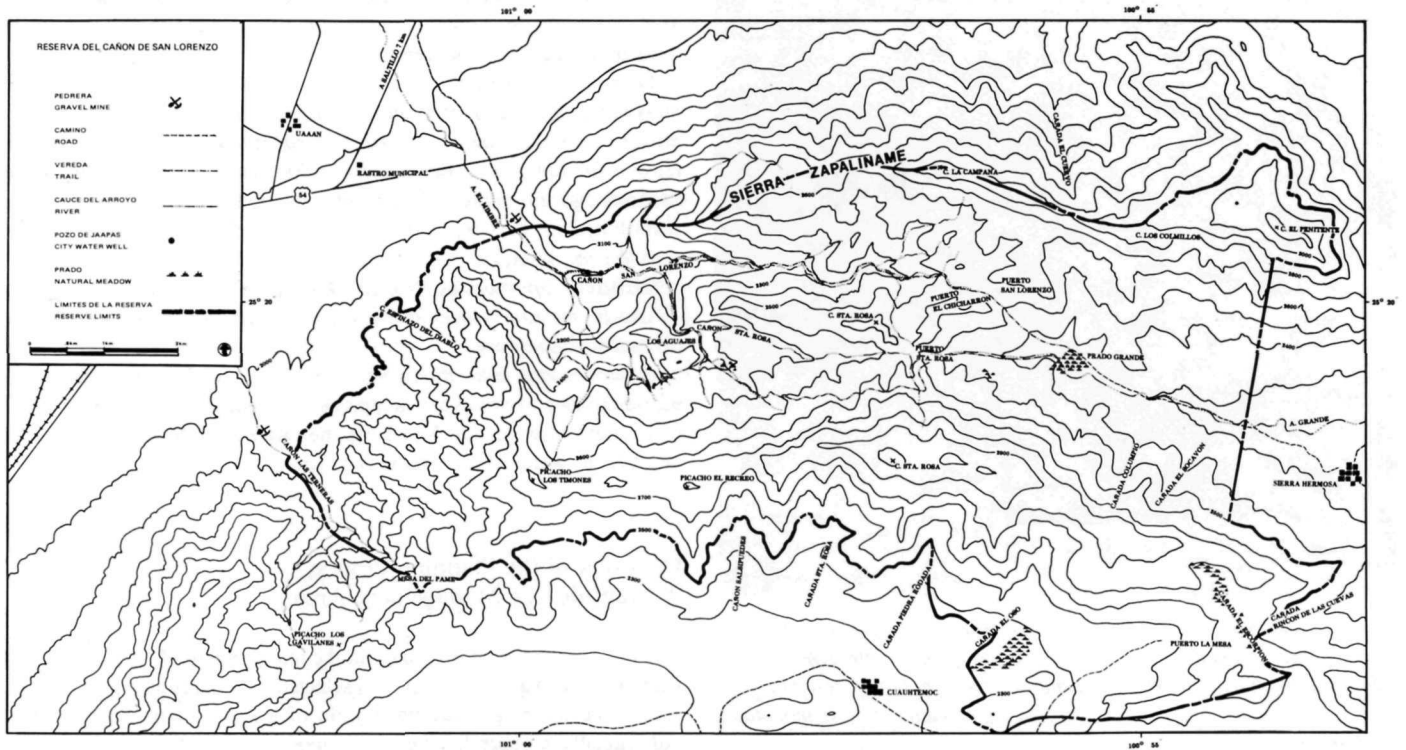
With this concept in mind, the Autonomous Agrarian University "Antonio Narro" (UAAAN) and the Organization of American States (OAS) entered into an agreement aimed at developing a mixed management system for the use, preservation and improvement of the existing natural resources of the Sierra Zapaliname—a system which would be sensitive to the socio-economic well-being of local rural people.

## Description of the Study Area

The San Lorenzo Canyon situated only 7 kilometers south of Saltillo is a representative ecosystem of the Sierra Zapaliname and, to a large degree, similar to most of the Sierra Madre Oriental. While the Canyon itself encompasses less than 1000 ha, the study area includes nearly 10,000 ha. The *ejido* villages demarcate the southern and eastern boundaries of the study area. The western limit is formed by the narrow entrance to the San Lorenzo Canyon and the crest of the Sierra Zapaliname forms the northern extension of the study area (see map). The karstic-limestone terrain is quite irregular and varies between 1600 meters of elevation at the mouth of the Canyon to more than 3100 meters at the highest point—Pico El Penitente.

Due to the area's rough topography, altitudinal variation, aridity and changes in soil moisture, the flora of the region is varied. For the most part it is xerophytic and belongs to the Chihuahuan desert arid zone (transition between the Chihuahuan and Sierra Madres). Five major life





zones can generally be recognized. Beginning with the higher elevations, these consist of (a) pine-juniper forest, (b) chaparral, (c) oak forest, (d) dense thornless brush and (e) thorny desert and cactus with underlying grasses (Wauer and Riskind, 1977). At the lower elevations near the limits of the study area, richer soils and less pronounced slopes support agriculture in the form of fruit orchards (nuts, apples) and vineyards. Included within the study boundaries are a few lush sites with surface water, primarily in the riparian zones in less accessible higher elevations.

Much of the wildlife has been depleted although smaller mammals are still present. White-tailed deer (*Odocoileus virginianus*), lynx (*Lynx rufus*), puma (*Felis concolor*) and coyote (*Canis latrans*) are considered rare, while racoons (*Procyon lotor*), rabbits (*Sylvilagus* sp.), squirrels (*Eutamias* and *Citellus* sp.) and pocket gophers (*Thomomys* sp.) are still common. Reptilian inhabitants include rattlesnakes (*Crotalus* sp.) and several species of lizards (*Sceloporus* sp.). Major bird species consist of scaled quail (*Calipepla squamata*), mourning dove (*Zenaidra macroura*), great horned owl (*Bubo virginianus*) and the endangered maroon-fronted parrot (*Rhynchopsitta terrisi*) (Wauer and Riskind, 1977).

### Benefits of Desert Preservation

Since many individuals are unfamiliar with desert regions, they often express skepticism at the need for planning them. What are some of the reasons for intensively managing a portion of the southern Chihuahuan Desert?

**Continued Human Pressures:** Perhaps the most compelling reason for investing energy in the planning of this area is that at present so little is being managed to provide outputs on a sustained basis, whether in protected or mixed management systems.<sup>1</sup>

<sup>1</sup> Work has been in progress for nearly four decades in the Sierra del Carmen area of northern Coahuila, located opposite Big Bend National Park in Texas, to designate a portion of that area as a park or reserve.

Scientists have also been conducting research in the Cuatro Ciénegas Basin in central Coahuila since the early 1940s. Recent human impact has substantially reduced the possibility that the area's unique ecosystems will be preserved.

Human settlements in the desert continue to increase; the result being that opportunities for biological research, wilderness recreation and other outputs become more remote. As the 1974 Symposium of the Biological Resources of the Chihuahuan Desert Region noted:

Even the most remote mountain ranges do not escape the ever-present grazing and browsing stock of the *campesino* or rancher. Industry related development and, to a lesser extent, land development extend into every corner of the region. Vast distance and isolation alone offer no guarantee of resource conservation . . . It is man who changes the productive grasslands to desert shrubs, who changes the forest to chaparral, or worse, who severely assaults the fragile desert water resources (Wauer and Riskind, 1977:iv-vi).

**Gene Pool:** The potential value as a source of germplasm both for the improvement of already domesticated species and for new uses is one of the most fundamental reasons for preserving representative ecosystems intact, regardless of how "productive" they may be judged by today's standards. The extremes of aridity, heat, salinity and limited nutrients "select" genes that give rise to characteristics adapted to survival in these areas. When domesticated species are crossed with wild strains, hybrids with increased nutritional value as well as other desirable characteristics may result. Desert plants are providing food for livestock and humans as well as a variety of products for industry.

**Watershed Protection:** Water is often the major limiting factor in arid land development. It is the common denominator, a valuable planning lever, which ties politician, farmer, businessman and scientist together. While the San Lorenzo Canyon receives only between 20-30 cm of precipitation per year, it is the major water catchment area for Saltillo and currently provides more than half of its potable water. Since this water comes from a complex underground fossil system—"old water" which is being withdrawn at a much faster rate than it is being recharged—any development in the region must take into account the wide use of this resource.

**Primary Production:** Primary production in this area of Mexico is low. Still, in the higher elevations the remnants of the original pine forest exist, which if managed properly could be used for Christmas tree production or low grade lumber and posts. Mid-elevations contain browse and shrubs that provide cover and food for deer and other





The firewood crisis has reached a critical point in this part of the Sierra Zapalinamé. If this area is not preserved soon and an intensive reforestation effort initiated, the remaining remnant pine forest will soon be eliminated and the water producing capacity of these mountains further reduced.

wildlife. Grasses and lower shrubs are used by cattle and goats. If these areas are managed properly the carrying capacity for both domestic and wild animals could be increased.

*Recreation Opportunities:* The topography, clean air, interesting flora and fauna, vistas, and proximity to Saltillo and Monterrey make the area attractive for many outdoor recreation pursuits. Indeed, one of the basic reasons for undertaking this planning effort is to be able to accommodate and manage this increasing and unstructured use which in itself has contributed to the degradation of the area, particularly through user-started fires, litter, etc.

*Research Opportunities:* Because of the proximity of the Canyon to the UAAAN, the area is ideal for basic and applied research in both biological and social sciences.

*Environmental Education Opportunities:* Schools will undoubtedly utilize the area for the practical portions of class work. Educational field trips could also be developed for the citizens of Saltillo and nearby villages, as well as for tourists.

### Overview of the Planning Process— A Multiple Use Management Area

The main project goal is to plan for the management of the San Lorenzo Canyon in such a way as to protect selected natural resources while at the same time insuring a sustained yield of a series of resource outputs. Additionally, a generalized planning model will be developed for appli-

### MEXICAN NATIONAL PARKS AND EQUIVALENT RESERVES\*

Name/Map No.	Demon.	Est. Date	Area Has.	State	Agency	Biographic Province
1. El Chico	NP	1898	1,835	Hidalgo	SAHOP	Madrean Cordilleran
2. Iztaccihuatl-Popocatepetl	NP	1935	25,679	Puebla, México, Morelos	SAHOP	Madrean Cordilleran
3. Laguna de Zempoala	NP	1936	4,669	México, Morelos	SAHOP	Madrean Cordilleran
4. Insurgente Miguel Hidalgo y Costilla	NP	1936	1,836	México	SARH	Madrean Cordilleran
5. Grutas de Cacahuamilpa	NP	1936	1,600	Guerrero	ST	Madrean Cordilleran
6. Pico de Orizaba	NP	1936	19,750	Puebla, Veracruz	SAHOP	Madrean Cordilleran
7. Cofre de Perote	NP	1937	11,700	Veracruz	SARH	Madrean Cordilleran
8. Zoquiapan	NP	1937	19,418	México	SARH	Madrean Cordilleran
9. Laguna de Chacahua	NP	1937	14,187	Oaxaca	SARH	Guerreran
10. La Malinche	NP	1938	45,700	Tlaxcala, Puebla	SARH	Madrean Cordilleran
11. Insurgente José María Morelos Pavón	NP	1939	1,813	Michoacán	SARH	Madrean Cordilleran
12. Bosencheve	NP	1940	15,000	México, Michoacán	SARH	Madrean Cordilleran
13. Lagunas de Montebello	NP	1959	6,002	Chiapas	SAHOP	Madrean Cordilleran
14. Constitución de 1857	NP	1962	5,009	Baja Calif. Nte.	SAHOP	Californian
15. Bolsón de Mapimí	MAB	1977	20,000	Durango, Chihuahua, Coahuila	IE	Chihuahuan
16. Michilia	MAB	1977	7,000	Durango	IE	Madrean Cordilleran
17. Montes Azules	MAB	1979	331,200	Chiapas	SARH	Campechean
18. Isla de Tiburón	NFR	1978	120,000	Baja Calif. Nte.	SARH	Sonoran
19. Isla Raza	NFR	1978	620	Baja Calif. Nte.	SARH	Sonoran
20. Isla Angel de la Guarda	NFR	1978	85,500	Baja Calif. Nte.	SARH	Sonoran
21. Isla Cedros	NFR	1978	34,700	Baja Calif. Nte.	SARH	Sonoran
22. Isla Guadalupe	NFR	1978	26,640	Baja Calif. Nte.	SARH	Californian
23. Isla Guerrero Negro	NFR	1978	40,000	Baja Calif. Sur	SARH	Sonoran

\*Areas 1-23 are recognized by the International Union for Conservation of Nature and Natural Resources.

NP, national park; MAB, Man and the Biosphere reserve (UNESCO); NFR, natural fauna reserve.

SAHOP, Secretary of Human Settlements and Public Works; SARH, Secretary of Agriculture and Hydrologic Resources; IE, Institute of Ecology; ST, Secretary of Tourism; DDF, Department of Federal District of México.

cation in ecologically similar areas in northern Mexico (UAAAN-OAS, 1979).

With the primary goal in mind, an interdisciplinary planning team was formed, and specific management objectives were outlined which include the sustained production of water, wildlife, pasture, timber, opportunities for research and outdoor recreation and education based, in part, upon the economic and social needs of the local rural villagers.

The planning process for San Lorenzo Canyon has been divided into three phases:<sup>2</sup>

A. *Diagnostic*: includes initial site selection, field reconnaissance, resource data collection, the development of a conceptual planning model, and establishment of official contacts with communal farmers and private property owners. In addition, necessary mitigating management strategies such as reforestation of selected sites, fencing, reintroduction of selected animal and plant species, controlled burning, and elimination of exotic flora were identified and prioritized.

B. *Strategy Formulation and Development of Management Alternatives*: Since planning a Multiple Use Management Area impacts both the resources of the area as well as those of adjacent lands, conflicts between interest groups are expected. Clearly, their resolution in a rational manner is required before decisions are made as to a development alternative. Therefore, data analysis was initiated with the use of models which permit potential commodity and noncommodity outputs to be compared. In short, development scenarios were generated. Once these alternatives and their management implications are thoroughly understood, an initial zoning plan can be adopted.

C. *Program Requirements for Implementation of Management Plan*: In this phase a general development plan and detailed management plan are formulated. During the former, the agency which will have long-term management responsibilities for this area will be selected and become more actively involved. The management plan will include strategies for control of exotic species, fire management, requirements for long term scientific studies, and for scientific monitoring of ecosystem function and visitor impact; administrative and maintenance plans including personnel and concession policies; and a public use plan for interpretation, environmental education and recreation services.

## Planning Issues

One of the most sensitive socio-political realities influencing the planning of this area is related to land tenure. Approximately 60 percent of the study area is "property" of two *ejidos*: Sierra Hermosa and Cuauhtemoc. These are agricultural government-subsidized villages in which pasture and woodland ownership is legally vested in the community and cropland is allocated on a semi-permanent basis for family farming by elected *ejido* managers (Eckstein, et al, 1978). Fortunately, only forest and grazing lands are located within the study area. Present *ejido* use within the study area consists of goat and cattle grazing, wood harvesting for both firewood and construction, limited hunting, and soil and lichen gathering for landscaping purposes. In addition, a few campers and day hikers use the area.

Lands adjacent to the study area are used for large scale dry-land farming to the east and south, and a gravel mining and crushing operation in the west entrance to the Canyon.

Unfortunately, the intent of the Agrarian Reform Act with regard to the management of the area's renewable natural resources has not been followed. For example, since it is illegal to cut green wood in Mexico, the procedure used by the *ejidatarios* is to girdle individual trees so that in two to three years the "dry" trees may be cut legally for firewood. There has never been a reforestation program instituted in this area and as a



*Unrestricted grazing by goats has left very few unimpacted sites in the study area. Future plans will preclude grazing in the scientific and day-use recreation zones.*

result the forest has receded considerably during the 30 years since the *ejidos* were established. A considerable amount of time, and monetary resources will have to be invested in the form of educational programs and loans in order to improve the productive capability of these forests as well as reorient the *ejidatarios* to the concepts of resource management. This is the only hope that their antiquated resource exploitation habits will be altered. It is not enough to simply curb established uses; productive alternatives must be found for the project to succeed in the long term. Therefore the possibility of large-scale irrigation projects to support orchard developments and improve crop production are being considered.

In addition to these quasi-public lands, 40 percent of the study area is in private ownership. These owners have been invited to participate in planning meetings and express their desires as to the long-term management which could conceivably involve life-leases or contracts spelling out permitted and prohibited uses while guaranteeing occupancy. However, in the end, purchase at market value, property exchange or expropriation may be the only solutions to resolving this highly sensitive issue, and placing all of the area under government control.

## Accomplishments to Date

Resource analysis and a preliminary plan have been completed. Official contacts have been made with the *ejidatarios* and field work has begun on erosion control. Additionally a biologist is investigating the feasibility of reintroducing the white-tailed deer in the future.

At the outset of this project, it became abundantly clear that planning a Multiple Use Management Area necessitates careful zoning to insure that the desired outputs are not in conflict. The scientific study area will be zoned "intangible" or off limits to all but scientists and regulated student groups. There will be no recreation development permitted in this zone. Specific areas will be zoned for "intensive" and "extensive" recreation use such as camping, hiking, environmental education and interpretation, picnicking, sports and a visitor's center complex. Additionally, "special use" zones have been tentatively identified to insure protection of major water recharge sites, continued harvesting of pine trees, and to protect isolated habitats of rare animals where they are not contiguous to the intangible zone. According to Ehrlich, interfacing this type of mixed zoning within a Multiple Use Management Area with adjacent land uses and then into a regional planning process "provides an appropriate framework for ecodevelopment" (1978:29).

<sup>2</sup>For a detailed description of the planning process in general see PARKS, Vol. 2, No. 3, and Vol. 1, No. 1, and Miller, 1980.

## Conclusion

This planning effort was initiated in September, 1979 and is scheduled to be completed before the end of 1981. It is an ambitious project on the part of the Mexican Government. However, with its completion, scientists will gain the use of an important genetic bank for ongoing research, recreationists the experience of camping, hiking, etc., in a portion of the Chihuahuan Desert managed to insure a quality outdoor experience, and all visitors will have the opportunity to gain an understanding of the complex system. Most importantly from the standpoint of ecodevelopment, *ejidatarios* will gain from potential employment in the area and from the long-term management of the area's resources in such a way as to maintain overall productivity in perpetuity.

While man has caused many of the present management challenges in the desert, man can handle them in a way that permits ecologically sound development. Mexico has the most to lose if this region is not managed with more foresight in the future and the most to gain from efforts to bring integrity to its unique resources.

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*The views and interpretations in this paper are the author's and do not necessarily represent those of either the General Secretariat or the Organization of American States.*

*All photos by Janet O. Meganck*

William E. Hammitt

# Fire-Rings in the Backcountry — Are They Necessary?

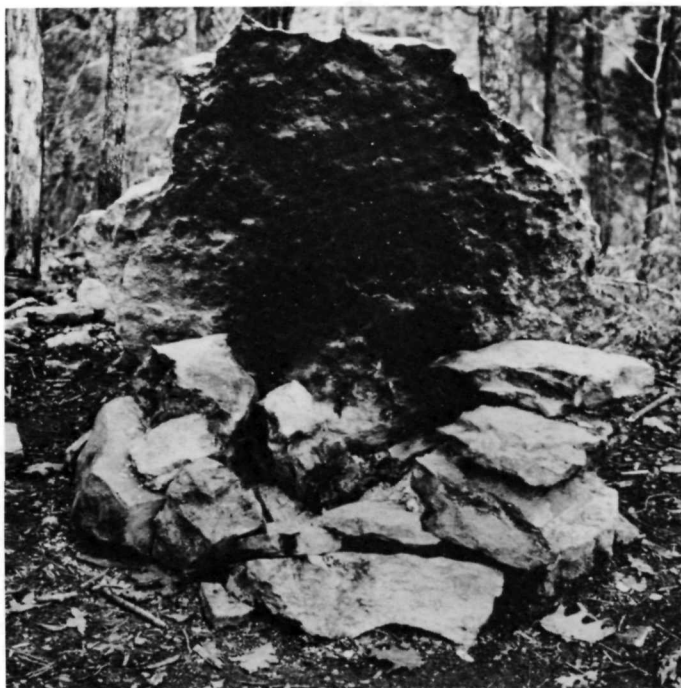
Have you ever been hiking in the backcountry or a wilderness area, in pursuit of solitude and escape from man's improved world, only to all of a sudden find yourself staring at someone's monumental "art work" . . . a fire-ring? Or worse yet, to come upon a secluded lake and find several fire-rings decorating its edge? Perhaps no other factor causes more long term visual impact in the backcountry than fire and the fire-ring. This is particularly true in the case of the fire-ring, for the blackened scar of a campfire might disappear after a few years, but a foot-high fire-ring can remain a monument of man's presence for a decade at least.

If wilderness areas are to retain a natural character, without evidence of man and his improvements, then where does the fire-ring fit into the picture? Many wilderness users would argue that fire-rings are unsightly and detract from wilderness environment. What this all boils down to

then is the need for a wilderness education program concerning the role of fire-rings in backcountry areas.

There is a certain mystique concerning the fire-ring. It is no doubt related to the fire building ritual that has long been part of the camping experience. Cooking was done over the fire and the fire-ring served a function for reflecting heat and placement of pots. But, the lightweight backpacking stoves of today are far more efficient for cooking than the open fire and provide far less impact to the natural environment. Many wilderness areas now require stoves for cooking, and more will in the future. The lure of the fire-ring goes beyond that of cooking, however, for many people consider it a component of *any* fire. Some may say it is used to contain the fire, to prevent the fire from spreading. Yet, I have seen fire-rings on sandy beach areas or in alpine areas where neither fuel or





*Fire-ring at a backcountry campsite in the Virgin Falls Pocket Wilderness, near Sparta, Tennessee. Fire-rings in many backcountry areas can be found that average one-to-two feet in height, presenting an obvious sign of man's past use of the area.*



*A fire-ring constructed at a developed campsite in Great Smoky Mountains National Park. Even though a campfire grate-pad existed at the site, individuals still carried stones quite some distance to construct this fire-ring. Note that the site was completely graveled, indicating little, if any, chance of the fire spreading.*

wind were factors. The fire could not have spread under any circumstances, yet the fire-ring was present. The fire-ring around the campfire is in many ways similar to the past practice of trenching tents. We have been able to eliminate almost all trenching of tents in the backcountry through educational programs and it is now time to make an attempt to do the same for fire-rings.

The education program involves two steps: (1) the practice of minimum impact fire building, and (2) the eradication of existing fire-rings in the backcountry. If one must build a fire in the backcountry, then

minimum impact fire building procedures should be practiced. The basic thesis underlying this procedure is to build a small fire without a fire-ring, so that fire site landscaping-restoration upon leaving the area will leave no trace of a fire having occurred. When building a fire, this involves scraping back the leaf litter or other surface materials to expose mineral soil. The scraped area should be no more than 2 to 4 feet in diameter and should be located in an area where landscaping-restoration of the fire scar will be easiest. The leaf litter scraped from the area should be stored in a pile nearby so as not to be trampled, for it will be returned to the original location upon leaving the camp site. Small sticks, less than two inches in diameter, are used as fuel and left to burn-out rather than being drowned-out when leaving the fire. The wood is allowed to burn completely so that only ashes remain instead of charred logs. The ashes are then spread out over the scraped area, and the leaf litter returned back to the fire site. A little raking of the replaced litter with a dead twig and a few well-placed branches can leave the area with no trace of a fire. Thus, a fire was enjoyed without the use of a fire-ring and better yet, there will be no monumental fire castle remaining to spoil the naturalness for the next backcountry hiker.

The second problem involves the eradication of fire-rings that already exist in the backcountry. In a heavily used, designated backcountry campsite, eradication of fire-rings might not be desirable. If the area is used on a regular basis, a few existing fire-rings may restrict fires to the designated sites. But for dispersed, non-designated campsites, eradication of fire-rings is being recommended by many resource managers. Fire-ring eradication is much more than simply scattering rocks about or pushing the rocks into the center of the ring to obscure the charcoal. It also involves environmental restoration, the destroying of all evidence of man's previous fire building practices in the area. The following procedure is recommended by the U.S. National Park Service:

1. *Break up the fire-ring* — Try to return the rocks to the area where they were originally obtained, or remove them some distance away with the blackened face turned toward the ground.
2. *Scatter the charcoal and ashes* — If there is a considerable amount, spread it some distance from the fire-ring and preferably in an inconspicuous place. Unburned refuse should be put in a plastic bag and packed out.
3. *Camouflage the fire-ring scar* — The fire scar should be hidden to discourage future parties from using the same spot. If a fire-ring has only been used once or twice, it can be easily landscaped with leaves and twigs, as suggested for minimum impact fires. For long established fire scars, soil brought from an adjacent area may be necessary to hide the blackened area.
4. *Scatter any collected and stacked wood* — Relocate wood some distance from the fire site and in an inconspicuous manner.

In summary, it is suggested that the majority of fire-rings are a carry-over of a previous era of camping, and today are a visual intrusion in backcountry camping areas. As with the trenching of tents, the fire-ring has perhaps outlived its necessity and desirability. Through teaching minimum impact fire building, and eradication of existing fire-rings, we can help preserve the qualities of the backcountry which will enhance the future wilderness experience of many.

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Shankar Ranganathan

# Gujarat Forestry Scheme: The Start of Something Good

Alarmed at the rapid denudation of the state's forests, the Gujarat forest department in India started a social forestry program in 1970 with the object of meeting the fuel and fodder requirements.

Gujarat state has an area of 196,000 km<sup>2</sup> and a population of 30.7 million, 72 percent rural, the balance urban. The cattle population is 14.4 million. Against an annual demand of fuelwood of 4.8 million tons, the supply from the state forests is 0.2 million tons, i.e. less than 5 percent. This really means that 95 percent of the fuel requirements are from illicit removal of wood from the forests and from the burning of cattle dung.

Domestic fuel consumption in the state is shown in the table below, in percent of the total used.

Firewood .....	63
Kerosene .....	14
Dung Cake .....	10
Charcoal .....	5
Coal .....	4
Coke & Electricity .....	3
Gas .....	1

It is estimated that if the cattle dung was used as manure instead of being burnt, 63,000 tons of additional food grains could be produced annually amounting in value to Rs.125 million. This annual fodder requirement is 14.4 million tons. A large portion of this too comes from forests—leaves and branches lopped off trees. Uncontrolled grazing of cattle in forest areas also prevents tree growth. It is not surprising that the



forest area of the state has dwindled from over 30 percent 50 years ago, to less than 10 percent of the total area today.

In 1974 a program was started of raising village woodlots on grazing lands; 4 hectares per village to meet fuelwood, fodder and small timber requirements of the village. Seedlings were distributed free by the forest department. The success of the program led to the formulation of the Community Forest Project. This project, launched on April 1, 1980, will cost Rs.650 million over 5 years; approximately half of the money will be the World Bank's contribution, the rest being provided by the State government.

The aims of the World Bank-aided projects are:

1. To meet the most urgent requirements in forest products of the rural population.
2. To induce the village community to actively participate in the plantation program through appropriate extension and sharing of the plantation revenue.
3. To provide employment, particularly to the landless agricultural labor.
4. To stabilize the environment.
5. To introduce fuel saving measures by introducing efficient designs of wood burning stoves and crematoria.

Scope: The project is designed to cover the following activities.

Activity	Target in hectares
<b>Strip Plantations</b>	
Roadside .....	31,600 ha
Canal Banks .....	2,000 ha
Railway Sides .....	3,400 ha
<b>Village Woodlots</b>	
Irrigated .....	2,880 ha
Rain fed .....	34,560 ha
<b>Forest Areas</b>	
Reafforestation of degraded forests .....	30,000 ha
<b>Tree Farms</b>	
Plantations in privately owned lands .....	1,000 ha
Seedlings for Farm Forestry .....	150 million
	<hr/>
	105,440 hectares
<b>Wood-Saving Devices</b>	
Improved crematoria .....	1,000
Smokeless stoves (chula) .....	10,000
<b>Support Activities</b>	
Research	
Training	
Service Personnel	
Farmer Training	
Publicity	
Communication	

To optimize land use to suit varying edaphic and climatic conditions, ten plantation models have been developed. Depending on locality,



*Eucalyptus trees growing on a field boundary near Baroda in Gujarat state, India.*

climate, irrigation facilities available and choice of species, between 641 to 2500 plants will be raised per hectare.

To motivate the village community to create and maintain woodlots, two categories of villages have been designated. In the first category, called 'Self-Help Scheme,' the villagers will contribute labor or its equivalent (cost of land preparation, planting, maintenance, protection, etc.). All benefits resulting from the plantation will go to the village. As an added incentive, these villages will be given priority for smokeless stoves and fuel-saving cremation facilities. The improved stoves and crematoria will effect 40 percent saving in fuelwood. It is hoped that between 25 to 30 percent of the villages will be in this category.

In the second category, known as "Supervised Village Scheme," the entire cost of raising the woodlot will be borne by the forest department. From the revenue, direct cost of plantation and a management fee equivalent to 25 percent of development costs will be deducted and the rest passed on to the villages. This is a substantial improvement over the existing practice under which the net profit from the plantations is shared on a 50:50 basis. The extra benefit is expected to go a long way in encouraging the village panchayats (smallest unit of local government in India) to divert more and more land for raising community woodlots.

In the case of strip plantations on state-owned roadsides and canal banks, the net profit will be shared equally between the forest department and the taluka\* panchayat concerned; the latter distributing its share equitably among the village panchayats constituting the taluka. Under the previous practice all profits from strip plantations went to the state government. Not surprisingly, there was little interest shown by the villagers in maintaining them.

In the Dangs district of Gujarat state, Adivasis (forest tribals) owning marginal lands get poor returns from cultivation. It is proposed to encourage them to raise valuable tree crops instead of continuing uneconomic agriculture. Seedlings will be distributed free by the forest department. Grass and other minor produce will provide additional revenue. To tide over the gestation period, the landowner will receive an annual loan of Rs.250 per hectare. When the plantation matures, the net proceeds of the crop, after deducting initial cost and loan, will be paid to the landowner.

Gujarat is probably the only state in India where schools participate in

reafforestation work. Seeds in perforated polythene bags are supplied free to schools by the forest department and seedlings are bought back from them at 15 paise (0.15 of a rupee) each. Nearly a hundred schools have started nurseries and over a million seedlings have so far been supplied by them.

### Benefits

The project is the most ambitious that the forest department anywhere in India has embarked upon in recent years. Yet it is modest. After ten years it will produce annually 400,000 tons of fuelwood (less than one-tenth the existing requirements) worth Rs.120 million at current prices. It will also provide employment to 25,500 people.

It is hoped that the project will serve as a catalyst in the rapid reafforestation of Gujarat state. Several other states in India are now planning to follow the example set by Gujarat. The key to Gujarat's success lies in the understanding that profit motivates people to sustain effort more than anything else.

*Acknowledgements: I am obliged to Mr. K. P. Karamchandani, I.F.S., Chief Conservator of Forests, Gujarat, for the data provided on the State's Community Forestry Project.*

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\*Administrative unit of a group of about 150 villages, with aggregate population of approx. 200,000.



*J.D. Cuillard*

## Central America Planning Seminar

Wildland management problems can present common threads in geographically related regions of the world. Experience gained in finding workable solutions all too often stays in the country of origin. If problems are shared, so should solutions. The Second Central American Mobile Seminar on Wildland Planning and Watersheds was a refreshing example of regional sharing and cooperation. In all, 35 participants representing 13 countries took part in this intensive three week seminar. Beginning in Costa Rica, it traveled through Nicaragua and finished in Honduras.

During the seminar participants gained an appreciation for the complexities of the planning process at all levels. Support for national park systems, for example, was seen as closely dependent upon conservation objectives adopted at the highest levels of government. Participants then discussed the need for a logical sequence of planning from country-wide and land-use plans to system plans, and finally, to individual unit and site plans. An international planning perspective was added through discussions of the World Conservation Strategy, Biosphere Reserves, and the World Heritage Convention.

One of the strengths of this seminar lay in its organization. This was no one-way didactic exercise, nor was it a sight-seeing excursion. Straight lectures were kept at a minimum and balanced with practical field exercises that required active participation and application of principles learned.

Each wildland or watershed unit visited presented different planning problems. The 35 participants were divided into smaller work teams and each assigned a particular problem to discuss. Each team presented its

recommendations in a written form which were then discussed in a planning session. For example, in Costa Rica's Cahuita National Park, solutions were proposed to the problems of the local population's antagonism toward the park and economic dependency upon it. Another group dealt with how to handle massive holiday tourism overrunning the park. In Honduras shifting agriculture threatens the integrity of parks and other vitally important watersheds. Seminar members shared their personal experiences concerning this serious social and ecological issue, and observed the progress the Hondurans have made in stabilizing shifting agricultural practices. The seminar then allowed for and received active participation by all members, and demonstrated that planning is a logical process that may well be the only way to insure the long run stability of wildlands.

The seminar was organized by the Wildlands and Watershed Unit at the Tropical Agriculture Center for Research and Investigation (CATIE) in Turrialba, Costa Rica. General financial support for the seminar, some staff members, and participant scholarships was provided by: Rare Animal Relief Effort (RARE), Kellogg Foundation, World Wildlife Fund, UNESCO, USAID, U.S. National Park Service, and U.S. Fish & Wildlife Service.

*J. Douglas Cuillard is a Park Ranger (Interpretation) with the U.S. National Service, currently assigned to Everglades National Park. He took part as a staff expert in the Seminar described.*



*Participants discussing the design and use of a partially completed visitor center at Masaya Volcano National Park in Nicaragua. Photo: Douglas Cuillard*

# PARK VIEWPOINTS

## Tourism or Conservation in the National Parks of Benin *Jeffrey A. Sayer*

Benin lies between Nigeria and Togo on the coast of West Africa; with an area of 112,620 square kilometres it is slightly larger than Honduras. The population is about 3.5 million, a large proportion of which lives in the humid coastal areas. The dry savannas of the interior are very sparsely populated. Benin has few exploitable natural resources and in terms of the economic criteria by which a nation's wealth is often judged it ranks as one of the world's poorest countries. Largely because of its lack of development the country has retained many features which make it attractive to overseas visitors, and tourism could become an important source of foreign revenue. Some tourists already come to Benin to visit the palm-fringed sandy beaches and to experience the fascinating cultural heritage of the country. A rather small number of these visitors penetrate to the Pendjari and "W" National Parks in the extreme north. (see map)

These parks are contiguous with similar protected areas in neighboring Niger and Upper Volta. They are all surrounded by extensive buffer zones which are managed for sport hunting. The parks, reserves and hunting zones make up a continuous area of about 2.5 million hectares where there are no permanent human dwellings. Apart from remote sections of the central Sahara, this is the largest uninhabited area in West Africa.

The larger of the two national parks is called the "W". It takes its name from a series of bends in the Niger river which form a "W" shape on the park's northern boundary. This park was established in 1954, but apart from one 44 km access road to a well-known waterfall there are no visitor facilities. The "W" park extends into Upper Volta and Niger where there is a network of tourist tracks and a small hotel. The second national park, the Pendjari, was established in 1961. It contains a small hotel and has about 300 km of tourist roads.

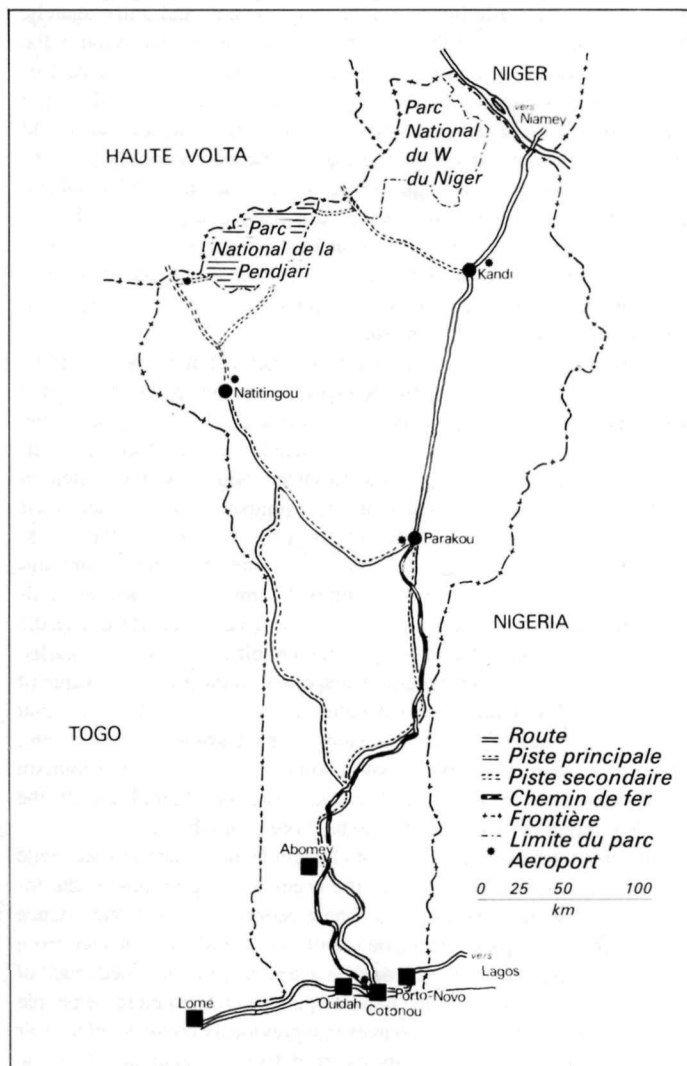


A typical park road in Pendjari park.

The area is mostly rather dry savanna woodland but it includes lakes, marshes, several rivers, some extensive grassy plains and a dramatic sandstone escarpment. It therefore contains a complete range of the habitat types which exist in the savanna belt of West Africa.

The outstanding feature of the area is its fauna of large mammals. With two exceptions all the large mammals which occur in the savannas of West Africa are found in both the Pendjari and the "W". The exceptions are the giant eland and the giraffe, both of which are now very rare in the region. The extent of the protected areas, the variety of habitats and the richness of the fauna are outstanding.

The visitors who came to the parks in the past tended to be the more dedicated travellers who made their own way from the coast by road and who were prepared to accept rather simple accommodation and facilities.



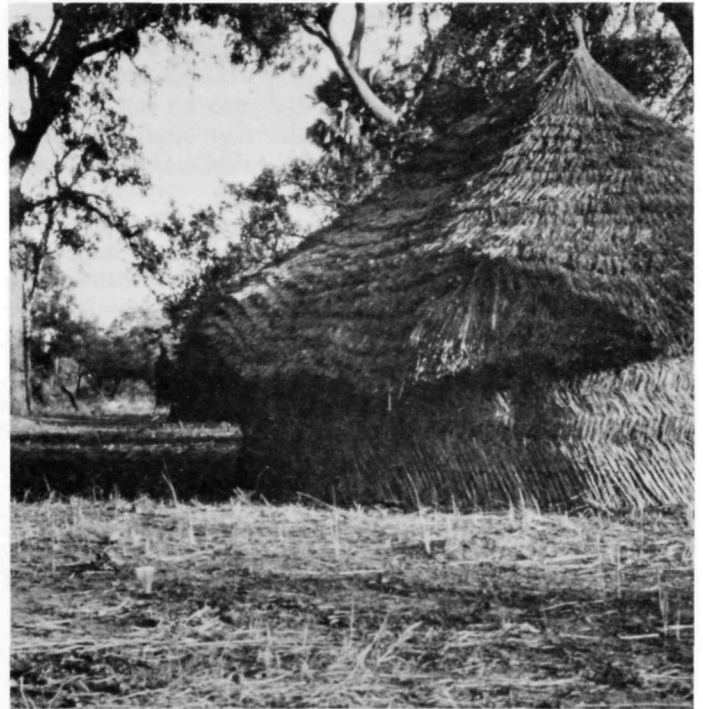
*Local residents work in Pendjari National Park reopening a park road at the beginning of the dry season. About 22,000 man-days of labor are used each season to maintain 500 km of game-viewing and access roads, making the park one of the larger employers of unskilled workers in the province.*



These visitors had little impact on the environment, and unfortunately, very little significance to the economy of the country. Even today the revenue generated by tourism is quite inadequate to meet the cost of managing and protecting the parks. There is now a widely held feeling that not only should the parks pay their way but that tourism could become a major industry and make a significant contribution to the economy of the country. For such an industry to be economically viable it would be necessary to change the entire scale of operations. Hotels would have to be big enough to accommodate package tours arriving by chartered aircraft, and they would have to provide the degree of comfort that such tourists expect. Airstrips would have to be built and more and better game viewing roads constructed.

At present poaching and agricultural encroachment pose serious threats to the future of the parks and especially to the preservation of the large mammals. Developments which provide compelling economic justifications for maintaining the protected areas are therefore very welcome. They also, however, give rise to some misgivings. These stem in part from fears that the presence of large numbers of visitors and their associated infrastructure will detract from the wildness of the parks. These problems can, I believe, be largely avoided by careful planning. More serious and difficult to deal with is the impact that such development might have on existing communities living near the parks and on the attitudes of both local people and government officials toward the parks. The basic problem is that excessive emphasis on the economic value of parks leads quite naturally to the belief amongst decision makers that parks exist primarily for economic gain. Such an attitude is undesirable, not least because in the event that at some stage in the future tourism should cease to be an economically attractive activity, then, logically, the park land might be reallocated to some more profitable use.

The most intractable problems of all stem from the need to reconcile park conservation objectives with the needs and aspirations of the inhabitants of the surrounding areas. These people are mostly subsistence farmers who in the past have made use of many products collected from uncultivated areas. In particular they have traditionally obtained much of their meat from hunting. When national parks were created these people were deprived of the use of resources that previously contributed to their well being. Such people now are not receptive to arguments about the



*Simple camp structures built by local people using indigenous materials have been favorably accepted by visitors to Benin parks who do not wish to stay in a hotel, or cannot afford to. Photos by the author.*

conservation of representative ecosystems or of genetic resources. They view parks only as enclaves set aside within their own territory for the amusement of foreigners. Some of them may benefit from employment in a park but for the bulk of the population exposure to an influx of affluent visitors may merely serve to raise their material expectations without providing the means to satisfy them. The situation in Benin is a good example of the paradox surrounding the relation between national parks and tourism in many developing countries.





*This Pendjari river bridge was built almost entirely of local materials by local labor.*

In the past international conservationists have been among the strongest advocates of promoting tourism in African national parks. This attitude stemmed from fears that the newly independent countries would not otherwise feel justified in committing scarce resources to conservation. Excessive emphasis on tourism even led in some instances to national parks being placed under the control of government ministries concerned with industry and tourism when their logical and rightful place should have been in ministries concerned with natural resource management. This is not to say that the national park movement in Africa has not and will not continue to benefit through its importance to the tourist industry but we have to be careful not to allow the situation to develop where the relationship between tourism and national parks becomes that of the tail wagging the dog.

We have to accept the fact that in the short term the principal benefit that local peasant communities can expect to derive from parks like the Pendjari or the "W" is rewarding employment. Tourism does generate additional employment. However, if the strategy chosen is to develop a sophisticated mass tourism then it is likely that the main beneficiaries will be the expatriates who will have to be brought in to run the operation.

I believe that tourism can contribute more to conservation if it is adapted to make maximum use of the human and material resources of the areas immediately surrounding the parks. For this reason construction and maintenance activities in the Pendjari should use labor-intensive methods and most work should be concentrated in the dry season when peasant farmers are available to work in the parks without any detriment to their basic agricultural livelihood. In addition many locally traditional technologies have proved to be highly appropriate to park management when, as an added advantage, their application may serve to perpetuate them. The simple camps illustrated are built entirely by local people using indigenous materials. Visitors have responded very positively to such facilities and apparently they appreciate the experience of being in intimate contact with the park and local tradition. The success of the program will be measured by the extent to which it leads to greater appreciation of national parks amongst the peasant communities of the area. The long term strength of any park system depends upon the value that the population as a whole attaches to it.

The parks and reserves of Benin, and the rich culture of the areas

surrounding them are a resource of international value. There can also be little doubt that in the long run their conservation could make a big contribution to improving the quality of life of the inhabitants of the country. In the short term Benin either has to find money to subsidize the protection of its parks or else open the areas to commercially oriented tourism with the consequent associated risks. Benin receives considerable international aid but when we have approached the various aid agencies for assistance our requests have always been assessed on the basis of their economic viability. Aid could therefore be justified only if it would lead to commercial exploitation of the parks. While most of the potential donors are preoccupied with agricultural and industrial projects, they have for many years also financed programs in the fields of education, culture and sport. Conservation, and especially the establishment of a system of protected areas, should be an integral part of the development process of at least equal importance to those noneconomic activities. The World Heritage Fund fulfills this need for a few outstanding sites but I would hope that the time will soon come when the conservation of the natural environment will be considered a normal part of all developmental aid programs.

*Jeffery A. Sayer is Chief Technical Adviser, National Parks and Wildlife Management Project, Thailand. Earlier he was team leader of similar FAO/UNDP activities in Afghanistan and Benin.*

# PARK TECHNIQUES

## Guide to Walkway Construction and Maintenance *New Zealand Walkway Commission Staff*

*The New Zealand Walkways Act of 1975 provided for the establishment of a system of walking tracks or trails throughout New Zealand. To assist in achieving a consistent approach in the planning and construction of this system, a booklet entitled "A Guide to Walkway Construction and Maintenance" was published by the New Zealand Walkway Commission after close consultation with the Department of Lands and Survey and the New Zealand Forest Service. It outlines the different types of walkways—walk, track and route—and provides simple but practical guidelines for planning, construction and maintenance.*

*The following article was abridged from the Guide. It should be of use and interest to park people in many parts of the world. —Ed.*

### Planning a Walkway System

Within the national parks, scenic reserves, forest parks, state forests, and local parks in New Zealand there are hundreds of kilometres of tracks, ranging from 5-minute walks to high alpine routes.

By traditional definition, the track is a path worn by use through the back country. The modern concept is different. The New Zealand Walkway Commission has adopted three basic walkway classifications. These are:

**Walk:** Relatively short. Suitable for persons of all ages and varying standards of fitness. Designed for high use in all but the worst weather.

**Track:** Well-defined and suitable for people of average fitness. Some tramping experience is expected. Dependent on weather conditions.

**Route:** Lightly marked or unmarked footways for use by well equipped and experienced trampers. Where necessary, markers are used to define routes. Very dependent on weather conditions.

Thoughtful planning is required in designing a fully functional walkway system.

Walkways should be designed for economy of purpose and site protection. They can be used to channel and direct people over a designated line with a minimum of pedestrian impact on the features of the site.

Aesthetic enjoyment is often the force motivating the user. For this reason plan and locate walkways to take full advantage of the scenery and other natural features. However, never lose sight of preservation, as this must

always remain the primary consideration right through the planning and construction phases.

Before proposals for a walkway system can be considered, an inventory of the landscape is required. Aerial photographs are an excellent aid and, with the use of a stereoscope, can be used to locate alternative ways to a proposed objective. Even the walkway gradient can be basically worked out, reducing the time spent in field reconnaissance.

Aerial photographs can help locate features of aesthetic, recreational, scenic, and scientific interest. Vegetation types and species can be determined from the photographs, and this can be valuable when planning walkways in which representative plant communities are to be incorporated.

Assessing the impact of public use is sometimes difficult, but it must be done. Questions must be asked. Is the feature unique? Will the terrain stand up to heavy tramping or will surfacing be required? Is the gradient suitable, and are there hazards that can safely be negotiated? And, finally, what is the likely use pattern; a few people or thousands a year?

A method is necessary in order to seek the answers. The planner must obtain answers to questions like the following before a decision is made, as it may be that a walkway is not desirable or practicable.

1. Is the proposal in keeping with the aims of the legislation?

2. Status of land over which the walkway will pass and statutory or other restrictions or conditions of use?

3. Purpose of walkway—tramping, sight-seeing?

4. Use of walkway—who will use it and in what numbers, for example, family groups, trampers? Proximity to urban areas is important in determining use.

5. Determination of the suitability and impact—

(1) What are likely problems that could arise;

(2) are there areas better suited;

(3) will the need for more facilities develop;

(4) are there sufficient facilities in existence?

6. Resource inventory—

(1) interpretative features;

(2) what interpretative themes can be developed;

(3) landscape assessment;

(4) any outstanding features of potential attraction or fragile features requiring protection, or avoidance by the general public;

(5) existing tracks, walks, and routes in the area?

7. Resource impact assessment—

(1) carrying capacity, determined by climate, vegetation, topography, terrain, soil types, visual impact;

(2) anticipated use pattern;

(3) anticipated facilities?

8. Visitor safety—

(1) What are the potential hazards to the visitor—bluffs, areas exposed to severe climatic conditions, dangerous rivers, the influence of tides on estuaries and promontories;

(2) can they be safely negotiated?

9. Construction methods and costs—dependent on the classification, that is, walks or tracks—

(1) benching, grade, steps, draining, surfacing, board walks, safety barriers;

(2) availability of labour and finance to undertake the job;

(3) bridging, huts, picnic facilities, car parks, toilets, rubbish?

10. Maintenance methods and costs—servicing facilities, patrols, rubbish disposal?

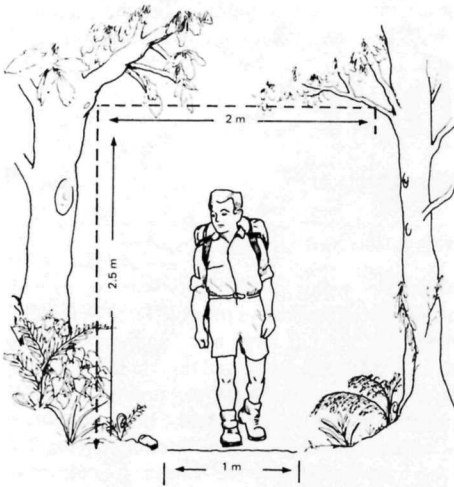
These factors are weighted and a decision is made. The planner must decide what is required for the situation, and to do this he has to be able to classify the type of walkway and the standard of construction applicable.

### Classification

It is vital that the classification of walk, tracks, and routes be consistent throughout the country to provide users with prior information on the standard and type of walkway they can expect. Any inconsistencies in the classification between areas—whether in the actual standard of the walkway or in the information on it (signs, leaflets)—could affect the enjoyment and safety of the user.

### Walk

A walk is a well-formed, well-signposted walkway designed for high use, normally over a short distance. It should be constructed to a "shoe" standard, and be suitable for people of



all ages, in all but the worst weather conditions. This standard of walkway is mainly used for access to facilities or features. It is often a one-way loop track designed to lead users to places of interpretative interest. It should follow an interpretative theme. The recommended maximum duration for the walk is 4 hours.

**Construction** — Formation should be to the highest possible standard; the development costs are high but subsequent maintenance costs will be minimized. The walk is designed to accommodate high-density use with a minimum of impact. Walks are not designed to involve a physical challenge; they should be of an easy grade, water-tabled, stepped, benched, and bridged as required. Handrails are useful aids in controlling people, without significant reduction in aesthetic value. The width of the walking pad should be 1 meter, with vegetation cleared back where necessary to a width of 2 meters and to a height of 2.5 meters. If vegetation clearance is any narrower than 2 meters, the frequency of track slashing is increased and vegetation takes on a "hedged" appearance. At points of interest the walking pad width can be increased to 2 meters to allow a group to gather round. The surface must be firm, and if necessary hardened, or board-walks should be constructed. All junctions are to be clearly signposted, and, if appropriate, seats provided at suitable points of interest (although bear in mind that seats seem to be disposal points for rubbish). One-way loop walks are desirable, to maintain interest and to increase the experience by minimizing the contact with other people.

**Track**

Tracks are well-defined and suitable for people of average fitness. Some experience in tramping is expected. On longer tracks, huts or camping areas should be provided at easy day intervals (6-8 hours). High standards of tracking are often expensive, and in many instances a high standard of construction may not be required. However, the track should be planned to accommodate features characteristic of walks. Where possible consideration should be given to incorporate access/exit side tracks to highways at easy intervals.

**Construction** — On some tracks, especially those prone to erosion or susceptible to damage, the only variation from walks may be fewer visitor aids such as handrails, interpretative signs, seats, and a lower standard of bridging. Adequate drainage on the track is essential, and surfacing may be required. The walking surface can be less than 1 meter wide; 500 millimeters to 700 millimeters has proved sufficient. Vegetation should be cleared where necessary to a width of 1.5 meters to 2 meters. Guard against short-cuts on the track line, and if at all possible avoid falls in elevation necessitating a climb to regain the loss. Much of the track may traverse slopes, so cutting and benching will be required, and batters should be compatible with the stability of the terrain.

**Route**

Routes are lightly-marked or unmarked footways for use by well-equipped and experienced trampers. Use is normally light and may be wholly dependent upon weather conditions. No surfacing need be done, grades can be steeper, and the route may be marked by poles, cairns, and tree markers. Bridges are often absent or basic, for example, walking wires. Routes may incorporate huts.

**Location, Alignment & Grade**

During the planning stage, the information gathered will have determined the class of

walkway to be constructed and, very largely, the line it should follow.

When considering walkway alignment, bear in mind that spurs often offer the best drainage and the lowest gradient up the hillside, and that the requirement for switchback segments is reduced. Flat land often presents drainage problems, and walkways formed on slopes of more than 7 in 10 (35°) require greater excavation, so causing additional scouring of the landscape, increased costs, and more problems of slope stabilization.

If possible, angle the walkway across the natural slope of the hillside, rather than take a line directly up or down the slope. This enables water to be diverted off the walkway formation, thus preventing it running down the surface and causing erosion.

If switchbacks (zig-zags) are required, try to use a topographic feature as a turning point so that the walkway does not appear to be carved out of the hillside. Avoid making the angles between segments of a switchback visible or too small, as users will tend to take short-cuts and walk straight down the hill, creating excessive disturbance to vegetation and soil. Switchbacks that are repeated or visible from each other are dull for walkers and are likely to have a scarring effect on the landscape. Drainage is also an important consideration; on well-sited switchbacks, surface run-off collected from one segment can be diverted off the outer corner so that it is kept away from other segments below.

Grade is an important factor, and in planning it is necessary to establish the difference in height between (a) the highest point, and (b) the lowest point, and the given length of the walkway between (a) and (b). Ideally, walkers should be able to appreciate the experiences without being preoccupied only with the fact that they are climbing. In this regard a gradient of 1 in 8 is *ideal* (where possible); it can be climbed without being too obviously uphill, even by relatively unfit people. It is also a grade which provides stability and good drainage, thus minimizing future maintenance. The steepest grade for walks should not exceed 1 in 6, which is appreciably steeper than 1 in 8. If it does, difficulties will be experienced in construction, and maintenance will be increased because of the possibility of erosion. Generally steps are required for any short stretches where a grade steeper than 1 in 4 is required.

Do not set grades by guesswork; use an in-

**TRACK ALIGNMENT — SWITCHBACKS**



**POOR PRACTICE** — Landscape is damaged by short segments and numerous switchbacks. Repetition is monotonous to the user.



**GOOD PRACTICE** — Switchbacks are not intervisible. Use is made of natural topographic features, varying length of track segments between switchbacks for desirable variety and to prevent cross-cutting. Note also the drainage can be designed so the surface run-off collected does not affect the track segments below.



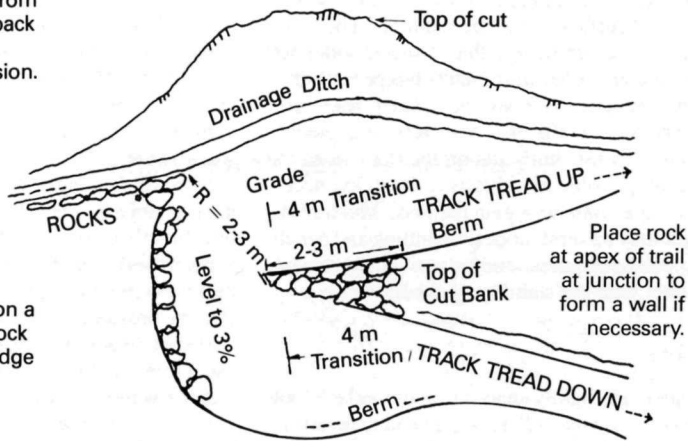
Use rock walls, logs, trees, shrubs, brush, timber or other obstacles to prevent cross-cutting.



SWITCHBACK DETAILS

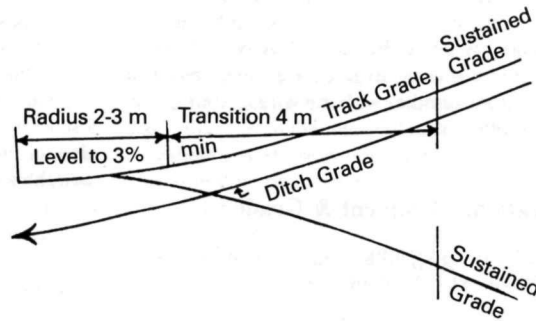
Open drainage ditch from upper side of switchback along hillside on flat-grade to prevent erosion.

If switchback occurs on a cliff or bluff, place a rock berm on the outside edge as a safety measure.



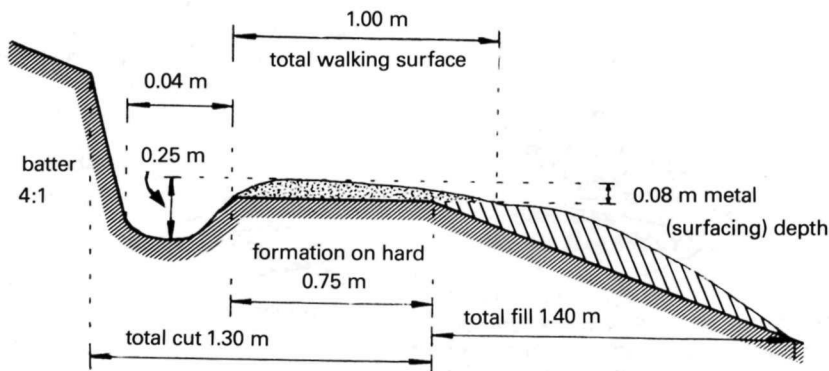
PLAN

Drain into a pile of rock onto firm ground to prevent erosion.



PROFILE

TYPICAL CROSS SECTION OF WALKWAY FORMATION



strument to measure grades in the planning phase and then continuously during construction.

Construction

Vegetation and Slash Removal

With care, it should be possible when surveying alignment of walkways to avoid large or feature trees. Do not cut large trees unnecessarily; if any trees are to be removed this should be noted in the initial request for the approval of the project. When trees or shrubs must be cut or slashed, remove the debris from alongside the walkway. Cut shrubs and saplings as close to the ground level as possible; slashed stumps are both unsightly and dangerous. Cut branches as close as possible to the trunk; "coat hangers" must be avoided. In some situations forestry-type pruners are an efficient tool both in construction and maintenance.

Although the 1-meter width for surface formation on walks may be slightly wider than needed in tracks, the 2-metre width for vegetation clearance should remain the same. If shrubs and saplings grow too close to the walkway edge, trimming the branches will be a constant problem, increasing maintenance costs and leaving the sides with a hedged appearance.

**Batters** — The steepness of these will depend on the nature and stability of the soil, but the critical thing is to ensure sufficient slope to avoid excessive soil creep and/or slips. A rise factor of 4 to 1 will, under many circumstances, be adequate. In very steep situations or in unstable country, it may be necessary to bench the batters.

*Note* — In volcanic ash country batters are to be avoided. It is better to "build up" the track surface or choose a different alignment than create an erosion problem by construction batters.

**Fills** — Downhill fills resulting from benching should usually be allowed to find their own angle of repose, although in some situations where there is a lack of fill it may be necessary to prop up with rocks, logs, and stakes. The walking surface or load-bearing portion of the walkway should be more on the base cut than the fill. When fill is placed alongside the walk or track, allow for ultimate subsidence through consolidation by letting the fill rise slightly higher than the level required. Avoid mounds or heaps of fill alongside the walkway.

**Cuts** — The base cut should form the slightly rounded shape of the final walking surface, and if done carefully, by planing off with a sharp shovel, undesirable back-filling and the use of excessive surfacing material is avoided.

Healing and Stabilizing

Scars on batters, fills, and cuts can be quickly healed by oversowing grass/clover/fertilizer or other seed mixtures compatible with the local environment. In most back-country situations,



A drainage problem



Unless tracks are adequately drained, erosion could develop into a major problem.



The same area as shown at left after treatment. In this particular case boulders were used to fill in eroded sections and to provide a good drainage base. A layer of fine angular gravel was then applied as the walking pad. Replanting was done where the track had been unduly widened by walkers avoiding the wet and eroded sections.

tation, soil type, topography, gradient, and walkway classification.

The two primary concerns must be the protection of the walking surface and the enjoyment of the user. Naturally, where there is a potential problem, greater effort and expense will be required for preventative measures on walks than routes, but, irrespective of the class of the walkway, surface water must not be allowed to erode it or lie on its surface for long periods.

It is important that the constraints of the walkway site are recognized during the planning phase and the control measures and methods necessary to protect the surface are carried out during the construction period. To ignore drainage during walkway construction and to cope with it entirely as a maintenance task is, at best, time-consuming and costly, and, more than likely, major reconstruction will sooner or later be unavoidable.

In many situations the constraints will warrant the formation of watertables to cope with the run-off from the "up-slope" and installation of frequent culverts across the walkway to prevent scouring. In other areas, particularly where the rainfall is light or the gradient is relatively flat, only an "out-slope" on the walking surface may be necessary. On level country

EXAMPLES OF WOODEN CULVERTS

All timber rough sawn

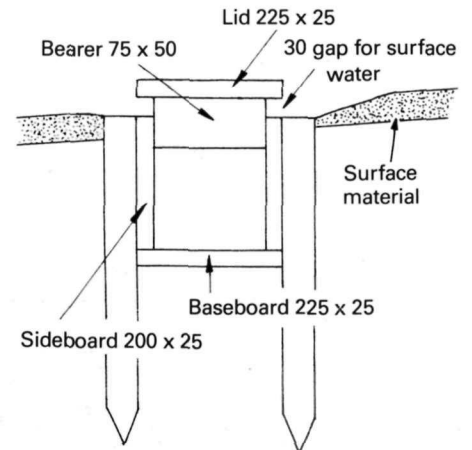
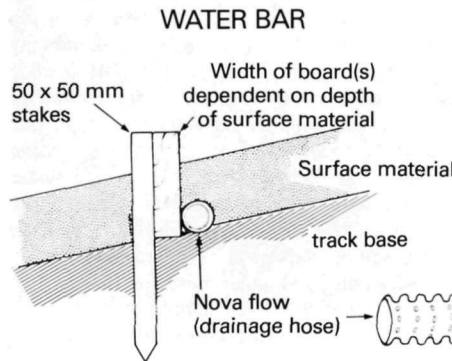
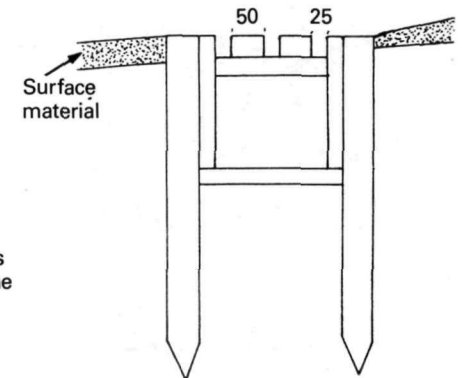
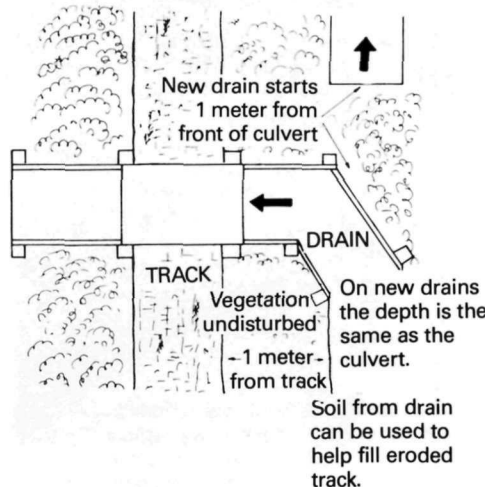


DIAGRAM OF WOODEN CULVERTS INTERSECTION WITH DRAINS



GENTLE GRADIENTS

the bareness of freshly exposed batters, cut, and fills soon heals with the natural colonization of mosses, ferns, lupins, etc.

The planting of native shrubs and trees will be necessary in some situations.

In certain cases willow and poplar species may be acceptable for stabilizing steep fill slopes.

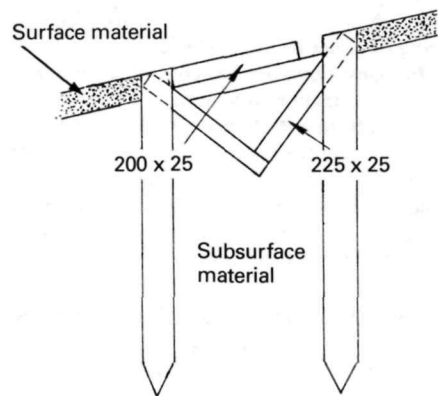
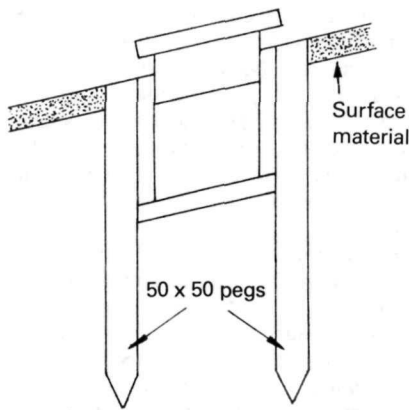
Coastal parts of walks may require marram (beach grass) plantings to stabilize the walkway.

Drainage

The provision of preventative measures against damage to walkways through the impact of rainfall and surface run-off is perhaps the most difficult and expensive phase of construction and maintenance. It has been said that the three golden rules of track maintenance are (1) drainage, (2) drainage, and (3) drainage.

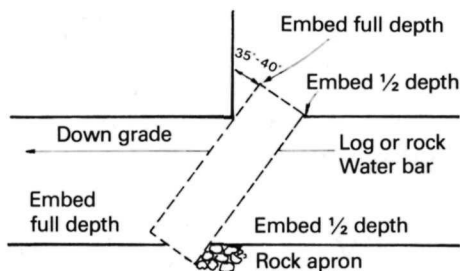
The extent and method of drainage varies considerably and depends on the climate, vege-

All measurements are in millimeters



STEEPER GRADIENTS

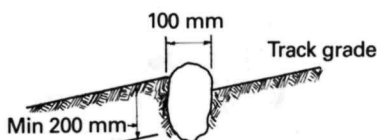
WATER BARS



WATER BAR PLAN



TYPICAL LOG WATER BAR



TYPICAL ROCK WATER BAR

the walking pad may have to be built higher than the surrounding terrain to encourage drainage and to keep it above the moisture level.

In certain high-use situations where wet and erosion-prone areas are a problem, river boulders (natural to the area) can be used to construct a stable and dry walking surface. The stones are laid firmly in a sand bed forming a dish-shaped profile, and then a dry mix of cement and sand is brushed between them. Finally a sprinkling of water is applied to set the stones in position.

The walking surface acts as a drain and pathway. In very wet conditions when water is running, the sides continue to provide a dry footing. At the water exits the stones are built up to a higher level than the walking surface to steady the water flow.

This method has application in high-use, shoe-standard walks where erosion and drainage is a problem.

It is important to ensure that the culvert water does not discharge directly on to the downhill fill (thereby eroding the base of the batter). Such methods may include using treated wooden fluming, concrete and clay piping, or building a wall of boulders at the discharge point to protect the batter.

Surfacing

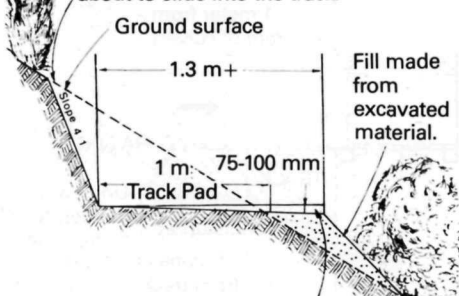
For some walks, and to a lesser degree tracks, surfacing may be necessary. Suitable surfacing material is not always easily obtained and may be very expensive. In this eventuality finance should be allowed for in the planning process.

A suitable type of surface has enough fine material through it to provide sufficient binding of the total surface and repel surface water run-off, as well as to resist the pounding of feet. Concrete and tar-sealed surfacing have been used on walkways where visitor numbers are very high, and under these circumstances it may be justifiable even if only to protect the resource. When using concrete for walkway construction, do not use boxing or forms if the

TRACK LAYOUT

For tracks of low gradient or where rainfall is not a problem.

Remove loose earth and loose rock up to 1 m above edge of cut if it is obviously about to slide into the track.



Track surface sloped to the outside to permit runoff. No need to watertable tracks on the inside cut in this situation.

“path appearance” is to be avoided. The edges should slope down and the natural material and vegetation be allowed to encroach and merge with the concrete. Suitable gravel appropriate to the general area, if scattered on the surface while the concrete is still wet, provides a natural finish. Once weathered and moss has had time to grow it is difficult to tell that it is concrete. Methods of applying surfacing include wheelbarrow, hopper on a frame pack, helicopters, and mechanized transport such as a power pony and trailer. Surfacing should be placed as soon as construction work has been completed.



River boulders used to construct a dry, stable walking surface.



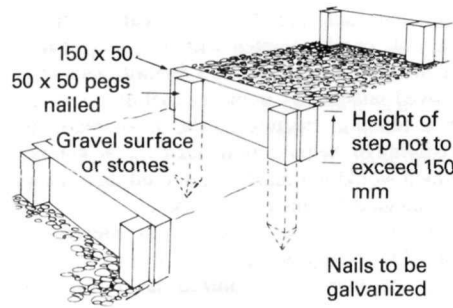
Surfacing the track is often necessary. Angular-shaped gravels offer the best binding qualities. Roundish gravels “move” with the constant walking action and will eventually disappear from the walking surface. Watertables and culverts must be incorporated at intervals sufficient to disperse the surface run-off.



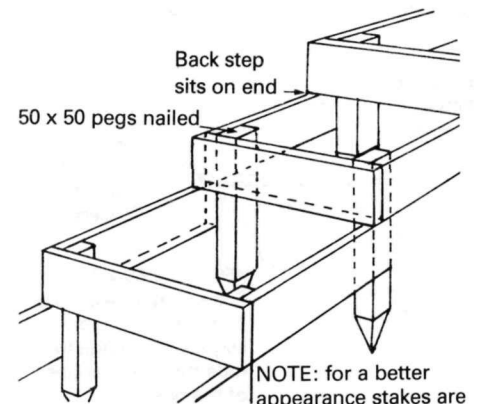
**Special Requirements**

**Steps**

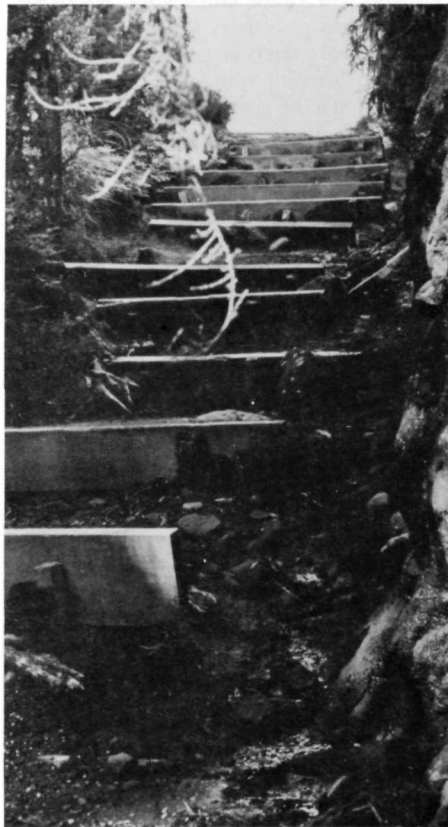
If at all possible, avoid the use of steps, though under some circumstances they are needed to negotiate a steep slope. Steps create high maintenance commitments, can be difficult to negotiate, and can create erosion problems. Often an alternative exists such as traversing a gully rather than going "down and up." A variety of material is available, and the sites should dictate the most suitable, for example, treated timber, rocks in concrete, or steel tubing.



**OPEN SIDED STEPS**



**BOXED STEPS**



*Steps should be avoided where possible. They are costly to construct, create high maintenance costs, can be difficult to negotiate, and can create erosion problems.*



*Boxed steps up an unstable slope.*

**Board Walks**

In wet country, across sensitive alpine bogs, swamps, or around lake shores which are prone to flooding, it may be necessary to construct board walks from treated timber to protect the resource from trampling of fragile vegetation and to enable people to walk with minimal impact and discomfort. There is a very real place for this treatment, and, although the initial cost may be high, maintenance and impact are minimized. The initial cost can be reduced by constructing the board walk to a width of 500 millimeters rather than the 800 millimeters width common in many parks and reserves. The thickness of board-walk timber using *Pinus* sp. should not be less than 50 millimeters.

On flat country never construct board walks in long straight stretches, but incorporate gentle curves compatible with the visual surroundings, for example, bush edge, adjacent ridges, etc. Curves can be neatly bevelled and gradients established easily. Stains and paint can be used to reduce the visual impact, but radiata pine will bleach to an acceptable natural toning in most weather conditions.

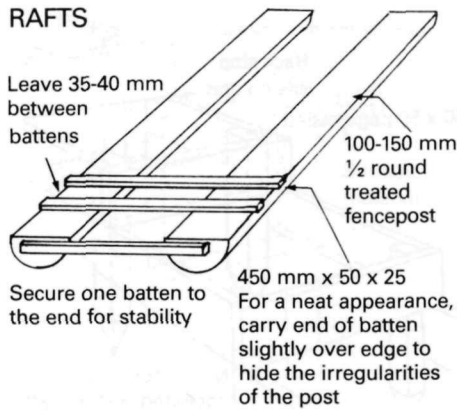


*The same site as above with the steps removed. Often the grade does not warrant steps.*



*A board walk across an alpine bog. Curves reduced the visual impact.*

**RAFTS**



**Rafts**

Rafts are mainly applicable to tracks, which often traverse expanses of water-logged ground. Such tracks deteriorate rapidly, even after light use, if left untended. Here, the cost of board walks would be prohibitive, but in this situation rafts could meet the requirements. An acceptable raft, which is quick to build and relatively inexpensive, consists of fence battens nailed across two half posts placed flat-side up (treated timber only). Each fence batten can be cut to provide three sections and a space of 35 millimeters to 40 millimeters can be left between battens. The surface provided remains unslippery. One of the main advantages is that the units can be made up in a workshop and then transported to the site by helicopter. Later they may be shifted or removed as required.

**Hand Rails and Barriers**

On steep steps and rocky terrain or where there are hazards, handrails or barriers can be constructed. These should be constructed from materials compatible to the local surroundings and must be to the highest standard. Treated timber is generally suitable for this purpose. Avoid using colored nylon ropes. Structures should not become the dominating feature but should be merely the means to protect people and natural features.

**Non-skid Surfacing**

If treated timber is used non-skid surfacing may be essential. Several methods are in use for treating slippery surfaces on board walks, bridges, stones, or concrete. Netting nailed over board surfaces or a light coat of tar and fine chips may be necessary.

**Marker Poles**

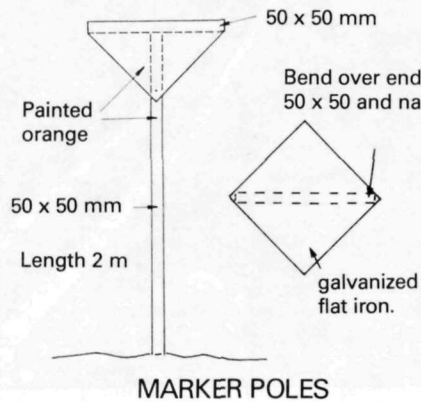
The method used to define the walkway over open country will vary according to the nature of the landscape. Poles, 2 meters long and driven into the ground at varying intervals, depending on topography and known weather conditions, are adequate. The principle of keeping poles off the skyline applies whenever possible.

In areas prone to snow drifts the poles would need to be longer. Orange reflectors can be

nailed on each side of the pole near the top, or the pole can be painted with an orange band. Hardwood, 50 millimeters x 50 millimeters has proved satisfactory in most situations. Radiata pine tends to fracture easily. To increase the visibility of the poles or to decrease the number which would normally be required the following method has proved successful.

1. A short section (300 millimeters) is nailed to the top of the pole to form a T.
2. A square of galvanized flat iron is then bent over the T section on the diagonal and nailed to the pole.
3. It is then painted orange.

**In modified landscapes (e.g., farmland)** where power and telegraph poles and fences are part of the landscape, marker poles on the skyline are acceptable and will, in fact, decrease the number of poles otherwise required. Treated fence posts of at least 100 mm diameter make ideal markers; if they are any lighter stock animals will break them. They should be placed with no less than 600 millimeters and no more than a meter out of the ground. Cattle will push them over if too much is exposed out of the ground. The post can be stained or painted in natural colors such as dark grey, black, brown, but a band (50 millimeters) of orange should be



*Installing track poles across open ground.*

applied near the top to identify it as the walkway route and to make it obvious. Alternatively, a white painted band at the top of the post with an orange marker placed over it has proved to be a very effective but not too obtrusive marker pole.

**In natural landscape in lowland country** the method described above can be used but placing marker poles on the skyline along ridges should be avoided wherever possible. A sign advising walkers to follow the ridgeline may be a better alternative. As stock will not be present, the timber can be of smaller dimensions but should not be less than 50 millimeters in diameter.

**On hill and alpine landscapes,** walkways that travel through country where weather conditions can make safety an important consideration need different standards for markers. Markers need to be visible even when cloud or mist descends or snow has covered the walking surface.

**Rubbish Disposal**

Although rubbish containers are not usually thought of in association with walkways, their presence or absence should be considered. Visitors will persevere with attempts to dispose of litter and other types of refuse at the expense of the resource. If this continues in an unmanaged state, problems begin to arise, and ways and means must be found to remedy the situation. Two options are available: either provide receptacles and accept the maintenance commitment, or attempt to educate visitors and be prepared to clean up behind the uneducable. The emphasis should be on the responsibility of visitors to remove their own rubbish from the areas they visit.

Many authorities in New Zealand have now rejected the old "bash, burn, and bury" philosophy. There is a growing demand for the "pack out" concept for remote areas. In many locations it is no longer acceptable to use rubbish pits. Clearly the point to be emphasized here is the need to increase public awareness of the problems associated with refuse disposal in natural areas and encourage the "pack out what you pack in" concept.

There are a large number of receptacle designs in use. Most are practical and effective although aesthetic values of some are a little lacking. The design and construction of refuse receptacles offer considerable scope for individuality and to this end recyclable containers are considered ideal.

## Let The Pulleys Do The Work

For a good many centuries, before steam- or petroleum-powered engines were developed to do most of our hard work, men depended on simple mechanical appliances to multiply their muscle power. With such devices, usually quite simple, one man could do the work of many men. The block and tackle is one example of a simple machine that has come down from antiquity without change in principle.

To move a heavy load, one man with suitably rigged block and tackle can lift or move many times his own weight. Block and tackle can be used in many of the field situations park personnel must deal with. For example, moving a tree blown down across a road or trail. Another use would be pulling a mired vehicle out of a mudhole. No doubt you can think of a number of other situations where you would need more force than you could apply using muscle power alone. A block and tackle could provide the answer.

This brief article is intended only as an introduction to the subject. If you are interested in digging deeper you can. The techniques are known in virtually every country, and published information is available. Unfortunately, current usage is largely confined to specialized trades, and to sailing vessels.

*Blocks* are one or more pulleys mounted in a wood or metal framework. *Tackles* are assemblages of ropes arranged to run over the pulleys in various particular ways.

Pictured here is a simple two-part or double block with its parts named.

To demonstrate how rope can be combined with a block to produce a mechanical advantage we use a drawing of a simple *whip*. A whip, using a single block, strictly speaking is not a tackle, but it illustrates the gain in power with a force/weight ratio of 1:2.

Note especially this key fact: the ratio is calculated by counting the number of ropes coming from or attached to the moving block. If you turned this example around so that the block was fixed and the standing part of the rope was attached to the weight, which is the moving element, there would be no gain in power since the ratio would be 1:1.

By coupling two blocks with ropes one can gain increased ratios of force to weight. The more pulleys—or sheaves, as they are properly called—the rope runs over the greater the advantage gained. For example, a *double whip* produces a power advantage of one to three: one kilogram of force applied to the hauling part of the rope will lift three kilograms of weight. Two blocks are used in this example. Note that one end of the rope, called the *standing part*, is fixed to the movable block. Since there are three ropes coming from the movable block the power ratio is 1:3.

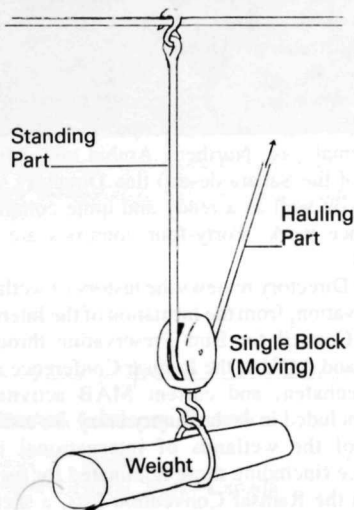
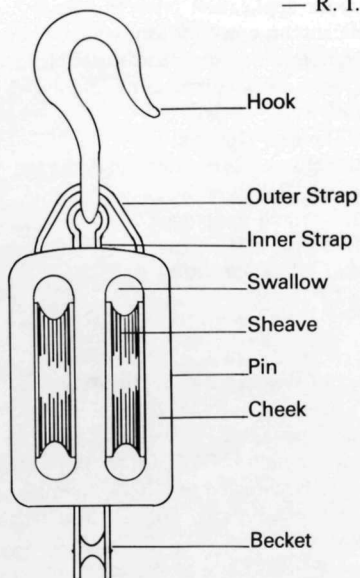
There are, of course, many arrangements of blocks and tackles producing power ratios of 1:3 or 1:4 or higher which are designed for specific jobs, or perhaps arranged for the convenience of the user.

One common example is the *two-fold purchase* made with two double blocks. As arranged in the following drawing, it produces a power of 1:4. However, if you switched positions of the two blocks the ratio would be 1:5.

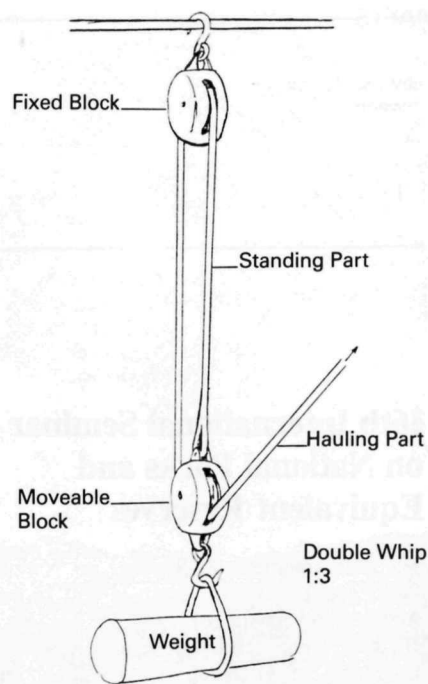
For the field, a *handybilly* can be made up to carry in a patrol vehicle or saddlebag, ready for immediate use. A handybilly is simply two blocks with line or rope reeved.

A hook is attached to one block, and a line or tail attached to the other. In lieu of the hook you might well use another tail. The hook is often very useful, however, but if there is no place to hook it you would have to tie a strop around the object to be hauled to hold the hook. To do that you would use the spare line you should also carry in your kit.

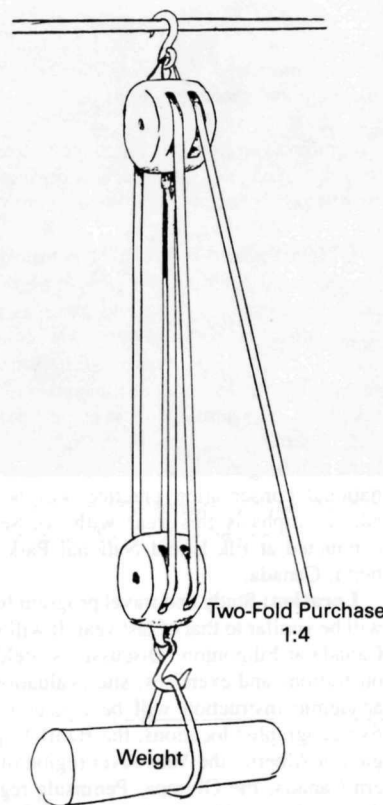
— R. I. Standish



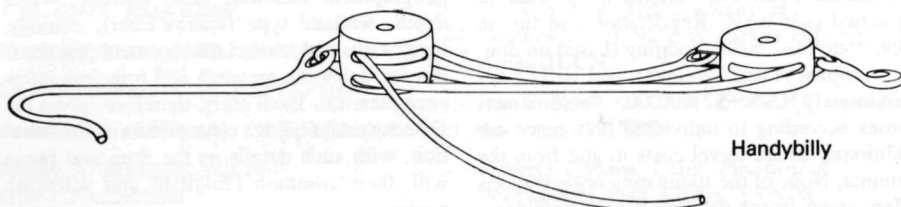
Whip — 1:2 Force to Weight



Double Whip 1:3



Two-Fold Purchase 1:4



Handybilly



# BOOKS AND NOTICES

## 16th International Seminar on National Parks and Equivalent Reserves

The 16th International Seminar on National Parks and Equivalent Reserves will be held August 2 to September 1, 1981. The Seminar is offered by The School of Natural Resources, University of Michigan; The National Park Service, U.S. Department of the Interior, U.S.A.; and Parks Canada, Department of the Environment, Canada. It is designed for senior administrators, professional personnel and conservation leaders responsible for the establishment and management of park and wildlife conservation systems and associated tourist programs. The Seminar language is English.

Since 1965, this Seminar has been attended by 491 park executives and conservation leaders from 94 countries.

**Objectives and Policies:** The purpose of the International Seminar is to examine policies, administration, planning and other aspects of management of national parks and equivalent reserves. Primary emphasis will focus on natural areas, with secondary emphasis on cultural resources. The human impact on park resources and methods to cope with the resultant problems will be given special consideration. International conservation practice will be given added emphasis this year with course work conducted at Elk Island National Park in Alberta, Canada.

**Location:** Study and travel program for 1981 will be similar to that of last year. It will start in Canada at Edmonton. Discussions, field demonstrations and exercises, site evaluations and academic instruction will be concentrated in five geographic locations: the Banff-Jasper region of Alberta, the Vancouver region of Western Canada, the Olympic Peninsula region of the northwest United States, the Island of Hawaii in the Hawaiian Islands, and the Grand Canyon-Tucson region of the southwestern United States.

**Seminar Fees:** The Seminar is operated on an actual cost basis. Registration and tuition fees, materials, meals, lodging (based on double occupancy) and Seminar travel will be approximately U.S. \$2,600.00. Personal expenses according to individual preference are additional, as are travel costs to and from the Seminar. None of the sponsoring organizations offers grants or scholarships for the Seminar.

Enrollment in the Seminar is limited to thirty-six (36) participants. We recommend that you send your application prior to March 1, 1981. Applicants accepted for admission will be sent registration information and material. Interested persons should direct airmail inquiries and applications to:

Tom D. Thomas, Director  
International Seminar on National Parks and Equivalent Reserves  
School of Natural Resources  
The University of Michigan  
Ann Arbor, Michigan 48109 / U.S.A.

**A Directory of Western Palearctic Wetlands, 1980.** Eric Carp, Compiler. IUCN, Gland, Switzerland and UNEP, Nairobi, Kenya. 506 pp. paperbound. US\$27.50 plus postage. Orders should be directed to IUCN's publications distribution agents: UNIPUB, 345 Park Avenue South, New York, NY 10010, USA, for USA, Canada and Latin America; Bowker Publishing Co., P.O. Box 5, Epping, Essex CM16 4BU, England, for Europe, Asia, Africa, Australia and Oceania.

If you are interested in wetlands anywhere in the western palearctic (Europe, Asia north of the Himalayas, Northern Arabia and Africa north of the Sahara desert) this Directory will serve you well as a ready and quite complete reference work. Forty-four countries are included.

The Directory reviews the history of wetland conservation, from the formation of the International Council for Bird Preservation through MAR and AQUA, the Ramsar Conference and Heiligenhafen, and current MAB activities. Data included in each country entry are a summary of the wetlands of international importance (including those nominated for inclusion in the Ramsar Convention list), a sketch map of the country, and details of each listed area. These include criteria (Heiligenhafen), geographical location, area, altitude, water depth, wetland type (Isakov/Eber), ecology, legal status and tenure, management practices, threats, scientific research and principal reference material. Each entry, therefore, gives the Directory user quite a clear picture of the situation, with such details as the flora and fauna with their common (English) and scientific names.

Annexes include the Heiligenhafen criteria and classification of wetland types.

As an editor I will no doubt find the publication of great value and frequently in hand since its scope is broad and its information useful.

— R. I. Standish

## European Parks Conference Scheduled for April 20-24

A European conference on nature conservation and recreation in national parks (UK), *parcs naturels*, *naturparke* and equivalent reserves will be held 20-24 April 1981 at the Peak National Park Study Centre, England.

This will be an informal conference for local managers and staffs of Europe's protected landscapes. The aim will be to exchange information and discuss how conflicts between conservation and recreation can be resolved.

Further details from: Peter Townsend, Principal, Peak National Park Study Centre, Losehill Hall, Castleton, Derbyshire, S30 2WB, England.

## Paid Subscription Plan Delayed

In the last issue of PARKS Magazine, page 24, we announced a planned program for paid subscriptions to the English edition in the industrialized countries. This was to begin with Volume 6. (April, May, June 1981).

For a number of reasons, including revisions to mailing regulations anticipated in February, it has been decided to delay the start of this program.

Further information on the plan will be published in future issues.



*Beautiful vistas of meadows and pine forest in the canyon of San Lorenzo south of Saltillo, Mexico, will eventually be shared by recreationist and scientist alike. These lands are planned to be part of the scientific management zone in a new ecodevelopment program in the Sierra Zapoliname.  
Photo: Janet O. Meganck*

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