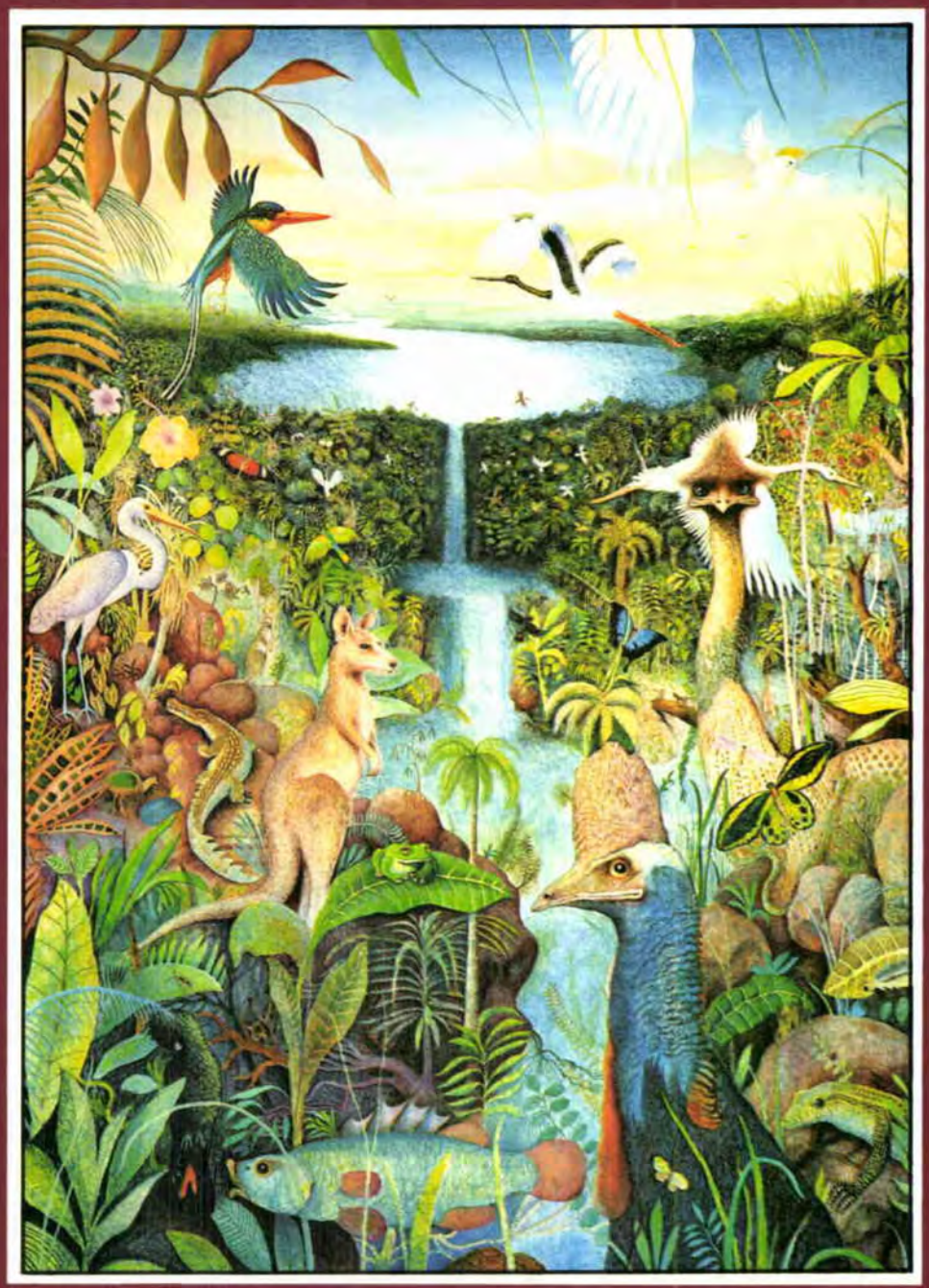
WILDERNESS



WILDERNESS

Edited by Vance Martin

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As a life-long conservationist,
Waller Standish (Wally) O'Grady,
Chairman of the Second World Wilderness Congress,
has continually worked towards
the reconciliation of humanity and the natural environment.
His message is that such a reconciliation will result in
a dynamic and evolutionary harmony in which
people and nature can peacefully co-exist and enhance each other.
This book is dedicated to Wally
and everybody who shares this vision.

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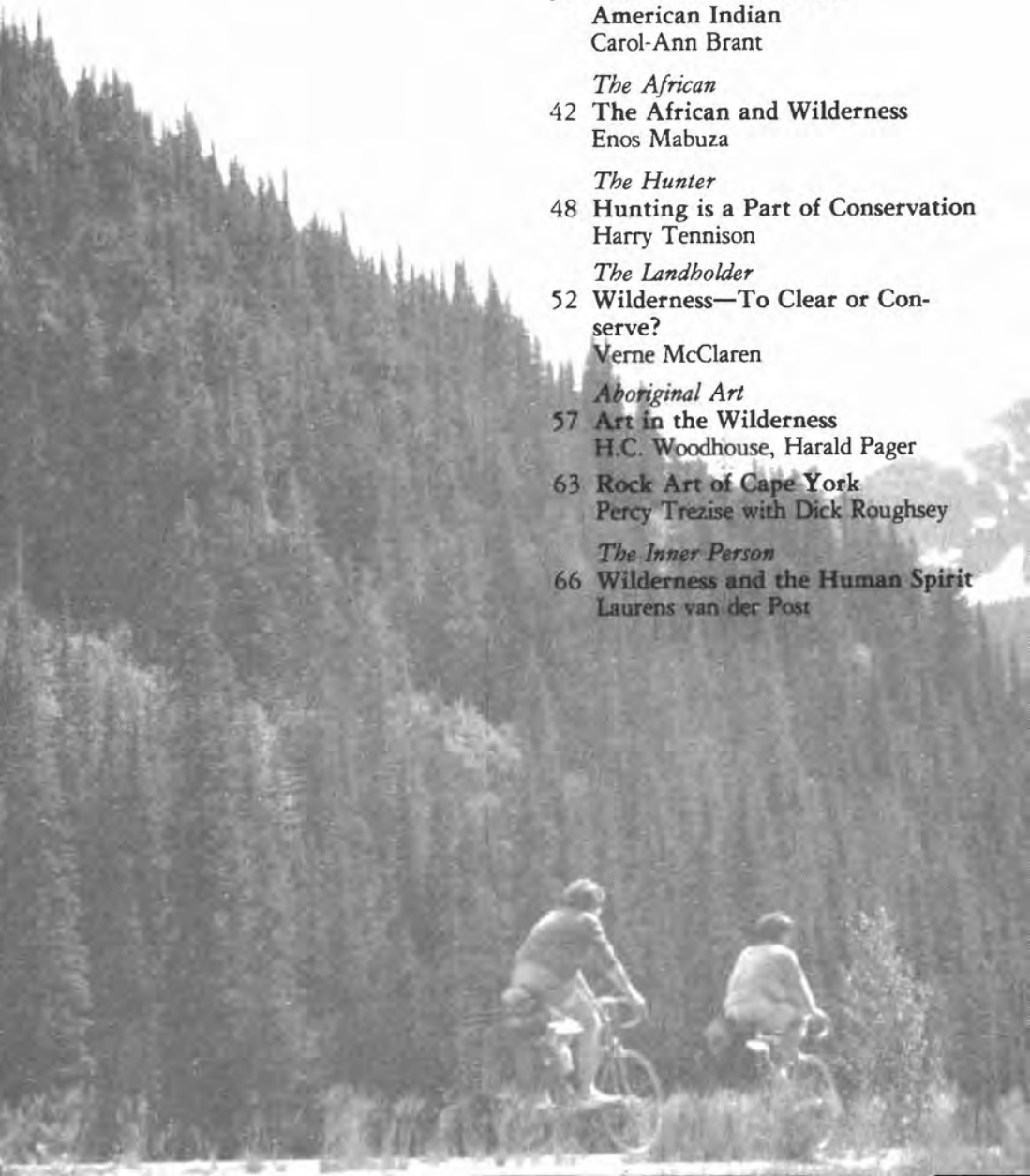
Vance G. Martin, Editor

TABLE OF CONTENTS



II. WILDERNESS— A PLACE ON THE EARTH

III. WILDERNESS— A NEED FOR OUR FUTURE

FOREWORD

Within the pages of this book are the sinews that bridge and bind the distant pasts of humanity and nature with the bright promise of their joint future. For humanity is the very nucleus of nature, as nature is the soul of humanity. Any separation of the two is a diminution of both. This mutual dependency of people and nature is the living essence of worldwide concern for the preservation and protection of those few spaces remaining on this globe where human technology is not an intrusion upon the psyche.

As our mental and physical prowess has increased, we have built and conquered and subdued and populated to such a degree that our inner connections with peace and solitude have been stretched to the limit. The World Wilderness Congress has become an affirmation that a balance must be maintained between our outer need for industrial and commercial growth and our inner need for wild and natural areas where our spiritual and contemplative values can be renewed. This is the organisation, these are the people, who give of themselves to remind each one of us that it was yesterday which gave us today and it is today that will give us tomorrow.

As communications improve, as people have more leisure time, as travel becomes simpler and cheaper, we need to have more than ever those still and special places where we can cleanse our souls and stretch our imaginations. Sir Isaac Newton was lying under an apple tree, not standing in a factory, when he discovered gravity. We have lost that apple tree and probably even the spot where it once stood. We can ill afford to lose much more. The more opportunities we have to meet nature on nature's terms, the more opportunities we will have to serve each other and the world in a lasting relationship.

G. Ray Arnett

President, World Wilderness Congress International Committee

INTRODUCTION

Laurens van der Post

We have a mighty task before us. The earth needs our assistance. The effects of many of our inconsiderate past actions, even though the impulse was often our need to understand ourselves and our environment, have caught up with us. Many of our current attempts at natural exploitation and self-education drive us dangerously close to planetary suicide. Nowhere else is this as evident as in our fast diminishing wild areas—those special places which have experienced little of our folly, and still retain the essence of the unhindered creative impulse of nature.

As I introduce this book to you I can say little more than that in so doing I am revealing a fundamental part of myself along with my call for the continued evolution of humankind and nature. We must come to grips with the needs for the survival of life on this planet, and one of the most essential of these needs is the preservation of large areas of wilderness. If this reconciliation can succeed I know that humankind will not only be serving the world of nature but will also be serving itself, allowing us to become truly benevolent masters of all which we survey and servants in the highest sense.

For me there is something particularly poignant about the choice of Australia as the location for the Second World Wilderness Congress. During a very critical moment in the last war I had the honour and the privilege of commanding a large number of Australian soldiers. One thing that I found with these wonderful Australian people was their love of an argument.

The Australian soldiers and officers would repeatedly come up to me in our desperate position and say, "Colonel, would you please come and settle an argument for us?" I would marvel at the wonderful vitality and intellectual curiosity that prompted these Australian men even while living daily in the shadow of death.

There was one argument I remember in particular. It arose one day in a Japanese prison after we had all been led out for what we were told was to be our execution. Only some of us were executed, the rest were sent back to our cells. It was a moment when one did not know whether one would live or die, and so a moment of heightened perception.

We all went back very depressed. About two hours afterwards one of the Australian soldiers came to me and said, "Colonel, would you please come and settle an argument?" It was an argument as to how precisely a kangaroo was born; was it born in the normal way, was it born directly into the pouch, was it born and then put into the pouch, or did it find its own way into the pouch?

The argument extended itself, reaching metaphysical proportions on variations of how the kangaroo was conceived and born. I must say that what happened to the genes and chromosomes of kangaroos during the discussion was nobody's business. I was quite incapable of settling the argument. Lions, tigers, leopards, elephants, yes—but your amazing marsupials, no, I did not have a clue. Of course, there can be no argument like that today, but it was significant that in a moment of death Australians chose to argue about birth and life!

The World Wilderness Congress is precisely meant to provide a platform for argument in its most highly developed form, that of the Platonic dialogue. It is one of the most ancient patterns of the human spirit that in moments of crisis people gather together to discuss the nature of the crisis, before seeking resolutions; and to discuss it with respect for the diversity of opinion and opposition encountered in attempting to overcome the crisis. To my mind we are holding this Congress in a moment of annihilation and death, like the Australian soldiers powerless in lethal Japanese hands.

It is *war* in which we are engaged. Ours is not simply an aesthetic or sentimental vision. Of course sentiment plays a role. My own emotions are as deeply involved as they were with my soldiers in the war. I can hardly stress them enough. I can only demonstrate them to you through some illustrations. We are involved in a war far more dangerous than others because it is invisible—launched upon us in little, mean, sleazy, sneaky ways.

It does no good merely to blame the mining and oil companies or governments as we have been doing. This war stems from an unresolved conflict in ourselves: a disregard for the values of nature in each one of us. If this war did not stem from a conflict so deep, it would not overtake us as it is surely doing. It is a conflict that imperils the human species. Again, make no mistake about it, nature will survive, but it is not certain that we shall. I know an old hunter in Africa who said to me once, "Laurens, you must always remember that should the whole of the human species vanish from the earth tomorrow, there would not be

a plant, bird, insect or animal that would not breathe a sigh of relief." No human society has ever had the power over life that we have today. We can remake, rehabilitate, redeem this world. If we betray that power we have no right to exist.

The most significant thing about the World Wilderness Congress is that it enforces the nature and urgency of this issue world wide, creating a platform on which all nations can meet to discuss one subject which is not political, but beyond politics, sociology and nationalistic ideals.

This issue transcends politics so much that it is something on which the whole of humankind can meet and be at one. No declaration of rights, human or otherwise, can be complete unless it includes the rights of the earth and what the earth brings forth. The earth is wounded and bleeding to death around us. Remember this urgency and recognise above all that what we have begun to do here is to make the world aware that we are a base from which all humankind can go forward to renew and make its divided self and the wounded earth whole, healed, and holy again.

Having talked of war and death I do not want to imply any spirit of pessimism. Even though I may sometimes be pessimistic in the tactical and short-term issues, in the strategic and long-term goals there is nothing we cannot overcome. The world today is sick because of partial, slanted and inadequate awareness of what we are and can be. Many people today are longing for the rediscovery of one great, overwhelming master value, through which we can all unite, and which may conserve the dwindling imbalance of nature—an apolitical and totally human value.

I say this with confidence because as I travel about the world I meet human beings everywhere who are no longer satisfied by the forms, institutions and social shapes in which we are contained. It is as if already they are members of a community to come, members of a community which as yet has no structure through which to express itself. This I find particularly in the world of wilderness, this community where, through nature, we can not only renew and rehabilitate the earth, but renew ourselves and our society. This already exists in everyone who is pledged to the call of wilderness, where we can give our entire selves to the totality of life on Earth. And I would say too, in the words of the poet Burns,

> "For all that and for all that
> it's comin' yet for all that,
> that men the wide world over shall brothers be . . . "

We will be brothers all the sooner by becoming locked together in this great battle for wilderness, and all it represents in the lives and spirit of ourselves and our children.

When I was a boy I sought out a new Zulu prophet, a man who was later to become a great religious leader in Zululand. I went to see him and he said to me, "Why have you come to see me?" I said, "I have come to you because I want you to teach me about Mkulunkulu, the great First Spirit." He looked at me sadly, saying, "People no longer speak of Mkulunkulu. His praise names are forgotten. They speak only of things which are materially useful to themselves."

We now have a custom in our first Wilderness Leadership School whenever we go out on trail with Ian Player and the wonderful Zulu guru of the wilderness, Magqubu Ntombela, that we never leave camp in Zululand without saying a prayer to the First Spirit, and that we never go into camp without thanking the First Spirit. In the camping ground of the Second World Wilderness Congress and on this universal plain of international dimensions, I would also like us to leave with a prayer. I pray to Mkulunkulu to help us to keep what is left of the world in the condition it was created and with the First Spirit's help to remake the world as it was intended to be in the beginning.

THE LEAF

Ian Player

When I was tramping the Mfolozi game reserve in Zululand in the early 1950s and thinking about starting the Wilderness Leadership School, I knew it was essential to select the right symbol. Most conservation organisations in Africa had used horned heads of antelope or rhino or carnivora. These had become cliché symbols with no real meaning. I wanted the Wilderness Leadership School symbol to be significant, simple, different and non-aggressive.

One evening, sitting at the camp fire, the sounds of the African night echoing all around me, I remembered as though in a dream a story of Grey Owl and how he saved the beaver of Canada. In my youth I had read his books and in later life became intensely interested in his philosophy of wilderness.

Grey Owl's real name was Archie Belaney and he came from Hastings in England. He joined the Ojibway Indian people and became accepted as a member of the tribe. He took Indian wives and hunted and trapped in the wild country of Ontario. His wife Anahero persuaded him to stop trapping. Grey Owl became a writer and lecturer and his fame spread across the world. He tried to lay a false trail about his origins and created a mystique about non-existent Indian forefathers. When he died he was accused of being a fraud but people had simply misunderstood what he was trying to do.

Towards the end of his life he was in the United Kingdom. He was a very sick man. Years of frontier living and wounds from the 1914-1918 war had weakened his body. He was on his last lecture tour and no doubt had premonitions of his death. But he spoke with nostalgia about the great rivers, the vast forests and the high mountains of Canada, the wildlife, the Indian people and the spirit of the wilderness. Then he said to his audience: "You are tired with years of civilisation. I come and offer you what?—a single green leaf."

In my musings I remembered the leaf and knew that this had to be the symbol of the Wilderness Leadership School.

I told my old friend Magqubu Ntombela, the Zulu who had been my game scout and mentor, that I wanted a leaf that would represent what I had in mind, an organisation that would give people an experience in wild country.

At that particular time I was looking for a wilderness area in Mfolozi game reserve, and together we had walked many miles along the banks of the two Mfolozi rivers. The old Zulu said he would think about a leaf and as we walked he pointed out different trees. Then one morning we left camp early and he took me down the Black Mfolozi river towards the junction of the two rivers. This was the hunting ground of all the great Zulu kings—Tshaka, Mpande, Dingane and Dinizulu. Magqubu called out the praise names and spoke to the spirits of his forefathers who had been here with the kings and with Tshaka when he had single-handedly killed elephant with a hunting axe.

Then he stopped at a tree the Zulus call msinsi; in Latin *Erythrina caffra*. Magqubu plucked a leaf and said, like a Biblical injunction, "Thatha lokhu—take this. Take this leaf because it comes from a tree that is a tree of the wild and you will also find it next to every kraal. So it is a tree of the people too."

The three points on the leaf symbolise the most important relationships in the world: person to divinity; person to soil; person to person. Many years later I realised that the fourth relationship was the internal relationship of each of us to ourselves, and that was as big a mystery as the leaf itself.

So the *Erythrina* leaf became the symbol of the Wilderness Leadership School. All the men who complete a trail receive a tie or a blazer badge while the women receive a brooch in the shape of the leaf. When they pass each other in the street and they see the symbol of the leaf, they know what that symbol means.

In 1977 at the first World Wilderness Congress, the *Erythrina* leaf was chosen as the Congress logo. Arrows pointing towards it were added. This represented a call to people from all over the world to come and talk about Grey Owl's *cri de coeur*: "You are tired with years of civilisation. I come and offer you what?—a single green leaf."

Those of us who have been into wilderness and who have taken people into wild areas and lived with them there, have seen them emerge from the wilderness with a greater sense of self-identity, as if transformed by a highly sacred atmosphere.

Laurens van der Post

WILDERNESS

A QUALITY OF HUMANKIND

Umfolozi Game Reserve wilderness area

On the Trail

THE INTERPRETATION OF WILDERNESS

Ian Player

Trail walkers of Wilderness Leadership School ford the White Umfolozi River, Zululand

For over twenty years I have been intimately concerned with taking people out into the bush of Southern Africa interpreting the sounds, sights, smells, the animals and birds, the vegetation and the history of the bush. My mentor was and still is an old Zulu who is now eighty years old. His name is Magqubu Ntombela. Magqubu cannot read or write. At the time and place of his birth the nearest school was a hundred miles away. His parents had no means to send him to a mission boarding school so he grew up as a tribesman. By his fourteenth year he was leading whites on hunting safaris on the perimeter of the game reserve, so from a very early age he grew up with a deep understanding of Zulu and wildlife lore. He says his ears are his books and his tongue is his pen. To go on trail with him is a never to be forgotten experience.

I would like to take you on a trail with the old man. Our parties are always small; we never take more than seven people. Imagine you are one of a group of seven such as we took out recently on a Wilderness Leadership School trail in the Mfolozi game reserve.

We walk in silence for a while so that we can absorb the atmosphere. The silence also enables us to hear if there is any danger ahead: a black rhino crunching branches, a lion growling, or the red-billed oxpeckers' churring warning cry, an indication that buffalo or rhino are nearby. Eventually we stop for a short rest in a glade sur-

rounded by trees with blue grey leaves which at a distance look like a faint wreath of smoke on the veld.

"This tree is called *Spirostachys africanus,*" I say. Magqubu shakes his head. It is a cue for him to speak.

"No, the tree is an nthombothi. The Zulu women mix the ground up shavings with a herb called mkokela and this is their powder." He breaks a small piece of wood and hands it around to be smelled. The scent is like sandalwood and epitomises the smell of Africa.

"We use the wood too, on the fire," Magqubu says. "A log green or dry will burn all night. But you cannot cook on it when it gives off smoke because it will give you diarrhoea."

We walk on and in the distance, spiralling on the morning thermals is a Bataleur eagle, with its lovely red and black colouring.

"That bird is called Ngqungulu," Magqubu explains. "It gets its name from the way it hits its wings together in the mating season. The sound is like that of a Zulu warrior striking his shield with a knobstick."

While we are watching there is the sound of another bird calling—a soft, musical set of notes running down the scale. It is the emerald-spotted wood dove and Magqubu tells everyone to listen carefully when he interprets what the bird is saying. "The bird says, 'My mother is dead! My father is dead! All my brothers and sisters are dead and my heart goes do, do-do, do do do do do'." Our group will never forget it.

By midday the old man has led us up the hill to a pan where rhino, bushbuck, impala, zebra, wildebeest and other animals come to drink. As we sit in the shade waiting for the animals to come, the old man talks about the nearby mpafa tree—*Zizyphus mucronata* to the scientist.

"We have two names for this tree," Magqubu says, "mpafa and lahlenkoos, which means to lay down the chief or the king. This tree is a meeting place between people and animals. Look at the thorns, one points forward and the other is curved back. This is like life itself. We are forever going forward for that is our destiny, but we are hooked to our past and can never shake it off."

The old Zulu then points to the lower branches. "The grey duiker and the steenbuck feed on the leaves and the new stalks. A little higher up, the impala and nyala eat the leaves and the stalks. And those branches that are broken. That is the kudu bull with his big curved horns who has smashed them by putting his head into the tree and twisting his horns. This in turn makes it possible for the smaller antelope to feed again, especially in the dry season when the lower branches have been stripped clean of leaves. The black rhino also loves the leaves, stalks and branches of the mpafa. Sometimes he pushes half the tree down to

feed on chosen leaves. This makes it easy for the duiker and steenbuck to feed again. The giraffe eats leaves, stalks and thorns from the crown of the tree. So from the bottom to the top it is used by animals. But that is not all. Porcupine feed on the bark, butterflies and ants take the sap. Baboons and monkeys eat the berries and the ones that drop on the ground are eaten by francolins, guineafowl, warthog, bush pig, wildebeest, zebra, white rhino and all the wild cats. That is the animals and the tree,'' he said. ''Now there is the story of man and the tree.''

He stops speaking for a few moments to give emphasis to the next part of his tale.

''We Zulus like to have the spirits of our relatives at the kraal. Now when my father died in Durban I took a branch of the mpafa and travelled to the city to bring his spirit back. I found the ward and the bed he died in. I laid the mpafa twig on the bed and I said, 'Father, I have come to take you home.' Then I caught a taxi to the station. I paid for two fares and bought two train tickets to Mtubatuba, one for my father and the other for myself. I laid the mpafa twig on a bunk and the other Zulu occupants respected it. When we arrived at Mtubatuba I took a bus to nearby my kraal and again I bought two tickets, one for my father and the other for myself. At the kraal I put the twig in the eaves of a hut and then said to my father's spirit, 'Father, you have now come home and you are part of the community of spirits.' I then killed a beast and my family and neighbours feasted.

''After the great battle of Isandlawana when twenty thousand warriors swept down from the heights of the Nqutu Hills and wiped out eight hundred officers and men of the British Army, four thousand Zulus died. Family after family had to travel to that battlefield to bring back the spirits of their relatives. Everyone carried a mpafa twig and when they arrived at that lone kopje on the plain they held the twigs above their heads and called out to their relatives, because by now all the bones had been mixed together, 'Ntombela, Mdalalose, Mabuza —woza amadhlozi—come spirits, come to the mpafa because we have come to take you home'.''

The story of the mpafa tree is over, and we walk towards the Black Umfolozi river. As we walk into camp in the evening and look across to the other side of the river, Magqubu points.

''Nangu—there. There are the lions. You must tell these people to be quiet for tonight the lions are going to kill.''

As the sky darkens a bushbuck, one of the barking antelope of Africa, comes up along the bank towards our camp. I know the bushbuck and have heard it bark in my own Karkloof forests and in the game reserves of Zululand. But the bark of this bushbuck on this evening is like no other I have ever heard. The bark comes from deep down in the stomach. It realises it is walking into a trap. It turns and escapes,

but a minute later a big nyala bull comes down a gamepath. It barks too, but it is too late. The trap springs and I hear the cough of a lion. That menacing sound is enough to make the hair curl on my neck. Magqubu nudges me and whispers, "Listen now."

Seconds later the nyala bolts and runs towards our camp. When it reaches the middle of the river I hear the lions plunging through the water. There is one loud smack and the nyala is down. I hear the long exhalation of air and the deathrattle in the throat. A few more coughs and other lions cross through the water. The nyala is on a sandbank in the middle of the river. Lions begin feeding and I hear the crunching of bones and skin being ripped off. But it is pitch dark and I can see nothing.

Magqubu turns to me and speaks quietly. "Listen carefully," he says. "The other lions are still up on the hill and you will hear them come down."

One of the feeding lions coughs and I hear the others making their way down a game path. Their progress is marked by the sound of pebbles rolling and plopping into the river. They too cross through water, reach the sandbank and begin to feed. This goes on for hours. The other members of the group are alarmed because the whole pride is only twenty-five yards away, but after a short time fear is forgotten in the intensity of the experience. Then the lions stop feeding, and we begin drifting off to our sleeping bags.

Magqubu says to me, "Don't go to sleep yet. Sit here with me for the night is not finished." He cocks his head on one side and says "Listen."

I can hear a noise on the river, apparently coming upstream. I recognise the sound but cannot quite place it. Magqubu says "Crocodiles." Then I remember how I have seen crocodiles moving upstream to feed on a zebra that has been washed down the river. They swim with their heads slightly above the water, small waves lapping at their necks. This is the sound I am hearing now. The crocodile swims next to the bank, and I hear it grab the remains of the lion kill.

Later there is even more noise and Magqubu says, "Nthlanzi—fish." It is a shoal of catfish passing, also probably attracted by the blood in the water.

I drop off to sleep in the early hours of the morning and wake just before dawn, that most wonderful luminous moment in the African bush. I peer through the early light hoping to see the whole pride of lions, but they are gone. Magqubu looks at me and smiles. "No, you didn't dream it all," he says.

He takes the group of us down to the river and on to the sandbank. He points and there is the whole night's story written in the sand. Magqubu shows us where the nyala had run and the spot where the

lion had struck it down. He reads the sands as we would read our daily paper.

This is the kind of interpretation of wilderness that makes it so worthwhile an experience. I have lately been taking out multiracial businessmen trails. On one trail there was a heated argument between an Indian, a coloured, a black and a white. It could quite easily have turned nasty. Old Magqubu came forward and gave them a lecture. His final words were, "When you die and you are buried six feet below the earth, the worms will not care about the colour of your skin." In the apartheid society of South Africa, which is a mirror of our world, there could not be better words of wisdom.

Recently a young Australian mining student came on a Wilderness Leadership School trail. He said: "I undertook this particular adventure with an attitude which I would charitably describe as noncommital, if not negative. From the outset the operation appeared to be a glorified school hike with the addition of an opportunity to view wildlife in a manner I had not previously experienced. As a consequence of this attitude I approached the exercise with the sole objective of collecting an experience which would have extreme novelty in Australia, given the relative ignorance of the Australians of African wildlife. As the trail progressed, however, and one became more receptive to the influence of both the environment and one's fellow travellers, this attitude was tempered and eventually dispelled as the realisation of the greater opportunities that were available gradually dawned upon me.

"Amongst this wider range of opportunities came the chance, not merely of a glorified trip but an ideal opportunity in a stimulating and non-stressed environment for introspection, reflection, and for establishing in my mind a more complete picture of myself and my own relationships with all those other components that go to make up our Spaceship Earth."

That young Australian understood what we are trying to teach.

The Australian Aboriginal

WILDERNESS- A NATURAL ASSET

J.D. Ovington and A. Fox

Before people came on the scene, the dynamic process of nature had produced a vast and fluctuating diversity of plant and animal species and had assembled these into natural communities and ecosystems of great complexity.

Mangrove forest, rainforest, savannah, grassland, alpine, desert and coral reef communities are just a few examples of this vast continuum of biological ingenuity. The particular pattern and species compositions of communities were broadly dictated by latitude, altitude, landform, continental location and geological history.

Geological history helps to explain differences between the assemblages of species. Thus the savannahs of Australia differ from North American savannahs not in form but in species due to the tectonic history of the continental plates, those great rafts of rock which transported plants and animals hither and thither.

Each species depends on the ecosystem in which it lives, and as part of it becomes a modifying agent, affecting energy and nutrient supplies and the climate nearby. Every community is a special assemblage

of species, and like the species is a product of progressive evolution over the ages. Conditions were never static; wilderness was always in a state of change reacting to changing ecological conditions.

With the appearance of the human species, a new and powerful ecological factor for change was introduced. The impact of people on wilderness varied greatly. The different political, social and economic systems of nation states were created to allow our species to maintain itself in different natural circumstances. These are the creations of human intellect, imagination, memory and communication.

For many hundreds of generations people lived as gatherers and opportunist hunters, depending upon the surrounding wilderness to supply their wants. Their impact on other organisms and the environment was constrained. In some places where the climate was relatively mild and natural resources were abundant, less than four hours of work a day was necessary to keep people supplied with a healthy diet and adequate shelter. Elsewhere life was much harder and the need to change the environment more pressing.

Growing mental prowess and ability to perform increasingly complex feats of communication gave the human species an immense advantage over other species. At first, leaps in technology were few, but nevertheless some had important consequences in the long term. For instance, about twenty thousand years ago, Australian Aboriginals made one of the earliest advances which proved of great significance: they produced ground edged tools. A relic of one such tool has been found in Kakadu National Park.

Technological changes generally led to the concentration of peoples into villages and, later, cities. In regions such as the Middle East, town dwellers and the supporting agricultural systems were becoming more and more divorced from their 'natural' habitat. People discovered that hard grains could be stored and that animals could be domesticated. The abandonment of nomadism allowed the accumulation of possessions. Resource sharing was replaced by barter which for convenience was replaced by systems of trade tokens. Wealth could be stored and traded. The tokens—cash or credit—represented resources, and people shifted from being land minders to land owners.

Some people retained a close relationship with nature. To the Australian Aboriginal, 'wilderness' did not exist as a separate entity. There was no place where the ''hand of man had not trod'' because the landscape was fully peopled and displayed evidence of the former presence of ancestors. For perhaps three thousand generations these people had evolved a pattern of customary behaviour and an extremely rich ritual and psychic life to create a relatively harmonious coexistence with the Australian ecosystems.

Elsewhere the growing population of urban and rural people became disassociated from their natural habitat, and nature became the

unknown, with wilderness a thing to be feared. Such perceptions were reinforced by religion which set people above and beyond nature, and later by the stories of travellers who roamed the Earth. Wild, untamed nature was perceived as something to be conquered, and native peoples were to be "shown the light of the true faith". This change in the perception and conception of wilderness, of nature, appears to have happened about three hundred human generations ago in some regions of the world.

Over the past thousand years, or some thirty three human generations, the mobility of people has gained momentum. Waves of people moved over the Earth, forever filling in the population gaps. The explorers and settlers from Europe considered land not peopled by Europeans to be empty and ripe for development.

The amassing of wealth began the historic era of rapid development and exploitation of wilderness. These achieved deeper significance with the industrial revolution, which was fuelled on a scale never before encountered, using raw resources accumulated over the ages by natural processes under wilderness conditions.

In the early phases of human expansion, the pioneer settlers rarely adapted themselves readily to the new environment. Always it was nature that had to adapt.

Time was an essential element. Until the industrial revolution the changes were usually slow enough for the natural systems to reach a new dynamic balance with the impinging forces. With the industrial revolution the capacity for rapid and extensive landscape change was greatly enhanced.

If not too much damage was done to the natural environment by the first generation of colonisers, the second generation's perceptions of place and activity were all of the new land, albeit influenced by parental attitudes. Nevertheless, the new landscape became imprinted with incidents, happy and sad associations, and with the experiences of life. The landscape was becoming personalised, and with this personalisation people's attitudes to it changed. Russell Ward in *The Australian Legend* describes this process very well.

As long as people have access to rural and wild landscapes and are motivated to want to understand them, then with each generation personalisation becomes more complex and identification more deeply rooted.

Clearly, wilderness is a conception of the individual mind. As such it is a changing, dynamic concept. In the case of the Australian Aboriginals, identification after two or three thousand human generations is so complete that they do not separate themselves from their environment. They see themselves as part of the landscape, not apart from it. The role of the Aboriginal within the environment is built on traditional behaviour—the question of why things were done or hap-

pened never arose; they were simply facets of the immediate natural surroundings.

Once people are taken out of close contact with the natural environment which sustains them, the perception of dependence fades. The notion that the ultimate source of food, shelter, new crops, new drugs and new materials must ultimately come from the Earth loses force in this change of perception.

The result of a multiplying and more demanding human population is an accelerating reduction in the wilds of finite Earth. Inevitably this has meant that wilderness has become more remote and less part of human life and culture. Diversity has been reduced and wild places have been subjected to human control and management.

In countries, such as Britain, which have seen a steady growth in resource use and a concomitant growth in population over some thousand or more years, there has been until the past hundred years or so a fairly harmonious wedding of landscape with technology; as the poet McKellar has put it, the growth of ''ordered woods and gardens''—a pleasant and homely landscape liberally splashed with cultural modifications. Nevertheless, while retaining a landscape of softness and charm, every ecosystem was greatly modified and many species lost or endangered by domestication.

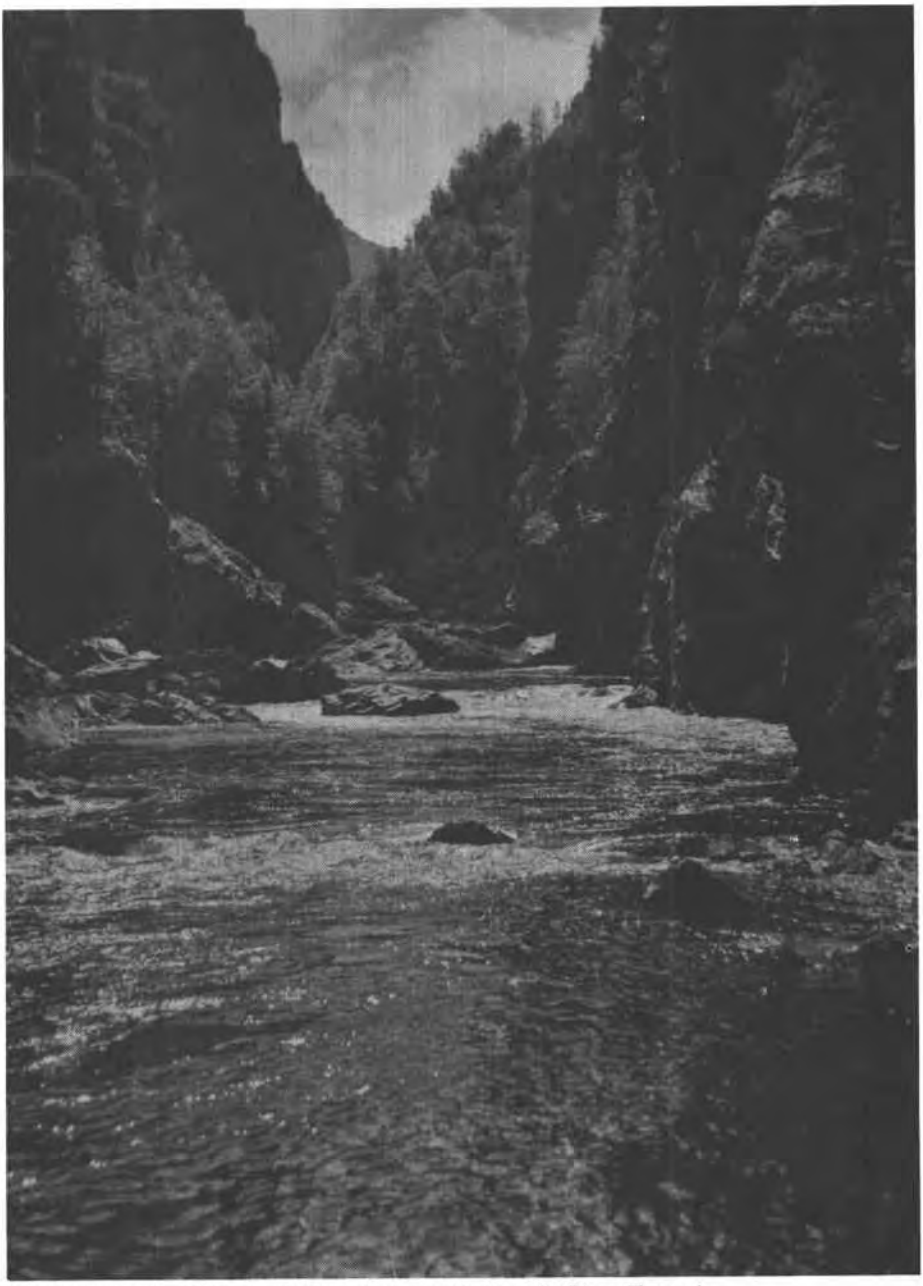
In contrast, in Australia, despite the presence of people for perhaps fifty thousand years or more, the landscape has remained dominated by natural processes. Over the whole continent the human population in all that time has probably never numbered more than half a million. The one tool Aboriginals used which was capable of modifying wilderness was fire. Yet studies of Aboriginal land use in Arnhem Land indicate that fire was used very sensitively, maximising diversity and protecting certain natural systems. No single great conflagration was allowed, and as the dry season advanced, careful and selective use of fire was made. This has been going on for so long that in these monsoon lands this activity can be seen as part of the natural process.

However, even where people were apparently living in a relatively harmonious relationship with nature, the wilderness was still subject to change. For some reason as yet not understood, a number of native Australian species, including some relatively large animals, became extinct after having successfully lived out many hundreds of generations of Aboriginals. Paintings of thylacines are common in the Aboriginal art galleries of Kakadu yet they are no longer found in mainland Australia.

Imagine the shocks to these finely adjusted wilderness systems following 1788 and the first settlement at Port Jackson, only six to eight generations ago. First, imported diseases ripped across the continent, and within four years more than half of the Sydney Plain Aboriginals were gone, victims of measles, smallpox and venereal

A detail of the 'Magnificent Gallery', discovered by P. Trezise in 1977

Sandstone escarpments of Cape York Peninsula offered shelter to Aboriginals during the wet season, and house their rock art galleries today



The Sanctum below Thunderush Great Ravine on the Franklin River, Tasmania

diseases. Exotic animals—sheep, cattle, pigs, goats, camels, horses, donkeys, foxes, rabbits, cats and dogs—multiplied. The ground became hard under the hooves of domestic stock which ate the vegetation selectively, converting scrubland and shrublands to grassland, and perennial grassland to ephemeral grassland. Some introduced animals preyed on native animals and others destroyed their natural shelter. Introduced plants ran wild, like prickly pear and blackberry. In some instances the introduced species spread rapidly, fanning out ahead of European settlement.

At the same time the establishment of permanent water, ground tanks and bores every ten kilometres or so released some native species which had been held in bondage by the permanent drought of the arid and semi-arid lands. Typical of the native species to benefit were the red and grey kangaroos. By their multiplication they duplicated domestic stock and rabbits in eliminating ground cover so essential for the survival of the small marsupials and native rodents.

The Aboriginal people were profoundly shocked as they saw the wild natural landscapes which they regarded as extensions to themselves being dismembered and destroyed by these various agencies. Some Aboriginal people adapted to the new circumstances, others were unable to do so. Thus within Australia there was a marked dichotomy of approaches to natural wilderness between the first and the more recent European settlers.

Today 83% of Australia's population live in urban areas around the south eastern seaboard. Immigration programmes have brought in many newcomers full of good will to Australia as a nation, but with their personalised landscapes thousands of kilometres away. Today one in three Australian families are one generation or less Australian. In a purely ethnic sense this has produced a greatly enriched human resource, but time is needed for these people to develop an understanding of the Australian landscape.

Public pressure is mounting to protect the near city bushland and coastal recreation resources for the urban population. The conservation of water, soils, forests and wildlife has become a matter of popular interest and common debate.

To many Australians 'taming nature' is an outmoded notion. Rather we should be thinking more of harmonious development. People are now better informed of the adverse consequences of conflict with natural processes. The news media report on soil erosion, wildfire, increasing flood damage, dwindling species and dying landscapes. Vocal conservation groups have proliferated, and reaction to unwise development can be swift and effective.

Nevertheless the continued enlargement of urban areas and the pupating of the majority of people behind the wood paling and brick fences of suburbia is of real concern. What kind of mental and emotional metamorphosis goes on in such a cocoon? What kind of land-

scapes are personalised now—the red brick villa, the corner telephone box, the individually nurtured garden, the city parks, perhaps a dog or a cat? Without the expansion of personal experience into nature what support for wilderness protection will these people be prepared to give?

The Earth's population has passed the four and a half thousand million mark, the last thousand million being born in the past fifteen years, half of one generation. The United Nations Organisation has stated that three bad seasons of harvest would cause widespread starvation. So far as the non-renewable resources are concerned some wise person said of oil, "As soon as the first gallon was used it began to run out."

Food and power are just two of the essentials for living on twentieth century Earth, and we find we are critically short of both. How important is wilderness to people with an empty belly or to an industrial nation whose wheels will not turn? Alternatives to the resources in short supply will be sought. One solution suggested to the oil crisis is to put sixteen million hectares of semi-arid lands under plantations of *Euphorbia* plants which produce large quantities of hydrocarbons directly. However, like many alternative technologies, this one utilises land more intensely and competes for land resources which may be in a wilderness condition.

But what is true wilderness? It has been emphasised that the wilderness concept is a personal thing, established from precepts arising from earlier experiences. It is perceived as the extreme of a spectrum of different land-uses. Clearly wilderness to a Briton, an Egyptian or an Australian are different things. The very existence of true, untouched wilderness may be queried as pesticides and radio-active materials have now dispersed throughout the world.

To the person from inner Sydney a visit to Audley and a walk up Kangaroo Creek in Royal National Park may produce an authentic feeling of wilderness. To other Australians the only real wilderness left in Australia may be the deep and almost unattainable vastness near the head of the East Alligator River, or the salt-crusted glistening shores of Lake Amadeus. Australians are more fortunate than other people in that some areas of untracked wild land are still available for the purest form of wild land use.

Clearly wilderness as a concept is highly variable when measured in landscape terms. In the extreme it generates a feeling of absolute aloneness, a feeling of sole dependence on one's own capacities as new sights, smells and tastes are encountered, as the unknown is penetrated. The challenge and the refreshing and recreating power of the unknown is provided by unadulterated natural wilderness large enough for us to get 'lost' in. Here it is possible once again to depend upon our own personal faculties and to hone our bodies and spirits.

Of course many other reasons have been identified for preserving a small percentage of our resources in wilderness condition apart from

the physical and mental health benefits to the individual human user.

Scientists see wilderness areas as natural assets in that they contain reserves of genetic diversity, the consequences of evolution in circumstances which can never be duplicated in time or space. Little is known of the properties of many plant and animal species, and wilderness provides refuge for species of possible future use for human benefit. To duplicate this role in botanic and zoological gardens would be costly and probably impossible. Wilderness is seen also as providing habitats for species threatened with extinction by development or environmental change. Similarly, wilderness can provide for the integrity of the evolutionary process of plant and animal associations. Within wilderness areas living examples of functioning natural ecosystems useful in research and education can be protected. Study of such natural ecosystems could assist in the development of new management systems for artificial landscapes.

What area of land are we talking about when seeking wilderness protection? Perhaps, on average, for all national park and nature reserve areas, 30-50% might be kept as 'real' wilderness. Australia would lose much if it ripped up these last few areas.

At Kakadu National Park, where the Park Service and the traditional Aboriginal owners are working together to conserve the area whilst permitting other uses in certain parts, the wisdom of traditional management is being increasingly recognised. It seems that in some respects the accumulated knowledge of local people may well exceed the outcome of millions of dollars of extensive research for years to come.

The most effective fighters for wilderness protection will be those Australians who have been able to personalise the Australian landscape. They will want to preserve these final vestiges of nature because they know that they too are things of nature. Aboriginal people have no trouble in understanding this point of view because they have sustained their civilisation continuously for so long, living as members of the natural systems.

Inputs from traditional knowledge, contemporary management technology, modern research and a sympathetic public are all needed to protect our common wilderness heritage. The sword of Damocles hanging over humanity and natural wilderness is the shadow of the extra thousand million people born in the last fifteen years. In the long term the threat to Australian wilderness may depend on the ability of the international community to come to terms with population growth. The launching of the World Conservation Strategy in 1980 is indicative of the changes in attitudes that are taking place throughout the world. This recognises that people are part of nature and the fragile life systems of our planet must be safeguarded if *Homo sapiens* is not to become another endangered species on the brink of extinction.

THE WILDERNESS OF THE AMERICAN INDIAN

Carol-Ann Brant

My name is Carol-Ann Brant, in Mohawk *Ka Jih Tsi Yoh*, which means Princess Pretty Flower. I am not a scientist or a formally trained conservationist; nevertheless, I am a conservationist by birthright and I am delighted to be here today to share and exchange ideas with my brothers and sisters.

I was born on the Tyendinaga Indian Reservation located in the province of Ontario, Canada. I am a direct descendant of Chief Tyendinaga, who lived from 1742 to 1809, and his third wife, Catherine. There are many paintings of the Chief but none that I can find of his wife. Contemporaries have described her as a tall, dark-haired beauty with copper-rose cheeks and a fiery temper. Chief Tyendinaga was also known by his Christian name of Joseph Brant and during the American Revolution War he led six nations of Iroquois and was commissioned Captain in the Army of King George II.

Consider the contrast between the events which took place during Joseph Brant's lifetime and our opportunity to view astronauts landing on the moon and making history for all humanity. The obvious con-

trast is testimony to the difference in each phase of our search for new horizons.

Through the miracle of science everyone could see what they were seeing: the surface of the moon—viewed on the spot for the first time in our history. With that momentous event many questions concerning the moon and the possibility of life upon it were answered. The gallant astronauts remained alone, with only eyes from Mother Earth upon them.

What if, on that remarkable landing, Apollo II had been greeted by moonmen? How startled and amazed the astronauts would have been, as well as the countless millions of onlookers following the flight via television!

Such a confrontation would certainly be among the most electrifying experiences in the history of science and exploration.

Surely this high point in the development of *homo sapiens* will be a great time marker in people's minds. Before the lunar landing and after the moon landing will symbolise not only this remarkable achievement but mark historically humanity's flight and progress in the exploration of outer space.

Other pivotal points in history have been so marked in recording the progress of humanity. B.C. and A.D. indicate a way of marking history. In the Western Hemisphere the voyage of Christopher Columbus and subsequent discovery of America divide time, people and events in what came to be called the New World.

To the cultures of the aboriginal inhabitants of North, Central and South America, the appellation Precolumbian is given to designate the ways of life before the discovery of America in 1492. This line of demarcation separates the prehistoric past of the Americas from their historic modern beginning.

One of the greatest differences between the voyage of Christopher Columbus and that of Neil Armstrong and his brave companions was the reception they received on landing in unexplored territory. Columbus happened upon a previously unknown people. The red people were added to the family of the world. In the fifteenth century the peoples of the world were naively and conveniently divided into three parts—white, black and yellow. From 1492 until today the so-called Indians, or fanciful red people, of America took their place and played their roles upon the world stage. The dramatic unfolding of history in North, Central and South America during the sixteenth to nineteenth centuries was the story of confrontation and conquest by European colonial powers in the subjugation of the American Indian and the slow but sure destruction of their culture.

The American Indian, even before Columbus, was the remnant of a very old race in its final stages, a race that had attained perhaps the

highest working concept of individualism and habitual spiritual consciousness ever practised.

Neither the word 'free' nor any corresponding term occurs in the root language; there never was anything for the Indians to free themselves from. Theirs was the spirit not seeking the truth, but holding on to the truth. Theirs was the mind nourished on choice. Whatever they needed to know, nature sooner or later revealed to them. And that which they desired to know—the best way to achieve their maximum spiritual potential—was the only mystery they chose to investigate. The North American Indian's life has always been a partnership with nature. They have a belief in one all-encompassing, inseparable, indivisible consciousness—oneness of the whole.

It is noteworthy to consider the fact that in every one of the nations of North America today, the beginnings and the basis of their culture was that of the aboriginal people—the American Indian. Naturally in those areas where the native civilisation reached high points in its development those nations have a richer background today. The Indian heritage of the United States has never been fully appreciated. In many parts of the country the Indians were removed, swept aside or destroyed along with their culture—a culture and a way of life that could have been beneficial for the new Americans who took over, as well as generations to come.

The discovery of America with its remarkable new products, peoples, and ideas changed the way of life of people everywhere in Europe, Asia and Africa. The white, the black, and the yellow all benefited at the expense of the red people. This sad fact is true in all the countries which make up the New World, but particularly in the United States. Had the Indian been appreciated, the culture respected and utilised, our citizens would be better off today. There were and are many qualities in Indian life and culture that have great value to society. Today the United States would be a much better place if the Indians had been given the role they so rightfully deserved.

One significant aspect of Indian culture was the folktale. Since they had no written language, the telling of stories concerning tribal ways, customs and history was an important means of education and recording important events.

My grandfather told me the story of creation thus: "Before the world existed and before mountains, men and animals were created, while the sky was yet without a sun, ere the moon and stars were hung up for the lamps of darkness, the Great Being was with a woman, she the beautiful spirit, the Universal Mother. This woman was not the same as the Great Being. He was spirit, bloodless, fleshless, bodiless; she bore the form.

Out of the union of the Great Being and the Universal Mother, land was created and all growing things sprang forth from it. In time,

there were animals of all kinds. The Great Spirit told the Universal Mother: you have created innumerable beasts but they are without a head. You ought to have made a being endowed with wisdom, to govern, with a little of my help, the affairs of the world. Such a being must be created and be called Man. Descend once more to the Earth, beautiful and Universal Mother, and give birth to one more being who shall be the lord of all the creatures that live, move, or breathe, on the land, in the air or in the water.

Upon receiving this command, the Universal Mother again descended to the Earth. She selected for her husband, in order for the production of the new being, a very subtle owl, who was the half-brother of a bear and a wolf, the cousin of a dog and a deer, and distantly related to the panther, the fox, the eagle and the adder. By him she had, at one birth, two children. Men take their qualities from the beasts, to whom they are related, and most from those whose blood they have most in their veins. If they have most of their father's, the owl, they are wise and generally become priests; if the wolf predominates, they are bloody-minded; if the bear, they are dirty and sluggish, great eaters, and love to lick their fingers; if the deer, they are exceedingly timorous and feeble; if the fox, cruel and sly; the eagle, bold, daring, and courageous and the adder, treacherous. Thus, men have all their different natures and properties from the brutes and oftentimes are worse than brutes."

The theme of my speech is supposed to be "The Wilderness of the American Indian". That is a very large task. The wilderness of the American Indian was as vast and as varied as the continent itself. There were, at the time of the first European contact, some five hundred different tribes each physically and culturally different from each other, speaking some 2,200 languages, each Indian culture reflecting the environment in which it was shaped.

My people, the Mohawks, were woodland Indians. Our wilderness was a land of shadows and hidden trails, stately trees, cathedral-like with their tall spires above and their gloomy aisles below, sweeping onward into unknown distance. When the wind spoke to the leaves, the Indian heard and listened.

The breezes rustled the leaves
The birds sang many songs
The forest moved in undulating patterns
The sun cast many shadows
The tall warrior who walked the path trod by many deer
Listened intently to the forest sound
For this was his language
This was not the language of sound
And only the soul understood

It was not heard but rather felt
Felt by the spirit that moved the man
Who had not learned the language but was born with it
A gift
Passed to him by others who had borne it through these same forests
This man knew that the sound was from within and around
His camp-fire at night
He tried to imitate in his crude fashion
The story he heard each day
From his Mother the Earth
But his spirit was not the Great Spirit
His soul was not the Great Soul
So he prayed and chanted for the day when he would
Journey to the stars
And he would leave for him who came next
A gift

Nature in the forest was a vast symphony beneath the great bowl of the sky: the smack of the beaver's tail on the water, just before he dives; the laughing owl's whoops; the crackling sound of underbrush being broken by the mighty tread of a moose. If a man were to break a stick or shout or otherwise betray his presence, the whole forest would freeze, united in silence against the intruder.

The Indians moved silently on moccasined feet, in garments of fringed skins, as much part of nature as the animals they hunted. In today's language humans were part of the ecosystem; animals were part of our food chain but there was no such concept as hunting. In the original language it meant making meat, not hunting. Everything from that animal was utilised; even today the tribal dress I am wearing was made by the Mohawk elder women from elk skins which they chewed with their teeth until the skins were soft and pliable. Then they were cut and hand sewn, beaded and embroidered with my name.

In the old days much of the bead work was done by the mothers of the tribe while they were sitting and listening to the men hold tribal council. The men gave speeches and the mothers memorised the substance of each speech. If unresolved differences arose during the council, they adjourned with their women in private conferences and the final decision was always influenced by these wise women.

When I was a little girl living on the reservation with my family, my grandfather often took me for walks in the surrounding woods. There were many wild animals at that time still roaming the woods: wolves, moose, deer and many other small creatures. My grandfather could move freely among these animals. We would sit by the edge of a creek and they would come and drink from the creek right next to us.

There was some silent communication between these animals and my grandfather that told them not to fear us. I can recall a time when a wolf with a thorn in her paw came to him and he removed it, neither having fear of the other. Other times the wolves' mother appeared to not have sufficient milk for her pups and she would bring them to him. In response to her plight he would put out pans of warm milk.

The North American Indian has become dispensable, and with the cooperation of the governments we as people and as a culture will be eventually destroyed, utterly and permanently. The only place where you will find a trace of us is in the museums and Disneyland, on display, along with the dinosaurs.

The reason why the Indian Nations have been destroyed is and always has been to gain the land we possessed.

In general our first Americans looked upon nature, including all land and that which it sustained, as being the gift of the Great Spirit. They carried no concept of individual ownership of land. As one of their great leaders said: "The Great Spirit made it for the use of Indians, and for all these favours we thank the Great Spirit and Him only." This statement, which found expression two hundred or more years ago, carries the basic concept of Indian land tenure held by red people today.

But with whites it was not so. They came west with a very different cultural heritage. With them, land and all that went with it was a matter of public and private ownership. The area occupied was the King's Realm. Under Europe's feudal system, the use of land was parcelled out as fiefs in exchange for his royal protection. Under the colonial system this same concept prevailed to a modified degree. The colonies belonged to the King. The natives were unauthorised occupants. These principles lie at the root of modern colonialism and capitalism, with all of their blessings and problems inherited from the past.

Now the large corporations covet the land we have remaining to us; the reservations that were once thought to be of no value suddenly are reservoirs of energy. Oil-shale, coal, uranium and many other minerals are waiting there to be dug up. But that will destroy the land and will make it uninhabitable.

The present caretakers of America have no regard for the consequences of their actions. They only think of gain of fuel for their furnaces, the electricity for television sets and ice cube makers, and minerals to make larger and more powerful bombs.

History is repeating itself only on a larger scale. Within a ten year period of the first landing of Christopher Columbus on San Salvador Island, it was turned by the Europeans from a verdant jungle to a desert. The descendants of these first colonisers are consuming the entire continent, building cities upon decaying cities. They have been wasteful with the bounty they found on these shores. Now the

resources are running short; soon the land will not be fit to live on.

The streams are being destroyed, the woods, the farms, even the very oceans that surround the continent. The Indian can only helplessly watch this destruction and reflect on the time before the white man when the earth was their mother, their religion.

All animate and inanimate things were imbued with a common spirit and had to act in harmony. The family and tribe were the focal point in life. Wherever the Indian walks on the continent, the spirit of their ancestors rises from their bones in the dust of the earth and speaks in a thousand languages. The Indian knows that this is home. To the colonisers, the earth is not their Mother, it is merely a commodity to exploit, to consume, to use up, to buy and to sell for profit. The final manifestation of this attitude will be the final destruction of all—the fish and animals, the birds and insects, the trees and grasses—and *dreams*.

We Indians have a saying that if it is not of the spirit it is not Indian.

We acknowledge one Force—the Creative Force;
One Power—the Reasoning Power;
One Sacredness—the Truth.

As a people we are a vanishing race. We have no political or military power; the only things left to us that we can share with the world are our beliefs: our consciousness of the many planes of existence and that the same invariables—the absolutes—extend to each plane; our true essence is of the spirit, our true parents are the sun and the earth.

Hiawatha was a reformer, lawmaker and prophet of the Mohawk tribe of the Iroquois Nation. He set forth these principles of the Great Law: sanity of mind and health of the body; peace between individuals and groups; righteousness in conduct, thought and speech; equality and justice; spiritual power. Hiawatha asked all the people to join hands and to act as if we had but one soul, but one head and but one tongue, so that the people and nations of this world shall be of one mind. A mind united in one idea: the preservation and protection of the natural world—the gift from the Creator of Life.

THE AFRICAN AND WILDERNESS

Enos Mabuza

Magqubu Ntombela, dancing in traditional Zulu dress

The history, the legends, the myths, the culture, the colour and the language of my people, the Swazi, have their roots in Africa. It was the pride of being an African that made Shaka, the mighty King of our sister nation, the Zulu, say to a white missionary that although the Almighty had endowed the white people with many attributes he had denied them a good black skin, and that is why they had to cover their entire bodies when dressed.

The traditions and culture of the African peoples were, in bygone days, interwoven with the wilderness. Wild fruits and berries were generally eaten raw. Wild herbs were boiled in a little water to form a vegetable stew and became indispensable food in times of crop failure. For many centuries the African was a pastoral farmer and a hunter, and while hunting was both a sport and a way of living, a balance between farming and hunting was maintained because of the awareness that survival was dependent upon the wilderness. There were no laws to protect the fauna and flora against injudicious human use of the environment because there was no need for such laws.

To the explorers and the missionaries of the eighteenth and nineteenth centuries Africa was sometimes the dark continent. It is said that it was the white explorers who illuminated the Dark Continent with the intellectual and spiritual legacy of Europe. Little is said about

the calm and balance that existed between the 'primitive' African peoples and the wilderness of this dark continent during the pre-exploration and colonial periods. If the Congress were taking place a century ago, we would regard our objective as being to devise ways and means to preserve the wilderness of Africa and retain and maintain the wildlife as it is. Our concern today is conservation, the re-creation of the environment as it was.

Of all the continents, Africa is said to have been the richest in wildlife. In our part of the country for example, it is said that so abundant was wildlife in the nineteenth century that the hunter-explorer Cornwallis Harris was able to sit on the tail-board of his wagon, close his eyes and fire three times in random directions, hitting an animal each time. However, the Africans and their wilderness began to disappear during the colonial and post-colonial eras. The Kruger, the Gorongosa and the Serengeti National Parks are but relics of the Africa that was.

The colonial era in Africa brought about the agricultural conquest of the land. Later, industrialisation lured the African to the cities where traditions and culture had to give way to the foreign values of a coke-and-jeans society which totally refocused their scale of values. The wilderness, with its hunting grounds and teeming game, became a dream of the past. The war that had been declared on the wilderness forced the Swazi to become more dependent upon the Western way of life. Our young people, who normally received part of their education in the wilderness while looking after the goats, the calves, the cattle and the corn-fields, had to give up this form of education in favour of a new education system completely divorced from the environment. Although they could now become successful teachers, clerics or lawyers, they had lost touch with the spirit of the wilderness which had inspired their forebears, noble people, kings and queens, to live adventurous lives as far back as living memory, to the days of fables and fairy kingdoms when people and wild beasts could talk to and understand one another much better than today.

Today, my own children can neither identify the antelope and the waterbuck nor name them in their own language. They cannot identify a single indigenous tree or shrub with its uses and values to humans. They have never enjoyed the thrill of sitting by the fireside in the evening and listening to tales of fact and fiction retold by their grandmother.

Africa has changed from the continent of boundless bounty and become the continent of endangered wildlife species. Tribute must be paid to those 'white Africans' who worked and fought hard against all odds to save what was left of the African wilderness. In the area where I come from, the late Colonel James Stevenson-Hamilton, despite being nicknamed *Sikhukhuza* (the one who shouted people away) by my people because he shouted and drove away some of them from certain parts

Elephant in the grasslands of a Natal game reserve

of the now renowned Kruger National Park, will be remembered by many generations to come for his dedication to conservation. In *Men, Rivers and Canoes* and *The White Rhino Saga* Ian Player recounts his spell-binding adventures in the game sanctuaries of Zululand and the saving of the white rhino. He relates his encounter with the proud Zulu, the shy Tonga and the quiet Swazi whose responses to the wilderness are both instinctive and mystic. Laurens van der Post, that great South African soldier, philosopher and author, has immortalised the endangered human species of Africa. What I am trying to emphasise is that the wilderness of Africa cannot be conserved without capturing and blending into it the spirit of the African. Most African countries may be blessed with wildlife in game sanctuaries, but as long as these are seen only as a white man's luxury they will become the targets of poaching and denudation.

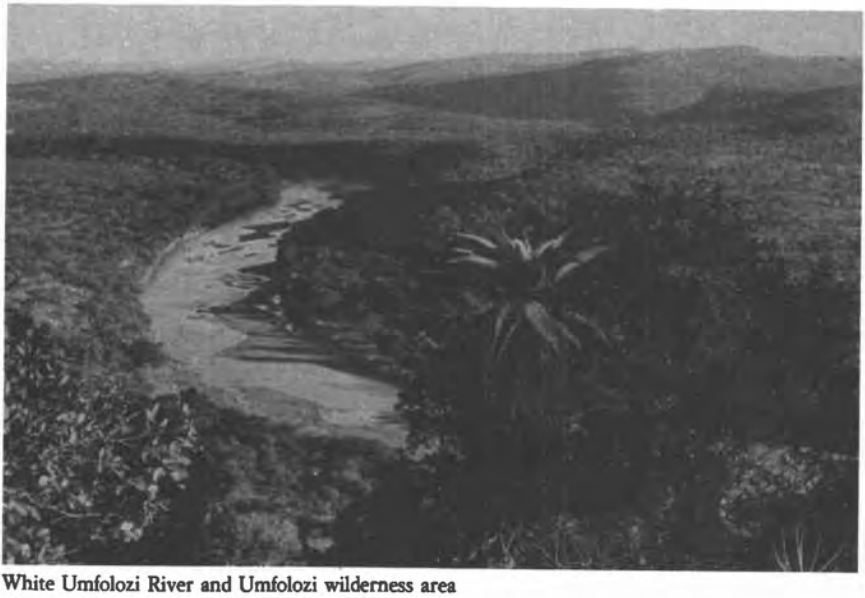
Looking at the state of nature conservation today, it will not help us in any way to blame the negative transformation of the African wilderness on the colonialists, the explorers and the missionaries. The culprits are no longer here to face the wrath and the fury. What Africa now needs is a formula whereby the African, young and old, can participate in the re-creation of game sanctuaries. While the African cannot be made to turn back from the urban society, there is a good chance of re-awakening consciousness and wilderness awareness in the developing territories of Southern Africa.

In our own area we have decided to stand and be counted by initiating a project to establish a small game sanctuary. According to one of the senior game rangers in the Kruger National Park, our area, part of which adjoins that Park, is one of the richest wildlife areas in South Africa. We have allowed hunting on a controlled basis because we believe that this will have immense economic benefits, stemming from people's willingness to go to considerable expense in order to get what they want, be it trophies or just sheer excitement. The revenue should certainly render the wildlife project viable. We can thus have our cake and eat it!

We cannot achieve our objective if conservation does not catch the attention of young people. Education holds the key to conservation and therefore our hope is our youth. To this end Dr. Sue Hart has had tremendous success in instilling in the minds and hearts of young Swazi student teachers at the Mgwenya Teachers' Training College an awareness and understanding of the need for nature conservation.

The wildlife sanctuaries of Southern Africa are today a main tourist attraction. There is something about Africa and its wilderness which the American, the European and the Australian tourist want to experience, an experience which many Africans have lost. Perhaps the answer to the turbulent Africa of today lies in the rediscovery of that experience by the African, even if only within the limited precincts of what remains of the African wilderness.

Lion in the Gorongoza Game Reserve, Moçambique



White Umfolozi River and Umfolozi wilderness area

Zebra and impala—Mkuze Game Reserve, Zululand

On the edge of the plain, Gorongoza Game Reserve

HUNTING IS A PART OF CONSERVATION

Harry Tennison

Impala capture—Mkuze Game Reserve, Zululand

Hunting is probably the most important part of conservation, for that is where the money comes from to pay for the research necessary to understand wildlife, the money to pay for game departments and the money necessary to re-establish animals lost due to factors other than hunting.

In my country, the United States, the money for game departments, research programmes, and the relocation of game comes from two sources. First there is the money for licences, which currently totals some $160 million each year. Secondly, we have two aid programmes financed by sportsmen over and above their licence fee. These two programmes were suggested by hunters and fishermen, who pay an excise tax on all sporting arms and equipment and all fishing gear. This year over $60 million will be contributed by them to wildlife restoration and habitat expansion, improvement and management. At one time the government wanted to abolish this tax, but the sportsmen fought for and won its retention, one of the few times in history when the payers of a discriminatory tax insisted that it be continued.

This tax money alone has done an enormous job to halt the rapid encroachment on wildlife habitats resulting from our population explosion, and species that were threatened at the turn of the century are now restored and doing very well. Among these are the pronghorn

antelope, the white-tail deer, the mule deer, elk, ducks and geese, and the wild turkey. The wild turkey is a wonderful example of what can be done when sportsmen provide the money and the drive to make a programme successful. Wild turkeys have been hunted ever since the first hunter in the new world wanted something to eat. At one time they were in great danger of disappearing, but the sportsmen demanded that they be studied, and it was their money that brought them back to the point where today they are again found in nearly every state.

It is true that not many people need to hunt for food in the way that we did when I was a youngster in Texas, and hunters know that the food they get from hunting is much more expensive than food bought in a store, but at least 95% of the game taken by hunters is eaten. The true sport of hunting is not in the killing but in the hunt itself: the adventure of being in the out-of-doors, of matching your wits and skill against the game and other hunters.

I do not remember many of the moments of actual kills, but I do remember the effort of the hunt, the long months of preparation, the continual training over the years. It takes quite a bit of skill to be a hunter, a good hunter. You must understand how to live in the wilderness. You must understand the game you hunt, whether it be on land or at sea. You must prepare yourself mentally and physically. You must be the master of whatever weapon you are using, be it rifle, bow and arrow, or fishing rod and reel. Most importantly, you must understand the rules of the game. Some of the rules are quite severe, especially if you disobey the rule of survival in a crisis. This is when your entire life's training comes down to one split second, that moment when you face danger so great that a mistake will cost you your life.

Moments such as this in your life help make you aware of the value of being part of the out-of-doors, of understanding your place in the game of life and what position you play. When you are faced with death by your own choosing you have a chance to look down the barrel of your own soul and you will come out stronger, more self-reliant and more confident that you have learned how to handle yourself. You will learn that you, too, are a natural resource and, like game, one that if handled correctly is renewable.

It was through meetings such as this—and especially the first World Wilderness Congress in Johannesburg—that many of us got to know each other and had the opportunity to know of our different, yet very similar, interests.Through that working together we accomplished the downfall of a terrible poaching ring in Africa.

Two things started the increase of poaching in East Africa, and mainly in Kenya. First was the jump in the price of ivory, which was an artificial means of getting money out of Kenya by the Asians who had had monetary restraints put on them by the government of Kenya. These restraints kept the Asians from sending their profits to their kin-

folk in India, Hong Kong and Singapore. So they figured a way to get their money out. They turned ivory into white gold by raising the price of raw ivory. They paid for the ivory in Kenya shillings, which was a way for them to spend their money. They were given permits to ship all the ivory they could find, so the poaching increased.

Secondly, the government cut out all hunting, which gave the poachers a free run of the country. The slaughter continued to such an extent that hunting of elephants may never return to Kenya. With the professional hunter removed from the hunting country, there was no one to protect the elephant from being slaughtered.

The government said they were closing hunting to 'protect the elephant'. Nonsense! Any time you place a value on something and try to protect it, it becomes more valuable than before, and this is when the thieves move in. While hunting was allowed very little ivory was sold. When hunting was stopped the value soared and so did the number of animals killed.

When legal hunting was allowed in East Africa, notably in Kenya and Uganda, there were no shortages of elephant or rhino for there was very little poaching. The poacher simply did not and would not take on a well equipped safari, headed by an honorary game warden in the person of the professional hunter. When hunting was forbidden the poacher moved in. The same is true in the case of the tiger. When tiger hunting was allowed there was practically no poaching; the only adverse loss of tiger was due to destruction of habitat. When tiger hunting was stopped, in the first year over one thousand were poached and you could buy as many tiger skins as you wanted in a hundred different shops in India.

The hunter conservationists are, I believe, more concerned about the disappearance of the big cats than anyone else, and to prove this they have put up their money to protect them by starting many anti-poaching movements. I will tell you about one that paid off.

In one country of Africa, and I must not mention the name in order to protect the project, my wife and I were visiting one of the game wardens who was having quite a problem with poachers. He simply could not catch them with the goods, although he knew that many of the people he apprehended were poachers. In discussing this with him, we talked a bit about the superstitious mind of the black African and how powerful some of the witch doctors are. Suddenly, the same idea hit us both. Why not have a witch doctor work for us? We found one and dressed him up as a game scout, and the next day when some apparent poachers were walking through the game reserve he stopped them. They naturally denied that they had been poaching. With this, off came the game scout uniform, out came the rolling bones and the other things that witch doctors carry, and the game was on. When the witch doctor told them that if they did not tell the truth they would be

dead in three days, you should have been there to see the light of understanding come into their eyes! Since then, over two hundred poachers have been caught, their game confiscated and their weapons turned in, and the witch doctor is the richest man in that part of the world, for we paid him five dollars for each conviction.

With the help of the New Mexico Game Department, we started an almost identical programme in the United States called 'To Catch a Thief'. In a year-long study, the New Mexico Game Department found that forty per cent of the game killed in New Mexico was taken illegally, so they started a programme that involved every person in that State. Whenever anyone saw an illegal killing they could call collect to a published number, report what they had seen, and if and when the criminal was caught they received a reward. The results were amazing. Ninety-seven per cent of the people turned in were sentenced. The cost to the game department was nothing; the cost to the taxpayer was nothing; 95% of the people who turned in violators were legal hunters.

So the hunter is a vital part of conservation. Hunters, possibly more than anyone else, have saved the game and will continue to do so as long as we are free to travel the world and enjoy being part of the great out-of-doors. When and if we are denied that privilege the game will suffer and disappear.

Hopefully, the hunter conservationist can be of assistance to the programmes that will emerge or are already emerging concerning our future. Because of our travels and our interest in what we have enjoyed, we can increase the awareness of city-locked individuals and groups. We have enjoyed the freedom of movement to anywhere we wanted to go in the past but not so today. Twenty-five years ago I started drawing rings around countries where it was safe to go and where I would be welcome. There are only a few rings left on my map today. Tomorrow there might not be any. Yet as long as there is one place left, the hunter conservationists will be there with their money and their desire to keep what is left wild and beautiful. Perhaps, as I travel some of these paths that are left, I will find your footprints and we can meet and sit down and enjoy the wonders and beauties of nature together in the wilderness.

The Landholder

WILDERNESS- TO CLEAR OR CONSERVE?

Verne McClaren

Transition from nature reserve to grazing pasture—Bernarra Reserve, South Australia

I live in and shall be talking about South Australia, but much of what I have to say is also applicable to other parts of Australia.

Almost all land suitable for agriculture in rainfall areas was taken up with early settlements in the form of large holdings and these holdings have subsequently been subdivided by each new generation. Little or no provision was made in those early days by landholders to preserve native bushland on their properties. Even in recent times the attitude among some landholders has been "Why worry about saving useless bushland when there are millions of acres of it?" During the past twenty five years, massive development of virgin bushland has taken place and still continues today. Fortunately, a number of natural bushland areas have already been set aside for posterity by conservation-minded landholders, but most of the remaining areas are doomed for development by this or the next generation.

It is in this field that every encouragement must be given to landholders to save what bushland they possibly can and education can play an important role along with a personal approach. I firmly believe there are many landholders today who are prepared to listen to the case for realistic conservation if they are approached in the right way.

As an added incentive for primary producers to preserve natural bushland, I believe governments should eliminate, or at least reduce,

land taxes on this land. Conservation today can be a political tool and most governments are taking a more genuine interest in it. The value of remaining bushland to the ecology cannot be overstressed, particularly as it complements our National Parks system by providing a passage for wildlife from one reserve to another. This applies particularly to native birds. It is a well established fact that ibis and numerous other species of insect eating birds assist farmers and graziers in the control of insect pests. I have observed large flocks of ibis consuming crickets and grasshoppers on my grazing property and they never seem to stop feasting. It is very much in the interest of primary producers to help such birds to survive. Without refuge and place to nest, they would rapidly decrease in numbers.

Australia is an exporting country and productivity has always been its life line. It is dependent mostly on primary production, which has been brought about by the development of virgin land. What is often not realised is that conservation is compatible with primary production on the same property, but good management is an essential ingredient.

To emphasise the fact that natural bushland reserved on private property can be an invaluable and in some cases unique possession to the owner and an asset to conservation, I shall relate my own experiences.

During the late 1940s I commenced developing my 4,200 hectare grazing property in the higher rainfall area of the south-east of South Australia. Over a period of years I worked long hours on a bulldozer clearing dense bushland comprising large pink gum (*Eucalyptus fasciculosa*) and associated plants. At the end of each long day I looked over the cleared land with a sense of achievement and with an eagerness to start next morning at daybreak. Each portion cleared in turn was sown to pasture and the results were exciting. Lush pasture produced top quality sheep and cattle, and the urge to continue development increased year by year. After a period it was as though nature intervened, and I became more and more concerned for the welfare of native fauna in the area being cleared, and conscious also of the total destruction of native flora.

When working alone on a bulldozer in total wilderness one observes sights which stir the conscience. Brush tailed possums and small sugar gliders jump terrified from falling trees. Hollow trees that have housed nesting birds for decades are pushed and crushed into enormous heaps. Nocturnal birds of prey fly from hollows of falling trees, bewildered and blinded by sunlight. Kangaroos, wallabies and emus flee their habitat as it becomes demolished. Wombats unearthed from their burrows race for the closest cover, which in most cases is the freshly piled up heap. Uprooted trees expose echidnas, marsupial mice and reptiles. Honey flows from crushed tree trunks. Wedge tailed eagles' nests built high up in the branches of trees crash to earth. The

poor old mallee fowl, driven from the nesting mound which it has assiduously worked over the years, has its mound flattened before the blade in a matter of seconds. The slow-moving sleepy lizard is crushed under the steel growser plates and many varieties of parrots fill the air with defiant screeches as their nesting hollows are torn down. But perhaps worst of all the terrified creatures taking refuge in the bulldozed heaps face almost certain incineration when the heaps are fired.

This form of land development is called 'progress' and outwardly it certainly is. Many land developers in the past have cleared large areas leaving no refuge for rarer native fauna. At least I had a large area of bushland directly adjoining the cleared area, and this to some extent eased my mind. Nevertheless the destruction worried me. Yet one becomes quite indifferent to the plight of these creatures while listening to the powerful drone of the engine, the crashing of trees, and concentrating while on the dozer and watching for falling limbs.

I cannot criticise others for clearing when I have done likewise, but I feel it is tragic that more land developers have not set areas of bushland aside. It can be likened to a carpenter who shaves off too much wood—it cannot be replaced. I can foresee the time when only a small area of bushland will remain, because by law there is no limit to the amount one can develop.

In the 1950s I set aside in excess of 400 hectares of natural bushland as a reserve. At that time the word 'conservation' was scarcely known and to talk about saving 'useless' bushland one had to be 'out of one's mind'. Thank goodness the situation has changed dramatically today, but even so one or two graziers have said to me in recent years, "This land is far too good to be standing idle." My reply has always been, "This land is far too valuable in its natural state to be cleared."

Over the years it has been easier to retain marginal lands for conservation than natural bushland which has excellent potential for development. Yet we must press on to retain all desirable areas of natural bushland before it is too late. All we have now by way of wilderness is all that we will ever have.

In the past large areas of wetlands have supported enormous populations of water fowl and amphibians. As a result of draining in these areas, vast amounts of land have been opened to agriculture and today these areas support lush pastures. However, there remain privately owned areas of natural swamp lands unaffected by drainage. Again, every encouragement should be given to landholders to set aside these areas as sanctuaries, not only to preserve the ecology of the areas but also to provide for migratory birds a passage from one region to another.

The district in which I live once supported a large population of Aborigines. Game was plentiful and to these indigenous people it must

have been the 'promised land'. It is sad that there are no full blood Aborigines left in the south-east of South Australia today. The last full blood died there in 1953, and the only reminders we have that tribal Aborigines once lived there are the ancient campsites surrounded by stone implements. These are only found intact on unspoiled bushland. Countless campsites have been ploughed under, and many Aboriginal burial grounds are covered with pasture. I am pleased to say that stone implements remain on my reserve.

Several years ago I approached two graziers within a 50km radius of where I live to see if they would each sell portions of their properties for conservation parks. At first one of the graziers showed very little interest in conservation or in parting with his land. However, after many discussions over a period of time, he agreed to sell his land, which is now known as Mt Scott Conservation Park. The former owner now takes a keen interest in conservation and assists park rangers by keeping a watchful eye on a portion of his former property. The second area purchased, now known as Jip Jip Conservation Park, contains an outcrop of massive granite boulders. These boulders have been sacred to Aborigines for centuries past and even today part-Aboriginal folk will not venture near them at night for fear that the large spirit dingo will devour them. They have told me that this creature, with feet like that of an enormous kangaroo, has large eyes that glow red at night. It disappears into the nearby white sands by day and slinks amongst the boulders at night.

Adjoining Jip Jip Conservation Park is a privately owned, unspoiled area of bushland. Within its perimeter is a large, deep water-hole surrounded by massive red gum trees and this area is also an ancient Aboriginal sacred ground. Present day part-Aborigines will not venture near this spot at night because legend has it that a giant bunyip rises out of the water-hole in the depth of the night and consumes all flesh within its reach. I am hopeful that one day this area may be added to Jip Jip Conservation Park. At least it should be retained in its present form by present and future owners of the property. To clear this area would be to destroy forever part of the Aboriginal spirit world which has meant so much to tribal Aborigines for centuries past.

Adjoining Mt Scott Conservation Park is another area of excellent bushland on which is located a shallow cave. A few years ago I discovered in the bowels of this cave a smooth bone about 25 centimetres in length. The Curator of Anthropology at the South Australian Museum at the time informed me it was a seal bone, the type of bone used by Aborigines for their witchcraft. This cave, shaded by large red gum trees, is 16km from the sea and it obviously played a part in Aboriginal rituals in bygone days. Again it would be a loss to the area and the country as a whole if the present owners cleared the land surrounding the cave. The two areas mentioned, namely the bunyip

and cave, are examples of what should be preserved in the field of anthropology and archaeology. Almost every area of natural bushland remaining on private properties today possesses important features, and some are vital for the preservation of endangered species.

Had I cleared all my land, I would have been wealthier in terms of finance but poorer in mind with the knowledge that it was I who had destroyed all the natural habitat and everything that belonged to it.

As the years have passed I have become very much involved in conservation, but one of my greatest pleasures is to wander with my family and friends through my wilderness reserve observing nature at its best—the wild flowers in season, the chatter of countless birds, and the trusting mallee fowl working its massive nesting mound while one sits in full view on the edge of the mound. Young wedge tailed eagles peer unafraid over the edge of their elevated nest and marsupials feed or rest in the shade. Sleepy lizards have all the time in the world to move about. All this is a far cry from the drone of the bulldozer which destroyed everything in its path.

There is serenity in natural bushland which does not exist elsewhere. It is a place of education for everyone.

Today I derive pleasure working my property, producing quality stock and all that it involves but inwardly I am thrilled that over twenty years ago I made the decision to set aside my reserve for all time. This form of pleasure can be shared by other landholders if they are prepared to make the same decision. Conservation *is* compatible with farming and grazing, and I urge all landholders who are able to do so to make 'provision for the retention and passage of wildlife' a reality and pleasure not only for themselves but also for future generations.

ART IN THE WILDERNESS

H.C. Woodhouse and Harald Pager

Rhebok mating—The rhebok was a popular subject of Bushman rock art

Wilderness is generally recognised as a natural area of the world upon which humanity has made little or no impression. Some peoples belong with wilderness: the Eskimos, the Red Indians and the Australian Aborigines. All are characterised by a hunting and gathering way of life; the men hunt and the women gather. Hunting and gathering make a minimum impact on wilderness.

The concept of wilderness is a human concept—it was formulated and developed by human minds. The first seeds of the concept were probably sown when people felt that they needed to get away from the security of the family group and venture into an unknown and usually hostile environment. Facing up to the challenges of survival increased their mental stature and sharpened their manual skills.

Paradoxically, there is no wilderness without people.

Another concept of people's mind and hands is art: the creation of images and beauty for the satisfaction of the creator—the artist—and sometimes additionally to meet a social demand.

There is a spectrum from art to artefact. At one end art is created purely for the satisfaction of the artist. Then come images which not only satisfy the artist but also have a magical or religious or social significance for their group. Finally, at the other end of the spectrum are artefacts—things or images created essentially for use but which

may nevertheless have the beauty that we associate with art.

Animals may create artefacts but only people create art—and only people create wilderness.

The concept of art and the concept of wilderness are closer than they might seem. They are both deliberate breakaways from the mundane world of everyday tasks, duties and obligations.

In Southern Africa we are intimately familiar with the concept of wilderness—we spend most of our time in the wilderness of international opinion! We also have our own 'wilderness people'—the Bushmen. They were the creators of 'art in the wilderness' of an outstandingly high standard.

The territory of Southern Africa comprises the Republic of South Africa, Zimbabwe Rhodesia, parts of Mozambique and Angola, Namibia, Botswana, Lesotho and Swaziland. In one form or another, human beings have occupied Southern Africa for about three million years.

Before the arrival of either blacks or whites this territory was the happy hunting ground of small yellow-skinned people, the Bushmen. For some thirty thousand years they hunted and gathered, practising a way of life that was of necessity in tune with their environment. This was the period of time known to South African archaeologists as the Later Stone Age. During this period they developed the techniques of engraving and painting, and left us a great artistic inheritance distributed over several thousand sites across the sub-continent.

The average height of Bushman males was only 1.5m and the women were still smaller. Although essentially *homo sapiens*, they had certain unusual physical characteristics, such as the semi-erect penis of the men and the steatopygia or enlarged buttocks of the women. Their languages were characterised by various click sounds.

Gradually the territory of the Bushman was penetrated by other groups from the north. First came the pastoralist Khoilhoi or 'Hottentots' with their sheep and cattle. Then came the blacks—probably at first in hunting parties but later bringing both cattle and agriculture. Just when the first penetration of Bushman territory took place we are not sure, but it was certainly before the beginning of the Christian era and may have been considerably earlier.

After the Portuguese circumnavigation of Southern Africa, which was recorded by the Bushmen in their art, the Dutch founded their settlement at the Cape in 1652. Since then the way of life of the Bushmen has been under pressure from both whites and blacks. Both groups initially regarded them as sub-human. Campaigns of persecution drove them first into some of their mountain strongholds, but by the turn of the last century the only survivors were those in the Kalahari Desert where about fifty thousand live to this day in various stages of transition from their original hunter/gatherer culture to more western ways

of life. This area is unsuitable for art since there are no rocks, so it is to the river valleys and mountains that we must turn for paintings. The engravings are found on flat rocks on the open plains or veld.

Bushman art expresses a deep understanding of and identification with the moods and individuality of animals, particularly the eland, the rhebok and the elephant, but including virtually every animal from the aardvark to the zebra. The attitudes in which the animals are painted cover every possible posture, and techniques of foreshortening and superimposition have been used to give depth to compositions involving herds of animals.

The art recognises the importance of the fundamental activities of people who lived in tune with their environment. There are scenes of hunting, gathering and fishing. But there are also scenes of dancing, of making music and celebrating the various stages in the growth of individuals, in particular the important ceremonies performed on the attainment of womanhood. The hunting scenes illustrate a variety of techniques, but the important weapon was the bow and its poisoned arrows—a tremendous leap forward in mechanical and chemical technology.

There is a feeling for the inter-relationship between people and animals using the artistic device of 'lines of magic force'. These lines link people and animals into an artistic unity by means of loops and convolutions that present a continuing challenge to the interpreter of the art.

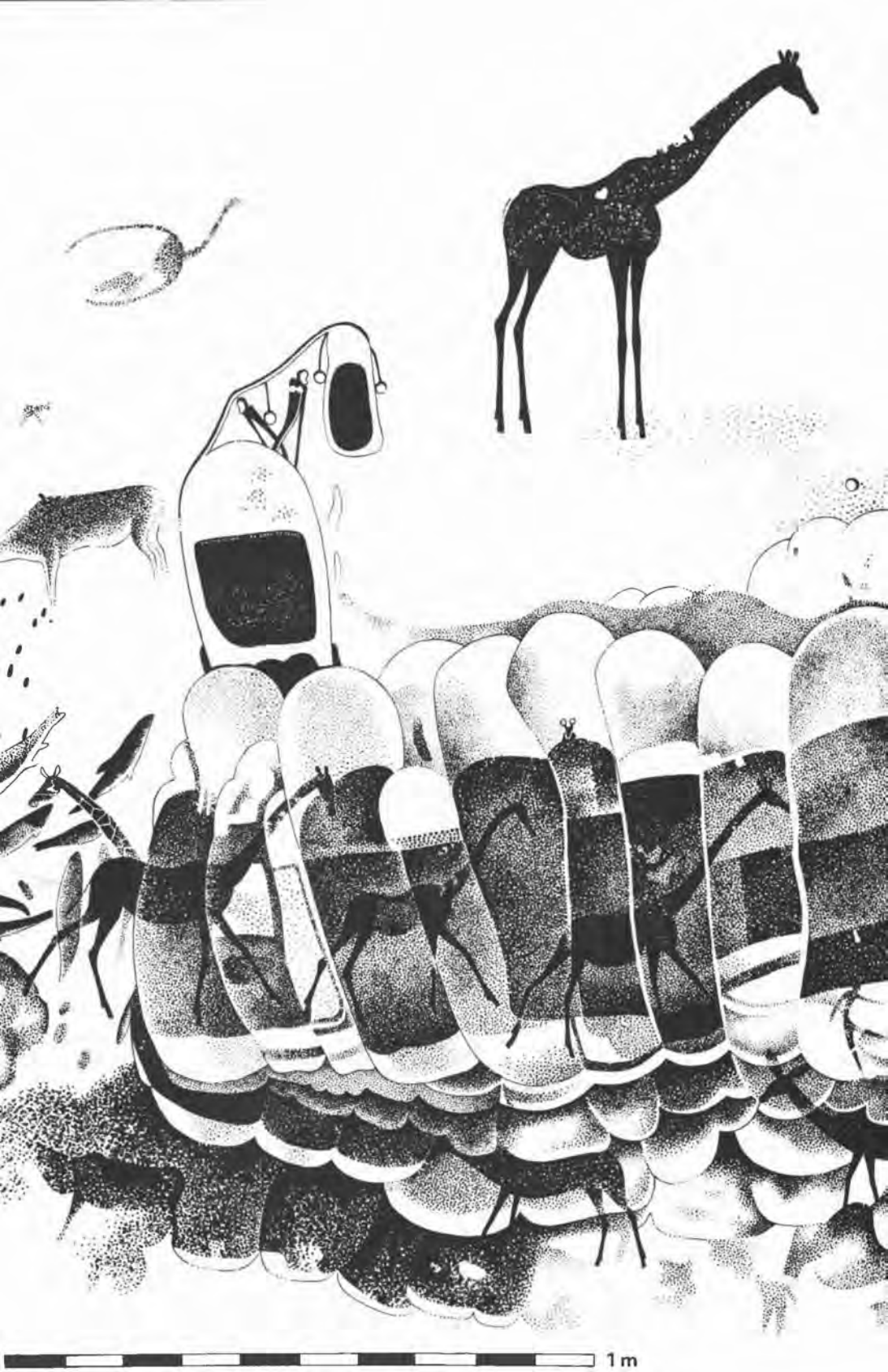
There is a sympathy with family groups and the intimate problems in human relations that still remain with us today. Artists have caught the very essence of these relationships and problems. One is compelled to suspect that in one picture the adulterer has been caught in the act!

There is also an imaginative development of the concept that all animals were once people. This is the opposite of the Australian Aboriginal concept that all people were once animals. The artistic expression of this concept has been achieved by painting people with animal heads and hooves, or in some cases elephant heads, trunks and feet.

'Flying creatures' range from normal people with their arms extended backwards or sideways, to creatures with buck heads and elaborate wings. The fact that these creatures are sometimes associated with human beings, even joined to them by lines, gives the impression that they have a spiritual significance.

Certain of the thoughts expressed in Bushman folklore are illustrated, notably the 'rain animal', a bull which sends heavy rain accompanied by thunder, or a cow which sends soft 'she rain'.

Men, women and eland in a meaningful relationship akin to bullfighting or the bull-jumping of ancient Crete is also a theme in some areas.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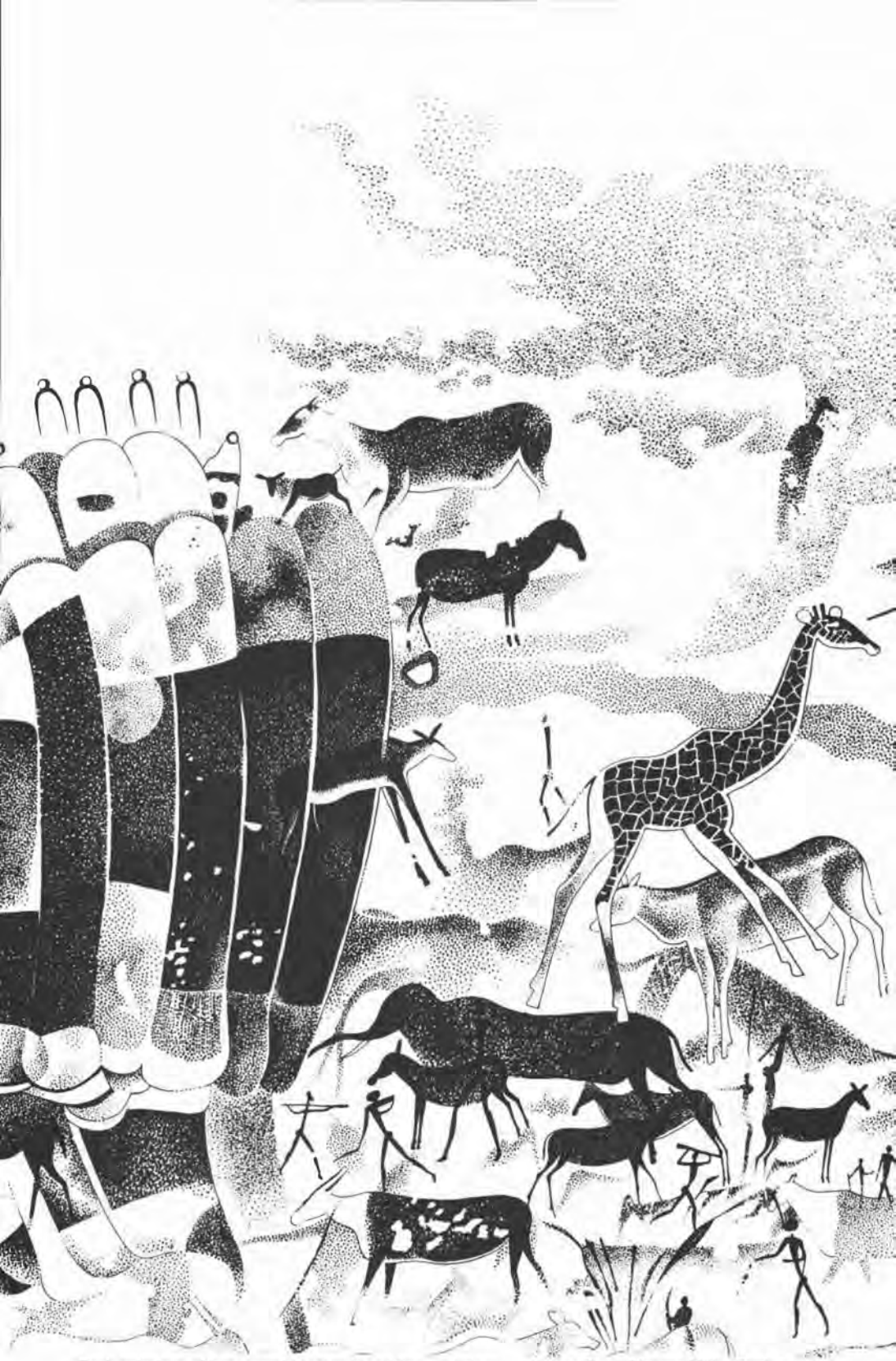


Rock paintings of honeycombs, animals and human beings — Inange Cave, Matopo Hills, Zimbabwe

Then there is the puzzling penis addition—a line, often decorated, at right angles to the penis that appears in many examples of the art.

Above all there is the ability to convey action. Men appear to leap across rockfaces with great *joie de vivre*, to recoil from the jump of a leopard, or to dance with exuberance.

The study of the art is obviously based on a great deal of fieldwork—looking at it and recording it. Early travellers and explorers left reports on the customs of Bushmen and a certain amount of their folklore was recorded during the last century. Studies of the Kalahari Bushmen have made it possible to make pertinent comparisons and to choose relevant lines of enquiry. Rock art studies provide useful material for both historical and anthropological research.

The sizes of the engraved and painted figures are relatively small in spite of the fact that the artists had many extensive rock faces at their disposal. Any works in excess of one metre across can be regarded as large. The average sizes are in the region of 300mm and many of the figures are even smaller—down to a miniature range of 50 to 10mm.

The paint was a variety of earth colours, mainly mixtures of iron oxide ranging from yellow to reds and browns, purple, white and black. These pigments were mixed with albuminous binders such as blood or egg yolk, and were applied with brushes made from animal hair or the quill of a feather. The precision and fineness of the application often testifies to the high manual skill of the artists. A few of the paintings were executed directly with the fingers. Most of the rock paintings are to be found under the overhangs of open rock shelters and on the faces of large fallen rocks. A few were executed on vertical cliffs and none are to be found in deep, dark caves. In sealed deposits a few paintings on loose stones have been discovered.

It appears that rock art studies in Southern Africa have already revealed one of the vital messages of prehistory. The ubiquity of antelope pictures and the illustration of rites performed in their presence suggests that sanctity was accredited to the very animals that were the hunters' prey. Moreover the 'lines of magic force' seem to demonstrate that a close bond existed between people and the animals around them.

The re-establishment of such a bond, even if it is less intimate due to circumstances of modern life, is the aim of the World Wilderness Congress. In many cases the tracts of land we wish to protect are veritable treasure houses of prehistoric art. Experiencing this art and the satisfaction provided by it is in itself enough reason to plead for the preservation of these sanctuaries.

ROCK ART OF CAPE YORK

Percy Trezise with Dick Roughsey

'White Ibis Gallery'—There are many other galleries in Cape York Peninsula as yet undiscovered.

Cape York Peninsula has several areas which contain minor examples of Aboriginal rock art but the main body of prehistoric and historic art occurs in the southeast section, located in shelters among sandstone plateaux which occupy an area of about ten thousand square miles.

The sandstone country is very rugged and harshly beautiful, dissected by deep gorges and creeks and topped by grey and red scarps. It is heavily timbered with an open forest of eucalypts and acacias. The area is presently used for open range cattle grazing.

Cattle mustering and mineral prospecting take place mainly along the creeks and river but, as there are virtually no valuable minerals in the sandstone, the rugged country remained unexplored and the existence of this vast and spectacular art body remained unknown. The Aboriginal tribes of the area had disappeared before the waves of European and Chinese prospectors travelling through it to the Palmer River goldrush in 1873 and 1874.

In 1960 road builders announced the discovery of several large and colourful galleries in rock-shelters near Laura. I inspected the new find and was convinced that the array of varied and colourful figures in a mosaic of superimposed layers must only be a small part of a large body of art throughout the sandstone region.

Since then my colleagues and I have employed aircraft for the

preliminary selection of likely areas, followed by intensive exploration using landrovers, pack and saddle horses, and on foot. After seventeen years of effort we have discovered many hundreds of galleries containing between them many thousands of figures. We estimate that we have discovered about 60% of what exists. So far this year we have found eighteen new sites containing over four hundred figures, some of them very spectacular. It is one of the largest bodies of prehistoric art in the world.

During the early years of our exploration we were able to gather much information about the engravings and paintings from the remnants of the old tribal people who had formerly inhabited the region. Much of the mythology concerning the land and its creatures, natural and supernatural, was recorded.

The rock shelters are found in the weathered bases of the scarps and under huge slabs detached from the layers of decaying sandstone. They are often located close to permanent water, sites which could be utilised during the wet season. During the dry cool winter months the families camped around waterholes or by drying swamps and lagoons.

The motifs engraved or painted depict men and women and all the animals, birds, reptiles and plant life of the wilderness, as well as ancestral beings and supernatural spirits both friendly and harmful, and all the things of daily life, their weapons, implements and utensils.

The art had many different motivations including ancestor worship, totemic ritual, love magic, hunting magic, sorcery, mortuary rites, fear of supernatural spirits, and ownership marks. There appears to be no 'art for art's sake'—everything had a specific purpose.

Most of the art depicts the more secular aspects of life—hunting magic, sorcery and love magic—and these figures are executed on the back walls and ceilings of living shelters. Art depicting secret and sacred ceremonies is usually found in sites unsuited for habitation, out-of-bounds to women and the uninitiated.

The first art style in chronological sequence is that of an early engraver, who appears to have been much concerned with emus. This has been dated by carbon-40 methods to a minimum age of 13,200 years B.C., though geological evidence suggests that it may be twice that age. The ancient style of engraving was succeeded by other styles of petroglyphs until engraving was abandoned for the easier and more spectacular pictographs employing ochre paints, these being plentiful in the area.

The superimposed layers of engravings and paintings are the recorded history of the people living in these sites over many millennia. The layers can be unravelled to reveal constant changes in the importance of motifs and motivations, reflecting population increases or decreases, changes in weather patterns and food supplies. There is evidence from remote times of affluent societies having leisure to ex-

ecute large works of art for totemic and ancestral worship while living well on succulent emus, and later evidence of the scarcity of meat, the people being reduced to living on nonda fruit, once the food of the emu.

The paintings portray the entire gamut of human emotions, of loves and hates, of joy and sorrow. The art was an ever-present part of daily life, a constant reminder of tribal laws and sanctions. The *quinkins* (supernatural spirits) painted on the ceiling of a cave and animated by the flickering firelight served to remind children of the presence of these dangerous creatures in the bush everywhere about them. Because of the Aborigines' animistic beliefs and their concept of genesis—that every living thing was once a person—everything about them was treated with due deference.

Two of the most important Aboriginal laws made this wilderness conservation possible: the law that clan land is all that you and your children's children will ever have, and the law that you take what you need from your land, but need what you take.

It is a never failing pleasure to be exploring the wilderness and come upon a new site. One is totally absorbed by the mystery of its remote past, sensing all the past pleasures, tragedies and events that have occurred there; the appropriateness of the ochre figures in their natural setting, and the awareness that countless generations of people lived here without causing any significant changes.

WILDERNESS AND THE HUMAN SPIRIT

Laurens van der Post

The verdant, rainforest-clad hills of the Cape York coastal range provide a space for contemplation

One of the salient facts of contemporary human experience is that our debt to life and nature is greater than our debt to science. Science has given us an enormous amount, and those of us who care about wilderness should acknowledge this, but it has failed us in not giving values.

Our values have to come from somewhere else. Now, my own source of values has never been purely rational. They are derived from something which in a more traditional time would have been known as the religious dimension of awareness. And I believe that if these values were to vanish, science and the scientists would vanish as well.

I realise, of course, that we are talking about a vast subject on which I could write a whole book, yet I have only a short chapter in which to share with you. My only consolation is even if I wrote a whole book the most important part of my thoughts would remain inexpressible. It seems as if we need to be conscious of the relationship between that within us that gives us our values, and that which makes us instinctively turn to and serve wilderness. To our development as in-

dividuals and as a human race this relationship is as crucial as it is mysterious.

Let me illustrate this by looking at a culture that is utterly contained in wilderness; still contained, as it were, in the garden which was our beginning. This aspect of ourselves we have not entirely lost, for wherever one goes and wherever one touches a human culture or civilisation there is a strange but all-pervasive nostalgia for something which people feel they have lost in the process of becoming who they are. And what is more, there seems to be a longing to return one day to that thing which has been lost, and to return in a way more meaningful than the manner in which it was left. Members of a culture which is still totally contained in wilderness, in the garden stage of our beginning, have something which distinguishes them most strikingly from most people on this planet. It is a primal fact of existence, a dominant feeling, that no matter where they go in life they are known. They feel that wherever they go in life they belong. In this world of ours we have lost this feeling of belonging. Yet at the same time we feel that we do know. We are the greatest civilisation of know-alls that has ever been created. St. Paul, in one of the greatest documents ever issued, spoke from the wilderness within him when he promised us and himself that one day we would know even as we are known. This is the quality that humanity once had within it, the feeling of being known.

How has this come about? How have we lost this sense of wonder, the very quality on which our being depends? The study of European history, the civilisation from which most of our values derive, indicates that gradually there has arisen a great cataclysmic divide within human nature. As we have become rational we have lost touch with our primitive nature, and as a result have lost touch with the sense of being known and of belonging. This divide has meant a loss of meaning in our hearts and minds. This is where we stand today. This is what wilderness is all about—a crisis of meaning in the modern world.

There are of course many external reasons advanced for this. All sorts of explanations are produced but I believe there is a fundamental and interdependent relationship—that the greater the divide, the greater the loss of meaning, and the loss of a sense of direction in life. And this great divide is what has arisen between the rational, consciously oriented in us and that which is symbolised by the wilderness within us. There seems to be a terrible sort of mathematical progression plotting the extent to which rationally controlled beings exploit the wilderness in the world and separate themselves from the wilderness of the spirit. Surely this quality of spirit tries to communicate to us day and night, through all that is instinctive and natural within us, offering a message of identity and meaning. I see people today as perilously poised between what they consciously profess and that for which they long instinctively and naturally. Even worse, this con-

scious self exploits us, putting us to a slanted use by distortion of nature and wilderness in the world without. These two forms of abuse—exploitation of the natural resources of the earth and the denial of the natural being within—are really one and interdependent.

A source of great confusion in the modern world is the idea that everything within us is subjective and that the truly objective world is outside us. This is as absurd as it is wrong. We have an immense objective world within us. This is the world with which modern psychologists are increasingly concerned. They have already discovered that this divide, this split, this schizophrenic condition of the spirit of contemporary humanity is due to the rejection, the neglect, the exploitation of this great objective, natural wilderness and garden world within our own spirit.

Perhaps the only truly great man I've ever known, Carl Gustav Jung, told me how as a child he discovered, to his great distress, that there were two states of mind in the world; one he called a natural and country mind, the other a town or city mind. This town mind was to him, as it is to me, daily becoming more unreal, terrifying and nightmarish, and the longing for a return to the natural or the country mind greater and more urgent. About himself as a young boy at school Jung wrote, "As I became more familiar with the terrifying life of cities, the stronger became my conviction that what I was getting to know as reality was not reality at all but belonged to a totally different order—a disproportionate abnormality of the spirit of man which passed itself off as reality. I longed for the view of reality which it seemed I lacked or had lost. I longed for the vision of the world as a country among rivers and woods, among men and animals and small villages bathed in sunlight with the rims of the clouds moving over them, encompassed by clear, dark nights—a world in which happily uncertain and unpredictable things can still happen. And the surrounding world of nature would be the world of the country which is no mere locality on the map, but is God's world, so ordered by him that it would be filled with secret meaning." And he went on to write how trees for him were not just trees but rather represented thoughts of our Creator, and as he walked through the forest it was as if he were looking at the act of creation itself and could feel the voice of the Creator speaking over his shoulder. This view accompanied him throughout his work, and encouraged him to become one of the greatest healers the world has ever known—a healer in the ancient religious sense of a person who unites that which has been divided and rejected, hurt and wounded within humanity. In other words, a healer makes whole, and it is interesting to note that this word 'whole' has the same origin as does our Saxon word 'holy'. Holiness and wholeness were one and, knowing this, Jung followed his search for understanding lack of wholeness through the lunatic asylums of Europe, finding them full of people who had been

driven insane by an upbringing which had divided their town and country minds. He did this by following the dreams of these people to what is instinctive, natural, and first in their spirit. This is especially relevant today in the Cape York Peninsula of Australia, where there are still people who believe and live in a moment which they refer to as dreamtime.

Jung found that the only way of closing the split, of healing the cataclysmic divide, was to build the instinctive and natural elements to balance the rational and scientific elements, so that the person was able to see that all these elements actually served one transcendent value. The moment this happened the madness, the abnormality, the exploitation disappeared and suddenly a great, new reverence for life appeared and there was nothing unreal left. Everything suddenly had a plus, a bonus quality which had been there, unseen, all the time. This is the quality which enables us to be always in touch with our life-giving dreamtime. Healed in this way, a person is conscious of all that is valuable communicated through dreams, which Jung referred to as the forgotten language of God. This is actually the great natural process which has occurred since humanity's beginnings, but which today is rejected just as our actions reject and exploit the world of nature.

How then are we put in touch with this process once again? It happens through the discovery that we really find our greatest meaning in serving both of the two great objectivities which I have mentioned. This means serving the outer world without regarding ourselves as dominant, and master of all we survey, but equally in the service of the great objective world within, which is an objectivity as immense and far-reaching as that which our rational outer self surveys. Even matter itself has a great, objective within. The physicist today can look into the nucleus of an atom and see it extend beyond the view of the most powerful electron microscope, until it becomes unsubstantial and unpredictable, behaving more like the substance of a dream or the substance of living thought. Humankind is subject to these two great objectivities, is the unique place of their meeting, and when this is acknowledged there is a personal experience and discovery of what the religious people in the old days called 'world without end'.

I use Jung's experience of nature and wilderness because, I believe, it is an experience which is confirmed in all of us who have truly experienced nature. Those of us who have experienced being exposed to wilderness, who have taken people into the wild areas and lived with them there, have witnessed a change within them similar to that which happened within Jung. Somehow they emerge from the wilderness transformed as if they were coming from a highly sacred atmosphere. Indeed, wilderness is the original cathedral, the original temple, the original church of life in which they have been converted and healed, and from which they have emerged transformed in a positive manner.

We know through our own experience that what Jung confessed so eloquently is true and applies to every one of us. It raises to immeasurable importance the urgency of the task, and the universal purpose of wilderness conservation. This is what Jung told me. But towards the end of his life, at the age of eighty-seven, he spoke of the great perils that threaten modern humanity: "Modern man has not truly looked into the great divide within himself, the great divide which separates him from wilderness and nature. And there is so much in nature which can fill us, day and night, through plants, animals and flowers, with the eternal in life, and the eternal in man. The more uncertain I have felt about myself and life, the more has grown in me, through nature, a feeling of kinship with all things. In fact, all that has been so long separated in me and the life of my time in the world has become transformed through this increasing familiarity with myself, filling me with a sense that is far more important than life, happiness and health."

I have not said half of what I wanted to say, but I would just like to finish with two stories. The first is from an apocryphal gospel from a Dead Sea scroll. It relates how Christ was asked by his disciples that same question which is asked in the New Testament, "How shall we know the way to the Kingdom of Heaven?" The version in the Dead Sea scroll, which is the oldest written testimony we have on the gospels, answers thus: "Follow the birds, the beasts and the fish and they will lead you in." And that, really, is what those of us who believe in wilderness try to ensure, and to do. It is all that we believe, and we can take that answer and carry it as a banner with what we are trying to do.

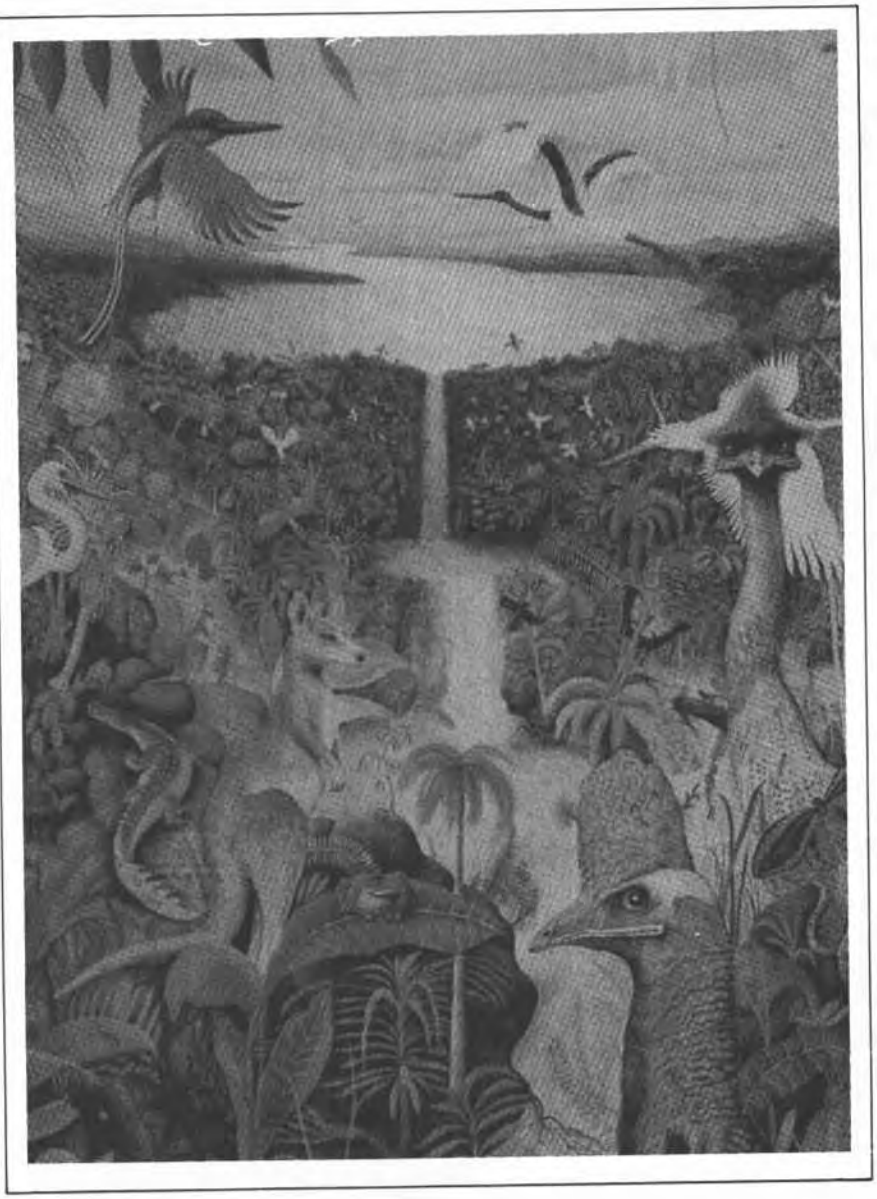
The other is a story of my own, one of those stories which are a part of the thirteen or so books which are in my head, clamouring to be written in the time which is left to me in this life. When I came back to the world, after ten years of war, ten years of death and killing, I found that I could not face society. I felt a strange instinct to go back to the wilderness of Africa, a wilderness which Ian Player and I have done so much to preserve. I arrived in Johannesburg on a very cold winter evening, and the man who greeted me at the hotel nearly fainted because he thought that I was long dead and he was actually seeing a ghost. I assured him that I was indeed alive and swore him to secrecy, and the next day I vanished. I didn't even go to see my mother, whom I hadn't seen for ten years and who believed me dead because I had been reported missing in action, believed killed. But I couldn't face human beings. I felt that I couldn't face this destructive, impossible species, so I went to live in the bush, alone. I remember the first evening in the wild, seeing the first kudu bull as I made camp on the Pafuri River. He came out of the river where he had been drinking, sniffing the air between him and me. He threw that lovely head of his back, and I looked

at him with a tremendous feeling of relief. I thought, "My God, I'm back home! I'm back at the moment when humanity came in, where everything was magical and alive, quivering with a magnetism from the fullness of whoever created it all." And I lived there for four whole weeks and gradually, through the animals, I was led back to my own human self. All the killing and death dropped from me, and only then could I go home and greet my own mother. But as I left this wilderness a tremendous thunderstorm began. For those who do not know, the African thunderstorm is unlike those in other places. They build up as temples in the sky, so that the sacred place of the earthly bush has a temple of heaven to support it. So as I was leaving this wonderful area the thunder rolled, the lightning flashed and the rain, which was needed so badly by the earth, started to fall. I felt that I had to say thank you in some way, and felt that I should do as does the bushman, by praying with my heart instead of talking with my mind. And I thought of the Lord's Prayer: "Our Father who art in heaven, thy will be done." "Yes, that's fine," I told myself, "since the rain is coming from the clouds and the mighty thunder is coming with it." But somehow, for me, this was not enough. It is not that I felt that I could improve upon this ancient and powerful prayer, but in that moment the smell of the earth, that marvellous incense that is created as rain is absorbed by a thirsty earth, made me feel another prayer, "Our Mother which art in the earth, may thy love be fulfilled, so that love and will become one."

I suggest to you that this is what wilderness means to us. May the will that is in Heaven and the love that is in Earth be one. And may the mind that divided us cataclysmically against ourselves, each other, and the earth, be subjected to the will of the Father and the love of the Mother, so that greed, lust, and the hunger for power that dominates human life today may perish forever, and humanity and nature again be united and at peace.

Wilderness is a large tract of entirely natural country. It is a region of original Earth where one stands with the senses entirely steeped in nature or, if you like, where one experiences a complete sensory deprivation of modern technology.

Bob Brown



WILDERNESS

A PLACE ON THE EARTH

Wilderness areas specifically discussed in this section


Iceland
Br. Isles
Europe
U S S R
Asia
Japan
China
Africa
Arabia
India
Borneo
N. Guinea
Australia
Tasmania
Antarctica
EASTERN HEMISPHERE

THE WILDERNESS OF CAPE YORK PENINSULA

J.P. Stanton

Blackbutt trees mirrored in Lake Coombo on Fraser Island, Queensland

To the north of Cairns lies one of the great wildernesses of the world, and to many of us who live here the wonder of it never dulls. Yet to many Australians it is an impediment to our betterment and a disadvantage we suffer in relation to the rest of the country. Its nearness often makes us nervous.

Cape York Peninsula lies between the approximate latitudes of 11° and 16° south. Its climate is hot and strongly seasonal. At Coen 98% of the average rainfall comes during the months from November to April. Iron Range, on the east coast, has 86% of its average rainfall in those months.

The heaviest rainfall is triggered by the arrival of the north-west monsoon in late December. For most of the rest of the year the prevailing south-east trade winds bring drought to all but the eastern coastal fringe north of Coen, where persistent cloud and light showers reduce evapotranspiration rates until late September. Total rainfall is between 1,000 and 2,200 millimetres per annum. Temperatures rarely exceed 40°C or fall below 10°C except at the highest altitudes.

The Peninsula can be divided into three geographic entities: Northern Cape York Peninsula north of the latitude of Princess Charlotte Bay; the Laura Basin and adjacent areas; and that part of the Gulf Plains which intrudes at the south-western extremity.

Northern Cape York Peninsula, that 400-kilometre-long finger pointing to New Guinea from the vicinity of Princess Charlotte Bay and averaging 200 kilometres wide, is the remotest and wildest part of the Peninsula. It is also the wettest part, and its high rainfall spawns large areas of lush and complex vegetation and abundant stream flow. A belt of high country close to the east coast follows the general north-south trend of the Peninsula from Weymouth Bay near Coen. Its alignment traps the moisture of the south-east trade winds, and the benefit of the cloud and regular light showers that this brings keeps at bay the drought that regularly plagues the rest of the Peninsula. Across the northern quarters of this sub-region the high country gives way to a gently undulating landscape of broad ridges, developed from siliceous sandstones. Massive aeolian sand deposits, now mostly fixed by vegetation, override the sandstone along the east coast.

Most of the country west of the ranges is a gently undulating plain. Its soils are derived from sedimentary materials, mostly weathered *in situ,* but with broad bands of recent alluvium along the major streams which almost bisect the Peninsula from east to west.

The Laura Basin and adjacent coastal country is the most accessible part of the Peninsula and the part most heavily visited. It is a flat plain of deep sediments, encircled by low mountains and hills on all sides except the north where it faces the sea. Included with this sub-region is a narrow strip of coastal country from Cape Melville to the Daintree River, which contains the highest and most rugged country of the Peninsula, rising to 1,375 metres at Thornton Peak. This coastal country also includes the great sand mass of the Cape Flattery area with its spectacular scenery of lakes and sandblows.

The accessibility of the Laura Basin is fortunate for the visitor as it is the most varied and interesting. All the major landforms and vegetation types of the Peninsula are found here, from the rainforest mountains of the Cooktown-Daintree area, to the dune-fields of Cape Flattery and the vast plains of the Normanby River catchment which pass from seemingly endless eucalyptus and melaleuca woodland, to palm savannah, the grasslands of marine plains, and the tidal salt flats which extend inland to over twelve kilometres from the sea around Princess Charlotte Bay.

The Gulf Plains sub-region which borders the Gulf of Carpentaria is mostly only just above sea-level. Throughout the Tertiary era some of the longest rivers of the state have wandered at will to leave a landscape dominated by old and recent alluvial plains and covered by grasslands and melaleuca woodlands. A feature of the coast is the very extensive marine plains and saltflats which broaden towards the south, and are the narrowest extension of an ever-widening belt of similar country that extends to the southern shores of the Gulf of Carpentaria.

When we put these three sub-regions together we have what has

Lake Calder, Lakefield National Park, Cape York

become known as the Cape York Peninsula Wilderness Area, a term which although in popular use has no legal standing. This is the area which is attracting increasing numbers of visitors with visions of adventure, excitement and challenge; and which leaves in the minds of most of them impressions of emptiness and vastness: 138,000 square kilometres with only 9,000 people—most of these living in the eight Aboriginal communities and the west coast bauxite mining town Weipa. The remaining towns of Coen and Cooktown together barely account for 1,000 people. The dominant impression is of a wide open country free of most restrictions: for some an opportunity to liberate the spirit; for others, unfortunately, an opportunity for unrestrained plunder and desecration of wildlife, beauty and aboriginal heritage.

But there are other impressions that will invade and dominate as knowledge and experience of this timeless wilderness grows; impressions that will live long and nourish love and respect.

There is, above all, the memory of peace. Day after day in the hot dry season there is the hush of endless silence that stalks from horizon to horizon and settles into night. It is a silence that belongs most to the open eucalyptus woodlands and the melaleuca plains, for in the rainforest there is the dropping of fruit and branches and the rustle of movement in the fallen leaves even on the stillest of days. Then there are the long cooler months of south-easterly wind; in the rainforest the canopy shakes and roars, and in the open forest and heathlands is a rising and falling like the echo of the sea in a shell held to the ear.

Then in November the silence comes again; the south-easter fades and dies and the first storm clouds of an approaching wet season drift across the sky. This is also the time of colour as a wash of colouring tints the canopy. With the first heavy storms the colour fades and the silence is broken as trees find new leaf and countless frogs emerge to call and breed, insects burgeon, and birds feed and call.

Water is an evocative word in the Peninsula. It sets the pace of life. Along the streams the sound of water in movement is forever echoed by the bubbling call of the yellow oriole. Birds continually move and call above the water and through the stream-bank vegetation, their vitality reaching crescendo at the honey-time. Then, as the tall melaleucas which line the streams and swamps burst into blossom and the air becomes sickly sweet with the strong caramel smell of their nectar, the senses are numbed with the sound and sight of flocks of thousands of brilliantly coloured lorikeets, hysterically screeching as they flash down the streams and into the trees. The trees, water and birds combine to create a spectacle of living beauty along the streams of Cape York Peninsula unparalleled in eastern Australia.

What separates Cape York Peninsula from other sparsely populated areas of Australia of comparable size is its high annual rainfall and the development and complexity of its vegetation. Here are

most of the features of the high rainfall belt of east-coast Australia which elsewhere have been annihilated or degraded. It represents our last chance to hold and protect the heritage of this part of the continent.

The Cape York Peninsula must be one of the most complex regions still left on Earth. There can be no more starkly contrasting ecosystems than those of the sclerophyll communities of eastern Australia and the tropical rainforest, yet here a wide range of variation in both these communities can be found in complex inter-relationship. There is little to equal the drama of complex rainforest giving way along an abrupt boundary to the harsh sunlit grey-green world of the eucalyptus forest or the single species monotony of a melaleuca swamp.

I have not chosen to give compelling scientific evidence of the value of Cape York Peninsula wilderness. I have, instead, preferred to dwell on the ways it can enrich the inner life of those who take the trouble to experience it. It may be desirable that rationality and science should rule the world, but there is little evidence that the behaviour of human beings was ever guided for long by their precepts. It is the heart that still rules, and if the morality of the arguments for caring for one of nature's last realms in this devastated continent (which Xavier Herbert so feelingly calls 'my poor destructed country') is not enough, the cold arguments of science will not suffice.

THE USE AND MISUSE OF WILDERNESS IN SOUTHWEST TASMANIA

Bob Brown

Franklin River

Wilderness is suddenly a topic for worldwide discussion. Why? Because it is on the verge of extinction.

This is a very clear example of that sad irony in human attitudes whereby our fascination with nature is galvanised by our success in destroying it. Witness the other contemporary examples of this remarkable but terrible fact provided by the recent upsurge of interest in whales, pandas and Cape Barren geese.

Yet, of all these intriguing things of nature, I would say wilderness will be the first to be made extinct. Certainly it is the only one of these examples in which the rate of its misuse and destruction is accelerating as its quantity diminishes.

In fact, in the last decade, more wilderness was lost from the face of our planet than in any previous decade in history—despite the great increase of community interest and effort to protect what is left of this valuable, vanishing resource. As things are going, we will all wake up in the dawn of the twenty-first century with not a scrap of wilderness remaining on the globe.

Unfortunately, wilderness—pure wilderness—is not readily identifiable to the world's public which has become so estranged from nature in this era of concrete and plastic conurbanisation. Wilderness is not trapped and put in display cages, never looks the same in any two

places, and has no response or even the possibility of a response to our human presence. It can mean different things to different people. And the confusion about the meaning of wilderness provides an ideal smoke screen for the misuser of wilderness while they proceed to exploit and destroy it.

It is clear that wilderness requires an unusual resolve from us if we are to protect it from misuse and destruction. In fact, it calls for a two-barrelled stand. A whale is a whale and a panda is a panda and a goose is a goose; we know without doubt what these things are and our resolve on their behalf is one-barrelled—we simply must protect them. But before protecting wilderness, we need to have lifted a first barrel in defence of the very concept, the real meaning of wilderness. We have to know what wilderness is and to stand honest and uncompromising about that definition.

Wilderness is a large tract of entirely natural country. It is a region of original Earth where one stands with the senses entirely steeped in nature or, alternatively, where one experiences a complete sensory deprivation of modern technology. Contrary to that which developers would have us believe, there is no room whatever in wilderness for roads, quarries, buildings or machines.

Once we have understood wilderness, the next step—the charging of the second barrel—is for us to stand in defence of its besieged remnants on Earth, against the aims of commercial exploitation or, as Sir Mark Oliphant* so clearly put it, against the ''so called 'development' of greedy men''.

Before I become more specific I must say a word or two about the eternal values of wilderness. We are less than the hundredth generation of technological humans set apart from nature. Hundreds of thousands

*Australian Wilderness. ACF p.11

The original Lake Pedder

of previous generations of our human and pre-human species lived in the total wilderness of Earth and, moreover, were a living part of that wilderness. It is no surprise, therefore, that we are all deeply marked by an affinity, both physical and spiritual, for the wilds. There is no one on the planet who does not lose when wilderness is lost, who does not have a far greater potential for fulfilment in life as long as wilderness persists and is protected on our small, crowded globe. As only those who have been in wilderness can fully attest, it holds unique and positive values for each and every one of us.

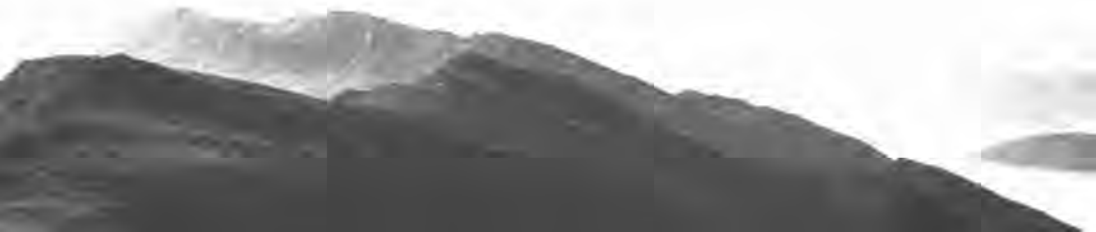
Though there is undeniable enjoyment to be had in modern travel and in facilities built in natural surroundings, this is not comparable to the fresh, pure dimensions of the wilderness experience. Words fail to convey why the experience of the true wilds is especially, incomparably fulfilling—just as words fall short in a description of the dimensions of the universe or of the fulfilment of love.

Just two centuries ago all of Tasmania, like all of Australasia, was wilderness. After the European colonisation most of the island was quickly transformed. Yet, amazingly, as late as 1965—just fifteen years ago—the south-west quarter of Tasmania remained an enormous wilderness.

The reasons for this have nothing to do with the grand beauty or fragility of the South-West. They are entirely related to the fact that the South-West was a rugged place with inhospitable weather and, so far as was known, its terrain was of no great commercial value. This accident of natural selection is the same one that has saved other remote and extraordinarily beautiful wild areas round the world from earlier destruction—the Himalayas, the Amazonian rainforest and Antarctica.

Together with Fjordland in New Zealand and Patagonia in South

Engineer Range in Southwest Tasmania



America, South-West Tasmania is one of the world's great southern temperate wildernesses. It is a land of snow-capped peaks shouldering glacial lakes, of broad button-grass plains and wild exposed shores, of swift-flowing rivers and ancient life-filled forests. And the South-West holds a fascinating community of life-forms, from the cetaceous giants which cruise in its ocean precincts to the unbelievably primitive shrimps which walk the bottom of its highland tarns; from the gnarled old Huon pines, some of which were well grown at the time of Christ, to the insects which share the same riverside domain but have lifespans of less than a day.

It is an unusually diverse country which has held the promise of fascination and spiritual satisfaction for endless generations of caring, respectful people—as the aeons of occupation by the Tasmanian Aborigines so amply demonstrate.

In the years since European colonisation and the ferociously abrupt extermination of those aboriginal wilderness dwellers, the South-West has mostly been empty of human presence. However, twentieth century prosperity brought the new Tasmanians more leisure time, and with adventure and stimulation more and more confined to their built-up, artificial surroundings, the trickle of people going into the South-West in search of its diverse and intangible rewards has turned into a torrent.

Whereas that remote mecca of Australian bushwalkers and mountaineers, Federation Peak, stood unclimbed in the South-West until 1949, it is now visited by hundreds of people annually. Whereas the Franklin River was 'unknown' just three years ago, it is now, suddenly, the nation's foremost wild and scenic river. Whereas the forests, swamps and gullies of the unnamed, most inaccessible corners of the South-West have remained unseen and unsung for ages, they are now being entered by the vanguard of what will be a veritable onslaught of visitors in future years.

The South-West, as with the world's other wild areas, is a modern Eldorado for those who would find some respite from this threatening, competitive world.

It would be tempting here to advance theories on wilderness management and on the ethics of wilderness travel and, indeed, on how its use by this flood of not-always-considerate visitors should be regulated to prevent their very presence ruining its essential character. But I will confine myself to one important speculation concerning wilderness usage. The age of science and technology, that traditional *bête noire* of conservation, may be galloping to the rescue of the world's wilderness.

Clearly, our global wilderness resource is already too diminished to accommodate the future interest of the many billions of us who are cramming its landscape. Yet, taking South-West Tasmania as our ex-

ample, wilderness can now be taken, through a burgeoning array of media, to people round the country and beyond. Some ten million Australian viewers, for instance, saw the remote reaches of the Franklin River on television programmes last summer. While such vicarious forms of enjoying wilderness are as yet primitive and frustrating, the possibility of such innovations as three-dimensional, 'sense-surround' television is real, and its potential is enormous. It holds the promise of more adequately tapping the limitless value of such a fragile, reduced wilderness and of sharing it with everyone on Earth, without it being trampled to death in the process.

And for those who raise their eyebrows at this and say, ''But it will never be the same as the real, on-the-spot experience,'' let me reply by saying that the world is in a mess. We shall only survive the present age of crisis if everyone forgoes much of what would have been their natural birthright in the pre-scientific age so that all can taste something of the earth's natural delight. The direct use of wilderness in times to come will be greatly restricted for us all, if we are to go about it wisely and ensure that there is a long-term prospect of our enjoying wilderness at all.

What, then, of wilderness misuse? South-West Tasmania has suffered, and is suffering, the most catastrophic misuse. In those last fifteen years, its wilderness area has been halved under the onslaught of the bulldozers and chainsaws of the state's Hydro-Electric Commission and forest industries. And, if present plans receive government blessing, the South-West wilderness will be reduced by half again within this decade, to a point close to its total loss. On top of all this, the mining companies are jostling for exploration leases on this magnificent natural domain.

The greatest single act of wilderness destruction in Tasmanian history occurred recently when the State Government gave its nod to the Hydro-Electric Commission's flooding of Lake Pedder, in the heart of the vast South-West wilderness. The overwhelming sense of awe and affinity for the natural universe which that region brought to its wilderness travellers is beyond description. Yet it is suddenly no more; it is an irretrievable wilderness lost in history. In its place is a visual quagmire of roadworks, quarries, toilets, powerlines, dams, dead trees and artificial impoundments.

It is an extraordinary tribute to the original majesty of Lake Pedder's environs that visitors continue to be impressed by the remnants of natural beauty left despite the HEC's flooding and constructions.

Meanwhile, south-east of the Lake Pedder hydro-electric scheme, forest industries are moving in to fell the last of the great forests of the South-West, their energy enhanced by the appalling wastage of hundreds of millions of dollars worth of alternate timber resources beneath the waters of HEC schemes, and especially that at Lake Pedder. Thirty

per cent of the South-West wilderness will be lost if the forest in the developers' sights is cut down.

The northern sector of the South-West wilderness faces a different but no less destructive use: another hydro-electric scheme. This sector holds in its heart the wild and scenic Franklin and Lower Gordon river system. The system's basin includes Australia's largest gorge complex, culminating in the Great Ravine on the Franklin River. Upstream from the Ravine is the incomparable charm of the Irenabyss chasm; to the south the Gordon Splits chasm; to the west the 700,000 year old Darwin Meteorite Crater; and throughout the system are limestone cliffs and caves, wonderful canyons, waterfalls and rock features, and a singular array of flora and fauna.

But the Hydro-Electric Commission is poised awaiting the State Government's go-ahead for its contentious Franklin-Lower Gordon scheme. The scheme would flood this rugged riverine wilderness in an orchestrated abuse, making talk of misuse by its growing horde of admiring visitors seem like that proverbial debate which took place over the rearrangement of the deck chairs on the Titanic.

Thus the cardinal abuser of South-West Tasmania is the state's own Hydro-Electric Commission, and it is clear that the Commission actually *wants* to build its schemes in these wild, wonderful places. Yet in justifying the billions of dollars such enormous undertakings cost, the Commission has needed to find a demand for the electricity that the schemes produce. In this its greatest respondent and ally has been the Commonwealth Aluminium Company Pty Ltd (Comalco). From the Lake Pedder scheme, for example, Comalco takes the largest block of power which, under a secret agreement with the HEC, it gets at less than a quarter of the cost per unit which Tasmania's householders and small factory owners pay.

Having said that, let me end on a positive note. Let us all be aware that the greatest misuse of wilderness begins with our everyday urban existence. Let each of us consider the wilderness in our day-to-day living and cut our consumer appetites for goods derived from wilderness-wrecking industries. And, finally, let me make a specific plea to help rescue South-West Tasmania's remnant wilderness from the proposed Franklin-Lower Gordon hydro-electric scheme. Acknowledging that there are good alternatives to hydro-electricity in Tasmania, I trust that Comalco will withdraw its notified intention to buy more electricity unless the state's HEC develops resources other than the wild Franklin and Lower Gordon Rivers. Such a change of attitude would surprise and gladden every heart here.

Were these companies to curtail or even reduce their intentions to enter new areas of the wilds of Australasia, it would make this Congress a singularly memorable event in the sad history of our devastation of our planet Earth.

Papua New Guinea

THE WILDERNESS AND PEOPLE OF THE STRICKLAND RIVER

J. Jerome Montague

Biami tribesman wearing kina shell and bamboo noseplug

New Guinea, and particularly the Strickland River basin, is still one of the world's great unknowns. The 320 mile long Strickland River flows from the central cordillera south to its confluence with the Fly River in the Western Province of Papua New Guinea. The Strickland was named after Sir E. Strickland of the Geographical Society of Australia in 1885 by the explorer Captain Everill. Massey Baker discovered Lake Murray by travelling up the Strickland and Herbert Rivers in 1915. Jack Hides travelled twice up the Strickland in the 1930s and reached a point 240 miles upstream from the mouth. Many parts of this fast silt-laden river are only visited every decade or so, and a section of the upper reaches has still not been fully explored.

The primary outpost in the area is the Lake Murray Station on an island in the lake, which was formed by the sinking of the middle Herbert River. There is no road within a hundred miles. The lowland waterways around Lake Murray are of surpassing beauty, but have never been visited by tourists. For most of the past two years I have lived here with a thousand captive crocodiles at the Baboa Crocodile Station. Until three months ago the nearest European was a lone missionary 180 river miles away. The Western province is the most sparsely populated in the country, and the Strickland River basin,

covering some 10,000 square miles in the northeast corner of the province, is the least populated of all.

The lower Strickland is the only section of the river that receives much impact from the outside. Three times a year the *M. V. River Fly*, a rusty fifty ton craft, makes the 350 mile trip up the rivers from the provincial capital in Daru to service the patrol post at Lake Murray. Weekly air charters to the grass field at the post bring mail and provide personal transport. Boat patrols from the Baboa Crocodile Station make quarterly visits to many villages, but there is less contact with the coast now than there was a few years ago, when expatriate crocodile-skin traders worked the area.

Despite thirty years of contact with this region, life for the majority of the native Kune tribesmen is unchanged from what it has been for the past few thousand years. Mission and constabulary efforts did manage to stamp out the headhunting which kept villagers isolated into pockets of fear. Some of the middle-aged Kune men have spent time in Daru's 'calabouse' for taking heads from the less powerful peoples of the middle Strickland.

All the houses are constructed from bush materials. Black palm strips are used for flooring while the walls and roof are constructed of woven sago palm leaves. The whole structure is bound together with canes. Houses are built on six foot posts to keep the dogs out and to allow for comfortable air circulation. Small huts on spindly twelve foot poles near the water's edge are for the exclusive use of women. Whenever a woman is having her period or is pregnant she leaves her proper home and stays in one of these shanties.

The village dress is traditionally a penis shell and twisted bark skirt for men and a grass skirt for women. Shorts purchased from the mission trade stores are fast replacing penis shells for men, but grass skirts still predominate for women. The men's dress becomes impressively ornate when a village decides to put on a 'sing-sing' or dance. For these events men add to their everyday dress by painting their skins with clay and ashes, donning bird-of-paradise and cassowary feather headdresses, and placing giant kina shells around their necks. The kina shell was once currency throughout New Guinea, and the kina is now the currency in Papua New Guinea. Chest-high 'kundu' drums carved and burned from solid logs and capped with goanna or filesnake skins provide the rhythm. Singing generally takes the form of whistling and hooting, with an elder leader (recognised by his tiny token drum and fluffy white egret feather headdress) crying out a story of the past. Dancers act out the incident. Wars, hunting exploits and love affairs are the primary themes of these dances. Women do not generally participate but show their appreciation for the men by mimicking and mocking them.

The lifestyle of the people is that of hunter-gatherers, a rarity in the

modern world. The bland white starch of the sago palm is the staple food. The preparation of sago, like most of the work, is the responsibility of women; hence a man's desire to take as many wives as he can afford. Bride prices are high and may obligate a man to supply gifts to his spouse's family for years; most men cannot afford more than two or three wives. Temporary camps are set up in the swamps to 'make sago' where the palms are cut down and the pith hollowed out. Troughs are built from sago bark at the water's edge, and the pith is placed in it and beaten with sticks. The starch runs into another bark tank below the surface of the water leaving the woody material to float away leaving a white powder on the bottom. This substance is then collected and baked in leaves or bamboo tubes, often stuffed with cassowary or flying fox meat. Sago cooked in this manner is a gooey cake with an agreeable flavour.

The men spend their time making weapons or stately forty-foot dugout canoes with ten-foot paddles, hunting or just lounging around. Almost all hunting is done with a bow and arrow. Arrows range from simple bamboo blades to the most wicked of them all, an elaborate arrow armed with numerous echidna quills which will not pull out of the victim. Animals hunted for food include goura pigeons, turtles, waterfowl, pigs and cassowaries. These latter two species are often held in captivity to be used for paying bride prices. Although this area is over three hundred miles from the sea and is purely freshwater, a surprising number of marine creatures are found here such as shark, stingray and seventeen-foot long sawfish. Throughout Papua New Guinea mammal diversity is poor, and while there is an abundance of bird species the numbers of individuals are not plentiful. There are no restrictions on hunting as long as traditional methods are used, but this low density of wildlife is a natural phenomenon and not the result of hunting.

Most of the Strickland basin is flat. Although hundreds of miles from the sea, the area is less than forty feet above sea level, resulting in a swampland. This is a prime habitat for crocodiles; freshwater crocodiles predominate but the wide Strickland harbours a number of the saltwater species, the world's largest crocodiles. In October 1979 a twenty-foot long 2,200lb 'saltie' was drowned in a fishing net at the Strickland-Fly junction. While salties have been variously reported to attain lengths of 27 to 33 feet, this drowned animal is the largest crocodile measured to date from which skin and skull are available for inspection.

In 1977 the Food and Agriculture Organisation of the United Nations began a two million dollar project called 'Assistance to the Crocodile Skin Industry of Papua New Guinea'. The goal of this project was to revitalise the industry and guide the wise utilisation of this valuable resource. It was noted from the beginning that crocodiles would be the only means of income for the unsophisticated bush people

Kangwezi chasm on Strickland River

Kune warriors at Lake Murray

of the area. The plan was implemented by setting up village crocodile farms and initiating a live crocodile buying scheme. Since natural mortality is very high among hatchling and yearling crocodiles, the harvesting of this segment of the population would be least damaging to the productivity of the total population. Mortality in farms is considerably lower than it is in the wild, and growth rates are faster for farmed animals. Crocodiles are raised in pens for three years until they are about five feet long. The crocodiles are then harvested and sold to local skin buyers for about US$120. The skins are exported primarily to France and Japan. The sale of skins from adult crocodiles was banned, thus protecting the breeding population from skin hunters.

In time it is hoped that the killing of wild crocodiles will cease entirely, and villagers will only capture small live crocodiles, either putting them into farms or selling them for a high price to the Wildlife Division to resell to farms in other areas.

Some miles up the Strickland from the Herbert River junction the wild sugarcane that marks the river's course gives way to rainforest. Many of these mammoth trees have base circumferences of sixty to ninety feet. Mudbanks diminish and long gravel bars prevail. Although the river is still fifteen feet wide in places, the current picks up measurably from five to eight miles per hour. When I came down the middle Strickland in November 1979 conducting a crocodile population survey, it was the first time in over a decade that a motor had passed over this stretch of river. Because of this lack of disturbance crocodiles were plentiful with densities as high as five per mile. There were many adults, and these crocodiles would lie on the bank unafraid, allowing us to approach within inches of them. It is difficult to get closer than a hundred yards to an adult on the lower reaches where hunting is continuous.

Since the Kune people of Lake Murray hunted heads until recently, it is not surprising that few dwellings exist on the Strickland within a hundred miles of the Herbert junction. Beyond this there are again inhabitants. On the western bank of the river are the Pars, a non-aggressive group of forest people that first received contact from the Asia Pacific Christian Mission in 1962. Most of the Pars live inland from the river, but small family groups of up to thirty people occasionally build villages along the banks. The Pars are not closely related to the Kune of Lake Murray. Instead of penis shells, the men wear a nut. Necklaces worn for sing-sings are made from cowrie shells and headbands from cus-cus fur and pigs' teeth and the artful use of clay, natural dyes and grass complete the outfit. If a woman is required for a role in these all-male dances, a teenage boy is skilfully dressed for the part.

The eastern shore of the river is inhabited by fierce cannibals known as the Biamis. These people are easily distinguished from other

tribes by their habit of wearing long bamboo plugs through holes cut in their nasal septum. They wear 'bilum' (bark cloth) loin cloths. This group has long been a thorn in the administration's side. In 1969 a government outpost was attacked and burned down by the Biamis and the station has been abandoned ever since. Cannibalism has largely been stamped out, but it does still occur and several Biamis are currently serving prison terms for committing this offence. Biamis are more closely related to highlanders than lowland Papuans. They are subsistence farmers growing banana and kau-kau (sweet potato). They do hunt but are not hunter-gatherers like their southern neighbours.

In the limestone mountains of central New Guinea lies an incredible gorge five thousand feet deep. Sinclair describes it thus: "Here razorbacks of rock tower out of an emerald grassland to form arcs like crater rims that fall sheer away; deep in the cliff snarls the wild white river. Here indeed is the grim lost world grandeur." This gorge, starting at the junction of the Ok Om and Lagaip Rivers, is the birth of the Strickland River. This gorge cuts its way south for eighty miles before entering the foothills.

Although several parties had seen the gorge prior to 1979, only two expeditions were extensive, and both met with disaster. Jack Hides came up from the south in 1938 looking for gold. He reached a point roughly one-third of the way through the gorge. Seven days after entering the gorge five of the carriers died of beri-beri and were left unburied on the track. Hides never found gold, his partner died of dysentery and Hides himself died a year later.

In 1954 Desmond Clancey led a difficult foot patrol along the entire length of the gorge but did not descend to the level of the river in many sections. He reported few inhabitants except for some cannibals who wore bean gourd phallocrypts. At the end of the gorge near the Burnett River junction Clancey put his group into canoes, only to encounter a giant whirlpool. A forty-foot long dugout spun like a toy in a bathtub, carrying eight Huri carriers to their deaths.

A year ago I learned that a British expedition led by Major Roger Chapman was going to attempt to traverse the gorge in inflatable white-water boats. Having had white-water experience and wishing to continue my crocodile survey to the upper reaches of the Strickland, an invitation from Major Chapman to accompany the expedition was well received. In October 1979 I flew to Lake Kopaigu in the Southern Highlands Province to meet up with the seven other expedition members. Here, among the Dunas and the Huris from Koroba, carriers, guides and interpreters were recruited. These tribesmen are the most elaborate dressers I have seen in Papua New Guinea. They make 'wigs' of human hair which they dye and adorn with flowers and plumes. In front the men wear a bilum material loin cloth and over their buttocks a fresh handful of 'ass grass'.

By the time we set out for the gorge laden with food, oars and rowing frames for the boats, we numbered thirty people. We snaked through rainforests and dried up river beds, and traversed the semi-arid kunai grass country that drops into the gorge itself. Upon reaching the river the carriers were paid off and sent back and a D-C 3 aircraft from the Papua New Guinea Defence Force parachuted our boats in to us.

The rapids were as challenging as any on earth. Tributaries often poured out of holes in the limestone and tumbled into the river. One of the most notable finds was the discovery of a four-hundred-foot long cane bridge over the gorge; a remarkable feat for native engineers. Although we did not encounter any people, this bridge, the sighting of numerous grass fires and the finding of a stone axe indicated that people do frequent the area.

The most serious obstacle we encountered was a chasm where the river runs through a fifty-foot-wide sheer walled gorge for a mile, before falling over a twenty-foot waterfall and plunging into granite chasms of unknown depth, less than five feet wide and several hundred feet long. A few miles below this chasm one of the boats was lost while trying to line the inflatables through a particularly treacherous rapid, and to add to our problems, the radio broke. By prior arrangement Australian helicopters would check on us if radio contact was lost, and the eight of us loaded the remaining boat into the helicopter and flew down the gorge. With sore disappointment we looked down on that last section, named Devil's Race and Falls Gorge by Clancey.

Although the Strickland will probably remain largely unchanged for many years, development plans for the coming decade will almost certainly alter this wilderness. On a tributary of the upper Fly River to the west of the Strickland, gold and copper reserves worth US$6 billion have been discovered. The Ok Tedi mine, to be operated by a consortium of American, Australian and West German companies, will be opening in the 1980s to tap these resources.

There have been proposals to set up a resort on Lake Murray of Ok Tedi employees. A planned resettlement scheme in the largely uninhabited rainforest north of Lake Murray will surely affect the Strickland wilderness adversely. This project calls for a road connecting Kiunga on the upper Fly to Nomad east of the middle Strickland. While the people of the Strickland should not be barred from receiving their share of development, a plan to protect the character of this extraordinary wilderness should be mandatory. Diamond and Raga suggested turning most of the Strickland into a national park or a wildlife management area. No part of Papua New Guinea is as sparsely populated as the Strickland, and it would be a natural choice to set this area aside as wilderness.

THE ANTARCTIC WILDERNESS

P.G. Law

Field camp on dog sledge trip to Hordern's Gap

Antarctica is the coldest, highest, driest and least-known continent in the world. Its area is roughly one and a half times that of Australia and about three per cent of its surface comprises exposed rock; the rest is ice sheet. The surface of the ice sheet slopes rapidly up from the coast to form a vast inland plateau whose mean altitude is about two and a half thousand metres above sea level. The highest part of the plateau is 4,200m above sea level.

The ice sheet is remarkably thick, averaging over 2,000m in depth. It reaches its greatest thickness inland from Australia's Casey Station, where 4,800m of ice overlie the bedrock. This ice sheet constitutes the world's largest reservoir of pure water—24 million cubic kilometres of ice.

Around the coast in some places there are mountains. Inland, only the tops of the highest mountains protrude from the plateau in a featureless expanse of ice and snow. The highest mountain in Antarctica is the Visnon Massif, 5,140m high.

Temperatures at different places in Antarctica vary greatly, according to season, latitude, altitude and distance from the sea. In general, coastal temperatures vary from around freezing point in summer to -30°C to -70°C in winter, while inland, on the high plateau, they range from a summer figure of about -30°C to a winter low of more

than 70°C below freezing. The lowest temperature so far recorded was -88.3°C at Vostok.

Most of Antarctica is a desert, the precipitation (in the form of snow) occurring mainly in coastal regions. Such snowfall varies from 20 to 50cm per annum of equivalent water, but inland on the plateau the precipitation is down to less than 5cm per annum.

Most of the coast of Antarctica is inaccessible to ships from April until October, and heavy pack ice prevents access to some regions even in mid-summer. Only three or four airfields exist.

Measured in terms of being undisturbed by people, Antarctica constitutes the world's greatest wilderness. The difficulty in gaining access to this continent and its inhospitable climate have discouraged the depredations that have happened elsewhere.

The first party to spend a winter on the Continent was that of Carstens Borchgrevink, a Norwegian who took a British expedition to Cape Adare in 1899 in the ship *Southern Cross*. During the next fifty years, expeditionary groups of various nationalities maintained stations, off and on, at various points on the coast.

No party had ever experienced a winter on the plateau until a Russian expedition in 1957 established a temporary International Geophysical Year station at Pionerskaya, inland from the main base at Mirny.

The I.G.Y. saw the opening up of Antarctica, but it was not until several years afterwards that all the major features had been photographed from the air and accurately mapped. Even now there are many areas that have not been visited.

To this day there has been no exploitation of any of the Continent's resources. Thirty to forty expeditionary bases have been established at points widely distributed over its surface, and scientists and technicians carry out research in a great variety of disciplines to extend our understanding of this unique region. The winter population of the whole Continent is less than a thousand people.

A number of nations claim territory in Antarctica: Argentina, Australia, Britain, Chile, France, New Zealand and Norway. At the end of the I.G.Y., in the climate of international accord then existing, the U.S.A. proposed that the nations involved should be parties to an Antarctic Treaty that would push territorial claims, together with the tensions that they generated, into the background, and stress aspects of international collaboration and co-operation in scientific research and other activities.

The Antarctic Treaty, drafted in 1959, had been ratified by mid-1961 by all the twelve countries named in the preamble: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, U.S.S.R., U.K. and U.S.A. Since then the following nations have acceded to the Treaty: Brazil, Bulgaria, Czechoslovakia,

Denmark, The Federal Republic of Germany, the German Democratic Republic, The Netherlands, Poland, Romania and Uruguay. Of these, only one—Poland—has earned the right, by establishing an Antarctic base, to attend the Treaty Consultative Meetings which are held every two years.

It should be noted that the provisions of the Treaty apply to the area south of 60°S latitude, including all ice shelves, but nothing in the present Treaty shall prejudice the rights of any state with regard to the high seas within that area.

As there is no indigenous—or even permanent—population in Antarctica, and no industry or commerce, the application of measures to conserve species and protect the environment is a much simpler matter than on any other continent. That such measures have been designed so soon after the opening up of the continent to human activity has helped considerably in making them effective, as also has the fact that all expeditions since the Treaty have been national ones controlled by governments. In consequence, it can be fairly stated that no other large area in the world is as effectively controlled in these aspects as is the Antarctic Continent.

This is not to say that it was easy to obtain agreement between the nations concerned, or that there are not many problems remaining to be solved. It has taken twenty years for the twelve nations that originally signed the Treaty to achieve the present state of accord, yet questions of exploitation of Antarctic resources on land and in the surrounding seas have not yet been resolved.

Antarctic Treaty Consultative Meetings provide the major forum in which the Treaty parties exchange information, consult on matters of common interest about Antarctica, and formulate recommendations to further the principles and objectives of the Treaty. Over the past twenty years much has been accomplished through these meetings, the major achievements being:

—the adoption in 1964 of 'Agreed Measures for the Conservation of the Antarctic Flora and Fauna'
—the designation in 1966 of 'Specially Protected Areas' to preserve their unique ecological systems'
—the designation in 1975 of 'Sites of Special Scientific Interest' to enable scientific investigations to be carried out at those sites without interference or disturbance
—the negotiation in 1972 of a measure for the 'Conservation of Antarctic Seals'
—important work is proceeding which is aimed at establishing a 'Convention for the Conservation of Antarctic Marine Living Resources'

—control of the exploration for and exploitation of Antarctic mineral resources is being explored.

One of the original articles of the Treaty has great significance for conservation and protection, namely Article V, which states that "Any nuclear explosions in Antarctica and the disposal there of radioactive waste material shall be prohibited," and that "In the event of the conclusion of international agreements concerning the use of nuclear energy, including nuclear explosions and the disposal of radioactive waste material, to which all of the Contracting Parties whose representations are entitled to participate in the meetings . . . are parties, the rules established under such agreements shall apply in Antarctica."

The International Council of Scientific Unions set up in 1959 a committee called the Scientific Committee on Antarctic Research (SCAR). It is non-political in character and comprises one delegate from each nation which maintains a station in Antarctica, together with representatives of the World Meteorological Organisation and certain Unions of the International Council whose interests extend to Antarctica. SCAR has been very active in providing the basic scientific data upon which the Treaty Consultative Meetings base their decisions.

At the various Consultative Meetings that have been held (the first at Canberra in 1961 and the tenth at Washington in 1979) a number of recommendations have been made, most of which have now been accepted by all the signatories to the Treaty. The recommendations spell out in considerable detail the regulations that have been drawn up to protect the Antarctic environment, and governments of Treaty Nations ensure that these are observed by their national expeditions. Loving and Prescott summarise the measures in the following terms:

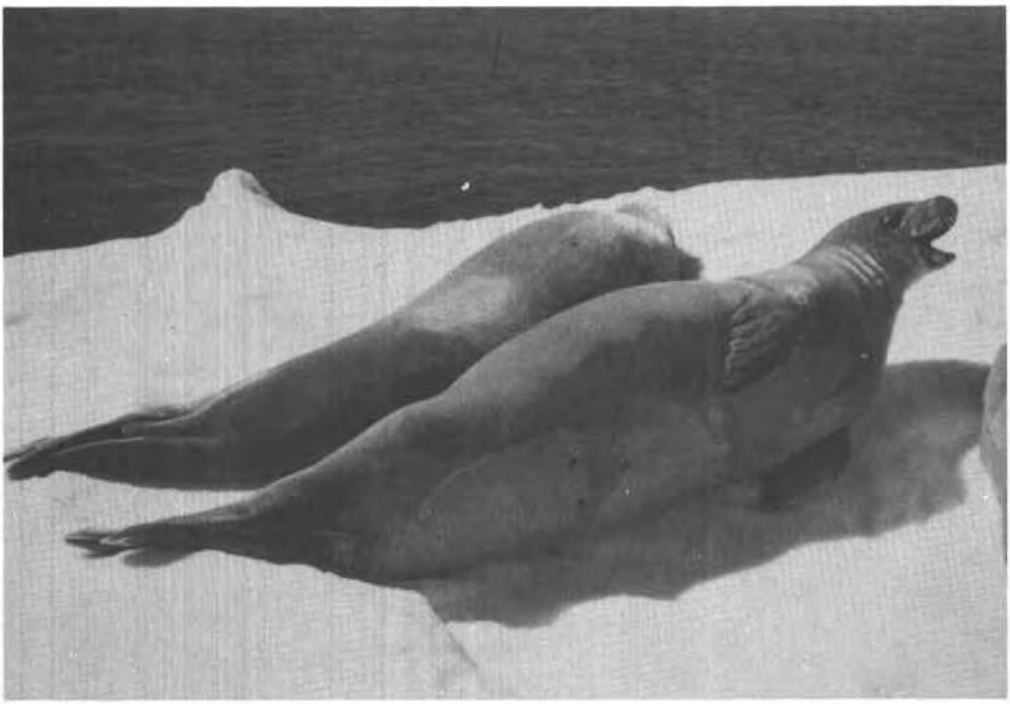
> First, it was urged that local stocks should only be depleted for collections for scientific study, to provide essential food for men and dogs, and to furnish living specimens for zoological gardens. Specimen collection for private purposes was discouraged except on a very limited scale, using wherever possible natural casualties. Second, it was recommended that alien forms of flora and fauna should not be introduced except under the most stringent controls. Third, harmful activities which should be avoided were identified. They include allowing dogs to run free, flying helicopters close to bird and seal colonies, using explosives or firearms close to colonies, and discharging oil into the sea or onto ice shelves.
>
> The eighth recommendation of the third meeting produced fairly precise rules to regulate conservation programmes in Antarctica. After noting that the agreed measures applied to the Treaty Area without affecting the rights of any country in respect of the high seas, five sets of rules were set out. First, it was stipulated that each government would prohibit the killing, wounding, capturing or molesting of any native mammal or bird, except in accordance with a permit. Permits were only to be issued for the provision of indispensable food,

and the collection of specimens for study and zoological gardens, and they were to be issued in such numbers as would guarantee that replacement could take place by natural increase in the following breeding season. Second, in order to provide a body of information on which estimates of the correct number of permits could be based, countries were invited to provide statistics on the numbers of mammals and birds killed, the status of species which might need protection, and the number which could be harvested without causing dangerous depletion. Third, the list of actions which should be avoided was repeated from the report of the first meeting. Fourth, it was agreed that certain species and certain areas should be designated as 'specially protected species' and 'specially protected areas' and subject to very careful control. Specially protected species can only be collected for a compelling scientific purpose, and provided such collection will not jeopardise the existing natural ecological system or the survival of that species. According to the agreed measures, in the specially protected areas it is forbidden to collect any native plant without a permit, and to drive any vehicle. Fifth, prohibitions were placed on the import of alien animals and plants except for scientific purposes, under strict controls, and countries were urged to take particular care to avoid the introduction of any diseases or parasites into the Treaty Area.

At the seventh meeting in Wellington the need to protect certain sites of special scientific interest was raised, and the third recommendation dealt with this subject. The representatives recognised that scientific investigation could be adversely affected by accidental or wilful trespass, and that designation as a specially protected area was inappropriate for a location where research into flora and fauna was continuing, or where the interest centred on the area's geology or geomorphology. To meet these anomalies it was decided to invite the Scientific Committee on Antarctic Research to make suggestions for the designation of sites of special scientific interest, together with proposed management plans for each site. The first seven sites of special scientific interest were nominated at the eighth meeting in Oslo.

In 1970, at the sixth meeting, attention was focused upon human activities which might have a harmful effect on the Antarctic environment. The general recommendation produced by the discussion called for the Scientific Committee on Antarctic Research to be invited to identify the types and extent of human interference which have occurred in the Treaty Area, and to propose measures which would minimise any harmful effects. The question was discussed in detail at the eighth meeting in 1975, when a code was proposed for the conduct of activities by teams in the Antarctic. In respect of solid waste it was recommended that batteries and all plastic and rubber products should be removed from the Treaty Area; all non-combustibles should be incinerated and the ash disposed of at sea. Liquid waste, such as human waste, garbage and laundry effluents, should be macerated and flushed into the sea, while large volumes of photographic liquids should be treated for the recovery of silver before flushing the residue into the sea. Waste containing radio-isotopes must be removed from the Treaty Area.

At the Santiago meeting in 1967, the question of tourism in Antarctica was raised because of fears about the adverse effect which such traffic might have on the environment and on scientific experiments. Some general principles were established at the sixth, seventh and eighth meetings; they included the right of station commanders to stipulate which areas might not be visited by tourists either because of the danger to life or the possible interference with scientific experiments, the exclusion of visitors from specially protected areas, and the need to respect historic monuments. Tour organisers must give assurances of



Weddell seal and pup

Emperor penguins at hole in the pack ice

compliance with the terms of the Antarctic Treaty, make final arrangements with station commanders between 24 and 72 hours before the date of arrival, comply with any restrictions on movement, avoid specially protected areas and respect designated historic monuments, and inform the government whose stations they have visited of their itinerary and the number of people landed at each station.

At the fifth meeting in 1968 a working group prepared a draft convention for the regulation of pelagic sealing, and it was agreed that it would be considered at the sixth meeting. A warning of the problems ahead was sounded by Argentina's delegate when he stated that recommendations regarding pelagic sealing must not be considered as a precedent affecting in any way the application of the provisions of Article VI of the Antarctic Treaty. Article VI stipulated that the Treaty does not affect the rights of any States in respect of the high seas within the Treaty Area. When the sixth meeting was held it was decided that the conservation of seals in the sea does not fall within the scope of the Antarctic Treaty, and so the matter was not pursued formally. However, the member states convened a separate meeting in London in February 1972 and adopted the Convention for the Conservation of Antarctic Seals. This convention follows the earlier draft very closely.

No living creatures apart from a few mites and insects have a permanent habitat on the Antarctic continent. The birds and seals derive their food from the surrounding seas and come ashore to breed.

The birds breeding on the continent comprise penguins (4 species), fulmars (5), storm petrels (1), cormorants (1), prions (1), gulls, skuas and terns (4) and sheathbills (1). If the milder area of the Antarctic Peninsula is excluded, this list of 17 species reduces to 11.

The species of seal that frequent the continent and its nearby pack ice are the Weddell seal, the crabeater seal, the Ross seal, the leopard seal and the elephant seal. On the islands further north fur seals are found.

Whales are the other mammals of the Antarctic, but they do not emerge from the sea and lie around on the ice or rock as the seals do. There are twelve species, divided into two families—the baleen whales and the toothed whales. The former feed on krill and the latter on fish, squid and, in some cases, seals and penguins. Only six species have been commercially exploited—the blue, the fin, the sei, the minke, the humpback and the sperm whale.

The flora of Antarctica is remarkably restricted. This is not entirely because of the cold. Antarctic conditions are not suitable for soil formation, and the extreme dryness of the desert climate inhibits growth. Algae and mosses are plentiful in coastal regions, when melt-water in summer and nutrients from around bird-nesting sites encourage growth. Lichens are the most widely distributed flora, and they can be found wherever rocks outcrop from the continental ice. There are only two species of flowering plants, grasses which grow in the milder climate of the Antarctic Peninsula. There are about 360 species of algae, 400 of lichen and 70 mosses.

The seas surrounding the continent are particularly rich in life. This is partly because the solubility of gases is greater in cold water; partly because the convective stirring caused by temperature differences brings up mineral-rich water from lower levels to the surface; and partly because in summer the long hours of daylight permit continuous photosynthesis.

However, this distribution of different forms of life differs from that of temperate waters. There is an immense abundance of phytoplankton and zooplankton at one end of the scale and an abundance of large creatures at the other end, but the intermediate species—fish—are restricted in variety, and much smaller in numbers than in tropical or temperate waters. There are only twelve species that seem to offer commercial possibilities. There is one exception to this; there is believed to be a great abundance of squid. We have very little knowledge of the extent of the squid population; all we know is that undigested squid beaks are found in the stomachs of many of the toothed whales, seabirds and seals that are caught, demonstrating that they form a major source of food for these creatures.

Of greatest immediate interest are the zooplankton, in particular the shrimp-like euphausids that grow to a maximum length of about 7cm. These 'krill', as they are called, form the staple diet of the baleen whales, the crabeater seals and many penguins and other seabirds. Modern technology has devised means of harvesting krill in great quantities and preparing it for use as food for stock, poultry and human beings. Developments in the last ten years have been remarkably rapid. A number of nations—the U.S.S.R, Poland, West Germany, Norway, Chile, Argentina and Taiwan—are either investigating the harvesting of krill or actively carrying it out. It has been estimated that a quantity of krill equal to the total world catch of fish could be harvested each year (about 70 million tons) without detriment to the maintenance of the stocks. However, the effect upon the ecosystem as a whole is unpredictable at present.

The great decrease in the number of whales over recent years has obviously made available more planktonic food for the seals and penguins, so a certain amount of harvesting of krill would merely restore the balance. However, we do not yet have enough data to enable us to assess the situation and define controlling limits. In order to deal with this problem the Scientific Committee on Antarctic Research, in collaboration with the Treaty Nations, is carrying out an extensive investigation called BIOMASS (Biological Investigation Of Marine Antarctic Systems and Stocks).

The fact that the Antarctic Treaty does not cover the high seas, the involvement in krill fishing of nations like Taiwan which are not signatories to the Treaty, the lack of quantitative data concerning krill in the ecosystem of the Antarctic seas, and the speed with which the

Adélie penguin rookery

exploitation of krill on a commercial level is developing, all underline the difficulties being faced by the Treaty Nations in producing a definitive regime for the conservation of marine living resources and the urgency of reaching agreement upon it.

The Antarctic Treaty says nothing about exploration for or exploitation of the mineral resources of Antarctica; yet it is clear that conservation and environmental protections in this region could be adversely affected if such activities were to be permitted to proceed without controls.

In 1976 SCAR set up a Group of Specialists on Environmental Impact Assessment of Mineral Resource Exploration and Exploitation in Antarctica (EAMREA). A preliminary report of this committee was published by SCAR in August 1977, and it was a basic document in the discussions held at the Ninth Treaty Consultative Meeting on mineral resources.

As a result of these discussions, Recommendation IX-1 was passed, which imposed a moratorium on all exploration and exploitation

pending the ''timely adoption of an agreed regime concerning Antarctic mineral resource activities''. The Recommendation asked Treaty members to make the best possible use of the conclusions and guidelines of the EAMREA Report and urged that they continue to study the subject and develop scientific programmes aimed at improving predictions of the impact of possible technologies for mineral exploration and exploitation, and at developing measures for the prevention of damage to the environment or for its rehabilitation. It was also decided to place the subject on the agenda for the Tenth Treaty Consultative Meeting.

What is the position regarding mineral resources in Antarctica? Although traces of most valuable minerals have been found at various times, no commercially significant deposit of any material other than coal and iron ore has been discovered. This is hardly surprising when one considers that only about three per cent of the rock of Antarctica is exposed and that until now very little prospecting, as distinct from academic geological surveying, has been carried out.

The EAMREA Report lists the following parts of the Continent as those most likely to attract mineral exploration: Antarctic Peninsula, Oujek Massif, Transantarctic Mountain and Prince Charles Mountain. The Report states that fossil fuels and non-metallic minerals (apart from gem minerals) are not likely to be mined because of their low unit values. It points out that transport problems and economic considerations make it unlikely that metallic ores would be exported, and that concentration or refining plants would need to be established locally. Although there are no logistic or technical reasons why such plants could not be built and operated in Antarctica, they would be prohibitively expensive at present day costs.

When one comes to hydrocarbons the picture is very different, particularly in regard to the continental shelf offshore. Although geological information is sparse, it is possible to identify areas off the coast of Antarctica where sedimentary basins of Tertiary and Cretaceous age may have developed.

Exploratory drilling for geological information by the 'Glomar Challenge' in 1972 encountered methane gas and traces of ethane in the sediments of the floor of the Ross Sea. Other areas of possible interest include the continental platforms of the Amundsen and Bellinghausen Seas and the shelf beneath the Weddell Sea.

Should any group ever attempt to exploit offshore oil resources in Antarctica, the technological problems would be great and the expense enormous. Moving pack ice would prevent the establishment of conventional surface drilling platforms, severe weather conditions (particularly hurricane-force winds) would further complicate problems, drifting icebergs in many places scour the sea floor at depths of two or three hundred metres, and the continental shelf lies at a much greater depth than that of any other continent. The extremely short season in which tankers could approach and collect oil is another limiting factor.

Nevertheless, in a fuel-hungry world there is little doubt that, if commercial hydrocarbon resources are discovered, means of exploiting them will be devised. Already the question of applications from oil companies for leases is posing problems.

It needs little imagination to picture the possible disastrous effects upon the Antarctic environment and its ecosystems of uncontrolled exploitation of offshore oil. The Antarctic is even more vulnerable to hydrocarbon pollution than countries in more temperate zones. Although the days of active exploitation are undoubtedly some distance in the future, the advent of exploration drilling is not. There are oil companies that would welcome permission to start drilling right now.

The political problems that this presents are extremely difficult, for the question of territorial claims comes right back to the centre of the picture. What authority is to issue the licence or permit? A claimant

nation will insist on its right to exercise its territorial authority, while non-claimant nations will dispute such a right. And what happens in the Pacific Ocean sector of Antarctica over which no nation has established a claim? And what about the nations of the world eager to share any new resources discovered but who are not in the club of Treaty Nations?

There would appear to be three major possibilities for the control of exploitation:

Control by nations with territorial claims. This might work if the exercise of control by a claimant nation were directed towards some goal of equitable international distribution of the resources produced, or the profits from them, and if the nation subscribed to an international regime for environmental conservation and protection.

Control by a consortium of those nations subscribing to the Antarctic Treaty. This would mean the abandoning of claims by the present claimant nations and the development of the Treaty Consultative Meetings. Exploitation would be available to any State, operating under licence from the consortium, whether or not it were a party to the Antarctic Treaty.

Control by the United Nations. The U.N. would be faced by a completely novel problem. Some organisation would need to be established with executive powers and with ultimate responsibility to the General Assembly of the U.N.

'Heritage of Man' arguments appear on first examination to support the third alternative. The world's resources are rapidly being depleted. Should not any resources discovered in and around the only unexploited continent be distributed fairly amongst the nations of the world? Few would dispute this; it is the mechanism of control and distribution that is in question. Upon further examination it can be seen that the other possibilities also permit this philosophy to prevail. One proposal already canvassed is that a consortium of Treaty Nations should apply the profits of licences, royalties and other accruals from its control of exploitation to the proper management of Antarctica and to the development of scientific programmes and other investigations in the region. The consortium would also exercise some regulation on marketing and distribution.

The biggest argument against the third alternative is the impracticability of attempting to organise an extremely complex and difficult exercise through the medium of a body comprising some 150 members. The first years of the Treaty meetings were difficult enough with only twelve nations, and they all subscribed to a common purpose and knew at first hand what Antarctica is like. I would be appalled at any suggestion of U.N. control. The idea of a host of nations, very few with any knowledge of Antarctica or real interest in its well-being, all

arguing about their shares of the distributed products or profits of the exploitation, fills me with dismay.

My personal belief is that there is also little future for the old system of territorial claims. They are not supported by the U.S.A. or the U.S.S.R., and are under increasing attack from the members of the Third World. Nevertheless, I believe claimant nations would be wise to fight for retention of their claims until such time as they see a practicable and acceptable proposal for replacing that system.

My own choice is the second alternative. I firmly believe that in an area that is as sensitive to mishandling as the Antarctic, those who are aware of the dangers and familiar with the environment should retain the major voice in its development. The Consultative Parties of the Treaty would need to conduct their activities in such a way that they could in due course come to be recognised by the United Nations as responsible trustees acting on behalf of the nations of the world.

There is, of course, another possibility where the exploitation of Antarctic resources is concerned, and that is to declare a complete moratorium on all exploration and exploitation. Antarctica would be preserved for the foreseeable future from all human depredations. This is an attractive idea, and it might work for a few years, but ultimately the needs of the world, particularly for oil, will produce such pressure that such a stand will prove untenable. The present situation of a limited moratorium while long-term measures of control are being devised would seem to be a more practicable procedure.

THE WILDERNESS OF GREENLAND

Laurence de Bonneval

Overlooking a portion of the vast, uninterrupted Arctic wilderness of Greenland

Greenland and Australia are continents at either end of our planet, yet Australia has had long-lasting connections with the Arctic and Greenland. I believe those who are most aware of this are a special breed of humans who sleep with binoculars on their pillows, rise at dawn and are constantly scribbling hurried notes in a battered pocket-book: ornithologists. They are the happy few who catch those rare visitors from the Arctic at their feeding sites; flocks of dumpy knots searching for their food in soft tidal mud banks, and other waders such as the tiny red-necked phalarope, the sanderling, or predators such as the Arctic skua and, with extraordinary luck, the Arctic tern.

I shall attempt to give you an impression of the Arctic land where these birds spend their breeding seasons—Greenland or *Kalaalit Nunaat* as the Greenlanders call it.

A thousand years ago, an outlawed Icelander named Eirik sailed westwards from his island in search of a land sighted earlier by one of his countrymen. He discovered a high mountainous coast with glaciers spilling into the sea and green fjords penetrating deep into the land. The sagas tell us he called that country Greenland "for he said that people would be much more tempted to go there if it had an attractive name".

The name no longer evokes in our minds pictures of green pastures

which attracted the Scandinavian settlers; it raises impressions of ice-fields, snow, permanent cold and Eskimos hunting seals on the sea ice. A true enough picture! Four-fifths of the country are indeed covered by a 3,000-metre-thick ice cap, the *inlandsis*, and temperatures may fall as low as -50°C in winter in the far north. This vast ice-wedge thrusting between the North American and Eurasian continents, both bridge and barrier between the Old and New World, extends from the Polar Basin to the Atlantic Ocean. Yet Greenland is not all ice; after the last glaciation, the *inlandsis* retreated, freeing mountains, hills and low lying lands in the coastal areas. There, immigrant plants and animals from east and west have settled in the course of time. Last of all came the people at the end of their long trek from Siberia and across Arctic North America.

From south to north, some 2,700km, conditions vary greatly. The climate ranges from a humid subarctic-atlantic (1,500mm yearly precipitation) to a dry high-arctic (less than 100mm per year). Mean temperatures also decrease northwards as well as the number of months with positive temperatures in summer.

The climate is strongly influenced by the currents, the pack ice drifting out of the Polar Basin, the ice cap and the sea ice in winter. The southernmost areas are influenced by the Atlantic Ocean and the proximity of the Gulf Stream and West Greenland current. The sea remains open throughout the year and only the fjords freeze in winter. Precipitation is high, especially snowfall in winter. From May to October temperatures are generally positive (mean summer temperatures are about 8° or 9°C on the coast and somewhat higher inland). A 'lush' vegetation has developed on the sunny sheltered mountain slopes and in the plains and valleys along the fjords. Birch and willow thickets recall the landscapes of Lapland. Farmsteads stand where the Icelandic settlers once had their homes, and red cattle graze in meadows by the fjords as icebergs from a distant glacier drift slowly past with the currents and winds.

Past the Arctic Circle precipitation progressively decreases to less than 100mm per year in the north and mean temperatures to -8°C or -9°C, with only three to four months having temperatures a few degrees above zero. Yearly temperature amplitudes increase and the year is divided into periods of continuous night and continuous day (up to four months in the far north). The sea remains frozen throughout the winter months rendering the coast inaccessible by ship. Moreover, in the east the icepack drifting out of the Polar Basin often builds an impassable barrier along the coast in summer.

On the vast rolling hills and in the shallow valleys the plant cover is mainly heathland in the drier areas, willow and dwarf birch thickets in sheltered spots, and sedge meadows in sites with poor drainage due to the permafrost. Northwards the plant cover becomes patchy,

restricted to areas where moisture occurs through run off or the superficial melting of permafrost.

Life is harsh in the Arctic for the few plants and animal species which have managed to adapt through thousands of years to such extreme conditions of cold and climate instability: years with surplus are followed by years of famine due to a slight change in climate. No rain or snow in cold years creates Arctic deserts; too much rain at the wrong season destroys feeding possibilities for herbivores through over-icing of the ground. Archaeological evidence shows considerable fluctuations in the population of musk-ox and caribou which have totally disappeared from certain areas of Greenland.

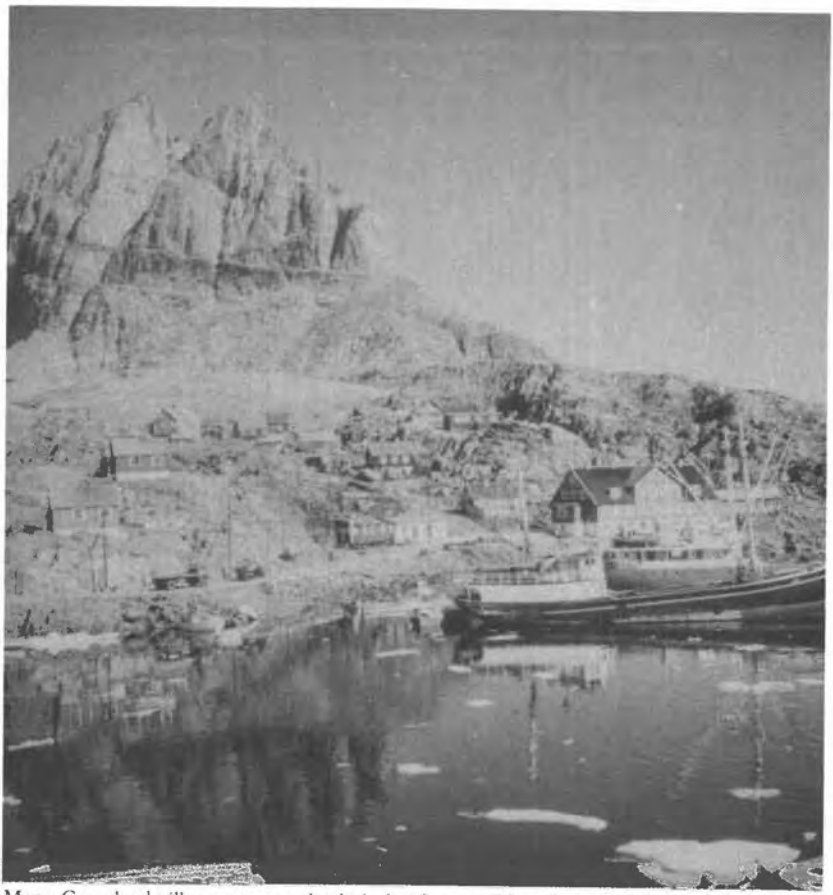
For the five hundred species of higher plants occurring in Greenland, adaptation has taken many forms: most of them are perennials with the capacity to sprout and seed during the brief summer weeks. Some even spend the winter with flower buds ready to blossom; others have developed a vegetative reproduction. The farther one goes north the slower the growth—only a few millimetres a year for woody plants such as the creeping arctic willow which clings to the soil for protection against the wind. Growth in form of a dense mat or cushion is another type of protection and a means of maintaining higher temperatures within the plant.

It may be the harshness of the high Arctic which makes the explosion of colour in the early summer an unexpected wonder: patches of bright pink willow herb on the gravel of a river bed; large cushions of purple saxifrage, the only striking colour on the raised beaches of the Polar sea; or the fragile yellow flowers of the arctic poppy flowering on dry barren ground. Under natural conditions, plant colonisation proceeds at an extremely slow rate, but the slightest fertilisation—at human settlements, under bird cliffs, around a decaying animal—or the churning up of nutrient-poor arctic soil bring an immediate response in plants which may grow twice their normal size.

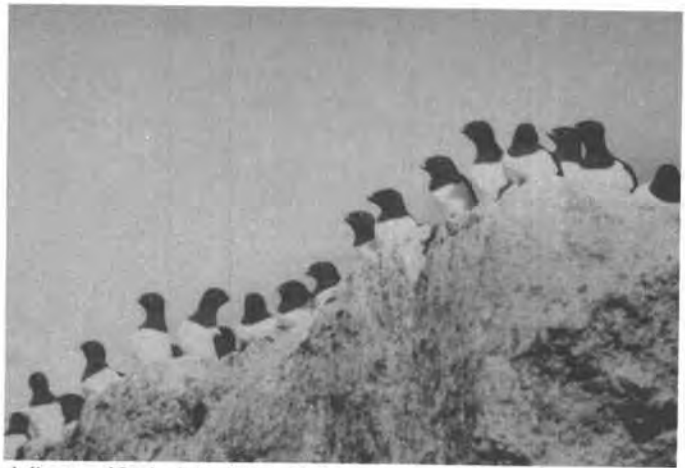
Greenland is a country of immigrants, and this is especially true for land animals which have mostly come from the American Arctic. Of the two large herbivores, the musk-ox occurs in scattered groups throughout the northeast part of Greenland and a small introduced population thrives in the hills of West Greenland. Their present number is reckoned to be 6,000 to 12,000.

The caribou wander in the hills of West Greenland and it is thought that a few individuals still exist in the Thule area where hunting has caused them to disappear since the beginning of the century. The musk-ox is totally protected and caribou hunting is restricted to a few weeks in September.

Other species live permanently in Greenland: hare, arctic fox, ermine and banded lemming. The wolf and wolverine sometimes cross over from the American continent. The Arctic fox—the blue



Many Greenland villages are completely isolated, accessible only by helicopter, or by boat in the summer



A line-up of Little Auks. These birds breed on coastal screes in the far north

The view over Jakobshavn, Isfjord

fox—feeds on hare, ptarmigan, young birds, waste from settlements and supplies brought at high cost to a deserted area by scientific expeditions.

Winged predators—the legendary raven, the snow owl and the gyrfalcon—are also permanent residents throughout the country, whereas the sea eagle is restricted to the southernmost area. Dramatic stories of sheep and children carried away by the eagle are told in the south, and its survival was endangered until recently, when it was declared protected. In reality it feeds on fish, birds and foxes, and nobody has ever seen a sheep carried away in its talons.

Birds have long since discovered the best *modus vivendi* in the Arctic. They spend the breeding season in the north when abundant food is available, and migrate to more favourable areas in autumn and winter. The return of the birds means spring for Greenland. From April onwards, seabirds, geese, ducks, waders and buntings bring life and noise to the silent Arctic. Sea birds such as kittiwakes and guillemots settle in vast colonies on coastal cliffs, filling the air with shrieking and the permanent coming and going of parents from feeding places to their young. The little auk breeds in millions on coastal screes in the far north. They are the swallows of the high Arctic: short sturdy black and white birds which rise like screaming fireworks from the slopes whenever a predator gull sails slowly past the colonies.

One of the main reasons for this flourishing life in the high Arctic is the fact that the sea provides abundant nourishment in the form of zooplankton in June and July when the birds rear their young. Sea mammals also exploit this plentiful food, and a description of life in Greenland would be totally inadequate if these animals which have ensured human survival through millennia were not mentioned.

Whales, walruses and seals (five species in all), as well as sharks and dolphins inhabit the seas around Greenland.

In the Eskimo legends an old woman living at the bottom of the sea rules over the sea animals and sends out all animals which serve for food; but in certain cases she withholds the supply thus causing want and famine. It is then the task of the shaman (*angakok*) to dive down and induce her to send out the animals again for the benefit of the people, by combing her hair.

Most of the greater whales have been brought to near extinction by the whalers, but the narwhale, white whale and minke whale may still frequently be seen when one travels along the coast, and they are hunted for food by the Greenlanders.

Another mammal, at home both on land and in water, roams the frozen seas and fjords of northern Greenland—the polar bear. Seals are their staple food and in periods of want they will eat any animal, including humans! Their tracks are visible on the ice leading from one

seal breathing hole to the next and sometimes there is a bloody patch where a seal has been caught.

From the green slopes and clear fjords of the South to the stone and clay barrens of Peary Land one reaches the extreme conditions of life. The thin snow cover is swept away by storms and generally evaporates before it can melt. The ground is everywhere permanently frozen and the melt water in summer is practically the only source of water available to plants away from streams.

Yet animals and people have migrated into the country along that northernmost route, from the North American Arctic, across Ellesmere and the frozen straits into Peary Land.

Some four thousand years ago the so called Independence Island people were the first to settle on Peary Land, where traces of their existence may be found on the raised beaches along the coastline. Cores taken from lakes show that the climate was milder and more moist at that period and the vegetation cover was richer than nowadays, thus affording food for land mammals such as the musk-ox.

These people hunted musk-ox, walrus and seals. Culture followed culture along that route; small groups crossed Smith Sound and moved eastwards and southwards along both coasts. Some were hunters on land, others lived on sea mammals. About the time of the birth of Christ, there came into the country a people called *Tunit* in the Eskimo legends: they hunted seals, walrus and caribou but did not use bows. They had no kayaks and no dogs, and moved on foot using small light hand-drawn sledges made of wood. It seems they were the inventors of the snow hut. Nine hundred years later there spread from Alaska along the Arctic coasts of North America and into Greenland a new aggressive people—the Thule people who replaced the Tunit. They were whale hunters and used umiaqs—large skin covered boats. As they moved along the west coast there evolved a new culture, the *Inugsuk* culture, which by the fourteenth century had spread all around Greenland. They hunted whales and seals and developed the kayak to a point of perfection, as well as equipment and clothing adapted to hunting from the kayak.

These are the people who, as they migrated southwards, met the Scandinavian settlers in southwest Greenland. The Eskimo and Icelandic sagas tell of these encounters, sometimes peaceful but frequently ending in bloodshed which may well be one of the causes for the extinction of the Icelandic population in Greenland. In the fourteenth century, for unclear reasons, the Scandinavian population was on its decline and part of the colonised lands and farmsteads lay deserted. By the early fifteenth century they had died out and the only people seen by Frobisher in 1578 and Davis in 1585-87 were Eskimos: Inugsuk people.

During the course of the seventeenth century the coast of West

Greenland was visited by whalers from many European countries. It is reckoned that in one season as many as a thousand whales were killed. No wonder that by 1700 the whale population had declined to such an extent that whalers started plundering meat and blubber from the Eskimos. Aggression on the local population became so frequent that the Dutch Government (one of the main whaling countries) grew concerned and punished severely whomever was known to have attacked or illtreated an Eskimo.

The year 1721 opened a new era in the history of Greenland with the arrival of a Norwegian missionary, Hans Egede, who settled on the west coast in the hope of converting the Eskimos to the Christian faith.

In 1728 the colony was moved to the site of the present capital of Greenland, Godthab, and the Danish government sent the first settlers—twelve convicts who had been married to twelve girls from a redressment home! Ten years later new missionaries settled in the country. Colonisation proceeded all along the coast from Julianehab to Upernavik, and the activities of the whalers were progressively controlled.

In 1776 the Royal Greenland Trade Company was created: until the Second World War it had the monopoly over all trade with and within Greenland.

The East Greenland Eskimo population was not discovered until 1884-85 and a 'colony', a trading post and mission, was established ten years later. In the Far North the Polar Eskimos, visited in 1818 by John Ross, were rediscovered by Peary but it was only in 1903-04 that the famous explorer Rasmussen travelled to Thule, later settling there.

The first forty years of the twentieth century were a time of great exploration in Greenland: Peary's attempts to reach the North Pole, the Thule expedition, Charcot, Ejnar Mikkelsen, Koch. It is from their reports that we draw our knowledge of Greenland, of the traditional hunter's life, long sledge journeys and so on.

But Greenland has moved fast since the Second World War, and the picture is no longer that recounted in their books. In 1953 Greenland became a Danish province and in 1954 the first regular air connection was established between Copenhagen and Sondre Stromfjord. That same year, for the first time, more than half of Greenland's population lived in towns.

In the following years national feeling and a feeling of solidarity with North American minorities grew, especially among the younger generations, leading in 1974 to the idea of Home Rule for Greenland. On May 1, 1979, Home Rule was introduced.

Greenland is the home of some fifty thousand people. Half of the population is under twenty, which makes Greenland a young country. Today, the majority (75.4%) live in urban areas and only 24.6% remain in the small villages and settlements scattered all along the south-

east, south-west and north-west coasts. It is interesting that in fishing districts the great majority of people live in cities (82.9%) and only 17.1% in settlements, whereas in hunting districts a majority (56.3%) still reside in settlements.

The traditional way of life, that of the hunter which is the symbol of the country, only occupies some thousand active people. This is due to a change in the way of life rather than to a decrease in animal population and when hunting was the only source of food the Greenland population was far smaller than it is today. Recently the campaign against the killing of baby seals in Canada which caused sealskin prices to fall drastically, has had a notable impact on the income of hunters.

Fishing is at present the main source of income. Some 2,500 people are active as fishermen and another 300 work in fish factories. The important species are cod, halibut, salmon, fjord trout, seacat, capelin and shrimps.

There are also some eighty sheep farms in south Greenland. By the end of 1978 the herd numbered eighteen thousand animals although yearly fluctuations are considerable and snowfall in winter frequently takes a heavy toll on the free ranging sheep. The breeds originate from Faroe and Iceland.

Life in Greenland has always been linked with the sea from which the Eskimos obtained their main food; Eskimo settlements were therefore built close to the shore and their remains may easily be spotted all along the coast by the patches of lush green grass (especially *Alopecurus*) growing on these sites. European colonisers also built their villages and towns on the coast or on coastal islands, mainly in the southwestern part of the country which is accessible by ship most of the year. The seventeen 'cities' all grew from trading posts and missions and have turned into modern towns with rows of highrise buildings and individual houses. Conditions are very similar to those of a European city, except for the refuse lying scattered all around the buildings and the sledge dogs howling their boredom. Supermarkets sell goods from all over the world even in the northernmost village of Qanaq: Australian canned peaches, Elizabeth Arden cosmetics and Levis Jeans. Young people with long glossy black hair and tight jeans lounge outside the community house drinking beer and listening to the pounding of reggae or Greenlandic pop which fills the neighbourhood day and night.

In the large southern towns many people have never shot a seal or tracked a caribou across the inland hills, and they resent being compared with the 'primitive' hunter living in an isolated settlement. Yet the free life of a hunter is part of their dream and part of the cultural identity which they feel has been robbed from them.

In the smaller settlements life has remained to a certain extent traditional; hunting and fishing are the main activities and part of every

child's background. Those who learn the art of managing a kayak are fewer, but handling a gun and driving a motor boat hold no secret for boys.

A country so thinly populated with vast uninhabited and inaccessible areas may seem safe from any environmental degradation. Yet the Arctic wilderness, with its low number of plant and animal species, is considered to be highly vulnerable as life there reaches its extreme limits. This led the Danish Government to take steps towards protecting it even before any need for it appeared, and in May 1974 the world's largest National Park was established: 700,000 sq km covering the whole of northeastern Greenland, including the ice cap and adjoining sea. It was recognised that once protection has become necessary it is already too late. The rapidly growing population of Greenland, the discovery of new mineral resources and development of tourism could easily destroy in a short time the fragile Arctic environment.

Other reserves were established: one in Northern Melville Bay which protects the denning area of polar bears and breeding grounds of seals; one in western Greenland for the musk-ox and caribou; and one in the south to protect the sea eagle. Also, hunting regulations have long been introduced, and some species such as the gyrfalcon and musk-ox are totally protected.

In 1981, under Home Rule, the people of Greenland will decide whether they wish to maintain or to alter the protection measures set up by the Danish Government. At present the feeling is that they value their environment as part of their cultural heritage and are opposed to any activities or action which may destroy the land.

The future lies in their hands only.

THE REMNANTS OF EUROPEAN WILDERNESS

Jean Dorst

Typical landscape in the Pyrenees

Apart from Australia, Europe is the smallest continent and it only slightly exceeds Canada in size. In fact it is merely a large peninsula attached to Asia, the widest land mass in the world. Some geographical features and a long series of historical episodes, however, perfectly legitimate its rank as a distinct continent.

In spite of its small size, Europe is highly diversified and ranges from the subtropical to the arctic zone. It is not a huge and homogeneous land mass and its shorelines contrast strongly with the relatively unbroken coasts of other continents, particularly of neighbouring Africa. The sea penetrates deeply into the land, both in the north and in the south.

A progressive climatic gradient leads from the Arctic in the north to the warm habitats of the Mediterranean in the south and another, oriented east and west, from the cold winters and hot summers of the continental climate to the rainy, wet and mild Atlantic coast. These various geographic and climatic features, modified by high mountains, create a wide range of habitats, both on land and in the sea, and a large variety of animal life.

Nevertheless, European flora and fauna are impoverished, if compared with their North American counterparts. This is mainly the consequence of the extensive glaciations which at several times deeply

modified the ecological conditions of most of Europe during the Pleistocene. As a mighty sheet of ice covered a great part of the land, plants and animals had to take refuge in southern districts where only a few survived. Recolonisation from these areas or from other continents took a very long time.

Though relatively impoverished, communities of plants and animals were flourishing in Europe when people came on the stage. Pre-industrial civilisation had a deep impact on nature; shepherds were responsible for the ruin of vast areas of the Mediterranean coastline. Later the most striking change was the destruction of the deciduous forests which covered most of the continent. During the Middle Ages, forests progressively gave way to fields and pastures. Some big animals became extinct, but many others survived as relatively slow change permitted many species to adapt to new conditions or to find refuge in unaltered districts.

At the present time, European natural habitats are deeply modified and most of the landscape has been violently altered. Except for some Arctic districts and a few scattered areas located in high mountains, the whole continent has been shaped by people in a relatively short time. Some extensive wooded areas are left but most have been cut up into small units with greatly modified ecological conditions. Drainage of swamps and numerous other changes accompanied the progressive destruction of forests and the increase of human population. Europe is very densely populated and very few areas are not inhabited.

Over the centuries, people have established a compromise between nature and their own artificial ecosystems, and some of these habitats maintain the primaeval balance. Thus the landscape of Western France, with its highly productive fields and meadows intermixed with woodland, hedges and marshes, can to some extent be considered as reminiscent of the mixed open forest which once covered the country. Though such habitats were never synonyms of wilderness, they were full of charm and quietness, and reflected a stable balance between nature and human civilisation. Genuine wilderness was still found in remote areas, especially along a few rugged coasts and in the heart of mountain ranges, though, once again, 'virgin' areas were already almost nonexistent.

This type of habitat persisted until the last war, particularly in France. After the war, rural communities were affected by deep changes. Many people deserted the country and migrated to towns, attracted by higher wages and a better way of life. Simultaneously, agriculture was immensely modernised. Horses gave way to tractors and almost disappeared. The rural landscape was reshaped in order to facilitate the work of the big machines used by agriculture. Hedges and woodland vanished, the space now being occupied by open fields. Use and abuse of pesticides and fertilisers changed the balance of soil and

agrosystems, eradicating birds, insects and smaller mammals, except voles and mice. Wildlife can no longer find refuge among intermediate habitats such as hedges or small patches of woodland. This evolution, visible throughout the traditional French farmland, has been very harmful to wildlife, and also to the centuries-old balance between people and nature, in habitats where one could enjoy life and relax far away from big cities in an overcrowded continent.

Even wilderness was severely disturbed during the past decades. Seashores already affected by oil pollution and disposal of industrial waste, particularly in the Mediterranean, were literally raped by anarchic building of seaside resorts, hotels, marinas and ports for luxury boats. The French Riviera, the Spanish Costa Brava, Italian beaches and Greek islands are covered with 'paradises' for tourists. Even the colder seas are now bordered by the so-called 'Atlantic wall', an expression taken from the line of defence established by the Germans during the war. Mountains also are submitted to tourist erosion due to the construction of too many winter sports resorts, with their huge hotels, night-clubs and networks of ski-lifts. Genuine wilderness also vanished from many alpine villages.

This is the present situation. Already reduced to a small percentage of the surface of the continent by dense population, intensive industrialisation and conversion into farmland, wilderness has been severely affected by recent transformation due to landscape remodelling.

On the other hand, the public is more and more concerned with the necessity for protecting vast areas in their wild condition, and there is an increasing demand for wilderness. Since the last war, under the pressure of public opinion, every European country has established national parks, nature reserves and similar areas. Hundreds of thousands of visitors have walked along the paths and enjoyed the scenery, peace and reminiscences of a remote past, when civilisation was not a mere synonym for technology.

I should like to emphasise the particular situation of France. French public opinion has certainly lagged behind other countries, especially Britain and Germany. For a long time the French were more interested in fine arts, monuments and archaeology than in nature. Products of the human brain and hands were more attractive to them. Then quite suddenly nature and natural features began to exert a great interest. People rushed to natural habitats, and thousands of visitors spent their vacations in the Vanoise National Park, in the Pyrenees and even invaded the tiny island of Port-Cros, our smallest national park, where the last Mediterranean forest is preserved in an almost primaeval state. Severe human erosion was the direct consequence of an excess of tourists. Wildlife was disturbed, particularly chamois and ibex; meadows and pastures were trampled by large numbers of people. In

the Camargue—a unique area due to the ecological situation of the Rhône delta, where sea, brackish and fresh water meet and mix; a small area surrounded by farmland, cattle and heavy industries—thousands of tourists wanted to see flamingoes and retiring birds. The responsible authorities had to explain that everybody owns this natural asset, and that the treasure itself is threatened if everybody is allowed to have close contact with it. A serious conflict already exists between protecting animals, plants and habitats, and opening wild areas to visitors, many of them not prepared to behave with the attitude of true naturalists.

Moreover, in many countries, and particularly in France, the establishment of national parks or similar areas often has disastrous consequences in the surrounding area. To put a particular area under strict protection, authorities have to negotiate with local communities, with the people living on the spot, often in poor conditions but strongly attached to their traditions. They are often reluctant to accept any control or limitation of their rights to exploit pastures by cattle raising, wildlife by hunting, or forests by felling trees at will. In order to constitute the nucleus of any park, authorities have to propose a buffer area where economic development through tourism and other new activities, including light industry, must be facilitated. The result is sometimes adverse to nature conservation, and some regrettable devastations have already been provoked after establishing protected areas which had to be compensated by economic development.

European countries have often been blamed for their hesitant policy in regard to national parks and other wild areas. We have to realise that Europe is a small piece of land where many people live close to each other. To set aside a substantial part of the territory means to abolish traditional and economic privileges, many of which arise from well-established patterns. In Europe, more than on any other continent, nature protection and preservation of wilderness are forever a compromise between will to conserve and legitimate economic constraints. On most of the continent wilderness will remain proportionally small compared to other continents.

However, there is an increasing demand for escapes from the urbanised world everywhere. This need increases the pressure on any piece of land kept in wild condition and this we have to prevent. It is tempting to exploit this demand by the creation of new sea and ski resorts, or establishing more public access to reserves. The last remnants of nature would be seriously threatened by such treacherous exploitation.

In spite of the efforts made by governments and private associations working for the defence of nature, the situation is becoming very serious in Europe. It could lead to a disaster if the present tendencies continue in the future decades. But there is reasonable hope that the

situation will improve if we take advantage of some very recent economic trends.

In many European countries agriculture is undergoing a true revolution. Farmland has already been abandoned by a large number of its human inhabitants. Agriculture is largely mechanised, and turns more and more into an industry concentrated in wide plains. The rest of the country is becoming marginal and is mainly occupied by elderly people unable to maintain a livelihood. The abandoned habitats will never return to their primitive state for many centuries, and land that was cultivated may give way to heavy erosion. This has already happened in the Mediterranean, an area devastated for the large part since antiquity, but cultivated with great care in some districts. These lands are now abandoned by agriculturists; terraces bordered by numberless walls of dry stones are no longer maintained and the earth flows away at every heavy rainfall, which causes disastrous floods in the neighbouring plains.

An almost similar train of events has occurred in the Alps, notably in the French sector. Agriculture is no longer a source of profit and the valleys are progressively abandoned by agriculturists and even pastoralists. Alpine meadows are no longer grazed by cattle and become degraded. An accumulation of grass which is not removed by herbivorous mammals creates a deep layer of vegetable matter under which alpine plants are concealed and die; moreover it creates a substrata on which snow is not really stable, increasing the hazard of avalanches.

These habitats and many others are now marginal and will never again be integrated in any mass production system. In Europe wilderness will mostly remain in high mountains and along seashores; but it will also be found in many districts which were formerly farmed but are now on the way to human desertification.

Land can be divided into five categories according to use. The first is urbanised and industrialised areas, with heavy industry and dense population. The second is highly productive farmland, with relatively few people and sophisticated agriculture, using fertilisers, pesticides and big machines to produce large quantities of crops. The third is forests, with three distinctive functions: production of wood and by-products; conservation of soil and habitats; and recreation. The fourth is areas where natural habitats will be preserved in national parks or nature reserves. And the fifth is these marginalised rural areas which as far as France is concerned comprise more than 40% of the land area.

The main problem with these marginal areas is how to manage them in order to maintain an active population with adequate means of living without any disturbance in the harmony of nature and wilderness. Society has to recognise the economic value of keeping marginal habitats in good shape through reasonable practices and tradi-

tional activities. Ecologists can give some clues on the various ways to avoid any major disturbances resulting from the excessive exploitation of natural resources or the impact of too many visitors. Tourism—even hikers or naturalists—can cause erosion.

In these measures lies the future of wildlife in Europe. Marginal areas will be essential parts of European wilderness in the decades to come. They are not 'virgin' as in some other parts of the world. All of them are created by people and result from the delicate balance maintained in a centuries-old co-operation with nature. A substantial revenue could be drawn from the people who would come to enjoy peace and harmony. Moreover, these areas will be the terrain in which many threatened European animals will find a chance of recovery, such as the bear or the lynx. Wildlife will proliferate in this environment and nature will be preserved for the benefit of the natural balance and ultimately for the benefit of all people.

TROPICAL RAINFOREST AND THE WILDERNESS EXPERIENCE

Peter Valentine

Ringtail possum, a common inhabitant of Queensland rainforests

During the five days of the Wilderness Congress some 200,000ha of the world's tropical rainforest will be destroyed.

Our knowledge of the extent of tropical rainforest remains very poor despite increased efforts in the last decade to improve our estimates. Perhaps the best attempt is that of Sommer in 1976, who estimated a global area of some 935 million ha. According to a separate estimate made by Persson in 1973 about 64% of the world's tropical moist forest is evergreen, which suggests a figure of around 600 million hectares of tropical rainforest. Sommer's data (see Table I) indicate that 41.6% of the original area of tropical forest has now been destroyed.

It is important to emphasise the very tentative nature of these estimates. Global statistics rely on individual governments and some regional estimates are quite inaccurate. For example the Philippines' claim that forests cover 57% of its land area was shown to be in error by Landsat imagery, which gave a revised estimate of 38%.

Knowledge of the rate of clearing is even more important than estimate of remaining areas of tropical rainforest. Concern was expressed at present destruction rates during the Eighth World Forestry Congress:

On present knowledge the tropical moist forests are being destroyed at a rate of about 30 hectares a minute and the rate of destruction is accelerating. If it continues, these forests may cease to exist as usable forests in 40 to 50 years.

Subcontinent	*Total land area*	*Potential moist forest area*	*Actual moist forest area*	*Percentage lost*
East Africa	236	25	7	72.0
Central Africa	408	269	149	44.6
West Africa	356	68	19	72.6
Total Africa	1000	362	175	51.6
Latin America	1401	750	472	37.1
Caribbean region	166	53	34	35.8
Total Latin America	1567	803	506	37.0
Pacific region	374	48	36	25.0
South East Asia	448	302	187	38.1
South Asia	348	85	31	63.5
Total Asia	1170	435	254	41.6
Total Humid Tropics	3737	1600	935	41.6

Estimates of land area (million hectares) and percentages of tropical moist forest lost.

Certain forest types are under even greater threat. For example, lowland tropical rainforest has virtually disappeared in Australia, particularly due to the expansion of sugar cane farming. In 1980 Webb pointed out that:

> Most of the rainforests of eastern Australia which occupied coastal areas with a relatively high and reliable rainfall were cleared for agricultural and pastoral development during the last hundred years of European settlement.

Cameron identified a total of 859,000ha of remaining tropical rainforest in Australia, of which only 89,000ha were within National Parks. In northern Queensland, Cassells and Gilmour consider that 600,000ha of rainforest remain from an original area of 1,200,000ha. It is important to remember that these 600,000ha are by no means pristine, the bulk of the area being under forest management for timber.

Similar concerns have been expressed for other areas of tropical rainforest. Writing recently about Malaya, Whitmore commented that "In Malaya the lowland dipterocarp rainforest is unlikely to last until the mid-1980s." Any attempt to obtain an overall figure for the loss of tropical rainforest suffers from enormous gaps in data. For example, an attempt in 1969 by FAO to identify annual clearing rates of forest areas involved a questionnaire sent to eighty countries. Only twenty responses could be used, and from these it was estimated that about 2.1% of forests were cleared each year. Sommer concluded that the an-

Rainforests channel and recycle a major portion of the fresh water on our planet

nual rate of loss for tropical moist forest may be about 1.2% or 11 million ha/year. Figures of this magnitude, and rates up to 2% per annum, seem to be widely accepted by many of those actively working at the global scale. Both FAO and UNESCO have been extensively involved in attempts to estimate remaining tropical rainforest. During 1980 a combined effort involving IUON, WWF and UNEP will culminate in a 'World Conservation Strategy' which will include the most up-to-date estimates.

Since the term 'tropical rainforest' was introduced to the English language in 1903, descriptions of it have captured the imagination of several generations of scientists and naturalists. Many of the most famous natural scientists of the nineteenth century experienced tropical rainforests, and their responses were inevitably positive and ecstatic: Humboldt and Darwin in South America, Wallace in South-East Asia and Huxley in Australia. It is also apparent that the more we have discovered about tropical rainforests the less we seem to know. David Brower, Chairman of Friends of the Earth in the USA, who wrote the keynote address for Australia's first National Wilderness Conference, recently commented on the need for tropical rainforest conservation:

> Tropical forests, our greatest global genetic reserve and wildlife habitat, deserve immediate and serious attention from the international environment community.

Although it is the symbolic value of rainforest wilderness which ranks highest for many people, there are numerous practical arguments for the conservation of tropical rainforest. Richards, in his classic book *The Tropical Rainforest,* outlines a number of values other than timber exploitation. The following list briefly summarises some of the practical values and benefits of rainforest conservation:

—**in the regulation of water regimes;** benefits include downstream water supply maintenance, flood mitigation, water quality, fish population and soil conservation.

—**as a gene pool;** maintenance of present resources, potential resources for the future, especially drugs and other biochemical compounds, recruitment needs of surrounding degraded environments.

—**for habitat preservation;** national and international heritage, areas for local and migratory fauna, provision of niches for an estimated 2-4 million species of plants and animals.

—**as a scientific laboratory;** basic research objectives, biological process studies, ecosystem dynamics, management control.

—**for outdoor education;** increasing educational awareness of wilderness as an expanded classroom for social and natural sciences and the humanities.

—**for outdoor recreation;** local and international tourism, quality of life, active and vicarious enjoyment.

—**as a critical element in the global ecosystem;** climate, oxygen cycle, carbon cycle.

In many parts of the world the future of indigenous communities is intimately linked to decisions concerning the exploitation of rainforest. While wilderness status preserves most of the above values, existing land use practices generally do not. Gomez-Pompa *et al* have argued that tropical rainforest in most places is unable to regenerate under present land use practices. Both mass extinction of species and significant, non-reversible structural change have occurred. The fact remains that knowledge of ecosystem dynamics in tropical rainforests is so limited that definitive statements are not yet possible.

Yet from the tiny proportion of tropical plants whose biochemistry is known, and from the small amount of ethnobotanical knowledge utilised by modern industry, enormous economic and social rewards have already been reaped. The USA National Cancer Institute spends $1.5 million per year screening plants for alkaloids with potential for treating cancer, with considerable success. In the USA medicines from wild plants have already produced a $3 billion/year industry.

Important though rainforest is, very often the popular image of rainforest is not always positive. Budowski pointed out that:

> Tropical rainforests, quite unlike animals like the panda, the vicuna, the tiger, the deer . . . do not enjoy a love at first sight sympathy from the public, and in fact there is a lot of suspicion in the minds of many people who sincerely believe that the tropical rainforest is basically 'useless', it harbours 'wild' and 'dangerous' or 'noxious' animals or at the least uncomfortable creatures such as leaches and mosquitos.

This notion of the forest as a dangerous, even malevolent, place is a familiar theme. In an interesting survey of Australian images of wilderness, Lynne McLoughlin found that 55% of places identified as typical examples of wilderness in Australia were deserts. This is perhaps not surprising given the nature of the Australian environment, but it is at odds with the traditional focus on forests and mountains in the literature on wilderness, both in the USA and in Australia. Australian landscape artists appear to be more aware of desert environments and many express similar attitudes to Robert Juniper's: "Australian wilderness is to me synonymous with desert landscapes—hot, dry places that both daunt and fascinate me." Introducing her excellent collection of comments by Australian artists, Bianca McCullough speculates on the origins of each person's attraction to particular landscapes and makes the point that despite her European upbringing it is the Australian outback which is the ultimate wilderness for her.

Tree frog, a well known and vocal inhabitant of tropical rainforests

Light filters through the broken canopy at the edge of rainforest in the Iron Range, Cape York Peninsula

In his autobiography *Moon and Rainbow*, the Australian Aborigine Dick Roughsey wrote of a rainforest environment:

> It was my first experience of rainforest and I didn't like it very much. The gloomy, dark green, dripping jungle seemed to be always about to swallow me, and after bumping into one stinging-tree it will be hard to get me back there again.

Some of the reluctance to preserve tropical rainforest may be related to the attitudes of early explorers and settlers. I looked at a selection of material on north Queensland, and two distinct attitudes towards rainforest emerge in the writings of both explorers and settlers, the first utilitarian and the second antagonistic. Utilitarian attitudes are characterised by the emphasis on 'useful' timber when describing the rainforest. A typical example comes from Palmer's *Early Days in Northern Queensland*:

> All along the east coast, where the rainfall is heavy, we find forests of splendid hardwood and scrubs containing cedar and pine of gigantic growth.

The predominant attitude in early writing about the Australian rainforest, however, is a fear of the trees, a kind of silviphobia, which sees the rainforests as physical and psychological barriers. The early explorers found the rainforests extremely difficult to penetrate, due largely to unsound planning and preparation. Kennedy thought that the rainforest inland from Cardwell was the vilest country he had ever seen.

The settlers who followed the explorers wrote of their struggles to overcome the resistance of nature to their efforts, and much antagonism is expressed in their writing. A typical example, describing the rainforests near what subsequently became one of the north's most attractive National Parks, Palmerston National Park, mentions "eight miles of dense scrub—the very worst devil-devil country, and awfully boggy". References to 'dense jungle', 'thick dark scrubs', 'terrible scrubs' and 'impenetrable jungle' are common in popular histories of the area right up to the present. The most recent phase of agricultural development on the Atherton Tableland produced a continuation of the antagonistic perspective, with the new settlers, like the earlier pioneers, regarding the rainforest as an 'obstacle to their hopes'. Even the official view was antagonistic, as expressed by a Royal Commission on Land Settlement and Forestry in 1931:

> Queensland needs no forestry science for present requirements. There is an abundance and enough of trade for all. Business or commonsense management, and not science, is the first requisite. The productive wealth of the country at present suffers from the fact that there are too many rather than too few trees: that is why ringbarking campaigns are being organised.

These attitudes, although undoubtedly still present within the community, appear to have been overtaken by conservation perspec-

tives and what might be appropriately termed the romantic view of rainforest. This is the kind of persuasive description common to tourist brochures and popular history accounts—a view entirely sympathetic to the rainforest but one which largely ignores some of the discomforts of life within the forest. Many people in the community certainly consider tropical rainforest attractive and worthy of conservation and parts of north Queensland rainforest may soon be just as important as the Barrier Reef in attracting tourists.

Turnbull's studies of African pygmies in the 1960s gives a valuable perspective upon attitudes to tropical rainforest. The Mbuti pygmies live in the rainforests in the upper catchments of the Congo; adjacent villagers are of Bantu or Sudanic extraction. Turnbull points out that in general the forest:

> . . . is considered as generous and friendly from the point of view of the Mbuti hunters and gatherers, and as niggardly and hostile from the point of view of the village cultivators.

The intimate view of the forest held by the Mbuti is reflected in the words used to address the forest—'mother', 'father', 'friend' and 'lover'. This personification of the forest by the pygmies reflects their insider perspective, yet the villagers who are essentially outsiders, see the forest as a fearful place, full of malevolent spirits.

Another example of attitudes towards rainforest—and one which offers much to western societies—comes from the Tukano Indians of the Amazon. The Tukano see the rainforest as a network of balanced finite energy flow, precisely the model of environment adopted by modern ecological research. Transactions with the environment at the everyday level are explained within an overall context of ecosystem stability, including an explicit focus on the role of energy.

For most outsiders the tropical rainforest is an incredibly complex vegetation form, and as such is impossible to comprehend except through broad terms such as 'jungle'. The sheer quantity of plant life and the diversity of animal life mitigates against the appreciation of the forest. The insider's view, exemplified by the Mbuti pygmies, is akin to that of interpretation experts in modern park management, those people who interpret the natural environment to visitors unable to devote the time to become personally familiar with the ecosystem.

One particularly valuable way of beginning to understand the rainforest is to use environmental 'keys' or 'cues'. This involves focusing on a particular group of organisms, simplifying the complex ecological interactions by only trying to understand a small part of the system. For the majority of visitors to tropical rainforest these sorts of introductions are necessary, and in this context the role of interpretation becomes even more important. As Budowski noted: "The whole field of interpretation of tropical rainforest is in its infancy."

It is very important to separate the concept of 'wilderness area'

from the concept of 'wilderness experience'. The former is objective wilderness and the latter perceived or subjective wilderness. A tropical rainforest wilderness experience does not have to take place within a designated wilderness area. Yet within such an area a wilderness experience can be virtually guaranteed. The criteria for wilderness areas in Australia have been discussed by several authors, and considerable consensus has been achieved. These experiential and ecological criteria may be summarised as follows:

Experiential criteria
—the core area's minimum width should be at least one day's walk.
—the core area should be free of major indentations.
—there should be no roads within the core area, or other signs of human disturbance.

Ecological criteria
—the core area should be of sufficient size to maintain all organisms indefinitely.
—there should be an adequate management or buffer zone surrounding the core area.

This idealistic set of criteria is quite difficult to translate into the kind of firm proposition beloved of planning agencies. The greatest problem undoubtedly occurs with the 'sufficient size' ecological criterion. The general practice in Australia has been to adopt a minimum population size of 5,000—a figure suggested by Slatyer in 1975 and adapted by others. A key organism is chosen and in most published examples this has been one of the large macropodids, such as the eastern grey kangaroo, *Macropus giganteus*. Adoption of this procedure has led to the proposal of minimum core sizes ranging from 150,000ha in semi-arid regions to 50,000ha in mountain and coastal zones in south-east Australia.

In translating these kinds of requirements to tropical rainforest a number of points need to be raised. Of primary importance is the size of the population—is 5,000 sufficiently large to provide an adequate gene pool? Whitmore believes that 10,000 individuals is the minimum population to provide an adequate gene pool in the case of plants. Plants have not been used in south-eastern Australia for the designation of wilderness, but the main characteristic of rainforest is its distinctive vegetation. Yet in tropical rainforests individual plant species are sparsely distributed. For example, wild fruit tree species in lowland rainforest in Malaysia occur at very low densities, most with less than 13 trees per 100ha. Other species of pharmacological interest occur with a frequency of less than two plants per 100ha. Many species of birds and mammals also exhibit low population densities. For these reasons tropical rainforest wilderness areas may need to be significantly larger than temperate vegetation areas, perhaps as large as the semi-

arid zones, if they are to conserve most of the species they normally contain.

The relative neglect in setting aside tropical rainforest for wilderness is a complacency which can no longer be accepted. The needs are clear although the precise requirements remain fuzzy due to lack of research. To err on the side of safety seems essential. The reluctance to set aside conservation areas in most parts of the humid tropics, despite severe impact on their ecosystems, is perhaps more understandable in countries facing the dilemma of development such as New Guinea and most Latin American nations, but it remains lamentable.

Effective tropical wilderness areas need to be very large if they are to serve a conservation role, and there is a need for the interpretation of these areas to encourage support and appreciation.

Australia may have a special role in the immediate future, both in promoting the need for tropical rainforest wilderness areas, and also in providing the rainforest wilderness experience to the national and international tourist. In research and development or innovative and effective interpretation techniques there is an opportunity for Australia to make a unique contribution, since we are one of the few affluent nations with sizeable tracts of rainforest wilderness.

CORAL REEFS OF THE GREAT BARRIER REEF

J.E.N. Veron

Flag Tail Surgeon

The Great Barrier Reef is a magnificent natural creation which continually inspires awe within me despite the fact that I have been over or upon it countless times. I would like to take you on a brief journey from the southern end to the northern extremity. In this process I hope that you perceive the Reef as it really exists, not as a single entity but rather as a wide variety of reef types, each with a different character and unique ecosystem.

The Great Barrier Reef Province is two thousand kilometres long, 590,000 square kilometres in area, and contains two hundred high islands, eight hundred coral cays and three thousand reefs, all interspersed by seven thousand cubic kilometres of water. On the west it is flanked by the Queensland coast and on the east by the waters of the Pacific Ocean. Unlike all other major physiographic features of the earth's surface the Great Barrier Reef has primarily a biological, and not a geological, origin. It is in a constant state of creation and change through the actions of coral, which is a family of living organisms. It is hardly surprising, therefore, that ever since the explorations of Cook and Flinders the Great Barrier Reef has been a subject of great interest and wonder. Now, only a few generations after its initial discovery by westerners, it is the subject of concern for government, scientists, and a significant part of the general public.

There are three major regions within the Great Barrier Reef Province. The southern region (as far north as 24°S latitude) is characterised by large platform reefs, many of which have islands and are surrounded by deep water. They have a character of their own and seemingly do not occur anywhere else in the whole of the Great Barrier Reef. This region includes the Swain Reefs and the Capricorn and Bunker Islands groups. Within the Capricorn-Bunker group the most commonly visited place is Heron Island, which is within the area recently declared a Marine National Park by the Marine Park Authority. To the northeast of the Capricorn-Bunker group are the Swain Reefs, where there is a completely different construction. There are no longer platform reefs and few islands. Instead we have massive interlocking reefs which are one of the most spectacular sights to be seen in Australia. An aircraft ride over these reefs provides an awesome spectacle. You can fly on and on over endless reefs which are interspersed with deep channels of ocean water within which are very strong currents. At each change of tide the ocean water literally cascades over the reefs. The northern end of the southern region is characteristically more reef than water. Some of the channels have steep vertical sides which go right to the ocean bed. When the tide changes the current follows these channels and then begins to spill over the reef as the force of the current increases. As this occurs more forcefully, standing waves are created, some of which are up to two metres high.

Moving on north we enter the central region which covers up to 21°S latitude. One of the principal differences between the central and southern regions is that there are no coral cays in the central region and the water is generally shallower between the reefs, which are much more defined than in the southern region. Occasionally there are deep channels but mostly it is large expanses of ocean interspersed with a few reefs. Around some of the high islands are fringing reefs, such as those around the mud flats of the Whitsunday Islands. The fringing reefs are quite different from all other ocean reefs, with a distinct zonation and fauna of their own. Palm Island, just north of Townsville, also has an extensive fringing reef surrounding it. The water is relatively murky and muddy but the Palm Islands have the highest diversity of coral in the entire Great Barrier Reef, which has led to the establishment of a new Marine Research Station there.

Above 24°S latitude, right to the top of the Australian mainland, is the northern region. This area is quite distinct from the others, being characterised by ribbon reefs, many cays, and relatively shallow water. The ribbon reefs form an outer wall or barrier along the whole of this region, creating a large lagoon area to the west with many small islands and coral cays. The ribbon reefs are of special importance and are a study in themselves. They form a great wall with the eastern front ex-

posed to the very strong wave action of the Southern Pacific Ocean. This barrier of ribbon reefs extends from just north of Cairns all the way to the Torres Strait. All of this system has its own unique coral features and fauna. At the northern extremity is the Torres Strait which has developed its own individual construction. In the Torres Strait the ocean current moves east-west, pouring through the Strait between Australia and New Guinea. The water is murky and muddy with a high concentration of sediment, and the current is very strong. The reefs of the Torres Strait are of an immense size and are mostly composed of mud with coral around the outside. There are also a large number of small coral cays. In the eastern part of the Strait are small islands surrounded by clear, very deep water with elaborate and well-defined fringing reefs. The Great Barrier Reef ends in the area east of the Murray Islands and Bramble Cay is considered to be the last cay before New Guinea.

The Great Barrier Reef is one of the greatest natural wonders on this planet. There have been coral reefs for the last twenty million years, but most of the existing reef in the Great Barrier Reef Province is less than ten thousand years old. We know that twenty thousand years ago the Reef area was actually a limestone plain, presumably inhabited by kangaroos and probably with a population of Aborigines. It is amazing to consider that in the last ten thousand years has been created an assemblage of flora and fauna which is probably more diverse and more concentrated than in any other region of comparable size. It is also a very productive ecosystem, its productivity perhaps being rivalled only by large tropical rainforests and mangrove areas. The reefs are dynamic entities with very complex internal organisations which are at present poorly understood. The corals which make up the actual construction of the reef are known to be the hardiest element within the entire system. While they can withstand the tremendous battering of waves they can die very quickly with changes in the chemical nature of the water, alterations in temperature or through predation. The Great Barrier Reef is a complex ecosystem, and in general complex ecosystems are relatively stable, so that if one component is removed or altered the effect is relatively slight. The most serious alterations currently being suffered by the Reef come from the actions of humans either removing selected species from the ecosystem (fishing, shell collecting, coral collecting and bêche-de-mer collecting) or from modifying the environment of the ecosystem in some way. People are not one of the natural components of the reef ecosystem, and apparently it has not yet evolved to accommodate human activities. The Reef needs our help. We need the Reef.

MANAGEMENT OF THE GREAT BARRIER REEF

Graeme Kelleher

Coral reefs are a rich ecosystem, providing shelter for myriad varieties of submarine life

The Great Barrier Reef is the largest system of corals and associated life forms anywhere in the world. As a uniquely beautiful natural environment on a grand scale, its conservation is part of the heritage of all people.

The Reef stretches for almost two thousand kilometres along the north-eastern coast of Australia in a complex maze of approximately 2,500 individual reefs. In places the Reef is a series of relatively narrow 'ribbon' reefs, but in southern areas it broadens out and presents a vast wilderness of 'patch' reefs separated by winding channels.

The reefs vary in size and distance from the mainland and there is considerable diversity in the corals, fish and other living organisms found amongst them. Reefs are submerged at high tide with most being partially exposed at low tide.

There are 71 coral cays (coral islands) on the Great Barrier Reef which are the breeding grounds and resting places for many species of birds. The Reef is of world significance as a turtle breeding area, and six species of turtle are found within the Reef region. There are over 1,200 species of fish and about 300 species of hard coral.

The brilliant colours and patterns and the bewildering diversity to be found within a single reef, together with the enormous extent of the

Great Barrier Reef as a whole, have earned it a reputation as the eighth wonder of the world.

The Reef and its associated organisms have had a long history of exploitation. Aborigines fished Reef waters for thousands of years before the arrival of Europeans. Since its 'discovery' by Europeans, the Reef has attracted several commercial enterprises based on harvesting its natural resources—bêche de mer, turtles, scallops, prawns, and migratory and bottom-living fishes.

In more recent times, tourism and its associated industries, combined with a large and diverse fishing industry, have made the Great Barrier Reef of considerable economic significance to Queensland and Australia. The future of these industries depends significantly on the conservation of the whole Great Barrier Reef as a viable, sustained ecosystem, since it is its scale and diversity which have made it the 'eighth wonder of the world' and the focus of world-wide interest. Conservation can only be achieved through a system which provides facilities for users of the Reef while remaining compatible with the maintenance of the Reef's natural qualities.

In the late 1960s and early 70s the development of new extractive industries coincided with increasing public awareness of the need to conserve and manage the environment generally and the Great Barrier Reef in particular.

Widespread public concern developed, within Australia and overseas, for the future of the Reef. This sprang from concern that one of the great natural heritages of the world should be conserved for future generations. It was usually expressed in relation to one or more of three areas of concern:

—concern at the possibility of over-exploitation of the natural renewable resources of the Reef
—concern at locally evident deterioration and the possible impacts of pollution
—concern about newly observed phenomena, such as the crown-of-thorns starfish infestations, and the possible role which human activities might have in such phenomena.

The passing by the Commonwealth Parliament in 1975 of the Great Barrier Reef Marine Park Act was the consequence of recognition by all political parties of the urgency of this widely expressed concern.

The Great Barrier Reef Marine Park Act established the Great Barrier Reef Marine Park Authority which, amongst other things, is a resource planning and management body. It is a 'people-oriented' body required to make provision for the proper use of the Marine Park.

Directly and indirectly the Authority operates in a sensitive and complex administrative area in which many bodies—commercial and

voluntary, as well as the Commonwealth and Queensland Governments—have interests and responsibilities. It has a small staff, highly qualified in research, planning and information functions.

The Act also established the Great Barrier Reef Consultative Committee, whose functions are to furnish advice to the Minister for Science and the Environment and to the GBRMP Authority.

The fullest possible liaison between the Commonwealth and the Queensland Government is vital to the establishment and operation of the Marine Park. Consequently, an agreement between the Prime Minister and the Queensland Premier in June 1979 provided for the establishment of a Ministerial Council.

The function of the Council is to co-ordinate Queensland and Commonwealth Government policy on the Great Barrier Reef. The Council is the point for approval and appeal in relation to the Authority's Marine Park declaration and zoning plans and their implementation.

In common with all environmental planning and management agencies, the success of the Authority will depend upon the management of people's activities so that demands upon the environment do not exceed its capacity to meet them on a sustained basis.

Impacts from human activities may be grouped into three categories:

—the impact of pollution. Pollution may be introduced through terrestrial runoff, coastal discharges, the atmosphere, neighbouring water masses, and shipping and other transport.
—impacts of extraction of renewable resources in the following activities: commercial fishing, recreational fishing, and scientific research. (Fishing is used in the broadest possible sense to include the removal of marine animals including shells, crustacea and corals). The extraction of non-renewable resources is specifically excluded from the Marine Park by Section 38 of the Great Barrier Reef Marine Park Act, except for approved research or investigative purposes.
—impacts of non-extractive activities in the Reef area, including tourism and recreation, film making, and scientific survey and studies.

Each of the three categories of demand or impact generates its own series of constraints in approaching management planning.

The extent and intensity of pollution will be determined largely by the social and economic policies of governments, and the conditions set by them. Planning for the regulation of pollution will be difficult, because it will involve the quantitative evaluation of the physical, chemical and biological impacts of actual and potential pollution, and their economic and environmental costs. These will then have to be compared with the economic and social costs of regulating the activities

which create the pollution. None of these assessments or evaluations will be easy and many of the data required for them will not be available. Technical assumptions and political judgement will be necessary.

However, the greatest difficulty will stem from the fact that the people who generate pollution which affects the Reef will, in many cases, not suffer if the Reef is adversely affected, and they will therefore not benefit directly from actions to reduce pollution and preserve the Reef.

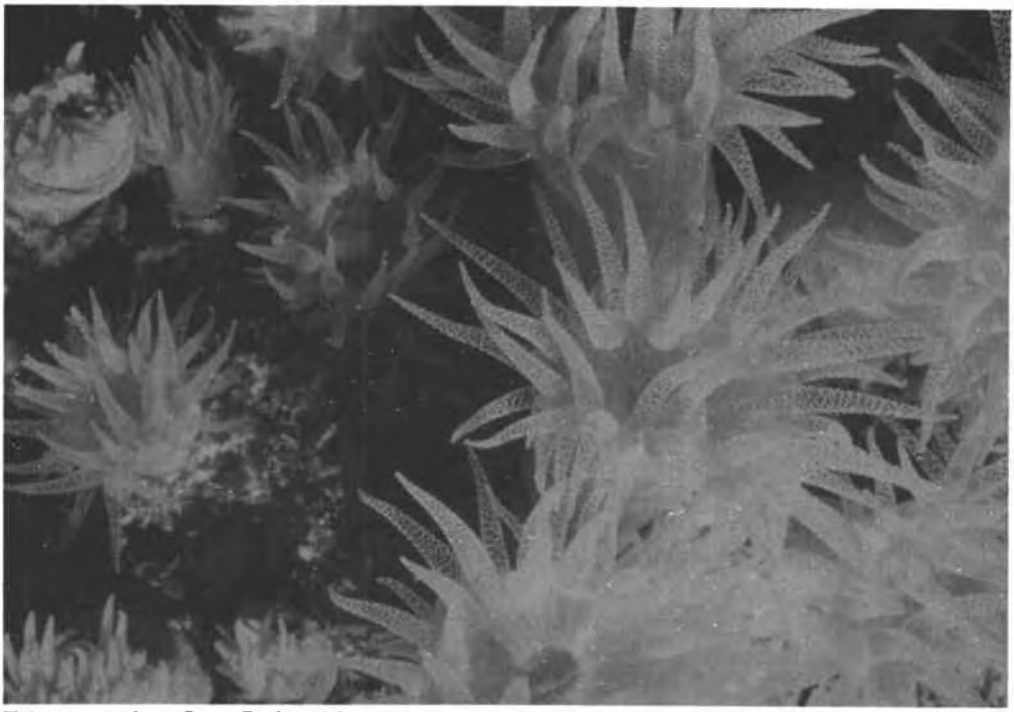
In contrast, planning for the demand imposed by activities such as fishing, and by non-extractive activities in the Reef area such as tourism, poses fewer social and economic problems, since the environmental quality of the resource must be maintained if the benefits of such activities are to be obtained on a long-term basis. Competition for the use of various parts of the Reef ecosystem, particularly at readily accessible sites, is intensifying and is one of the major reasons for establishing a resource management system through the creation of zoning, which provides for incompatible activities to be separated and for all activities to be regulated so that the Reef ecosystem is protected.

Competent management of the Marine Park is dependent on an adequate knowledge of its physical and biological resources, the complex physical and biological processes which occur within it and the social and economic factors which affect human usage of the Reef.

Therefore, although the Authority does not see itself as primarily a research organisation, it takes whatever action is required to ensure that research necessary for competent management is carried out. Usually, such research is undertaken by specialist research organisations. Where, however, such institutions are unable or unwilling to assist, the Authority will do the work itself.

Most people experience and enjoy the Reef through recreation, much of it serviced by a growing tourist industry. Careful attention to recreational activities, needs and potential impacts is therefore vital in planning. The aim is to ensure that opportunities for the public to visit and appreciate the Reef are provided in ways which conserve the Reef. The Great Barrier Reef Marine Park will not be a national park, although it will contain areas which are set aside to provide national park type functions. The Act requires: "The reservation of some areas of the Great Barrier Reef for its appreciation and enjoyment by the public; and the preservation of some areas of the Great Barrier Reef in its natural state undisturbed by man except for the purpose of scientific research." In planning for management of the Great Barrier Reef Region, the Act is based upon the premise that the Great Barrier Reef is a finite resource system.

When considering present and future 'reasonable use' of the Great Barrier Reef, the Authority sees recreation and tourism as growth



Tubastrea coral, on Carter Reef at night

areas in an age in which there is increased time for recreation. Economic growth is continuing and a higher proportion of people are now able to afford the cost in time and money of travel and accommodation.

The Authority also appreciates that the potential for growth of tourism, as well as extractive activities, is based on renewable resources. In the managed situation envisaged by the Act, each activity should plateau at a level at which yield is sustainable without long-term damage to the Great Barrier Reef ecosystem.

An additional factor is the change in public attitudes, which is increasing demand for activities aimed at appreciating the natural environment without exploiting it.

In summary, therefore, the Authority sees recreational demands increasing, with the likelihood that non-extractive recreational and tourist demands will be the principal growth areas. All of these demands will have to be managed in a way which conserves the reef ecosystem. The management process includes zoning and the regulation of activities within zones.

The Authority has produced a zoning plan for the Capricornia Section of the Reef which provides for all current activities to continue. Incompatible activities are being separated. It is a comparatively detailed plan, and compared to the total size of the Reef some of the zoned areas are comparatively small. These are the zones that would be classified in national park terms as wilderness zones. The largest zones in this section of the Park are general use zones in which restrictions are less severe. Nevertheless, it should be emphasised that in terrestrial terms the 'wilderness' areas in the Capricornia Section are quite extensive.

In the future larger areas of the Reef will be zoned and managed as wilderness areas. Even areas which are not classified as wilderness areas will retain most of their wilderness character, partly because of inaccessibility and the sheer size of the Great Barrier Reef, but more importantly because the Authority is charged with the responsibility of managing the Reef so that its natural qualities are conserved.

The Authority will design zoning plans and revise them if necessary to ensure that the overall wilderness character of the Reef survives. It recognises that it is this character which is the essence of the Reef's value both materially and spiritually to the people of Australia and the world.

I will tell the story of the African chief, who, when a European asked him who owned a particular piece of land, replied: "The many who have lived here in the past, the few who live here now and the many who will live here in the future." When dealing with a resource as limited, endangered and valuable as wilderness, it would be presumptuous if not delinquent of any present-day manager, as the representative of "the few who live here now", to make decisions which would needlessly destroy values which should be available for our children and beyond—"the many who will live here in the future".

G. J. Armstrong

WILDERNESS

A NEED FOR OUR FUTURE

Captions for the following colour plates—

'Female Ancestral Being' from an Aboriginal gallery in Cape York Peninsula. Geological evidence indicates some of this art to be as much as 25,000 years old.

Bizzante River in Lakefield National Park, Cape York Peninsula

Percy Trezise with Dingo in 'Massive Gallery' near Laura, Cape York Peninsula

Landscape in Zimbabwe, one of the areas in which Bushmen left considerable record of rock art

Rock art depiction of Quinkin, or Aboriginal supernatural spirit, in the galleries of Cape York Peninsula

Adélie penguin and chick, Antarctica

Massive icebergs are the backdrop for crabeater seals basking in the sun

A springtime view of the west coast of Greenland

Colourful alpine flowers brighten the Greenland meadows for a brief period each year

TROPICAL RAINFOREST

A frond of a tree fern, just beginning to unroll

Orange Bracket fungus, amongst the vegetative litter on the rainforest floor

Rainforest canopy from above. An unbroken canopy is necessary for correct functioning of rainforest ecosystem.

GREAT BARRIER REEF

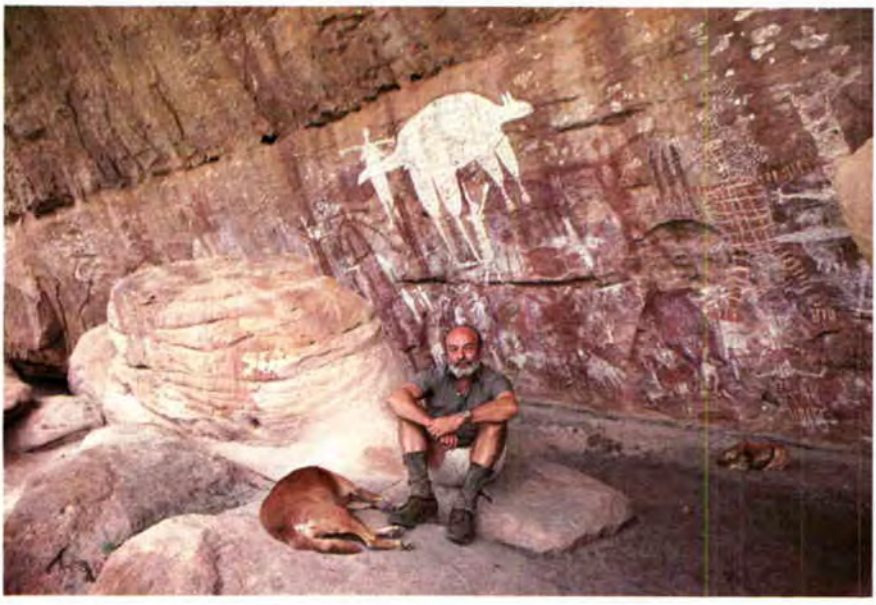
Hoskyn Isles, viewed from the west

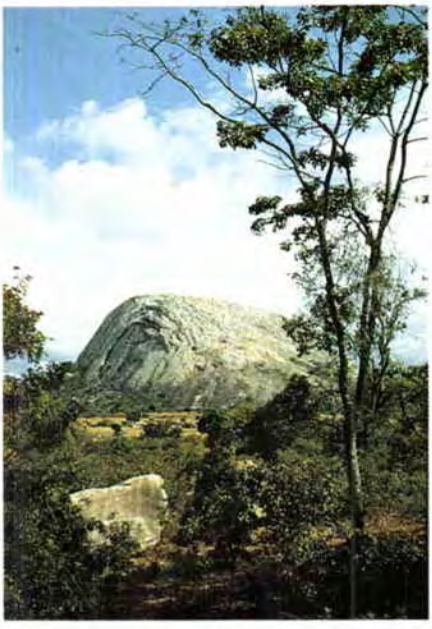
Surgeon Fish, near Heron Island

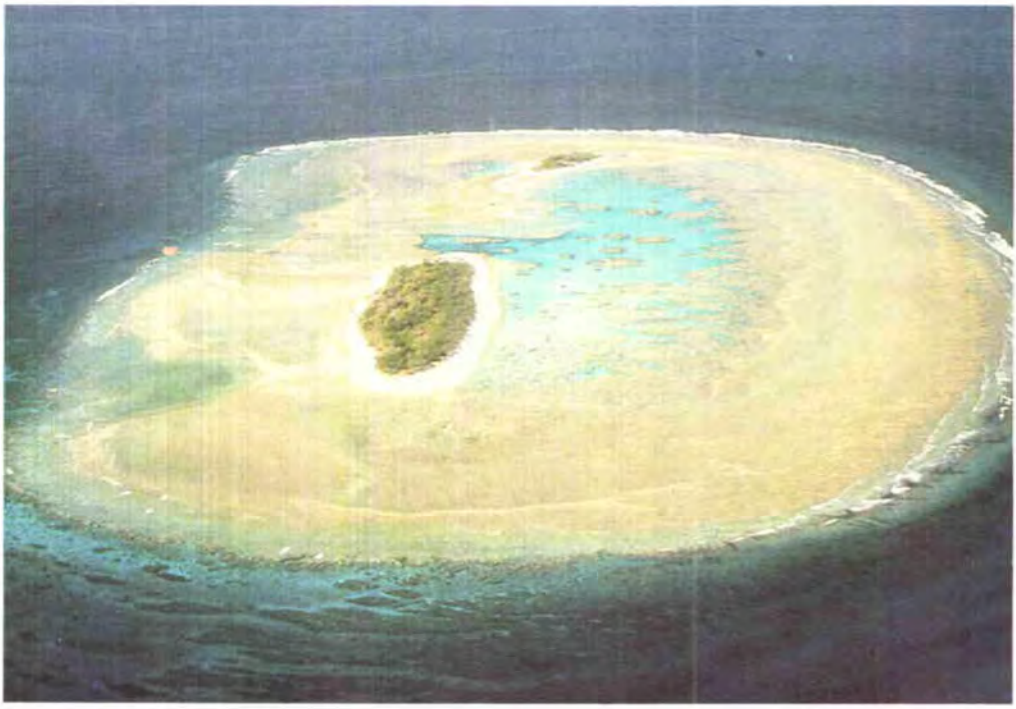
Crinoid coral formation on Hardy Reef

A submarine seascape near No. 10 Ribbon Reef, showing various coral formations and a giant clam

The butterfly-like pleurobranch, near Heron Island







PEOPLE AND WILDERNESS

Lloyd Brooks

Backpacker—British Columbia

'People and Wilderness' would seem to be a contradiction to many, for wilderness generally is considered to be a place where people are viewed as transient interlopers.

I consider people as a necessary and vital component of the whole process of setting aside these special areas, of managing them and of benefiting from them through knowledge and appropriate use.

We who are enthusiastic about wilderness do not always fully comprehend that a decision to set aside wilderness is also a decision concerning long term commitment of public funds. Even more significantly, it is usually also a decision to forgo for all time any other resource benefits from a substantial block of land. Obviously such a decision must have strong justification in relation to the country's long term resource needs. This requires strong public support in most countries.

We tend to overlook the importance of involving all sectors of the public both in the initial selection of an area and in its future availability. It takes much more than scientists, academics, professionals and wilderness enthusiasts to secure wilderness and manage it properly. It

will take much more than these minority groups, no matter how dedicated, to defend wilderness against the growing demand for more products, particularly energy, from the world's finite resource base.

The small percentage of lands reserved for wilderness could be steadily eroded unless there is a strong, informed countermovement. Popular support of wilderness must be cultivated even at the risk of more intensive recreational use of these lands. An overly protective stance in their management could lead to the greater danger of loss of needed public support.

Our objective is surely to make our wilderness readily available and enjoyable to many, consistent with the conservation of the special values we cherish. Those of us who value natural ecosystems for any substantial reason, whether that is love, understanding or inspiration, must find new and effective ways of sharing our values with others.

The same concept is implied in the preamble to the United States Wilderness Act of 1964, when it refers to encouraging "the maximum range of public use opportunities consistent with the preservation of the wilderness resource". The problem is, how can people in great numbers benefit from wilderness without the loss of the very values they seek?

First of all we must realise that wilderness cannot survive as such on its own, but rather it must be part of a well-balanced natural resources management programme, with a range of outdoor recreation opportunities for the whole population and with special attention to the natural areas near towns where people pressures are greatest. If wilderness areas are designated independently of other resource needs and without regard for other types of outdoor recreational lands, they will inevitably be challenged in the years ahead, since they would unnecessarily be tying up resources. The very people who should be our strongest allies, the outdoor recreational enthusiasts, could become the greatest threat to maintaining the integrity of wilderness. We have all seen national parks which have taken on the role of urban parks. Without adequate alternative recreation areas, inappropriate and potentially destructive uses inevitably invade the wilderness.

A second important consideration in providing for a "maximum range of appropriate public uses in wilderness" is the matter of clearly determining the purpose of these lands and setting management objectives to achieve that purpose. These in turn should indicate permissible human activities and levels of development. It is not enough just to aim widely at preserving the aesthetic quality. We have to know what we are protecting, its tolerance level and how to accommodate public impact without needless restrictions. Some species of wildlife, for instance, can adapt to the human presence whilst others are extremely intolerant. Certain soil conditions and related plant communities quickly

deteriorate under only moderate foot traffic. Others are far more resistant to wear.

Clearly, wilderness areas must be studied, carefully researched and continually monitored to determine their ecological carrying capacities. This should be done well in advance of any development programme leading to increased visitation and greater human impact. If we are to accommodate more people in these special lands, and we must, we have to recognise there will be some trade-offs, some sacrifice areas, as the price of higher levels of use. In any event wear tends to be localised along travel routes and is not destructive to the overall wilderness ecosystem.

There will always be controversy, of course, as to what is an acceptable impact on a natural environment. We are dealing not only with recognisable limits to use but also with quality, which is a value judgement. Some visitors to wilderness are far more sensitive to signs of human presence than others.

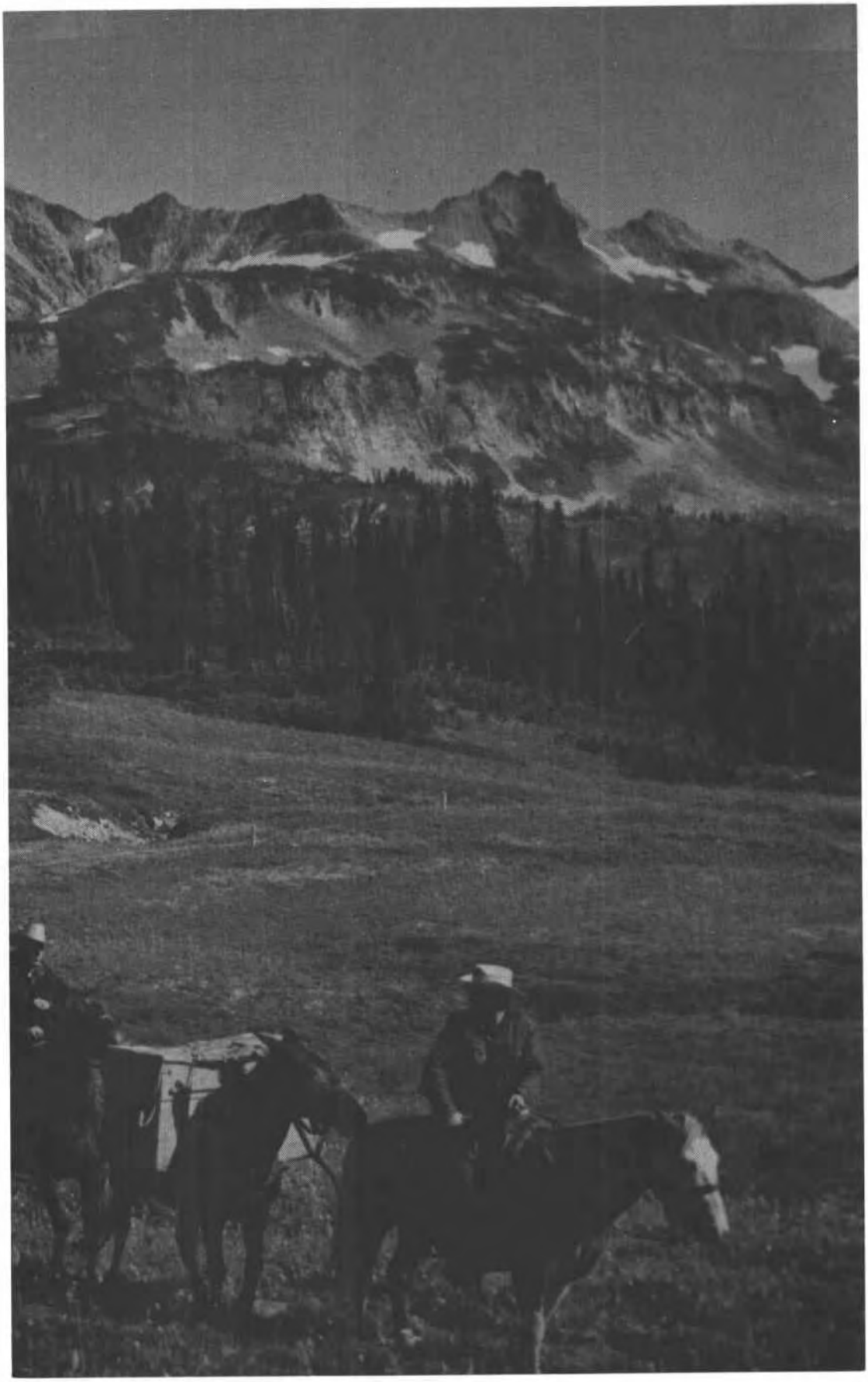
We are also dealing with another aspect of the problem, the social problem of people's behaviour in wilderness and the tolerance of people for other people in a remote setting. It has been said that overuse is more often just the wrong use in the wrong place. I suggest that it is also the mixing of people with different aspirations and different perceptions of what constitutes an inspirational or recreational experience in the out-of-doors.

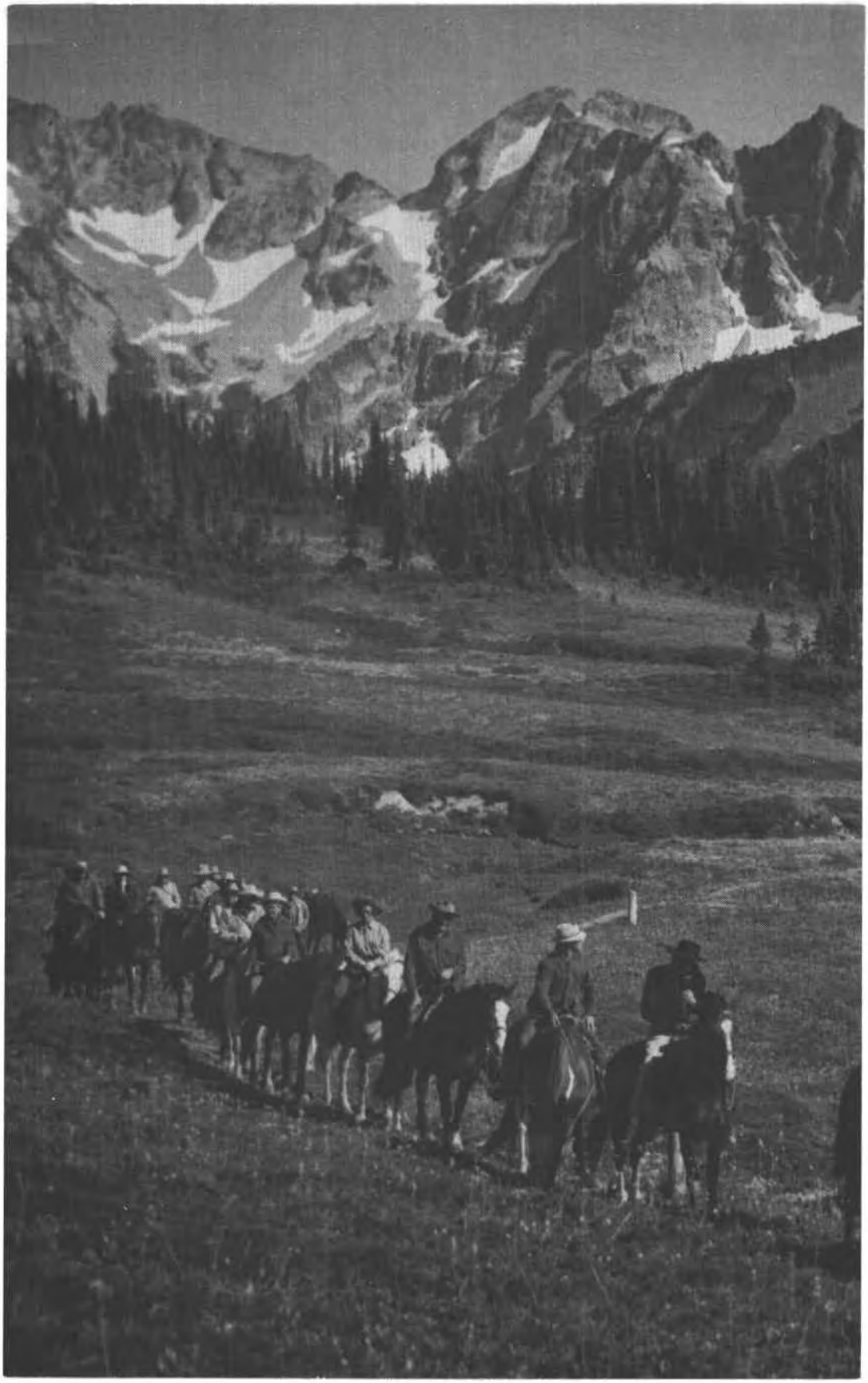
I heard recently of the unhappy experience of a party which had hiked for many hours to relish the beauty and solitude of a high alpine plateau in British Columbia. No sooner had they arrived than a helicopter landed nearby and disgorged two trail bikes complete with riders, who then proceeded to tear up the delicate alpine landscape. The trail bikers thoroughly enjoyed themselves. The hiking party was horrified.

Legal controls and penalties on certain types of use and abuse may be the only answer in some situations. But these are the very antithesis of the freedom from restriction one likes to feel is the very essence of the wilderness experience.

The zoning approach is one way of effectively sorting out incompatible uses and providing greater protection for wilderness values. This has been developed in one form by the National Parks Commission of Canada which introduced zoning in its overall plans to assist in the management of the tension between preservation and use of park lands. The five-zone system incorporates two levels of wilderness preservation in the most protected zones.

The most guarded is the Special Preservation Zone which has the purpose of protecting the "unique, rare, endangered or best examples of representative features". The next level is the Wilderness Zone which seeks to designate those areas which are intended "to preserve





the essential natural or wild environments'' without the help of motorised access or anything other than ''minimum, primitive-type visitor facilities''.

These zones give a type of defence in depth by limiting access and facilities as one moves further away from the roads, prepared trails, chairlifts and accommodation centres located in the outer, less protected zones. It is interesting to note that changes to a park zone are considered to be a major revision in the management plan and therefore require public notice and consultation.

Much can be done in the planning and management of wilderness to minimise human impact, provided the area has been fully researched to determine its limitations. Parallel to this effort is a public education and information process designed to develop understanding and concern for the environment, in addition to skills in wilderness travel. It is relatively easy to adapt a natural area for use by people, compared to developing management strategies to change people's behaviour. The more urbanised our societies become, the greater is the gap to bridge between the urban dweller and the wilderness visitor in adapting to natural surroundings with minimum impact on the ecosystem.

The orientation and interpretation centre has been a major step in filling this gap. Through the use of visual aids, audio equipment and trained staff, these centres have become increasingly effective in inspiring the visitor to use and enjoy natural areas safely and respectfully. Much more effort needs to be expended in understanding the visitor, however. We need to know the visitor's motivations, limitations, perceptions of the wilderness and expected benefits.

I believe it is possible, with responsive planning and technological aids, to satisfy far greater numbers of visitors to all but the most fragile of wilderness areas. It is true that technological means to reduce user impact increasingly put people into a technological cocoon which tends to isolate them from the experience they seek. But whether we like it or not we have been moving in this direction for many years with the aid of improved outdoor clothing, lighter camping equipment and portable fuels. Is there not a place for the viewing lodge, judiciously placed at the edge of wilderness, adjacent to a site frequented by wildlife, where people unskilled or unable to travel in the wilds can observe and enjoy the beauty of free-ranging wildlife?

I hope I have convinced you that such technological means of ''developing the maximum range of use opportunities'' can be both entirely appropriate adjacent to a wilderness and, if done with full understanding of the impact and the trade-offs involved, are desirable and even essential to the very survival of wilderness in a world becoming increasingly populated and demanding of products from a limited resource base.

preceding page:
Trail riders east of Cloudy Pass, Glacier Peak Wilderness, Washington, USA

MANAGEMENT OF WILDERNESS IN NEW SOUTH WALES

G. J. Armstrong

Kanangra Boyd National Park in the Blue Mountains of New South Wales

I recall visiting, many years ago, an art exhibition in which the paintings were based on religious themes. One depicted an elderly gentleman of typical biblical appearance, clad in flowing robes, adorned with a handsome white beard, seated at the wheel of a small sports car which he was driving at a furious pace across a deserted landscape. And the Old Testament text on which this graphic scene was based was ''. . . and Moses burnt up the desert in his Triumph''.

Apart from the possible conclusion that managers of wilderness may, even in those days, have had problems with illegal access, this story serves to illustrate the way in which even simple ideas can be misinterpreted to suit our own purposes.

Much has been written in recent years about the etymological derivation of the word 'wilderness'. Its evolution has been traced by Stankey and others to the Old English word meaning 'the place of wild beasts'.

I remember travelling through a carefully managed, logged, treated eucalyptus forest with a politician who looked out of the window of the car and exclaimed ''My word, isn't this a wilderness.'' It was indeed 'a place of wild beasts', but with tame foresters added as a bonus. At about the same time, a forester friend of mine complained that his wilderness experience had been spoiled when another camper appeared

on the remote beach he was visiting. These are two different interpretations of the same word, both being used with a certain degree of accuracy.

Attempts have been made to identify wilderness in terms of size. The United States Wilderness Act (1964) instructed government agencies to examine all roadless areas in excess of five thousand acres which had opportunities for solitude or unconfined recreation with a view to their reservation as wilderness—the implication being that anything less than five thousand acres was unlikely to have genuine wilderness value. The definitive study of wilderness in New South Wales by Helman *et al* likewise depends heavily on size as a basic criterion of wilderness value and identification, but goes to the other extreme and specifies a minimum area of 25,000ha; a core area of 10km in width; and a surrounding buffer of 25,000ha or more. Using this approach, the study identified only twenty true wilderness areas left in eastern New South Wales and south eastern Queensland.

The Australian Conservation Foundation combines size, perception, condition and ecological needs in its definition of wilderness—"a large tract of primitive country with its land and waters and its native plant and animal communities substantially unmodified by humans and their works. Large size and spaciousness are the essential characteristics of wilderness."

On the question of size, the Australian Conservation Foundation stated: "A wilderness area must be big enough to satisfy two requirements: firstly, it must be able to survive as wilderness and maintain genetic diversity despite adverse influences from surrounding settled and modified areas; and secondly, must enable visitors to experience solitude and the particular sensations associated with being in a spacious primitive area."

Perhaps there is an overemphasis on size and spaciousness, but the importance of individual perception is clearly identified. It is appropriate to quote from the writings of John Muir, one of the fathers of the modern conservation concept of wilderness, when he talked a hundred years ago about his early experiences in the Sierras: "I have never before noticed so fine a union of rock and cloud in form and colour and substance, drawing together earth and sky as one; and so human is it that every feature and tint of colour goes to one's heart, and we shout, exulting in wild enthusiasm as if all the divine show were our own. More and more, in a place like this, we feel ourselves part of wild nature, kin to everything . . ." To John Muir at that moment, wilderness value lay wholly in the perception of the individual.

The New South Wales National Parks and Wildlife Service subscribes to the view that it is impossible to define wilderness in any specific manner. There are a number of basic components—it has to be a sustainable resource, with genetic diversity, in natural condition, suf-

ficient in size, location or quality to allow the human experience identified by John Muir and others to be felt. But the most important factor is the capacity to provide that unique experience to the individual, because if that criterion is met then it should be axiomatic that the other values are being met and protected also.

The prime responsibility for the manager of a nature conservation area is to maintain, and if possible improve, the values by which the area was initially identified and for which it has been reserved. In the case of wilderness, it is to maintain or enhance its capacity to provide a special type of experience to the user and, therefore, the other qualities which go to ensure that experience.

Here I will tell the story of the African chief who, when a European asked him who owned a particular piece of land, replied: "The many who have lived here in the past, the few who live here now and the many who will live here in the future." When dealing with a resource as limited, endangered and valuable as wilderness, it would be presumptuous if not delinquent of any present day manager, as the representative of "the few who live here now", to make decisions which would needlessly destroy values which should be available for "the many who will live here in the future".

To me the major value of the United States Wilderness Act is in the direction it gives to government authorities to examine all areas with wilderness potential so that the rights of future generations will not be casually ignored. Even without such legislation, it should be clearly seen as a responsibility of all land managers to protect those rights whenever the needs of "the few who live here now" can be satisfied elsewhere.

In my opinion, and in this I probably will be at variance with a number of conservation bodies in New South Wales, there is no need for special legislation to establish a separate land use classification of 'wilderness'. It would however be advantageous if a firm direction could be given to land management authorities to examine all areas under their control which might have wilderness potential, and arrangements could be made for their conservation before their long term value for this use is compromised or destroyed.

Although there is provision in the New South Wales National Parks and Wildlife Act 1974 for the declaration of wilderness areas within national parks or nature reserves, not a lot of use has been made of it. Only four areas in Kosciusko National Park have been specifically zoned as 'wilderness' in the management plan prepared in 1974.

However, there are a number of large, unroaded areas in many of the 51 national parks managed by the Service. In fact, fourteen of the twenty identified in the Helman report as major remaining wilderness areas in New South Wales are now safely located within the national park system. These areas contain a wide variety of environments, in-

cluding semi-arid lands in Sturt National Park; sub-alpine areas in Kosciusko National Park; coastline areas in Nadgee Nature Reserve; and a selection of wet and dry sclerophyll types in a number of parks along the tablelands. As yet there are only limited areas of rainforest, but efforts are being made to increase these.

Agreement on the identification and reservation of an area as wilderness does not automatically lead to the protection of its wilderness values. Threats do not disappear after reservation; they merely change their nature or sometimes re-appear in a different disguise. Success in any competition against other land use interests may mean that threats of mining, logging, grazing and other inappropriate practices are progressively removed; but the trail bashed by a bush-loving four-wheel-drive enthusiast or an incorrect burning regime introduced by an unskilled manager are no more acceptable than the logging track or the illegal grazing fire which they replace.

In New South Wales we are fortunate that because of the combination of low population and area set aside for nature conservation purposes our parks as a whole are not as yet subjected to the pressures present in many other countries. For example, New South Wales has 10% of the number of visitors per hectare to national parks of the United States of America, and only about 1% of that experienced in Japan.

More importantly, the distribution of nature conservation areas in relation to population provides an additional protection for parks and reserves, and the continued movement of population towards urban areas indicates that this will be strengthened.

Turning now to a brief consideration of specific management problems in New South Wales, I have already pointed out that user pressures on natural areas in New South Wales are far lower than in most other countries and well within acceptable limits.

Mining is completely excluded unless formally approved by Parliament. However, exceptions to this may be approved in several parks presently being considered. Significant energy reserves are known to exist under these areas, and agreement may have to be reached on arrangements for future deep mining with minimum surface disturbance before reservation as park will be accepted. As a matter of policy, however, the Service will continue to oppose mining in any national park or nature reserve, not only because of direct disturbance but also because of the ancillary effects of access and related developments.

Logging is permissible under the New South Wales National Parks and Wildlife Act for management purposes only. This provision has been included to permit necessary habitat manipulation only, and no logging is permitted for purely commercial purposes.

Grazing can be accommodated more easily, but as our parks and reserves do not contain any significant areas of land which would be

grazeable without severe environmental damage, the likelihood of its introduction is becoming steadily more remote.

Few of our parks are suitable for water storage or electricity production, and we do not have problems such as those being experienced in South West Tasmania.

Hunting is not permitted in any New South Wales parks or reserves. Any manipulation or control of wildlife populations which might become necessary will be carried out by the Service itself. We have no wildlife, apart from a few reptiles, capable of endangering visitors, and thus we do not have pressures for controls such as occur in the case of some species in other countries.

One of the principles for management of wilderness identified by Hendal *et al* is that "the management of wilderness must be viewed in relationship to the management of adjacent lands". This is particularly true in New South Wales in relation to two areas of concern—dingoes and fire.

The dingo, or native dog, is believed to have come to Australia with the Aboriginal many thousands of years ago, and survived by predating mainly on small or young native fauna. As more land was converted to production the dingo retreated into remote areas, areas which are now largely state forest or national park. From these areas some dogs move out to attack stock on adjoining properties, and there is constant pressure from neighbours for its rigid control, and in some cases its extermination. Like other canine species, the dingo is very susceptible to the poison *1080* and the Service has adopted a policy of hand baiting and trapping on the periphery of parks when stock losses on adjoining properties can be attributed to dingoes. Needless to say, emotion rather than fact often credits the dingo with prodigious feats of endurance which are strongly disputed by wildlife managers.

The second problem which also affects our neighbours is that of fire management. Many Australian environments are fire-dependent, and many vegetation associations in parks and reserves represent fire seral communities. To maintain diversity in these communities, which is a necessity for many reasons, the manager must determine an appropriate fire regime. But the decision is not that simple. On the one hand the extreme conservationist argues that all induced fire is bad and that the most acceptable option is to eliminate artificial fire and allow natural fire to burn uninterrupted. On the other hand our neighbours may insist on a reduction in the fuel which might carry a major fire and thus endanger their property, and the only way to achieve this is by planned fuel management programmes. Many of our eucalypt forests are capable of surviving intense fires which are very difficult to control, so the views of both sides are not unreasonable. The solutions towards which we are working include:

Small is beautiful—Alpine flowers abound in the high meadows of Kosciusko National Park, NSW

If we do not correctly preserve natural areas now, will our children have only situations like this in which to experience nature?

—fire management techniques aimed at biological diversity
—burning by induced as well as natural fire
—a general 'let-burn' policy where natural fires are allowed to run uninterrupted is not acceptable in our situation. The management of each fire situation must be determined individually
—making our fire management more scientific, through increased research, monitoring and use of more sophisticated techniques of simulation and training
—where direct action is necessary to control fire in natural areas, immediate action following the fire to rectify any damage caused.

Lastly there is the inevitable problem of access. The construction or retention of tracks into natural areas is the surest possible way of reducing or destroying their wilderness value. Many of the lands acquired for national parks in New South Wales already have a developed system of fire trails. Additional tracks are sometimes built in emergency situations, particularly for fire control, and there is usually considerable public pressure to retain these. When they are retained, there is an inevitable tendency for managers, researchers and the like to continue to use them and thereby perpetuate their presence.

Such access into wilderness areas is of course completely unacceptable, and as a matter of policy they are closed as soon as possible if an area is to be so classified.

In the management of all areas under the New South Wales National Parks and Wildlife Service, efforts are being made to involve the public to an increasing extent. Advisory Committees with community, scientific and user representation have been established to assist with the management of many of the more important areas.

In considering public input, we must ensure that we do not only tap or respond to the views of an elitist minority. Their opinions are certainly valuable—in fact, they may have a better perception of park management than many others—but it is the Service and ultimately the government—the government of all the people—which must accept responsibility for policies and decisions concerning the management of important natural areas.

I cannot do better than conclude by repeating the words of Aldo Leopold: "The richest values of wilderness lie not in the days of Daniel Boone nor even in the present, but rather in the future." Nothing has happened since to suggest that Leopold's words are not true. We in New South Wales see it as our responsibility to ensure that future generations have the opportunity to make their own assessment of the value of wilderness, which we have a duty to preserve for them.

MANAGEMENT NEEDS AND PROBLEMS ASSOCIATED WITH WILDERNESS PRESERVATION

George Stankey

Canoeists make an early morning start—British Columbia

Wilderness is receiving an increasing level of attention as a critical element of national and international programmes of nature conservation. For example, the World Heritage Trust and the Biosphere Reserve programmes represent measures undertaken to ensure the long-term preservation of areas where natural ecological processes will be protected.

Obviously, designation of wilderness is a necessary first step. This involves defining wilderness, developing the legal and political framework needed to establish such areas, and formulating the administrative apparatus to implement designation. However, it is important to remember that designation is only a means to an end. That end state is somewhat variously defined, but in general is taken to encompass the long-term preservation of natural ecological processes and conditions. Also, as in the United States Wilderness Act, such areas are provided in order that settings for particular kinds of outdoor recreation will be available. In such areas it is common to find transport and resource-development activities, such as timber harvesting and mining.

These conditions which wilderness preservation is intended to provide, however, are not fully ensured by the drawing of lines on a map. The threats to wilderness are subtle and far reaching. Even in the far reaches of the Antarctic, investigators report the presence of radio-

High alpine hikers in British Columbia

active fallout, chlorinated hydrocarbons and heavy metals. Pervasive global deterioration of the environment means that virtually no area is free from human influence.

Although wilderness designation usually eliminates dramatic sources of environmental disturbance, there are others whose influence in the long term can be just as serious. Recreation use is perhaps one of the most obvious. Rising numbers of hikers, campers and other outdoor enthusiasts have given rise to the concern that wildernesses may actually be 'loved to death'.

The point of calling attention to these continuing impacts on wilderness is to remind us that national and international achievements in wilderness preservation may give an illusory picture of progress if, after designation, these sorts of influences continue unabated. As George Marshall, former president of the United States Sierra Club, has noted, "At the same time that wilderness boundaries are being established and protected . . . attention must be given to the quality of wilderness within these boundaries, or we may be preserving empty shells."

The question of how wilderness is to be managed is inextricably linked to the philosophical issue of what wilderness is to represent. We need to recognise the culturally-based origin of the wilderness concept; there is no absolute standard by which wilderness can be judged. Yet we can still prescribe purposes and goals for wilderness, and from these judge the appropriate management philosophy that ought to prevail.

The main choice lies somewhere along an anthropocentric to biocentric continuum. Under an anthropocentric (or human centred) philosophy, wilderness would be established primarily for its recreational values, and management would strive to facilitate and serve those values. Actions to promote recreation would be taken, even if substantial impacts on natural ecological processes occurred. On the other hand, the biocentric (or environment centred) approach would feature the maintenance of natural ecological processes as the primary objective, even to the restriction or total prohibition of human use.

The basic building block of any management programme is accurate information about the resources and their use. It is also necessary to develop an organisational framework for working out tasks to be accomplished and the management technologies to be employed. The key element in management is the formulation of management objectives—statements of measurable conditions to be achieved or maintained. These objectives are derived from broad statements of goals which comprise the general features and characteristics that wilderness should provide.

Goals are often lofty statements of intent, and are often unattainable, yet they lend direction and purpose and give shape to more specific management objectives. Objectives, in turn, serve as criteria

for identifying policies and the actions necessary to achieve them.

Without objectives, wilderness management can become a collection of miscellaneous and unrelated actions with little clear purpose.

As with any form of management, there is a need for wilderness management to be reasonably sure that a given action will produce a particular outcome. However, the poor quality of baseline information, coupled with the complexity of ecological and social phenomena tends to create a high degree of uncertainty.

A good example of this kind of problem can be found in the United States wilderness where concern has been expressed for altering the distribution of recreation use. It has been suggested that the wilderness authorities should provide more information, develop new trails and access points, and provide more facilities. But it is not clear whether these measures will alter distribution or simply increase the total amount of use. There are also questions as to how well the shifting of uses serves ecological objectives. For example, the spreading out of uses may result in the encroachment of people into critical wildlife habitats, thus denying species important nesting or breeding areas. Spreading use over a wider area with the intention of reducing ecological impact may even be counterproductive.

There are at least two steps needed to correct these problems. First, an accelerated programme of ecological and social research must be undertaken throughout the world's wilderness. Much as this kind of research programme is needed, however, it is unlikely that the resources or commitment exist in most places to make it reality. An effective alternative, also useful in its own right, is the development of monitoring and evaluation programmes designed to provide policy makers and managers with periodic, systematic feedback on the outcomes of actions and programmes. Such information can serve to validate expected results or to alert those in authority that the consequences of a particular measure are not in keeping with what was anticipated.

The basic issue when considering management philosophy is simply: What is wilderness to be? What are the conditions we define as constituting wilderness and what are the attendant uses considered to be appropriate within such areas?

In Alberta, Canada, for instance, wilderness is managed very strictly. Although recreation use is permitted, visitors may not use horses, hunt or fish, or gather berries. Local wilderness supporters are urging that in addition to these 'ecological' wildernesses, the government designate 'recreational' wildernesses that are managed to facilitate recreation.

In research on recreation impacts on vegetation and soil, even very low levels of use can produce relatively large amounts of soil compac-

tion and vegetative disturbance. But at what point does the generally inevitable impact become unacceptable damage?

In many of the world's wilderness areas, indigenous populations can still be found. What ought to be the role of such native populations in an area managed primarily for natural values? What are the long-term biological consequences of their continued residence? More importantly, what are the moral and ethical implications if their removal is suggested? Should wilderness count among its many values the preservation of certain life styles? No easy answers exist for such questions, but their resolution will be entirely arbitrary unless some philosophical framework outlining the purposes and roles of wilderness is available.

Wilderness is an important and valuable form of land use, yet unless it is viewed as one element within a broad spectrum of land management settings, it is unlikely that a viable wilderness system can be maintained. There are many political, economic and sociological reasons for this.

First, although wilderness yields important benefits and values for all people, it only directly benefits a relatively small proportion. If wilderness is provided without a parallel effort to offer a range of amenity and recreational settings for the whole population, it will be difficult to retain the necessary political support for wilderness. Many authors have commented that the future of wilderness lies in the city—a reminder that we need to meet the needs of the majority if we hope to be responsive to the minority.

In addition to its unique ecological and social values, wilderness includes other more traditional values as well—timber, minerals, forage and so forth. It is the presence of these other values, of course, that leads to much of the conflict over wilderness designation and there are undoubtedly legitimate questions as to which management strategy represents the 'highest and best use'. Wilderness designation can result in economic hardship, particularly on a local scale.

But much of the pressure for resource development within wilderness stems from our continued preoccupation with the exploitation of more and more land to meet our needs as opposed to the adoption of intensified resource management programmes. Our failure to undertake intensive timber management, investing time, money and scientific know-how in the most productive sites and practising appropriate timber stand improvement and thinning operations, means that many of the marginal timber stands we find in areas suggested for wilderness in the United States are proposed for exploitation. The point to be made here is that wilderness can be a direct beneficiary of improved management practices for other resources. By giving increased attention to more intensive resource management, many of the current pressures on wilderness can be reduced.

Finally, providing a full spectrum of recreation settings in areas other than wilderness can help avoid development of a phenomenon analogous to the ecologist's 'invasion and succession'. By providing settings where the greatest variety of public tastes can be accommodated, we reduce the possibility that recreationists will be forced to select from a narrow range of choices, thus conceivably bringing inappropriate demands and preferences to settings not capable of meeting them. For example, if areas similar to wilderness but managed primarily to satisfy recreational demands are not available, then people will use wilderness all the more.

Although wilderness designation creates much attention and excitement, it is only the first step towards the long-term objective of preserving wilderness. The long-term task involves the definition and implementation of a programme of policies and actions to manage wilderness in such a way that it appears unmanaged.

NATURE CONSERVATION, WILDERNESS, AND INTERPRETATION

William Carter

Plank buttress roots, a feature unique to rainforest trees

The conservation of a nation's natural heritage depends not only on the direct action of setting aside parks, but also on having a population aware of nature conservation values and motivated to conserve natural resources on all lands. In part this is being acknowledged by the greater emphasis that nature conservation organisations are placing on interpretation. Freeman Tilder defines interpretation as an educational activity which aims to reveal meanings and relationships through the use of original objects, by first-hand experience, and by illustrative media, rather than simply to communicate factual information.

There is great scope for interpretive solutions to nature conservation problems, which range from those which are site-specific to those which are world-wide in character. For example, the whaling issue is of international significance because of its emotive aspects, because of the possible extinction of a dominant part of the world's biota. Here international cooperation is required to reverse the trend to extinction. By way of contrast, the poaching of maiden hair ferns from a national park is a site issue because the individual species and its relatives are widespread. Here local action is a more appropriate means of resolving the problem. If all conservation problems are considered in this way some perspective can be obtained to help determine priorities and techniques to solve the issues that confront administrators and park rangers daily.

All too often professional administrators and managers in the conservation field lose this perspective. The tendency is to address the smaller or less significant problems as isolated entities and leave the larger issues unresolved. At the regional or state level, it is not unusual to seize one strategy, forgetting the alternatives. Perhaps the best example of this is the national park movement itself. Parks are often seen as satisfying the needs of nature conservation rather than being an important strategy.

While preserving a patch of tropical rainforest is an important part of conserving a valuable national resource, it does not ensure the conservation of all other remaining areas, nor does it ensure that the area preserved will survive in perpetuity. Unless approaches to conservation are complemented with strategies that address the broader issues involved, national parks may become nothing more than islands of naturalness in an intensively artificial world.

To move to specific solutions, among the tools used by resource managers to control people are zoning, access control and the provision of facilities. These techniques can have dramatic success in solving site problems and, as a result, have achieved a high level of credibility amongst resource managers and administrators. Interpretation also attempts to solve problems through changes in behaviour and attitude. In this way it has the potential to solve not only a specific site problem, but also related problems elsewhere, and thus contribute to the resolution of regional and national nature conservation issues.

Unfortunately, interpretation has often failed to realise this potential because interpreters, lacking a clear view of their role in the spectrum of conservation problems, have failed to link solutions to problems. Such failures have generally led to a lack of respect for the interpretive function. In turn, interpreters often hide behind the positive response of visitors to justify their existence, which leads to interpretation being evaluated on its media rather than its message.

Basically interpretation is communication. Communication is the act of imparting a message from a sender to a receiver through a channel and receiving feedback as to whether a message has been received. In the field of interpretation, the tendency has been to concentrate on only two aspects of this model, the sender and the techniques. Evaluations of interpreters are largely based on their ability to manipulate the media, on fluency and other personal traits—the tools of the trade rather than the product. The challenge to interpreters is to clearly identify the messages to be communicated and show how these relate to solving problems.

One of the main messages for a nature conservation authority to be communicating is a conservation ethic—a code of behaviour towards the environment that will ensure the maintenance of its highest quality. While this message provides a goal, it does little in the practical

sense to assist in the attainment of that goal. The conservation ethic must be expressed in terms that different audiences can understand and respond to.

The first step is to find out why nature conservation problems exist. If these can be seen in relation to the group of people using a particular facility, it can help in determining priorities for conservation interpreters:

WORLD PROBLEMS	NATIONAL PROBLEMS	STATE PROBLEMS	REGIONAL PROBLEMS	SITE PROBLEMS
Human needs, strengths, weaknesses that determine basic motivations and actions	National character which determines overall approach to resource use	Community attitudes that conflict with nature conservation principles	Occupations and land use incompatible with habitat preservation	User expectations and inability of the site to meet these

From this array it becomes obvious that park communication programmes should be based on site-specific information; regional communications programmes should be based on a land use theme consistent with regional conservation priorities; state and national programmes can be based on principles of ecology and so on.

To many people wilderness and interpretation seem to be an incongruous combination, so much so that interpretation rarely has an opportunity to influence plans for wilderness management. Yet despite the exclusion strategies employed, 'people problems' persist. Clearly a communication strategy is needed, and with care interpretation can be compatible with the wilderness experience.

Concepts of wilderness are coloured by one's culture, personal experiences and background. It is therefore not surprising that despite a general agreement as to the philosophy behind wilderness conservation, there are many areas of conflict as to what constitutes wilderness and how it should be managed. One objective for interpreting wilderness is to streamline these often divergent perspectives into one that society accepts and feels it can afford; to highlight the areas of consensus rather than disagreement. If effective, this agreement will then ensure the appropriate use and care of wilderness.

In the context of wilderness conservation a primary interpretive message is the need to maintain the natural integrity of the landscape. This is because the ecosystems found within wilderness areas are either successionally mature, as in tropical rainforests, or they are areas sensitive to disturbance, such as heath lands on infertile soil.

Secondary interpretive messages relate specifically to conservation or management of particular ecosystems. Suitable secondary messages for interpretation might be:

—to promote the wilderness concept
—to foster wise land use
—to demonstrate natural processes and their relevance
—to encourage the maintenance of the long-term integrity of wilderness resources in any use made of them by visitors
—to motivate people to apply nature conservation principles both in wilderness and in their day-to-day lives
—to provide for the enjoyment, appreciation and understanding of wilderness.

Some of these messages have greater relevance particular to identifiable groups in the community, and can be used to promote and communicate the other messages. For example, the wilderness visitor is more likely to respond to communication based on enjoyment and appreciation, whilst the local farmer will be more likely to be prepared to discuss matters of land use. The appropriate technique for communication of the message depends on the nature of the message, on the characteristics of the audience, and on the resources available.

There are three specific target audiences that I would like to mention: the wilderness visitor, the vicarious user, and those who make use of land for other than its wilderness value. Interpretation addressing the wilderness visitor should seek to develop realistic expectations of the wilderness experience, provide skills and information required to facilitate an enjoyable experience in order to fulfil expectations and encourage a positive response. These objectives can be divided into those appropriate away from the reserve, and those which can be used when visitors are on the reserve.

The objective of off-site interpretation is to put wilderness areas in perspective within the range of outdoor recreation facilities, and to provide potential visitors with the skills required for a wilderness experience.

A general principle of on-site interpretation is that visitors should have all the information needed to enjoy their wilderness visit prior to entering the area. Thus traditional on-site interpretive techniques, such as guided walks and trail-side exhibits, will be inappropriate. However, the need for information on the resource in order to safely negotiate it provides a useful bridge for communicating messages that allow the visitor to protect the resource as they use it. It offers an opportunity to communicate ideas that heighten the wilderness experience.

The plants, animals and landscape can all provide stories that can be told to illustrate the principles of conservation. Interpreters can:

—identify the significant stories of the wilderness resources

—indicate how these stories can be used to develop the conservation ethic
—indicate to resource planners the requirements of the resource by interpretation so that these requirements become significant resource planning constraints
—identify media that best suit the story to be told, and the target audience.

When the visitor has these stories in mind tracks become more than just routes from one place to another, haphazardly offering a wilderness experience, they can become interpretive media in themselves. Maps and information brochures can be designed to promote this progression of experiences. With minor modification, destination points and routes can be altered to 'rest' certain areas. Thus the stories become significant, yet unobtrusive, management techniques to conserve the wilderness resource.

If the need for wilderness is appreciated only by those who use the areas, then the long term security of such areas is doubtful. There is a need to interpret wilderness to those beyond its bounds. Yet unplanned interpretation runs the risk of acting as a promotion exercise, often creating a false impression of the wilderness experience. This may encourage people to seek out wilderness when they are ill-prepared and too inexperienced to fully appreciate it, or simply overwhelm a resource that is already overused.

Interpretive programmes developed for vicarious users should address the same problems, but off-site the detail need not be specific—the concept is what is important. The biological values and the processes that are being preserved in wilderness are messages of importance and interest to the majority of people. The mass media can satisfy the needs of many people for wilderness.

Scattered around the world there are still vast tracts of land that are worthy of being called wilderness. Only some of these are included in conservation reserves, and of the others, some are grazing lands or are being used for other than their wilderness values. These areas of 'wilderness' have a nature conservation and recreation value that must be fostered and a failure to do so severely jeopardises the chances of designated wilderness areas fulfilling their assigned role.

The challenge is not so much to interpret the values of these areas to visitors, but more to indicate to those who 'farm' this sort of wilderness the role they have to play in preserving and protecting the area's natural value.

Declared wilderness areas are a modern invention. Where wilderness areas have been dedicated, many have been created over and amid land already occupied. A programme of positive and responsible land management which includes a good neighbour policy and an active programme of interpretation is vital in order for wilderness to fulfil its role as part of a nature conservation strategy.

THE VOLUNTEER'S ROLE IN NATURE CONSERVATION

J.G. Mosley

Selway Bitterroot Wilderness, Montana, USA

We conservationists are very lucky people. To us life is always interesting, and we maintain and retain our natural curiosity. But if we are distinguished by our love of life, our other distinguishing characteristic is that we care. We are tuned into the needs of future generations more than most other people. Non-conservationists sometimes think that conservation must be a wearisome responsibility, but it isn't. We really can't help being conservationist, and of course to most of us it is an enjoyable task. We see ourselves as part of nature's built-in defence mechanism, trying to correct some of the things that go wrong in nature as a result of people's more thoughtless activities. Certainly I believe that the community has a need for us. There are so many forces and interests in society which work to maximise present returns without thought for future needs. Most conservationists find that they operate most effectively if they band together in voluntary conservation organisations. The Australian Conservation Foundation publishes a directory of these organisations and two years ago there were twelve hundred conservation organisations and groups in

Australia. I work for one of them, a national group with a membership of 8,500 people, and our task is to promote the protection and enhancement of all aspects of the environment at the national level.

There is no use pretending that this is not a hard task at times. Conservationists face the situation of having to persuade people who think in terms of five, ten or twenty years. From the very earliest years of European settlement the lives and economy of Australians have revolved around the business of exploiting the raw materials of our environment for export. Once it was wool and meat, now it is minerals and energy resources. Conservationists are the only Australians who believe that any other future than this export-dominated, resource-intensive economy is possible. As a nation we are readying ourselves for a decade or more of taking advantage of the world's shortages, particularly of energy, and growing rich on the proceeds. It pays us to use up our resources more and more quickly. To keep up the rate of development we are also willing to see much of this industrial activity pass into foreign ownership. These attitudes are reflected in the aggressive stance that some governments and companies take towards anybody who challenges this philosophy, or who dares to point to cumulative effects or possible alternatives. For instance the Australian Mining Industry Council, the lobby organisation of the Australian and foreign-owned mining industry in this country, believes that the role of conservationists should not be to oppose development but to apply environmental standards to it. Development, or at least the mining industry's version of intensive, large-scale resource development, should be sacred.

We are not against development, but we have our own idea of what constitutes proper development. Sustainable development, the kind which does not conflict with the maintenance of essential life support systems and environmental variety, is the only possible basis for our society. This contrasts with the trend which, as some resources are depleted, takes more and more desperate measures to develop inaccessible resources, causing massive environmental impact and tying up capital which could be used for sustainable development.

An increasing amount of our effort as conservationists is going into research into sustainable alternatives, such as renewable forms of energy. But until society as a whole has made a major change of direction we still need to defend environmental quality by responding to those proposals of others which would adversely affect the environment. We still have to counteract those industrial lobbies which believe it to be in their interests to use up resources quickly in order to make bigger profits.

The Australian Mining Industry Council advocates mining in national parks, and opposes the establishment of wilderness areas if they are not to have mineral exploration within them. It is this

organisation which has opposed federal grants to conservation groups. We are extremely fortunate that the Australian public and the majority of companies have not swallowed this propaganda, and have supported the role of conservation groups, including making available administrative support grants for non-government conservation organisations.

The protection and conservation of land has the broad objective of maintaining variety and diversity as the basis of a satisfying life. Natural areas also serve to maintain wildlife and essential life support processes, as well as providing a key recreational role.

One of the significant landmarks in the conservation of our natural diversity has been the National Parks movement. Dating from the turn of the century it signalled a new appreciation of the natural environment by the European settlers. Even though all of the environment is precious and needs to be protected, some areas are outstanding due to their size or character, and the National Parks system helps to protect these.

Organisations like the Australian Conservation Foundation are totally involved in making the public more aware of the needs of the environment. For example in 1967 and again between 1972-1974, the proposal to destroy Lake Peddar National Park in southwest Tasmania by constructing a hydro electric power reservoir made us begin to think as a nation of our national treasures. Legislation was passed to assess projects with potential damage to the national estate and to protect such treasures once they have been set aside. This legislation was not passed in time to save beautiful Lake Peddar, but it did save Fraser Island,the world's largest sand island, from beach sand mining. Fraser Island became the first area to be placed on the Australian Register of the National Estate.

In the case of the Great Barrier Reef, the lobbying of conservationists in the late 1960's and early 1970's succeeded in obtaining a moratorium on oil drilling and helped to pass the Great Barrier Reef Marine Park Act. However, to date the government has not made the moratorium permanent, and the legislation speaks only of protecting 'the reef'—the coral structures which make up the reefs themselves—and not the reef ecosystem as a whole. If the government wanted to exclude oil drilling from the entire reef, which is controlled only by the Commonwealth and Queensland governments, it would have to simply declare the entire region a marine Park, and not just the 2.4% which is currently designated.

Another major development in Australia in recent years has been the establishment of a new kind of national park, serving to provide both for Aboriginal occupation of the land as well as for nature conservation—Kakadu National Park is the prime example. In Cape York Peninsula we have an opportunity to further this new national park

concept. Here we have a unique situation where a politician, the premier of Queensland, is at the head of conservationists in urging that Cape York becomes a national park in its entirety. We see the distinct possibility of a long term solution to the future of Cape York Peninsula being formulated, involving both a return of the land to its rightful owners and the conservation of the distinctive qualities of the peninsula.

The Australian Conservation Foundation is involved in many other aspects of conservation as well. Rainforest preservation is one of our major objectives, and we are also working to protect and clarify issues concerning the Antarctic and the preservation of whales. We are currently working for legislation to restrict the expanding trade in kangaroo products, and not surprisingly we have also evolved a national plan for the conservation of wilderness areas.

The future will bring new challenges, as we develop an alternative view of how the relationship between people and nature can evolve successfully. Voluntary conservation groups are vital to the national interest. The need to show how a sustainable society can be developed is an important one, and will be difficult until new approaches to decision making are in operation. It will still be necessary to rise up and defend the variety and stability in our environment wherever it is threatened, but we will also be able to go on the offensive and create a second front, to create a sustainable world. Unless we do this the lives of our children will be very much poorer than ours.

International Cooperation

SCIENTIFIC IMPERIALISM AND THE THIRD WORLD

Felipe Benavides

Vicuña grazing in the Andes mountains

Spaceship Earth—our only known natural habitat in the whole universe—is more likely to be destroyed by population explosion than by nuclear explosion.

While human beings multiply, our planet seems to shrink. Not in size but in its productive capacity to provide for humanity's food needs—to say nothing of its life-support systems.

It is dramatically evident that, in spite of an abundant biological richness, hundreds of millions of human beings survive in such a poor state that they cannot obtain sufficient protein to feed themselves properly. Statistics show that, of ten children born, three or four die before the age of five years. And, in the case of Peru, the numbers are even more horrendous. Surely this is disgraceful as we approach the twenty-first century.

By the time that a just distribution of the Earth's wealth has been attained, hundreds of thousands of children will have died as a result of unparalleled inhumanity and insanity in these very countries where so much richness in natural resources abounds. This will be caused, principally, because of the strong pressure exerted by the richest nations on those most poor, in their anxiety to obtain natural resources to feed factories and industries in order to provide their markets with products which satisfy their demands for novelties, luxuries and armaments.

In the name of progress the ecosystems of the Third World are daily subjected to torments from the most sophisticated of technologies, which despoil its seas, its rivers, its rainforests and its flora and fauna. 'Progress' is seemingly characterised by the ignoring of natural biological laws, with the accompanying destruction of elements vital to the maintenance of the ecological equilibrium of renewable resources. Wilderness is fast becoming a wild world of human madness and selfishness.

In many cases it is these same nations of the Third World, so abundant in natural resources, which for political or economic reasons sacrifice their richness without pausing to think of the well-being of coming generations—the fourth world of those humans yet to be born.

The destruction of the rainforests, where powerful machines slice away thousands of hectares to produce deserts, is as grave and outrageous as the lack of respect shown for the property of the forest inhabitants, human and animal, who are displaced and assailed without respect for their rights. We may fear the genocidal war machines, but that which is practised methodically, silently and efficiently against the life-support systems of our spaceship planet does not seem to worry us.

It is only fair to say that due to delayed conscience some nations of the developed world are today making a true effort to save what is left. The recently announced World Conservation Strategy is evidence of how responsible people can come together to make a call to the world to awake universal concern for the cause of wildlife conservation. Even so, there remain in wealthy nations very powerful forces which continue to foster the depredation of the renewable resources of the Third World.

The attempt to halt, in the name of common humanity, the destruction of that great source of oxygen—the Amazon—by the men and women of the rich nations is praiseworthy, but is it already too late?

Nearly all of the damage inflicted on this vast green lung comes from the economic power of those same industrialised countries. What a paradox!

Peru is no stranger to vandalism. Her oceans, her rivers, her punas and rainforests have also been scenarios for the looting of marauding barbarian Attilas.

Father Bernabe Cobo asserted in his important work *History of the New World*, concluded in 1653, the following:

> There come by this coast of Peru schools of anchovy
> (*Engraulis ringens*) so thick that, in my navigation
> From Lima to Trujillo in the year 1627, there
> Approached our ship one so great that it seemed
> The water a black stain, and because the sea was
> In calm, the people got them in baskets—with

No more work than placing the reed baskets in
The sea and removing them, full of anchovy.
In this city of Lima and her environs great
Quantities of anchovy are consumed they have
Fish of very good taste—apart that
This is a great help for the poor people because
For a penny everyone of a house could supper,
Albeit 10 or 12 persons.

Today the anchovy, the principal link of the food chain within the two hundred mile limit, has been gravely reduced by greed. All the Peruvian conservationists' efforts to avoid this collapse have been in vain in the face of the tempting prices offered for this protein-rich food by the industrialised nations to feed cattle and chickens. Even now, despite the disaster of the anchovy as a lesson, we have launched forth on the destruction of other species to replace the anchovy in the crematory ovens of the fishmeal industry: the Pacific sardine (*Sardinops sagax* or pilchard); the jurel (*Trachurus symmetricus murphil* or Pacific jack mackerel); the machete (*Brevoortia maculta chilcae*) known as menhaden or shad, are all being converted into fishmeal for export—species that have almost disappeared from the daily table of a country with one of the highest infant mortality and malnutrition rates!

In 1977, 213,109 metric tons of fish and shellfish were extracted for consumption by our people. Of this total, after the reduction caused by cleaning, which represents 50% of the weight, there remained only 106,000 metric tons to contribute to the feeding of 16 million people.

As a result, the average consumption of fish per person in Peru was barely 18 grams daily per person. If we consider that the fish protein content is 21.2%, it shows that in that year the Peruvian seas gave daily 3.8 grams of protein per person, only 7.6% of the 50 grams daily required for the normal feeding of one person.

This is a performance which leaves much to be desired in a country which in 1977 took more than 2.5 million tons from its sea. A simple comparison with another country of the Third World, the Philippines, shows us the gloominess of our reality.

The Philippines in the same year, 1977, extracted from its seas 1.5 million tons—or 35 kilograms per annum per person—much less than the 156 kilograms registered in Peru per person. But in terms of effective feeding the Philippines managed to obtain 82.2 grams of fish per day for each of its 43 million inhabitants, 17.4 grams of protein constituting 34.8% of the necessary amount for efficient human nutrition. In other words, with a fish catch of only 22% of Peru's, the Philippines obtained from the sea a food quantity 4.6 times that of the Peruvians.

What is the difference between the Philippines and Peru? The reply is simple. While Peru used 92% of its catch for the production of

fishmeal for export and only 8% for human consumption, the Philippines used 73% of their catch for feeding people.

The seriousness of these figures cannot be disguised by the economic benefits which the fisheries report for the fishmeal industry, because it is proven that human consumption generates a higher value. Thus in global terms, the Filipino fishery is four times greater in value than the Peruvian.

What was the origin of the Peruvian fishing boom? The book *Who Will Survive?* published in 1967 by American diplomat Paul Paddock and his brother William, ex-director of the Panamerican Agricultural School, states:

> The growth of the fishing industry in Peru is unequalled in the history of industrial fisheries development. How did it happpen? Perhaps the chief reason that it happened at this particular time is that fish processing equipment was suddenly on the market at bargain prices. This happened because the sardine industry of California collapsed when the fish 'just disappeared' and the herring industry of Norway collapsed when the fish 'just disappeared'. The Californians and the Norwegians cast about for a new area to fish and remembered Peru; it had long been known that this coast, unique in the world, teemed with anchovy. Simultaneously, research conducted in the temperate zones was bringing about a revolution in chicken farming: this opened a huge new market for the fishmeal feed that now supplies protein to chickens.

Again, in the Paddock brothers' book thirteen years ago, as if in premonition:

> A sour note in the Peruvian fishing boom is that no one knows how long it will last. It is based solely on anchovies and little is known of their life cycle. Worse, little is being done to conserve this resource.

Serious consideration should also be given to guano and the guano birds: the population, which was calculated in 1956 to be about twenty million guano birds, produced 250,000 tons annually of the most valued fertiliser in the world.

Doctor Robert Cushman Murphy called the guano (*Phalacrocorax bouganvillii* or white chested cormorant) ''the most prized bird in the world''. In his book, *Bird Islands of Peru,* published in 1925, he wrote:

> Small though the Chincha Islands are, their name is known in the farthest seaports of the world, and their share in making fortunes and abetting calamities, in debauching men and demoralising administration, and in serving as the inanimate cause of greed, cruelty, extravagance, economic ruin and war has given them a historic place quite out of proportion to their size.

Professor Claus Wirtiki, of the University of Hawaii, in a study of the current 'El Nino', says that in 1957-1958 the population of guano birds was reduced to six million. Today, we doubt their number reaches three million, although a small recuperation has been noted due to banning of anchovy fishing in zones bordering the Guano Isles of Chincha.

The production of guano in 1978 was only thirty thousand tons—and other dangers loom over the guano birds. When the fishmeal factories begin their 'cooking' at a short distance from the National Reserve of Paracas, the wastes and offal of the factories are tossed into the sea, killing *en masse* all kinds of fish, eggs, crustaceans, plankton and zooplankton.

The food chain of the Peruvian sea is one of our planet's most perfect creations. The guano birds cannot live without the anchovy and there can be no guano without birds. The anchovy cannot survive without zooplankton nor can the zooplankton without phytoplankton.

The bonito cannot survive without the anchovy, and part of this food chain also includes the sardine, the silver sides (*Nectarges nethenthe*), the mackerel and the Pacific hake. Even so, be it for greed or through irresponsibility, all kinds of fish, including the flounder, are sent to the fishmeal incinerators. And we hear Peru saying with a cretin's pride that "we are the world's biggest fishmeal producers". But at what cost!

In a report published by FAO in 1979, the following is said:

The evaluation of the future demand for fishmeal is difficult. The market for this product has suffered serious reverses especially as a result of Peruvian anchovy fisheries collapse. In 1970 there was an annual production of 12 million tons, the most important among world fisheries oriented to the exploitation of a single species. Its collapse occurred in 1973 and the capture remained at less than a million tons in 1977.

The fishing ships coming from the Pacific represent almost half the world catch. Among the species almost completely decimated are the anchovy, the large tuna, the salmon and the hake.

But it is still possible to save the Peruvian Sea. I don't think it is too late. Nature is generous but she must be given a rest, time to recuperate herself, by applying a rational policy of extraction for human consumption and giving top priority to the Peruvian people.

"The future of humanity depends on the solution of poverty," observed the French Foreign Minister, Jean Francois Poncet. He adds: "Poverty is the failure of progress and, therefore, ours."

What a great truth, spoken by a man from the industrialised world!

Recently, under the banner 'The seas must live', the rich nations of the world launched a campaign to save this life but, at the same time, large fishing ships with destructive force scooped up the tiniest living thing from the deep sea. Who are the owners? We, the impoverished, fall back in the face of power's influence and export our people's protein to leave a future generation weak in body and mind.

It will be difficult for us to reach the galloping technology of the more advanced nations, so we should for this very reason measure and conserve our natural resources, the renewable ones.

Examples have been seen of how Third World nations have manag-

ed to dominate the price of oil and become great economic powers both within and outside of their own nations. But these same nations must remember that oil is exhaustible, as are copper, silver and all the minerals and we shall be obliged to mine those riches from the deep sea in future.

Even so, the possible irrational exploitation of the marine deep's minerals (manganese, nodules and the like) can wreak grave consequences which today are still unpredictable. The detriment of the oceanic environment, the disturbance of the ecology and the wholesale plundering of this great icthyological richness would be the cause of a great catastrophe affecting all humanity. It is necessary to prepare the technicians who will assume the great responsibility of controlling the exploitation of the radioactive minerals whose existence has been detected in the sea's deep.

Meanwhile, everything that has life is renewable. But against all of this conspires modern technology, in some cases a form known as 'scientific imperialism', described here by the world-renowned and illustrious Venezuelan ecologist, Doctor Gerardo Budowsky:

> Scientific imperialism is a widespread phenomenon today and takes many different forms. It is insidious and can be camouflaged under what may appear to be very good goals. Because all the actions are 'carried out in the name of science' they may seem to be automatically justified, and any protest may be stifled by strong criticism.

Having lived and studied for many years in the industrialised nations, Doctor Budowsky can appreciate the abnormalities and contradictions existing between the nations which divide the planet into two great geographic areas: the rich north and the poor south (with a few exceptions, such as Australia or New Zealand). In his work *Scientific Imperialism* Budowsky says:

> A multi-million trade benefiting the importing countries has developed, leading most probably to the depletion and perhaps the extermination of certain species—and the trade itself. While it may be argued that the introduction of new technologies may lead to new incomes for the local people, scientists have the duty of looking at the long-term interests; and if their new technologies fall on cultures that do not realise the necessity to use them without destroying the very resources on which such trade is based, they should take the utmost precautions in feeding what presently is an extremely dangerous tool into the local systems.
>
> Ultimately it may possibly be quite appropriate to introduce these technologies, but at a proper time, when populations that benefit from them are fully prepared to use them wisely on a truly permanent basis for the right kind of development, one that does not jeopardise the possibilities of keeping the options open for future generations.

There is an excellent living example of Doctor Budowsky's wise words in the case of the vicuña—that gentle cameloid inhabitant of the high Andes. The 'Catch 22' situation arises when scientists allege that

the objective of the endangered vicuña conservation in the Pampa Galeras Reserve is to obtain an overpopulation in order to justify their culling. The so called overpopulation, which we have evidence to refute, means the slaughter of more than 10,000 vicuña which represents 14% of the world population of an animal on appendix I of C.I.T.E.S. (Committee for International Trade in Endangered Species).

Many are the times I have found myself impotent in the face of the force of foreign interests and the indifference of some of my countrymen when coming out in defence of some animal on the way to extinction. This indifference is due to the lack of knowledge about the realities of wildlife and its consequences to humanity. Meanwhile, the rich and advanced nations of the world have at their service scientists who lend themselves to this 'scientific imperialism' to which Doctor Budowsky refers.

On the other hand, it is fair to explain that the local scientists do not have the economic independence to confront the 'scientific imperialists'. Some emigrate in search of better opportunities, others throw in the towel and abandon their scientific careers to devote themselves to business, industry or teaching. Among the latter there is no lack of those who, through their technical knowledge, end up by becoming efficient predators of nature. Others bow their heads and let things carry on so as to safeguard their personal economic situation. There is no lack of those either who, having studied abroad, earn merits in the service of 'scientific imperialists', and, in certain cases, become its most obsequious and servile instruments. I have named them 'mercenaries of conservation' and their masters a scientific mafia.

As conservationists of the Third World, we should unite and demand the formation of a commission to stand for the conservation of nature in the nonaligned countries, or for any other movement that gathers together Third World nations. It is essential to create an International Environmental Tribunal to which all countries can appeal in defence of their rights, no matter how rich or poor they are.

The contraband in skins, ivories and plants in danger of extinction are not crimes which concern only the country of origin—they affect all humanity. The impunity enjoyed today is due perhaps to one reason only: that contraband travels by a one-way route, from the poor countries to the rich.

The vicuña united five Andean nations by a multilateral agreement, the La Paz Treaty, signed by Peru, Bolivia, Ecuador, Chile and Argentina. This is a fine example of conservation which is more than a decade old, despite the influences of the 'scientific imperialists' who vigilantly search for a way to take control of the skins of the animal which produces the finest wool in the world. It was coldbloodedly stated by German foreign experts in a report dated May 1979 that the

sale of skins of baby vicuña had a greater value than the skin, wool and meat of adult vicuña, because there is 'less waste in bioenergy in producing a baby'.

It seems that foreign experts sometimes look at an animal, even when an endangered species, as would a furrier.

Vicuña must be repopulated in the vast empty areas along the Andes, promoting the breeding of the animal which can and must be sheared for making the most valuable cloth in the world. Perhaps Peru should look for the answer towards Australia and New Zealand who understand what shearing the wool of animals means for their economy.

Without any doubt the powerful lobby of the international fur trade has tried to find a way to open up the lucrative vicuna market, despite the declared moratorium which is an integral part of the La Paz Treaty of 1969. At the meeting of C.I.T.E.S. held in Costa Rica in March 1979 there was an attempt to demote the vicuña from Appendix I (all trade forbidden) to Appendix II (limited trade under government control) of the list of animals in danger of extinction. This would have resulted in the wholesale slaughter and poaching of a species, 80% of the world's population of which is to be found in Peru. Happily men and women from the rich nations, as well as conservationists from the Third World, successfully opposed this shabby manoeuvre.

We conservationists of the Third World do not often win. Even so, faith and hope must be the watchwords for the new generation who may find links of unity within the Third World movement. The conservation of the environment and its renewable natural resources should be one of those links in the search for justice on a world wide level. Surely the animals—the great silent majority—have rights as well as humans!

This may be dismissed as idealistic, but I sincerely believe that our planet will become civilised, based on ideals transformed into reality. On the other hand, if idealism does not turn into reality I fear that we are on the road to digging our eternal grave.

No one should doubt that the role of the great architect of the universe was to maintain the multiple ecosystems of this creation in perfect equilibrium, among them humanity.

Natural Resources

MINERAL EXPLORATION IN RELATION TO WILDERNESS AREAS

Ian Hore-Lacy

Percussion drill on dry lake bed, drilling a test bore

Both minerals and large undisturbed natural areas are national resources of importance to any national community. In Australia our dependence upon energy and metal minerals is obvious in our transport, communications, houses, large buildings and so forth, not to mention that 42 cents of every dollar spent overseas on cars, calculators or travel is earned by mineral exports. I scarcely need to elaborate on the importance of large undisturbed natural areas for our recreation and for conservation.

Land use planning must be undertaken on the basis of an understanding of the land's capabilities. It is no use clearing rainforest for farms if the land will not support farming. It is no use setting aside areas for mining unless they have suitable mineralisation and it is no use opening a fragile ecosystem in a park for mass recreation when there are other areas available which will withstand prolonged trampling.

The capabilities of some areas are fairly readily established. With our existing knowledge of Cape York for instance, it would not take

long to determine the potential of part of it for cattle, sheep or agriculture. Peter Stanton has already done some excellent work identifying areas of principal conservation interest, and something is known of the bauxite potential along the west coast.

But with minerals we often have a problem. There are several reasons why it is impossible to define areas of importance for Australia's future mineral supply. Any designation of land use must be tentative to the extent that mineral potential remains unknown. In practice the low mineral potential of many areas can be confidently asserted. However, other areas have a geology which makes them highly prospective for economic mineralisation.

The management of any area must take this point into account and allow continuing access for research on the land's potential, including mineral exploration. This management need applies to all large undisturbed natural areas, as long as exploration activity is undertaken with minimal disturbance and does not jeopardise the aesthetic and recreational value extensively or for long.

If significant mineralisation is found it is then desirable to ascertain whether it constitutes an economic orebody of sufficient importance to warrant mining. If it does constitute such an orebody, there would be a need to re-examine land use in that area and maybe change it. This would require some establishment procedure for the area involved as well as arrangements for location of infrastructure. For instance, the Ranger mine in the middle of the Kakadu Park will occupy about 1,200 hectares of a lease area of 7,900 hectares within a park area of 1.25 million hectares.

Many in the mining industry and other people tend to oppose wilderness or any national park type proposals because they may lead to sterilising some of the nation's mineral resources. It is and will continue to be argued that unless exploration access is guaranteed, wilderness areas or national parks which are closed to exploration should be as few and as small as possible.

If people persist in seeking stupid and unnecessary confrontation on land use issues without working out something more rational and in the national interest then we will *all* have to live with seeing conflicts resolved in Canberra or State capital cities sometimes with little regard to the most relevant criteria.

We do need to realise that the probability of finding a workable mineral deposit is low. Despite exploration over most of the Australian continent involving the expenditure of more than $150m per year, only a fraction of one per cent of the country is disturbed by mining. By the turn of the century it will still only be a fraction of one per cent, and there are many people in the industry who are determined to see that there will be no scars left to tell where exploration has been going on in the meantime.

Now I would like to discuss briefly the matter of mineral exploration activity as it might be conducted in large undisturbed natural areas.

First, is it worth noting that at least some exploration organisations, and certainly many field geologists, are extremely sensitive to the attitudes and values of others seeking large undisturbed natural areas for refreshment and recreation. Many field geologists are sensitive precisely because of their love for wilderness areas. The exploration divisions of well-established companies are both prepared and able to abide by rigorous guidelines or required procedures in their activities in national parks or other such areas.

The exploration techniques available to field geologists which have no more effect on the environment than that of a bushwalker include the use of satellite multispectral imagery, and the geochemical analysis of stream sediments and surface water, including such new techniques as laser-induced fluorescence for uranium in water. Other techniques involve the use of aircraft flying over the area or people on the ground surveying on a graticular pattern.

Further investigations may require other techniques which create some temporary and local disturbance, and should only be undertaken in close collaboration with management authorities. These include rockchip sampling, collecting soil samples with a hand auger, and using a man-portable power auger for bedrock sampling.

I would call all these phase one of an exploration programme. Finally, there are techniques which would be needed to actually prove up an orebody, or phase two. These would create disturbance which, though still temporary, should not be undertaken without clearly canvassing the consequences of mining the orebody and making early allowance for this.

The exploration techniques concerned involve cutting drill pads and the use of trucks or heavy support helicopters to move equipment from site to site. The techniques include rotary air-blast drilling and diamond drilling.

The enduring effect of even these techniques can be made negligible by careful attention to plugging drill holes and ensuring vegetative rehabilitation. In fact there should be strict requirements for ensuring that if mining does *not* follow, the areas should be rehabilitated to their former state.

A great deal of work can be done to explore for mineralisation without adverse effects on a natural area and with very few effects on other users. Only if these yield very promising results is it necessary to consider moving on to the mining stages.

It must be emphasised that in the last decade geophysical and geochemical equipment has become more sophisticated, more sensitive and more portable. Its sophistication means that specific minerals

sought can be quickly identified or their absence confirmed, its sensitivity means that small traces can be picked up and their sources more readily traced, and its portability means that what once required a truck or Landrover now needs only a horse or human to cart it around. However, such equipment still cannot identify oil or gas, and in many cases still cannot accurately distinguish one mineral from another. Perhaps we shall see developments over the next decade or two to take us further and enable new information to be obtained from old ground.

Mining techniques are also developing, and these will affect how much land needs to be alienated should that occur. *In situ* leaching is already sometimes possible for copper and uranium, and *in situ* gasification of coal may not be far off. But mining is further down the line than exploration and, to the industry's regret, very little exploration activity is consummated in actual mining.

In the present context it is sufficient to stress that compromises must be made and, whether we decide to ignore valuable minerals in order to preserve wilderness or to erode the value of undisturbed natural areas to enable mining, I believe our pre-eminent concern should be that decision making is carried out openly and with access to *all* the relevant facts. Our children and grandchildren will expect no less of us.

MINING AND REHABILITATION IN NATURAL ECOSYSTEMS

John W. Lewis

Mt. Assiniboine Park, British Columbia

It is evident that wilderness means many things to many people. Until recently, wilderness to most people meant a desolate, uninhabited area. The *Encyclopaedic World Dictionary* defines a wilderness as 'a wild region, as of forest or desert; a waste; a tract of land inhabited only by wild animals; any desolate tract'.

In recent years, with the massive urbanisation of people in the developed countries, wilderness has come to mean something else, a yearning for a simpler way of life.

In a sense, wilderness is a luxury. Society's basic needs for food, shelter and a reasonable standard of living need to be met before preservation of wilderness areas can be considered. Part of the problem in defining wilderness lies in the multitude of benefits which different people ascribe to it. The major benefits may be summarised as the experience by the individual of a primitive and remote area, conferring a spiritual revival upon the individual, scientific study of natural ecosystems, the preservation of genetic diversity, and the provision of aesthetic and recreational values.

Mosley pointed out that the primary motive for the establishment of wilderness areas has come from 'hardy recreationists' wanting more remote and primitive conditions than those obtained in National Parks, and scientist-naturalist groups seeking greater security for natural en-

vironments than those in National Parks. It is arguable that the latter objective cannot be met by existing or proposed National Parks, and it would seem that those desiring wilderness areas are a very small group. It is an ironical fact that if everyone wanted to go to a wilderness area it would be destroyed.

Fortunately, this does not look like happening. Ditwiler described a 'wilderness experience booth' in Yellowstone National Park which provides the smells, sights and sounds of the real thing. Apparently many park visitors prefer this to getting out into the natural wilderness.

I am completely in favour of setting aside substantial areas for National Parks for the enjoyment of everyone and of preserving areas of particular ecological importance. However, I question the imposition of North American concepts of wilderness on our Australian conditions.

Most of our concepts and definitions of wilderness in Australia seem to have been derived from North America, in particular from the USA Wilderness Act of 1964. In such phrases as "where man himself is a visitor who does not remain" are used. However, there are important geological, topographical, climatic and ecological differences between the two countries.

The vital role of the Australian Aborigine in shaping our natural environment has been almost completely ignored. In their publication, *Wilderness in Australia*, Helman *et al* disposed of the subject in three lines. Yet to the Aborigines, the 'wilderness' was their home and they managed practically the entire Australian landscape before white people came. Therefore it seems rather arrogant to talk of people being only visitors in these areas.

Wild areas inhabited by Aboriginal people are considered by Smith not to meet the requirements for wilderness contained in the USA Wilderness Act. Instead, such areas should be distinguished by some other term such as primitive area or Aboriginal wildland. George Stankey pointed out that wilderness preservation depends on a general social recognition that there is such a thing as wilderness.

Definitions of wilderness require it to be completely natural and completely unaffected by any human activities. Yet is this really the case in Australia?

In Australia we think of a wilderness area as being in much the same condition as when white people arrived. However, there is evidence that the Aborigines, during at least thirty thousand years of occupancy of Australia, maintained a continuing environmental impact through the deliberate use of fire husbandry. Throughout the continent explorers noted the constant burnings of the Aborigines. They did this to provide fresh, succulent feed for their grazing stock and to provide ease of access. The Aborigines inhabited and used all of the

land, and when white people came to Australia there was no wilderness.

It is well established that most of our natural ecosystems are made up of fire-climax vegetation and it is certain that thirty thousand years of firing have resulted in permanent vegetational effects. The regular firing of the bush by the Aborigines must have been a major factor in the establishment and maintenance of this vegetation structure and composition.

Now that the husbandry of the Aborigines has gone, we have what may be termed an artificial wilderness. Helman *et al* comment on the serious implications that fire has for Australian wilderness and adjacent areas. Without the regular controlled burning by Aborigines the amount of flammable material grows to a heavy accumulation after a decade, and the risk of catastrophic fires increases markedly. Yet in the Kosciusko National Park several hundred miles of fire roads were closed to vehicular access in the four designated wilderness areas and fire control practices were modified to serve wilderness conservation aims.

At first sight, mining would appear to be incompatible with the wilderness concept. However, as Ian Hore-Lacy points out, both wilderness and minerals are national resources and we need to have an inventory of both types of resource. There is a continuing need for mineral products, and ultimately the community must decide whether a mineral resource within a wilderness area should be extracted.

Assuming that a decision has been made by the community that a mineral resource within a wilderness area will be mined, then the magnitude of the impact will obviously depend on the type of mining operation and its duration. An underground mining operation will have a smaller impact on the topography and vegetation than open-cut mining. However, heavy metal pollution and acid tailings may be a problem with base metal mining, and special measures will need to be taken to prevent contamination of the environment from these sources.

It is generally accepted that ideally a wilderness area should contain a 'core' area of sufficient size to permit complete remoteness from the influences and structures of people and a buffer or management zone. Each of these areas might be in the order of 25,000ha in extent. It would be preferable for mining to take place in the buffer zone but, since minerals are where you find them, this may not always be possible.

Mining in a wilderness area, or in any other relatively natural area of ecological value, should only proceed with a high degree of pre-mining planning, care during mining operations, and post-mining rehabilitation of the environment. It is a corollary of these activities that mining is a temporary land use, not a permanent one. This may be questioned by many but, given that rehabilitation can be accomplished successfully, it becomes a matter of deciding the time scale during

which natural processes will eventually mask the effects of the mining activity.

An example of this approach is the operation of Ranger Uranium Pty. Ltd. in the Northern Territory. The mine and infrastructure are located at Jaribu within the Kakadu National Park, an area of six thousand square kilometres which was dedicated in April 1978. When mining is completed, the area will be incorporated into the park. Ultimately, a further 6,000 square kilometres will be added to the park after the mining of other minerals in the region.

A very comprehensive programme of pre-mining monitoring of environmental parameters is presently under way. On the completion of mining, the highest standard of rehabilitation will take place.

Of course, any mining operation will have an adverse effect on that particular part of a wilderness area, degrading most wilderness values for a long period of time. It may take fifty to a hundred years for the effects of mining to completely disappear. This may seem a long time to people unaccustomed to thinking in geological or ecological time scales. However, if we aim to preserve our wilderness areas for all time, this is not a very long time to wait for these small pockets within the wilderness to become indistinguishable from their surroundings. We already accept areas already substantially modified by people (in this instance, Aborigines) for our so-called pristine wilderness.

We should not have fears that mined and rehabilitated land will be regarded as being any less suitable for inclusion in wilderness areas by our descendants and Australia is one of the few countries in which rehabilitation of natural ecosystems after mining is undertaken.

Open-cut mining causes the greatest disruption to landforms and plant and animal communities. The rehabilitation of such areas usually commences as soon as the mining operation has advanced sufficiently to allow shaping of the overburden. Irrespective of the type of mining operation, once the operation is finished all traces of artificial structures should be removed.

The major forms of open-cut mining in Australia are for bauxite, coal, iron-ore and mineral sands. In mineral sands mining only a very small volume of heavy minerals is removed—usually less than 1%—so the remaining sand can be replaced and reshaped to conformations similar to those before mining, merging with adjoining undisturbed landforms.

In the other types of mining substantial volumes of bauxite, coal and iron-ore are removed, and the overburden is replaced in the excavation. Bulking of overburden material as a result of disturbance reduces the difference in volume to some extent, but new landforms possessing features almost identical to those before mining usually result.

Where suitable topsoil is present before mining it is usually removed and conserved during the mining process. This is sometimes done in

two layers. Such soil is a reservoir of plant nutrients, soil micro-organisms, organic matter and seeds of native plants.

However, this is not always the case. Sometimes the topsoil is leached and degraded and in such cases portions of the overburden are relocated and replaced on the surface of the mined land to form a new soil under the action of weathering processes. When this is done, it is necessary to re-introduce soil micro-organisms by spreading a thin layer of original surface soil and litter over the new soil.

The surface of the soil must be protected from wind and water erosion before the native plants become established. This is accomplished by chemical means, using spray-on stabilising materials such as *Terolas*; physical means, such as plastic mesh fences and surface webbing on steep slopes; or biological means, such as temporary cover crops, usually of a cereal plant such as cereal rye or sorghum, and mulches of chopped vegetation. Hydro-mulching is also sometimes used.

The main method of returning a majority of the species to an area is by returning topsoil. Pioneering and colonising species native to the area normally predominate. A mulch of chopped native vegetation from the mined area is also sometimes spread to provide seeds.

Seeds of the more permanent members of the plant community, principally trees and shrubs, are also collected by various methods and introduced into the soil once primary stabilisation has been achieved. Seeds are collected from the same provenance to which they will be returned. Nursery seedlings are also raised from such seeds and planted out at the appropriate time.

Plant nutrients are used sparingly in the rehabilitation of native ecosystems. The objective is to return to the system nutrients that were lost during the mining process, so that eventually a self-sustaining nutrient cycle will re-establish.

In wetter regions, potential leaching of natural and fertiliser nutrients into lakes and streams must be carefully monitored. In semi-arid regions, excessive fertiliser application may lead to the retention for long periods of nutrients in the soil, particularly phosphorus, at levels higher than before mining, causing permanent changes in the composition of the vegetation.

The developing vegetation on mined areas should be regularly checked for its progression and action taken, if necessary, to correct any deficiencies. This additional work, usually entailing enrichment planting of seeds and seedlings, will be required only in the early years of rehabilitation. The measurement of plant community parameters, such as species density, plant cover and species diversity, will be part of the monitoring programme. Information from the pre-mining studies will provide the baseline data for the monitoring programme.

Rehabilitated land is not, as some would think, unnatural or ar-

tificial. Our actions provide the essential components of the ecosystem for natural processes to work on.

The range of animal species that occupied the site before mining will re-colonise once the food and habitat factors necessary for their survival are present. In practice, this means that at each stage of the plant succession, ultimately to the condition that prevailed before mining, there will be a range of animals to use those particular conditions. This range will probably be markedly different in composition from the pre-mining range during these immature stages of the vegetation, and may also change rapidly from year to year.

Once the factors for the natural development of the rehabilitating areas have been set in motion, the areas should be isolated and not interfered with. The mined areas will ultimately merge into adjoining undisturbed areas.

TROPICAL RAINFOREST-CREATING A NEW CULTURAL LINK

Alan Grainger

Tropical rainforests contain numerous plants, animals and insects, many of which are of potential benefit for our future and well-being

The tropical rainforests are dying at human hands. The product of sixty million years of evolution and the world's richest biome will be almost totally obliterated within less than a human life-span.

This magnificent wilderness amounts to about 935 million hectares in area, enough to more than cover the Australian continent and about the same size as the U.S.A. including Alaska. But it is disappearing at a rate of about 15 million hectares a year, an area the size of England and Wales combined. Every second an area of rainforest the size of a soccer pitch is destroyed.

Already forty per cent of the climax area has disappeared. Since the U.N. Conference on the Environment, held in Stockholm in 1972, issued a strong recommendation that the rainforests be conserved, little if any action has resulted. In the last ten years more and more of the forests have gone: Indonesia has given the green light to logging in Borneo and Sumatra, and Brazil has made giant strides into the Amazon, to give just two examples.

By the end of the century most of the damage will have been done,

and that gives us ten years more in which to act.

Traditional peoples, like the Yamomamo of the Amazon, have always had a close relationship with the forests in which they lived. To them every plant, every animal, had a name, a personality, a role in the forest and a meaning in their lives. The forest was an integral part of their culture and the last thing they would do would be to destroy it.

We cannot return to this primaeval Eden, nor can we discard thousands of years of human social evolution as if it were garbage. But we must start from where we are now to forge a new cultural link with the rainforests before it is too late.

The forests worked for millions of years to make it possible for humankind to live on this planet, and today their role in maintaining life on Earth is as vital as it ever was. The tropical rainforests stand at the very fulcrum of nature, a crossroads in the intertwining cycles of water, oxygen, carbon and nitrogen which are the cogwheels keeping our planet ticking.

The ecological consequences of losing the rainforest are very far reaching. To give just one example, carbon dioxide given out when the trees are burned, as half of them are, could build up in the atmosphere and soak up heat that would normally escape into outer space. The earth would get warmer and the polar ice caps partially melt. The consequent rise in ocean levels would flood London, Washington and Cairns.

In addition, there would be a reduction in the volume of water transpired by the forests and the amount of heat absorbed from the sun, with more heat being reflected. A senior U.N. official has predicted marked changes in atmospheric circulation and global weather patterns as a result. We are tampering with the workings of nature which, for all our technology, we could not replace.

Homo sapiens now covers the face of the earth and has transcended a localised habitat. For most of the five million species of plants and animals living in the rainforests this is not possible. They cannot exist outside the forest.

The World Wildlife Fund estimates that 276 species of mammals, 345 species of birds, 136 species of amphibians and reptiles, 99 species of freshwater fishes and no less than 20,000 species of plants living in the rainforest are currently threatened with extinction. Worldwide, one species of life vanishes from the planetary stage every day. Cutting down the tropical rainforest is like bulldozing the homes of up to half the number of species on our planet.

Deforestation is a cultural challenge encouraging us to relate to previously unthought of dimensions of life on Earth—the livelihood of species other than *Homo sapiens*.

We are all part of the process of deforestation; the tropical rain forests are as close to each one of us as are our heart or lungs. It would

be hypocritical of us to blame only the loggers, the farmers and the mining companies for clearing the forests, because we consume the wood, food and raw materials which they produce.

The landless cultivators wreaking havoc in the rainforests of South-East Asia are merely repeating what we have done in Europe, America and Australia: clearing the forests for food and fuel. There are no saints or sinners. We are just a race of human beings trying as hard as we can to survive.

Deforestation does not result from a lack of technical capacity or education. Australia chips its jarra forests, while America and Japan are often right in the thick of commercial logging. Europe is one of the main consumers of tropical hardwoods. We should not look down upon countries such as Indonesia, Brazil or Papua New Guinea for felling their forests. They are just imitating us—they think that it will give them a passport to the club of rich nations.

It is clear that unless we can take action to modify our cultural relationship with the rainforests they will die. In my opinion the blending of a 'tree consciousness' and an awareness of our forest heritage into our national cultures is paramount.

When India launched its social forestry programme, involving village people in afforestation schemes along roads and fields and round villages, it was not successful at first. The reason, according to the Inspector General of Forests, was not a lack of people, trees or technical back-up. They had failed, in his words, to impart to the people a 'tree consciousness', an indefinable but no less tangible feeling for trees that makes them inseparable from a well-run farm or a happy village, and which is the most powerful motivation for the planting of trees or the conservation of forests.

This feeling needs to be translated into the ground-rules upon which any culture or change of culture has to be based. I would like to suggest some basic principles on which to found a strategy to save the rainforests, principles that relate to what we are doing now as well as giving us guidelines for the future.

The forests have a right to exist independent of their benefits to humanity. They provide homes for our fellow creatures and maintain the stability of the biosphere.

If we regard the conservation of wilderness only as a means of giving people a place to escape from urban turmoil, then the designation of national parks will always take second place to short term commercial interests. We will end up with a few reserves in the mountains where the loggers cannot go, or in the areas where the species content is poor, whereas what we should be concentrating on is saving the lowland rain forests which are the richest of all, and are always the first to disappear.

Wilderness is not wild. It has a character and wealth of its

own and this should be the prime criterion for delineating national parks and conservation areas.

It is vital to set aside a sufficient area to conserve the genetic diversity of species. Given the wealth of species in the rainforest such species will often be found at low densities. To form a gene pool for the kauri pine (*Agathis spp.*), a timber tree with great potential for plantations in the tropics, an area of 75 square kilometres may be required.

The conservation of our forest heritage demands the preservation of national sovereignty over natural resources.

No country should dictate to any other except by example. Without a national cultural, technical, legal and social infrastructure, forest conservation cannot happen, but often countries have lost their rightful sovereignty, so ways should be found of assisting its preservation. Indonesia is the most important tropical logging country, but half of the money received from log exports goes back to the West to pay for imports of paper and other wood products.

Conservation and development are interdependent

We are frequently exhorted to spend, spend, spend; but I believe the old virtues of thrift and saving are still very valuable and apply to natural resources too. We have taken plants like the rubber tree out of the rainforests and are cultivating them outside, yet we still rely upon the gene pools of wild plants in the forests in order to breed new varieties to combat new pests or adapt to changing conditions. The tropical rainforests may be thought of as life insurances for the continuing cultivation of many important crops which originate within them.

Just think of the potential wealth waiting to be harnessed from plants still growing wild in the forests. Imagine the impact on the local and national economies of five new crops like rubber or sugar cane; or the effect on medicine of a new cancer cure originating in a rainforest plant. And we would throw this away for a decade of logging or a few years of farming before the cattle get overcome by ticks or the soil fertility is exhausted and crop yields plummet.

Integrated land use is the key to conservation and development in tropical areas.

The Great Barrier Reef is one of Australia's major tourist attractions, but it is most intimately connected with the nearby rainforest. Conservation of the Reef alone may be inadequate without proper forest conservation. This is just one of many examples of the land use in one area depending for its continuation on the right choice of land use in a nearby area.

Areas of natural forests conserved in their natural state must be integrated carefully with those which are to be managed for timber or cleared for plantations of pines, sugar cane or oil palm.

Multiple land use schemes combining agriculture and forestry—called agroforestry—are much more productive and more

A majestic Flooded Gum *(eucalyptus grandis)* in the Terania Creek rainforest, NSW

sustainable in the tropics than monocultures. Instead of cutting down its mangroves, Thailand has realised that they are rich breeding grounds for fish, and is harvesting fish and timber on a sustainable basis.

There is no conflict between agriculture and forestry, or between wise utilisation and conservation. Each has its place, but a much greater maturity and responsibility must be exercised by both farmers and foresters if utilisation is indeed to be wise.

Recently it has been suggested that the drug companies and food corporations which depend on the tropical forest gene pools should subsidise their conservation, thereby giving an explicit value to the wealth of the rainforests.

While I believe that this is something which could be achieved in a couple of decades, to obtain urgent action another approach is necessary. The World Ecological Areas Programme launched such a proposal at the end of January, after more than a year of consultation amongst prominent conservationists. The strategy is to offer loans to countries with tropical rainforests within their borders, in order to reforest areas previously deforested by establishing plantations to produce timber more efficiently than the natural forests.

The basic condition for the loans will be the conservation of specific areas of forest as collateral, so that in twenty years time countries such as Indonesia will have a healthy forest products industry and still have large areas of their rainforests intact.

The future is not bleak, but if we are to achieve action in the next ten to twenty years it will be exhausting. Saving the tropical rainforests will require positive and decisive action, otherwise we may lose them by default.

The forests are the soul of a nation. Ehrenfried Pfeiffer said: "When a culture reaches maturity and becomes over-ripe, it must return to the forest, the source of all life, in order to rejuvenate itself. If a culture sins against the forest, its biological decline is inevitable."

AFTERWORD

Ian Player

When we organise an African wilderness trail, we traditionally end with an indaba. This is a Zulu word meaning a gathering of people. In the old days the Zulu chiefs, whether great or minor, frequently held indabas where they could hear the views of their people. Consensus decisions were then taken and the chiefs knew which direction they could safely follow. This custom persists today.

Our Wilderness Leadership School indabas give participants an opportunity to express themselves, and there have been many moving speeches made about the impact that wild country has had on city orientated minds. The shock of experiencing nature in her wild state has released a flood of self expression, or in some cases a desire to say nothing, words being inadequate to describe the depth of the experience.

When the School expanded its horizons people came from all the countries of the western world, drawn by the age-old attraction of Africa's mysteries. The trails have become a meeting place of minds, where around the camp fire at night experienced field officers guide the talk to the three basic questions: Who am I? What am I? Where am I going? The setting is the unique, magical continent of Africa. At night when the skies sparkle with stars and one of the group keeps watch, there is time to reflect on the life drama of veld and bush: creation-birth-growth-maturity-decay-death-rebirth.

People are coming on trail for reasons that go far beyond wanting to look at big game. It is a journey of self exploration in some of the remaining bits of old Africa, the home of the human race.

Years passed and I spoke to many people about the need for an international indaba, a gathering where great minds of the world could meet and talk, not only about wildlife and wilderness, but of humanity and where we were going. The need was for more than a group of

wildlife experts getting together and reading papers to each other. Somehow those people on the fringes and those others who were oblivious of the natural world had to be drawn in. Politicians, businessmen, scientists and government administrators needed to be heard. The spiritual association of humanity and nature so beautifully expressed in the culture of the American Indian, the Bushman and the Aborigine had to be shared as well. These were the ideas which led to the decision to hold a big indaba in 1977—the first World Wilderness Congress in Johannesburg, South Africa.

Those of us who were able to attend will never forget it. For five days we listened to speeches ranging from Edmund de Rothschild's description of the building of the Churchill Falls dam in Labrador to a seventy-seven year old Zulu talking in scientific poetical terms about how his people were once at one with nature. There was a Highlander from Scotland, and a Bushman spoke in his own language. The Deputy Governor of Alaska, a Minister of Conservation from Canada, the Chief of the Zulu people, a South African Cabinet Minister and some of the finest experts on wilderness, wildlife, and the administration of wild lands had their say. The hunters who frequently have their contribution denigrated or spurned also had an opportunity to talk, and so did the people who run zoos. There were arguments and counter-arguments. There was hostility and gentleness, but at the end of the week there was a marked atmosphere of the spiritual unity of humanity and a greater understanding of our dependence upon the earth and the need to know it and ourselves better.

A committee was formed which became known as the World Wilderness Congress committee, and it was decided that the Australian delegates would take back to their country an invitation to stage the Second World Wilderness Congress in 1980.

Wally O'Grady, Percy Trezise, Dick Roughsey and Verne McClaren accepted the challenge. It was not easy for them and it took persistence and courage to find the finance, obtain the political support, and set about organising the next congress. I had the good fortune to fly to Australia twice and I know the heartbreaks and difficulties, the suspicion and hostility that had to be overcome. It is no secret that in the same way that the Johannesburg Congress was in jeopardy many times because of political difficulties and the lack of finance, so the Cairns Congress went through some painful birth pangs.

Many people all over the world asked, "Why Cairns? Why not the Opera House in Sydney? Why not Melbourne or Perth?" But the World Wilderness Congress committee was delighted that it was Cairns. This town is the gateway to the Great Barrier Reef and the bush wilderness of Cape York. This is where the tourist, industrial and economic pressure on precious natural resources was being felt. Cape York and the Barrier Reef were places of the future, and the Congress

in Cairns would attract the kind of people who had experienced seeing their own countries damaged and brutalised by poor planning and thoughtlessness.

From the opening day when the Prime Minister of Australia, Malcolm Fraser, spoke and the schoolchildren of Cairns sang the national anthem and Waltzing Matilda, to the last evening when the Prime Minister of Queensland, Bjelke Petersen, spoke, the audience listened with deep attention to speaker after speaker.

It is true, as was experienced in Johannesburg, that there were people who tried to cause trouble, who were rude, and who were hostile to some of the speakers, but in the end when Laurens van der Post summed up the Congress with a speech that will long be remembered, there was no doubt that the Congress was a brilliant success. It made politicians commit themselves, and I believe they did it gladly because they knew it was the wish of the people. It brought scientists and administrators together, and gave the ordinary person in the street a chance towards a better understanding of the country in which they live.

If Africa has been described as the dark continent, then Australia is the forgotten continent. But the Cairns Congress made many of us aware of the enormous potential for true wilderness experience that was waiting to be realised in Australia. It would be to Australia that the wilderness lover would trek, for it was only in Australia that true wilderness would remain for the foreseeable future. Australia, with a small population and most of it concentrated in cities and towns, has more wild lands than any other country in the world.

I believe the Cairns Congress drew attention to this particular aspect of Australia, thereby making the international community appreciate, like the Australians themselves, that Australia's wilderness is a most rare and beautiful asset that must be cherished at all costs.

Wilderness is under threat. It is a quiet crisis and deterioration is happening daily. Since the sixteenth century sixty two species of mammals have become extinct. The toll of birds, plants, insects and trees is far worse. This is not through any apparent process of evolution but through the depredations of human beings.

In the United States some 22,000 square miles of the south western wilderness in the great basin of Utah and Nevada could be affected by the MX missile system. In Uganda some of the finest national parks in Africa—Murchison Falls and Queen Elizabeth Park—have been overrun by armies, and wildlife has been brutally massacred. In Kenya the black rhino have been reduced from 11,500 in 1973 to 1,800 in 1979. In my own country there is great pressure to open coke deposits in the Kruger National Park, one of the oldest national parks in Africa.

Satellite photographs show a most frightening deforestation in

Latin America and South-East Asia, and as a French philosopher said, "The forests come before civilisation, the deserts after them." Mounting population pressure and poor farming techniques are leading to terrible soil erosion in Africa and North and South America. Humanity is asking more of the earth than it can give. How far can we destroy nature before we destroy ourselves?

What is the answer? The answer is personal commitment by dedicated conservationists who understand what it is that they are conserving.

President Theodore Roosevelt played a crucial part in the fight for national parks, wildlife management, hunting and a sound conservation policy for the United States. He walked and hunted in Africa and spent time with John Muir in the Sierras. Under Teddy Roosevelt more than 234 million acres were reserved for conservation. Once he threw away a prepared speech and roared out to his audience, "I hate a man who would skin the land. A nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value."

Winston Churchill, who guided the western world in some of its darkest and most crucial hours, had his wilderness experiences riding on the South African veld in the Anglo-Boer war and sleeping under the stars.

General J. C. Smuts, one of the great political philosophers of our time, wrote the following which embodies much of his philosophy:

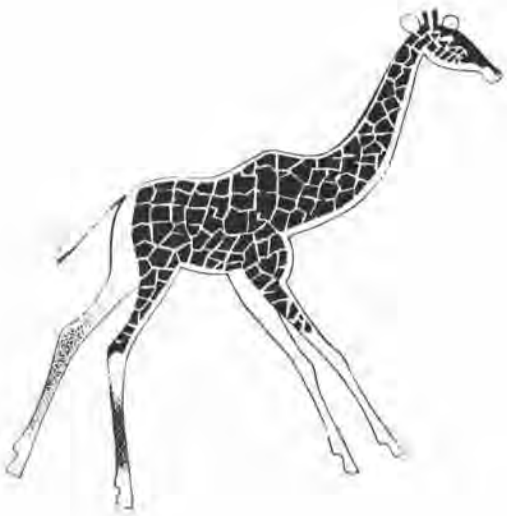
> When I was young I loved nature rather than sport and took to botany as a hobby. And in Africa, once you leave our deserts, it is grasses and glory all the way. At sunrise and sunset on our veld, in spring and autumn, when youth and maturity are in command, there is a strange fascination which no pen can describe. It is not single flowers, but the mass which overwhelms your senses. You become a passive instrument for nature to play on with all her magic fingers.

This was written ten days before his eightieth birthday when he was thought by some people to be a man wearied by war and political defeat. But these sentences still vibrate with the emotions of youthful love.

Wilderness imparted something to these great figures, a strength which for the rest of their lives they were able to draw upon like drawing money from a bank. They experienced that mystical sense of union with the earth.

These then are some of the problems that future world wilderness congresses will be considering. I believe that at the end of each congress, despite the acrimony that will surface from time to time, there will be a greater understanding of the three points of the leaf: person to divinity; person to soil; and person to person.

Summaries of Talks Not Included in this Book and Additional Material on the Second World Wilderness Congress at Cairns, Australia



SUMMARIES OF TALKS NOT INCLUDED IN THIS BOOK

The Management of Queensland Parks *Dr. G. Saunders*

The National Parks and Wildlife Service has responsibility for the preservation of the natural condition of national parks. Their management policies concern both presently established parks in Queensland as well as providing for an evolution of new types of national parklands.

Social Prestige and Wilderness Conservation
Professor Amotz Zahavi

How, in this competitive world, is a person who has devoted their life to nature conservation able to compete with the others who are simply selfish? The general problem of altruism is a key to the reconciliation of human activity and environmental conservation.

The Australian Writer and Wilderness
Dr. Xavier Herbert, PhD

In this personal account of changes which he has witnessed in the Australian environment over the period of his lifetime, the author claims that the Australians have sold their country to foreign capitalists, in the process inflicting irreparable damage on the land and wildlife.

Coastal Conservation in Southern Queensland
John McCabe

The coast of southern Queensland offers a series of landforms which together rank as one of the world's most diverse and exciting coastal ecosystems. These unique natural features have interesting geological origins and are of immense value to the national estate.

Rainforest of the Daintree River to Cooktown Region
Dr. George Heinsohn

This is the last large, relatively unexploited rainforest of Queensland. The role of this and other rainforest areas throughout the world in maintaining natural diversity, providing clean water, regulating climate and purifying the atmosphere is essential proof of the need to preserve them from further destruction.

Rare Frogs and Reptiles of the Cape York Peninsula
Jeanette Covacevich, Glen Ingram

Northern Queensland is the home for many rare animal species. Frogs and reptiles are a significant but undervalued part of this community, and it is vital to preserve these species and their habitat before they become endangered.

Wilderness Preservation in Natal, Republic of South Africa *John Geddes-Page*

Wilderness conservation is presently alive and well in Natal. But its

survival depends upon two factors—the ability of its advocates to interpret the wilderness concept in its proper context to the masses, and the management of people's involvement in a wilderness experience without defeating its aims or without denying any individual the right to use it.

Over-abundant Herbivores Limit Wilderness Values
Professor George Petrides

Though we must preserve what we have now, the protection of a species of animal can lead to over-abundance, which has to be recognised as a natural danger to wilderness. It seems evident that the control of extensive animal numbers is required in order to retain the wilderness character of certain areas.

The Role of World Wildlife Fund in Wilderness Conservation
Vincent N. Serventy

The World Wildlife Fund has, from its beginnings, been involved in the broadest fields of nature conservation even though its public image is mainly understood as the conservation of species. For example, habitat preservation has been of primary emphasis in such campaigns as 'The Tropical Rainforest', 'The Seas Must Live', and others. A uniquely Australian organisation, the Australian Heritage Commission, also assists wilderness preservation to the extent that it places on a federal register those areas of social or natural value which are deemed important for future generations.

The KwaZulu Wilderness *Prince Mangosuthu Gatsha Buthelezi, as read by Hon. Dr. F.T. Mdhlalose*

The name Zulu is derived from a Zulu word meaning 'of the Heavens', thus Zulu are known as People of the Heavens. We could be just as appropriately regarded as People of the Wilderness, for we are a people with an innate love for and understanding of wilderness in its true sense. The true future of nature conservation in South Africa should have nothing to do with considerations of racial background of those working in this field, but should be dependent on economics, fair land distribution, conservation education of the people and conservation training for those wishing to make it their career.

The Great Barrier Reef, A World Wilderness *G. Ray Arnett*

The Great Barrier Reef is the largest structure ever created by living cells, and it should be afforded protection from developers, shell and coral collectors, pesticide run-off, off-shore sewage dumping and other threats. Any problems relating to petroleum exploration can be resolved but the ground rules must be clearly defined before leasing and exploration begin, not after activity is under way. Barrier reefs, islands, and coastal areas everywhere need all of the help they can get.

The Second World Wilderness Congress

Col. Sir Laurens van der Post

Rt. Hon. Malcolm Fraser, Prime Minister of Australia, opening the proceedings

Display areas and workshops were available throughout Congress week

The Second World Wilderness Congress was held in Cairns, Queensland, Australia, in June, 1980. It was the second in a series of such events and followed the First Congress which was convened in Johannesburg, South Africa, in November, 1978. More are being

Display of Aboriginal materials

Dick Roughsey, O.B.E.

planned for the future, at approximately three year intervals and occurring on a different continent each time. The proceedings of the first congress, *Voices of the Wilderness,* and general information can be obtained from: Wilderness Leadership School, P.O. Box 15036, Bellair, Natal 4006, South Africa.

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Mr. Graeme Kelleher, B.E.
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Ian Player
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Dr. George Petrides
Department of Fisheries and Wildlife, Michigan State University, USA

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October, 1983

The International Committee has agreed to convene the 3rd World Wilderness Congress in Scotland. The Findhorn Foundation will host this event, and further information can be obtained by writing to:
World Wilderness Congress
Findhorn Foundation
The Park
Forres, IV36 OTZ
Scotland

There is
no one on the planet who
does not lose when
wilderness is lost.

Bob Brown

WILDERNESS

Edited by Vance Martin

Why do we need wilderness on our planet? And if we do need it, how do we keep it wild? These were the questions discussed at the 1980 World Wilderness Conference in Australia, and Vance Martin has edited the most important contributions to this conference into a continuous text which examines the interplay of the scientific, ecological, social, cultural and spiritual aspects of our world's wild places. Contributions include many well-known scientists and environmentalists, including Laurens van der Post, Jean Dorst, Ian Player, Madame Laurence de Bonneval, Geoff Mosley and Ray Arnett. Eight pages of colour and over seventy black and white photographs complement the text.

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