

SOUTH PACIFIC COMMISSION

REPORT ON ASSISTANCE TO WESTERN SAMOA
WITH NATIONAL PARKS AND CONSERVATION

by

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CONTENTS

	<u>Page</u>
INTRODUCTION	1
Objectives of mission	
1. To provide expert advice on potential forms of development in each demonstration park.	2
TUSITALA HISTORIC AND NATURE RESERVE	2
'O LE PUPU-PU'E NATIONAL PARK	3
2. To prepare basic training material, including mini-training sessions and on-the-job training for the limited staff available.	7
3. To give a lecture to all forestry staff on conservation.	7
4. To identify one or two marine reserve areas to be created under the reserve system.	7
PALOLO DEEP MARINE RESERVE	9
OTHER MARINE RESERVES	12
5. To examine the potential of an island in the Nu'utele Group as a nature and recreation reserve.	13
6. To consider the possibility of an archaeological reserve.	14
7. To meet with the underwater club concerning their co-operation in establishing and maintaining marine reserves.	14
8. To film appropriate segments of the SPC film on village environmental management.	15
9. To advise on regional organizations or others able to help in the establishment of conservation areas in Western Samoa.	15
10. To correlate proposed national reserves into a tentative regional biosphere reservation programme related to the Regional Ecosystems Survey.	16
11. To assist in planning the Conservation Campaign and to prepare materials for use during Conservation Week.	16
ANNEX I Palolo Deep Marine Reserve: explanatory texts for signs at Reserve entrance.	19
ANNEX II Palolo Deep Marine Reserve: texts for markers on underwater nature trail.	21
ANNEX III Land ecosystems (biomes) in the Samoa-Wallis and Futuna Biotic Province.	23
ANNEX IV Western Samoan Conservation Campaign.	27

INTRODUCTION

This report is based on a visit made to Western Samoa from 30 August to 14 September 1978 at the request of the Government. A requested follow-up visit is planned for early 1979. Special thanks are due to Ian Trotman, Chief Forest Officer, and his staff who organized the visit so efficiently. The following are the principal people met during the visit; their co-operation and many contributions to the success of the mission were appreciated. Much of the material in this report is based on their suggestions.

People Met

Mr Tau'ili'ili Uili, Director of Agriculture
Mr Tupuola T.K., Deputy Director of Agriculture
Mr Ian Trotman, Chief Forest Officer
Mr Tuli Taogaga, Acting Superintendent of National Parks
Mr Laurie Powell, Forestry Officer
Mr Tom Dow, FAO Adviser, Forestry
Mr Ed Parsegan, Peace Corps Adviser, National Parks, Forestry staff
Mr John Hellescoe, Chief Agriculture Officer
Mr Seve T. Imo, Senior Agriculture Officer, Upolu
District Agriculture Officers, Upolu
Mr Alphonso Philipp, Director of Fisheries
Mr Dan Popper, Aquaculture Adviser
Mr Bob Davidson, Peace Corps Marine Biologist
Mr Perefoti, Director of Education
All school inspectors
Mr Nick Wilson, Director of Works
Mr John Wanneck, Public Works Water Engineer
Mr David Hamilton, Water Division
Mr Lealiifano J.T. Soon, Director of Lands and Survey
Capt. Mair, Harbourmaster
Mr Graham Thomas, Broadcasting, and staff
Dr Stephen G. Reynolds, FAO Pasture Agronomist
Mr Clive Pedrana, Food Technologist
Mr J. Walters, Managing Director, Samoan Forest Products
Mr Laurens Hansen, Samoan Forest Products
Mr Cliff Ollier, UNDAT National Parks Survey Team
Dr Binion Amerson, UNDAT National Parks Survey Team
Mr Art Whistler, UNDAT National Parks Survey Team

The sections of the report that follow are based on the terms of reference agreed for the visit.

1. To provide expert advice on potential forms of development in each demonstration park.

TUSITALA HISTORIC AND NATURE RESERVE

The Tusitala Reserve on Mt. Vaea will always be one of the most important parts of the Western Samoan National Parks and Reserves system, especially for public education, because it is so close to Apia. It should be developed to maximize its accessibility and educational importance.

The new trail to Robert Louis Stevenson's grave and the new visitor and recreation facilities are an excellent start towards making better use of the Reserve. The old trail still needs further reconstruction to eliminate particularly slippery or dangerous sections. An additional path could be made to the base of the waterfall near the Reserve entrance; a safety railing is also needed to keep visitors from dangerous areas at the top of the falls. Other trails could be developed after a master plan has been prepared as described below.

The immediate area around Stevenson's tomb could be improved with low retaining walls, steps between levels and plantings, in order to prevent erosion and to make more space for visitors and school groups. Flowers or low shrubs should be placed around the tomb to discourage people from sitting or standing on it. Benches should be provided around the lower levels for people to rest and enjoy the view.

A master plan should be made for the whole of the Reserve. Areas of natural forest should be preserved as far as possible in their present state. Buffer zones of native or exotic tree plantings may be needed along certain reserve boundaries to discourage the expansion of gardens into the Reserve. Recreational facilities should be restricted to the area around the Reserve entrance.

The Reserve has great potential for the creation of a botanical garden and arboretum which would be both a place of beauty for the public to visit and valuable for educational, forestry, horticultural and scientific purposes. Apia presently lacks the kind of public parks or gardens that add so much to Suva, Lae, Port Moresby, Tahiti and Noumea. Areas of the Reserve which have been disturbed in the past or planted to exotic trees can be partially replanted with all the native trees and plants of Samoa, as well as with flowers and decorative plants from other parts of the world. Care should be taken, however, not to introduce species liable to escape and become a problem in forest areas, as has happened in Tahiti. The initial plantings could be of native trees, and the rest of the garden could be developed around them as they grow up, with new trails, areas of lawn, native plant groupings, and exotic collections being added gradually as resources permit.

Discussions should be held with adjacent landowners to ensure that developments planned near the Reserve boundaries are compatible with the Reserve use. In particular, there should be co-ordination with the Catholic Church to maintain the major block owned by it on the western slope of Mt. Vaea in a natural state, if at all possible. Eventually this land might be dedicated by the owners for conservation purposes or perhaps even added to the Reserve.

The educational aspect of the Reserve should be developed with nature trails along which labels give the names and traditional uses of the trees and plants, and signs or interpretive panels explain the geology, birds, animals and view points in the Reserve. Traditional legends about Mt. Vaea and historical material about Tusitala or quotations from his writings could also be included. The Department of Education should be involved as much as possible in planning the educational programme in this and other reserves to allow the closest possible relationship to school curricula and to meet the needs of visiting school groups.

It would be useful to encourage public support for the development of the Reserve. Service clubs (Rotary, Lions, etc.) might be able to help with specific improvement projects. Women's clubs or groups could contribute to the development of the botanical garden. Public tree plantings by important figures, perhaps on Arbor Day, could emphasise the importance of the Reserve as a national resource.

'O LE PUPU-PU'E NATIONAL PARK

The 'O le Pupu-Pu'e National Park is one of the most significant recent conservation projects in the South Pacific. Since it will set an example for many other Island countries, every effort should be made to ensure its complete success. As the planned New Zealand-International Union for Conservation of Nature and Natural Resources assistance project should provide detailed development plans for the Park, this report concentrates on general guidelines for park management.

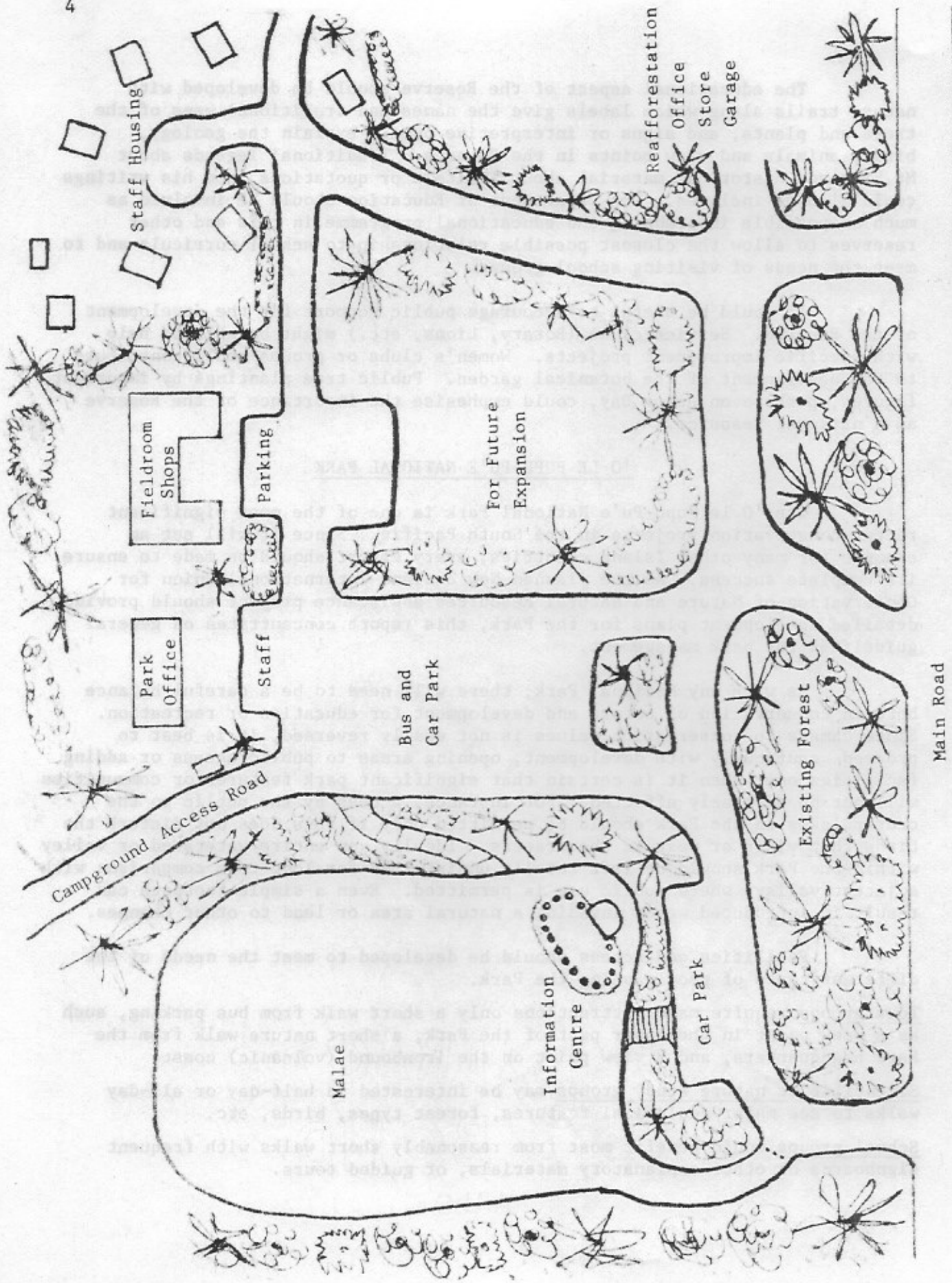
As with any National Park, there will need to be a careful balance between conservation of nature and development for education or recreation. Since damage to conservation values is not easily reversed, it is best to proceed cautiously with development, opening areas to public access or adding facilities only when it is certain that significant park features or communities will not be adversely affected. For instance, access by the public to the crater lakes in the Park should be permitted only if this does not disturb the birds that visit or nest in the craters. Ideally, an entire watershed or valley within the Park should be left totally undisturbed for long-term comparison with adjacent valleys where public use is permitted. Even a simple footpath can result in introduced weeds invading a natural area or lead to other changes.

Facilities and access should be developed to meet the needs of the different types of people using the Park.

Tour groups require major attractions only a short walk from bus parking, such as a view point in the upper part of the Park, a short nature walk from the Park headquarters, and a view point on the ironbound (volcanic) coast.

Scientific or nature study groups may be interested in half-day or all-day walks to see major geological features, forest types, birds, etc.

School groups would benefit most from reasonably short walks with frequent signboards or other explanatory materials, or guided tours.



**Figure 1. 'O LE PUPU-PU'E NATIONAL PARK
PROPOSED PARK HEADQUARTERS DEVELOPMENT**

Day visitors who come primarily for recreation or to enjoy the beauty of the Park will want to choose from paths ranging from short and easy for the elderly to long and challenging for the young and energetic.

Campers may want several possible day excursions from the main campground near Park headquarters, or campsites at intervals along the longer trails where they can stop for the night.

In general, trails should be constructed to meet these different requirements; visitors should not be encouraged to clear their own trails or to travel cross-country, both for their own safety and to protect the conservation value of the forest. A network of trails should therefore include access along the top of the Park and along at least part of the coastline, one or possibly two trails running the length of the Park from the mountains to the sea, access to at least one of the caves, and some shorter loop trails or interconnections leading to features of interest. Trails should provide access to all principal forest types. If possible, an area of coastal forest and a higher-level watershed should be left without trails as conservation areas. For areas with fragile features such as the exposed lava surface near the sea access should be left difficult, to control the number of visitors, unless full-time supervision can be provided.

Other facilities to be developed in the Park should include the Park headquarters with staff accommodation, office and maintenance areas, and an information centre (Figure 1) to be located preferably in the quarry area adjacent to Togitogiga. This location avoids taking more valuable land elsewhere in the Park and will result in the restoration of an otherwise degraded site. Another disturbed quarry area further inland could be restored as a campground for tourists, local residents, and youth and scout groups. Access by road to the campground should be through the Park headquarters to permit proper control of campers. Picnic areas can be developed at appropriate spots in the Park.

Small fales for temporary or overnight shelter and simple fireplaces may be needed at a few points along the longer trails in more remote areas, for hikers on trips of several days, and for those caught in heavy rain.

An important problem in conservation areas throughout the Pacific has been illegal encroachment by people clearing land for gardens or other uses. This is politically a very delicate issue, and confrontation should be avoided if other means can be found to protect the integrity of the Park boundaries. The boundary should be adequately marked so that it is clear where the protected area begins. In some places signs or markers may be sufficient; in others, fencing may be necessary. Where possible, buffer areas should be established around the Park. The government farm at Togitogiga and the planned reafforestation area will provide buffer zones along part of the Park perimeter. Similar protection may be required along the upper boundary of the Park nearest to the cross-island road, where land-clearing pressures are greatest. It might even be useful to plant a narrow belt of trees along the boundary, since people are less apt to clear land on which something has been planted by government. If areas are illegally cleared within the Park, they should be replanted to prevent further use and encourage regeneration. In such plantings within the Park, trees native to Samoa should be used.

It should be recognized that conservation areas are not withholding land from development; a park or reserve is itself a kind of development with short-term economic benefits such as increased employment and tourism, and long-term benefits in the protection of natural resources such as native species or gene pools, and water supplies.

The support of the local people should be encouraged as much as possible in the enforcement of Park regulations. Appropriate local matai could be named as honorary Park Wardens. If villagers develop an economic interest in the Park, for instance through concessions operated in association with it, they will come to see that it is in their interest that the Park be maintained.

'O le Pupu-Pu'e National Park should be developed as an example of the benefits of a major park area for the people of Samoa. Decisions on the management and development of the Park should be made in this context. Eventually, as public support for conservation increases, a similar major park should be considered for Savai'i.

2. To prepare basic training material, including mini-training sessions and on-the-job training for the limited staff available.
3. To give a lecture to all forestry staff on conservation.

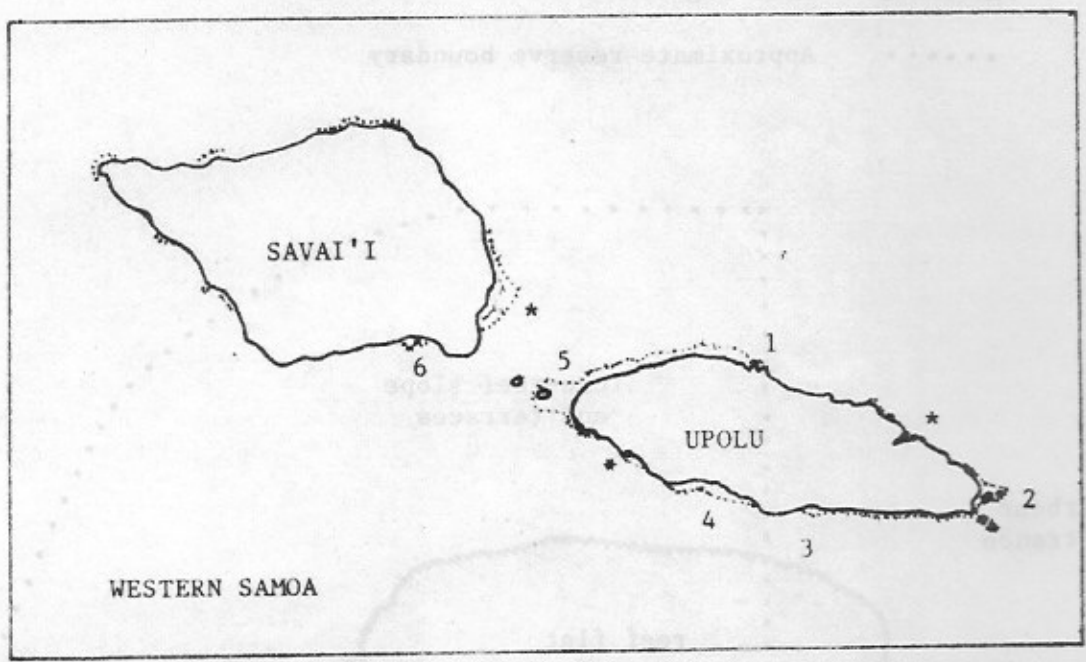
These two points were combined in the limited time available for staff training. Two formal training sessions were held for all available forestry staff. The first covered the purpose of conservation, conservation in the Pacific context, and the roles and activities of a conservation officer. The second went into more detail on the educational and extension roles of conservation officers, the development of park facilities and management plans, and basic ecological principles underlying park and reserve management.

In addition, considerable time was spent in the field with the Acting Superintendent of National Parks, Tuli Taogaga, discussing many aspects of park development and laying out the underwater nature trail. Candidates for an SPC study visit grant in National Parks development were also interviewed.

4. To identify one or two marine reserve areas to be created under the reserve system

While time did not permit field surveys of all potential marine reserve areas, a detailed examination of available aerial photographs confirmed the recommendations of the 1975 UNDAT/IUCN report on a National Parks System for Western Samoa, which indicated sites worthy of further study (Figure 2).

AREAS OF MAJOR REEF DEVELOPMENT
WITH PROPOSED AND POTENTIAL RESERVE SITES



Proposed marine reserves

- 1. Palolo Deep Marine Reserve
- 2. Namu'a Island Nature and Recreation Reserve

Potential sites for marine reserves

- 3. Nu'usafe'e/Tafata
- 4. Fusi/Tafitoala
- 5. Satuimalufilufi/Fuailolo'o
- 6. Satufia

* Additional areas in which reserves might be considered

Figure 2. AREAS OF MAJOR REEF DEVELOPMENT WITH PROPOSED AND POTENTIAL RESERVE SITES.

AREAS OF MAJOR REEF DEVELOPMENT

WITH PROPOSED AND POTENTIAL RESERVE SITES

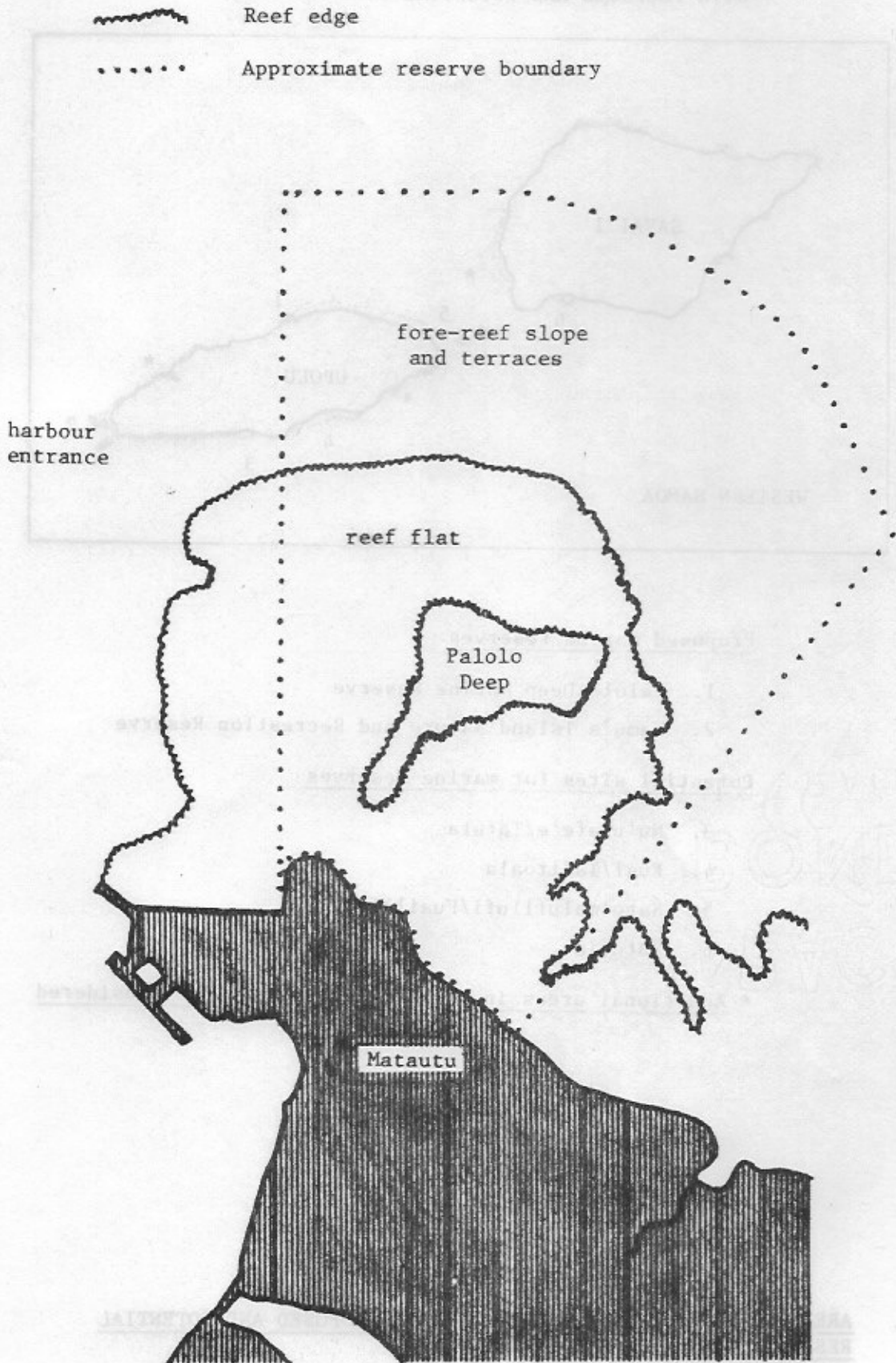


Figure 3. PROPOSED PALOLO DEEP MARINE RESERVE

Three sites were examined in the field. Mata'afa Island was suggested because of its earlier use for tourism, but it was found to have little conservation or recreational potential. The island would require major capital investment to restore it to a useful size; the nearby deeps were largely sandy with little living coral; and the adjacent reef flat seemed healthy but not of outstanding interest. The second site, Namu'a Island, is reported on below. The third area, where most attention was concentrated because of its potential as an example for marine conservation and education, was East Reef and its enclosed Palolo Deep off Matautu Point at the entrance to Apia Harbour. It is in this area that the first marine reserve in Western Samoa should be established. The project as described below was discussed with and received the support of the relevant government departments (Fisheries, Lands, Public Works, Marine) and the matai of Matautu Village.

PALOLO DEEP MARINE RESERVE

Palolo Deep off Matautu (Pilot) Point is ideally situated for development as a marine reserve. It is very accessible to the people of Apia and to tourists; is a safe place to swim, and contains many corals, fishes and other features of interest. It is also a very fragile area easily destroyed by misuse or overuse. Already some large coral heads have been broken up, probably by careless visitors or fishermen, and one area in the deep has apparently been recently dynamited, reducing the corals to rubble. While visitors should be encouraged in the reserve for educational purposes, the area should receive strict protection and supervision, which should not be difficult given its accessibility and the co-operation of Matautu Village and adjacent residents.

Boundaries

The reserve boundary (Figure 3) should on the east go from the high water mark out the channel in front of Matautu Village to 500 m. seaward of the reef crest, and a similar distance out on the west excluding the westward margin of the reef along the harbour entrance.

The western margin of the reef was apparently damaged by construction in the harbour, and is the proposed site for a sewage outfall, so it is better excluded from the reserve. The northern margin would be 500 m. beyond the reef crest, and the southern margin the high water mark, although the latter could be extended to include the access route and a small interpretive area.

The reserve would then contain Palolo Deep itself, the surrounding reef flat across which water enters the Deep and which is important to the ecology of the Deep, the outer and eastern reef margins which protect the Deep from the prevailing winds and waves, and the fore reef slope and the extensive submarine terraces out from the reef; these have a rich coral cover, which should be typical of the outer reefs along northern Upolu. The area proposed for the reserve is only a small fraction of the total reef area around Apia, and should make little difference to local fish catches. It may in fact lead to increased fish resources in adjacent areas by providing a centre for fish reproduction and repopulation.

An access route to the reserve could be made along a narrow strip of government land at the far end of the garden of the easternmost government house at Matautu Point. This would eliminate the present trespassing

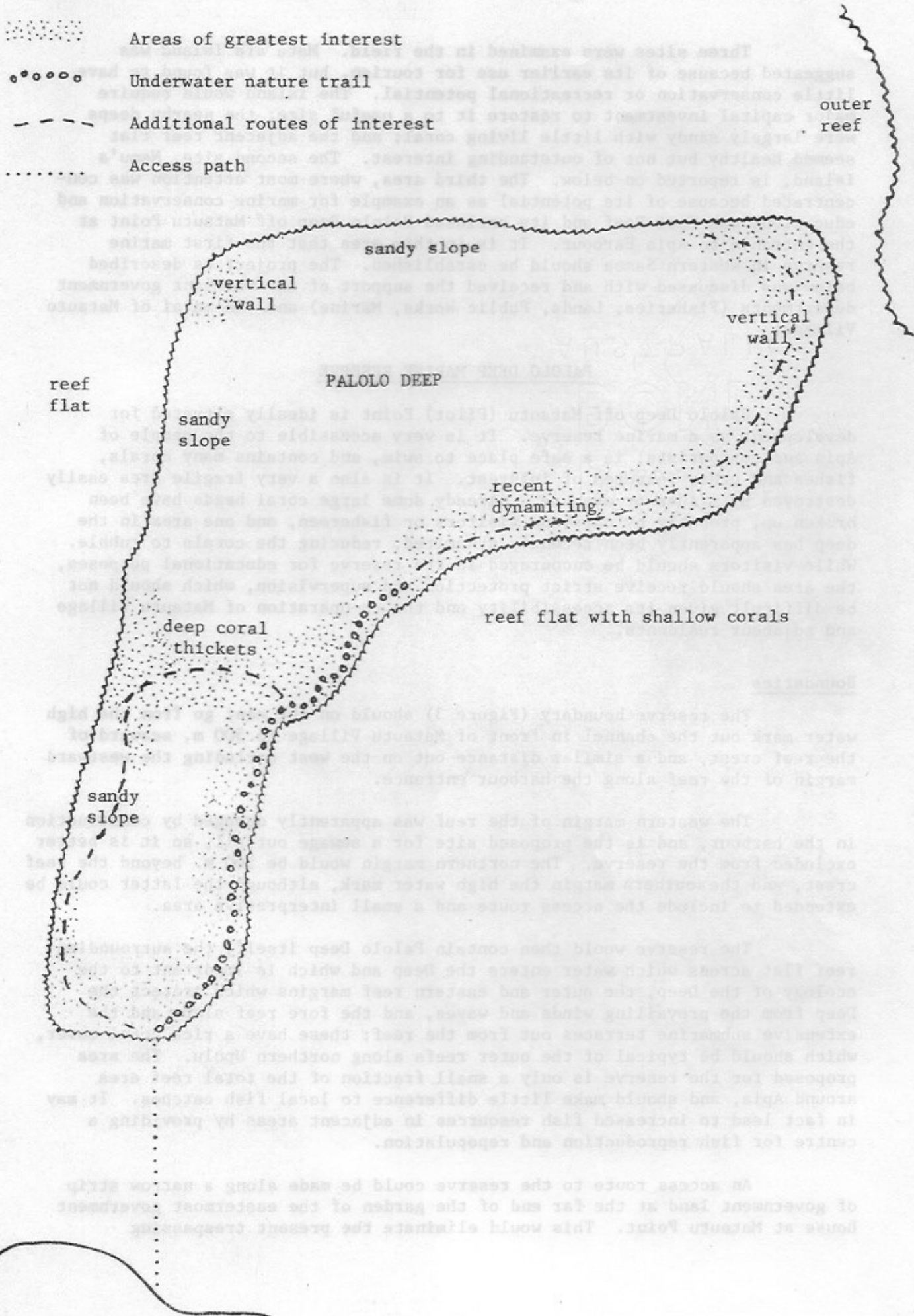


Figure 4. PALOLO DEEP

through residents' gardens by those going out to the Deep. A small area at the water's edge could be developed with a shelter for the person supervising the Reserve and with signs explaining and interpreting the features of the Reserve (Annex I).

Development

Everything in the Reserve, whether living or inanimate, should receive complete protection. It may be necessary initially to allow some traditional fishing by the residents of Matautu, particularly during the useful life of the recently constructed fish trap on the reef-flat east of Palolo Deep. This trap should be completely removed once it is no longer in use, and the construction of traps within the proposed reserve should be discouraged in future years. While fishing by outsiders should be prohibited at the outset, it may be necessary to educate the residents of Matautu to the need to fish elsewhere, and indeed to the potential benefits of the reserve for fishing in adjacent areas. Any attempt to force a fishing ban on local fishermen could be counter-productive. The alternative economic benefits of developing the reserve as a tourist site should compensate for any loss of fishing resources.

Since public education and tourism are two significant reasons for creating the Palolo Deep Marine Reserve, the access to and facilities within the Reserve need to be planned with care to allow maximum use without damage to the area's fragile corals and habitats. A path or walkway should be cleared across the reef flat from the shore to Palolo Deep to reduce damage to reef flat corals by trampling at low tide. Since corals are slow growing and easily broken, visitors should not touch them, but should either walk on the path or swim if the water depth permits. The path may need some maintenance or re-clearing after storms.

An underwater nature trail in the Palolo Deep itself could explain the principal features of interest and encourage visitors to take care of the more fragile corals. Visitors should swim and not walk on the bottom or corals. A concession for the rental of masks, snorkels and fins could provide a source of income for a local group (preferably the village of Matautu) and also reduce damage to corals by poorly equipped visitors. A small glass-bottomed boat could take non-swimmers around the Deep, with a sign in the boat giving the explanations corresponding to numbered markers on the nature trail. The trail should be indicated with highly visible (white or yellow) markers, with each marker clearly visible to a swimmer at the preceding one. Labels on the markers could explain reef features and ecology. Initially these could be embossed plastic labels on ceramic tiles, cemented to concrete block pylons anchored in the reef with lengths of steel reinforcing rod. In the longer term, engraved plastic plates may prove more permanent. An initial section of trail with 30 markers was laid out during the mission (Figure 4 and Annex 3).

Management

The management of Palolo Deep and the maintenance of the fragile coral communities within it will require careful attention if the area is not to be gradually degraded. Supervision will be needed to ensure that visitors do not engage in damaging activities, and to lead tours, provide directions and answer questions.

It will be important to try to control or prevent pollution or disturbances in the lagoon east of East Reef (where Palolo Deep is located), as the water from that part of the lagoon empties out the channel east of East Reef and can easily carry-over into the deep. This may account for some of the increase in turbidity in the Deep in recent years. Silty turbid water from dredging is particularly to be avoided. Litter (bottles, cans, rubbish) in the reserve should be collected periodically, perhaps with the aid of the underwater club or other local divers, whose help could also be solicited for other maintenance and monitoring activities in the reserve. If increasing numbers of Crown-of-Thorns starfish (*Acanthaster*) are seen in the deep, it may be necessary to collect them for disposal on land in order to protect the corals.

The reserve should be carefully watched for any changes in its biological communities. Simple monitoring surveys using techniques such as those developed by the South Pacific Commission (to be published as a Coral Reef Monitoring Handbook) should be repeated every few months to detect changes in the corals, plants, animals or fish that indicate problems threatening the future of the reserve. Such monitoring surveys should allow corrective action to be taken in time if needed.

Appropriately trained staff in the Fisheries Division such as the Peace Corps marine biologist may well be able to assist with the more technical aspects of reserve development and management. Close co-operation should be encouraged between the National Parks Section and the Fisheries Division in all activities involving marine reserves.

OTHER MARINE RESERVES

The need for further marine reserves should be evaluated in the light of fishing and tourism pressures on coastal resources as well as basic conservation interest. Any activity that needlessly destroys the resource on which it depends is unwise if not tragic, and it should be a responsibility of government to take whatever steps are practical to prevent such destruction. In this sense, marine reserves can play an important role in fisheries management, just as taboo areas did under the traditional system.

A reserved area usually permits the natural system to return to a more productive and balanced state. Fish populations and their food supply can increase, and can spill over into adjacent areas where fishing is still permitted. With adequate conservation areas, a sufficient reproductive stock of fishes and other reef life is always assured, and it is impossible for overfishing to push the resource to the point of collapse.

Reserved areas for fisheries management can either be permanent, such as the proposed Palolo Deep Marine Reserve and others that may be added to the National Parks and Reserves System, or temporary. In the latter case, an area is closed to exploitation long enough to allow its resources to recover, and then reopened while another depleted area is similarly closed. Such reserves can only be effective if supported by an educational programme among the fishermen themselves.

For the long-term needs of Western Samoa, some combination of the two types of marine reserves is probably needed. Outstanding sites of conservation and tourist interest could be made into Marine Reserves or incorporated into National Parks, while rotating fisheries management areas could be used to maintain the productivity of coastal fisheries elsewhere.

5. To examine the potential of an island in the Nu'utele Group as a nature and recreation reserve.

Because of transportation difficulties, only Namu'a Island could be visited, but since it is in Government ownership, it has the most immediate potential for reserve status. There is some question about old Land Board decisions concerning Namu'a which should be clarified before a reserve is established; perhaps an exchange of old ownership claims for permanent copra and concession rights can be arranged.

The forest on Namu'a has been considerably altered by clearing and planting in the German era, but some species rare elsewhere do remain. There are some mangroves along the shore. The island has some geologically and scenically interesting cliffs and exposures, and the house foundations, cemetery and other remains of German occupation have some historic interest.

While some natural features would be protected, the principal use for Namu'a should be as a recreation reserve. The island is very attractive and easy to reach from the mainland across a short stretch of shallow lagoon; rowing across is not difficult. There is an excellent sandy beach on the protected northwest side which is ideal for swimming in the lagoon. An area enclosed by old rock groynes remaining from the German occupation makes a safe shallow swimming area for children at high tide. There is enough space for a number of small groups or for a large tour group.

Development of the recreation reserve would require relatively little effort and expenditure. The old German well could be restored to provide a water supply. Sanitary facilities would be needed and should be located away from the well. The beach and the area behind it should be cleaned up and perhaps some grass planted, with picnic tables, a barbecue and perhaps a small fale shelter for visitors. Explanatory panels could both show natural features of interest (geology, plants, marine life) and the history of German occupation. Eventually a loop trail to the top of the island could be constructed.

There is a problem of access to the beaches on the seaward side of the island. Visitors venturing around the island at low tide might find themselves trapped by the incoming tide. A warning sign is therefore necessary. If feasible, a trail to those beaches might be considered, but it would be difficult to construct.

The reserve should include the lagoon and reefs for perhaps 100 m out from the island. While much of the coral in the lagoon is dead, heavy tourist visits would inevitably prevent recovery or result in further degradation, so a measure of protection is needed. It was not possible to examine the reef seaward of Namu'a Island, but it may be worthwhile to extend the marine reserve on that side, perhaps even as far as Fanuatapu Island, as recommended in the 1975 National Parks report.

The reef around Namu'a was heavily infested with Crown-of-Thorns starfish (Acanthaster planci) during the visit, with densities up to one per square metre in the corals behind the reef, and many observed moving across the sandy lagoon floor. This will inevitably affect the corals in the proposed reserve, but could be very interesting to study in the longer term. If a reserve is established, a detailed survey of the living coral cover and the effects of Acanthaster should be initiated. Follow-up to the survey

over a period of years would provide information on the long-term effects of Acanthaster and the rate at which Samoan reefs recover, information which would be very useful in planning for fisheries management and determining the need for starfish control measures. It should not be difficult to arrange for outside assistance in making the surveys if necessary.

The establishment of a Namu'a Island Recreation Reserve would create a number of economic opportunities which could be awarded as concessions, perhaps to the former traditional landowner. These would include providing transportation to the Reserve (small boats or perhaps more scenic native canoes), a contract for supervising and maintaining the Reserve (litter clean-up and removal, etc.), and possibly a catering service providing picnic lunches, refreshments or even traditional feasts for tourist groups.

The 1975 National Parks report recommends that eventually all the Nu'utele Islands should be incorporated in a National Park. The establishment of a reserve on Namu'a Island could be seen as a step towards the development of this park.

6. To consider the possibility of an archaeological reserve.

Time did not permit treatment of this question in detail during the visit. Since archaeological sites require considerable effort to protect and/or restore, it may be better to delay creating any archaeological reserves until the National Parks section has the experience and resources to manage them properly. Without such protection, it is often better not to call attention to an archaeological site by giving it reserve status. An exception to the above recommendation would be a site or feature threatened by destruction, in which case establishing an archaeological reserve may be the best means of ensuring its survival. The National Parks section or other appropriate Government body should develop an inventory and map of all sites of archaeological and historic interest (abandoned village sites, fortification, burial grounds, sacred or taboo areas, etc.) both to assist in planning and to help identify features that may be in danger. Sometimes a small effort in documenting a feature before development proceeds can make an important contribution to historical understanding. The same body should also collect and maintain all published and unpublished reports on archaeological investigations in Western Samoa.

7. To meet with the underwater club concerning their co-operation in establishing and maintaining marine reserves.

The principle of using interested private organizations and members of the public in support of conservation activities is a very good one and should be pursued wherever possible as a way of increasing public support and economising on scarce Government resources. Western Samoa unfortunately lacks a national conservation association such as those found in some other Pacific Islands and most metropolitan countries.

The underwater club was unfortunately inactive at the time of the visit, but it was possible to meet with one member, Mr Clive Pedrana, and to enlist his assistance in the development of the Palolo Deep Marine Reserve. The National Parks section should continue to ask for the volunteer help of amateur divers whenever their skills can contribute to such aspects as developing interpretive materials, providing underwater

photographs, maintaining underwater installations such as nature trail markers, conducting monitoring surveys or cleaning up litter on the lagoon bottom.

8. To film appropriate segments of the SPC film on village environmental management.

This film, which is being made in a number of places in the Pacific as part of the SPC programme of environmental education, is intended to show island villagers the effects of good and bad actions on land, soils, forests, water supplies, reefs and lagoons. The co-operation of the Government and people of Western Samoa was enlisted in particular for the sections on traditional agriculture, village life and forestry development. The extensive assistance of the Forestry and Agricultural Extension staffs and of Samoan Forest Products made it possible for the photographer working under contract with SPC to film almost everything required, and this assistance is greatly appreciated. It is hoped that the completed film, which should be available in 1979, will be of use in Western Samoa's education and extension programmes. It is also hoped to produce for the Forestry Division a short training film using the footage not required for the main film, and extra scenes were taken for this purpose.

9. To advise on regional organizations or others able to help in the establishment of conservation areas in Western Samoa.

Western Samoa is already quite successfully using the principal sources of aid for conservation projects in the Pacific; SPC, the International Union for Conservation of Nature and Natural Resources, UNDAT and bilateral sources (New Zealand or Australia). SPC will continue to assist to the extent that its limited personnel and finances permit. The 1979 work programme in particular has provision for aid with coastal surveys, national environmental planning and programme support, and environmental education. SPC can also assist in locating aid or consultants from outside sources, as it is now doing for the needed boundary survey of 'O le Pupu-pu'e National Park. Once the Convention on Conservation of Nature in the South Pacific comes into force, the SPC will assume continuing bureau duties, and this should serve as a mechanism for increased inter-country co-operation and exchange within the South Pacific. The Government of Western Samoa, as depository, should try to complete its own ratification of this Convention and to urge other parties to deposit instruments of ratification or accession, so that it can come into force as soon as possible.

Western Samoa is a state member of IUCN and continues to receive considerable assistance from it. UNDAT has just supported a second major conservation study. New Zealand is providing significant aid, particularly through the personnel it is making available.

There may be possibilities of further assistance from Australia, and the rapidly developing potential of the University of the South Pacific, particularly in its Institutes of National Resources and Marine Science, should not be overlooked.

While there is already good co-operation and co-ordination between the above organizations, the South Pacific Regional Environment Programme (SPREP) now being launched should improve all aspects of co-ordination and support for conservation and environmental assistance.

Since the first phase of SPREP concentrates on assisting countries to define their own needs and programmes, Western Samoa could certainly include consultant help in developing a phased plan for implementing conservation projects in its request for assistance from SPREP. Later phases could well include more concrete assistance with conservation areas if the Government so requests.

It should be recognized that the establishment of conservation areas in Western Samoa is probably limited more by the general level of public and government acceptance of the need for conservation than by the availability of outside aid. The latter can probably be found for any need supported strongly enough by the Government. Given the present excellent progress, it would be unwise for outside agencies to push conservation more rapidly than the country is ready to accept.

10. To correlate proposed national reserves into a tentative regional biosphere reservation programme related to the Regional Ecosystems Survey.

With the new information available from the recent UNDAT-sponsored survey of 'O le Pupu-Pu'e National Park, it is possible to improve and update the major land biome classification for the biotic province that includes Western and American Samoa and Wallis and Futuna (Annex 4). 'O le Pupu-Pu'e National Park and Tusitala Historic and Nature Reserve together seem to protect about half of the biomes identified. The National Park would thus be an excellent candidate for classification as a Biosphere Reserve under the UNESCO Biosphere Reserve Programme. It should also serve as a model for the type of park needed elsewhere in the Pacific if island forests and birds are to be preserved for the future.

In addition, several typical marine ecosystems such as fringing reef, lagoon reef and seagrass bed would be protected in the proposed Palolo Deep and Namu'a Island reserves.

11. To assist in planning the Conservation Campaign and to prepare materials for use during Conservation Week.

This point was added during the visit and involved a considerable amount of time, including participation in a Conservation Campaign meeting and explaining conservation and the role of the schools to a meeting of all the school inspectors. Three radio programmes on the reasons for conservation and conservation activities elsewhere in the region were taped. An information sheet was also prepared for use by teachers during the Conservation Campaign (Annex 5).

General Comments

The present National Parks and Reserves Act 1974 allows for the creation of parks and reserves only on Government land. Once the park concept is better understood and supported by the general public, it may be desirable to amend the Act to permit the extension of conservation measures to important national features that are not in public ownership. A number of methods have been developed elsewhere in the Pacific to permit this while respecting traditional family ties to the land. These have included the creation of a National Trust, the establishment of management

areas on customarily held land, long-term leases, and the voluntary surrendering of certain development rights. It should be possible when the time comes to develop a legal formula acceptable to the traditional land owners of Western Samoa.

Evidence suggests there is a continuing decline in coastal marine and particularly fisheries resources on Western Samoa reefs. Pollution from urban and industrial sites is increasing. Illegal dynamiting for fish continues to destroy reef productivity. Overfishing is probably pushing some species well below their normal replacement rate or optimum sustainable yield. The annual Palolo swarms are diminishing or disappearing entirely. The increasing infestation of reefs by Crown-of-Thorns starfish (Acanthaster planci) will further reduce reef productivity, at least in the short-term if not permanently in some areas already under other stresses. These problems suggest the need for better information on coastal resources if they are to be preserved for the future. Both a basic inventory or descriptive survey of the reefs and lagoons and continuing monitoring studies to detect changes seem to be called for. Such surveys can provide a basis for management decisions such as the need for pollution regulations, a starfish control campaign, fisheries reserves or management areas, etc. Actions taken without such information, including the option of not taking any action, may well be more costly in the long-term.

The original request from the Government of Western Samoa for SPC assistance with National Parks and conservation included another visit to follow-up on progress made and to recommend further action required. It is suggested that this visit be during the first quarter of 1979 at a date to be mutually agreed. Points that could be covered in such a visit include evaluation and possible improvement of the Palolo Deep nature trail, preparation of further interpretive and educational materials for Tusitala reserve, evaluation of progress in the development of 'O le Pupu-Pu'e National Park facilities, identification of possible Archaeological Reserves, development of conceptual drafts for possible revisions to the National Parks and Reserves Act 1974, further training for National Parks staff, and establishment of simple monitoring surveys in the Palolo Deep area. The visit would also provide an opportunity to develop appropriate liaison with the new Chief Forest Officer.

Since the principal recommendations arising out of this visit were incorporated in draft cabinet papers during the visit, no separate list of recommendations is included in this report.

PALOLO DEEP MARINE RESERVEExplanatory texts for signs at Reserve entrance
(should be given in both English and Samoan)

Palolo Deep is a sunken part of the lagoon bottom entirely enclosed by the outer coral reef. Its protected waters encourage the growth of fragile and delicate corals, some perhaps hundreds of years old, which in turn attract many kinds of fish. The deep receives both cool ocean water carried in over the reef by waves, and water warmed by the sun on the shallow reef flat. The water is often slightly cloudy because of the poor circulation with the open sea.

Palolo is the Samoan name for a reef worm (Eunice viridis), part of which swims to the surface for reproduction each year in October following a lunar cycle. It is a traditional Samoan delicacy.

The coral reef is made of the skeletons of many plants and animals. If the corals and algae (plants) that build the reef are killed, it will stop growing and may eventually erode away.

Corals are colonies of small animals that eat plankton (tiny floating animals) in the water and also get food from algae living inside them. Hard corals make stony skeletons. Some corals, called soft corals, do not.

The corals, other animals and plants on the reef provide food and shelter for the fish that are an important part of the Samoan diet. If the reef life is killed by pollution or bad fishing practices like dynamiting or poisoning, then the reef will not support as many fish.

Common fishes of Palolo Deep (with photographs or colour drawings and common, Samoan and scientific names).

Common animals of Palolo Deep (photographs or colour drawings and names of common animals such as holothurians (sea cucumbers), Acanthaster (Crown of Thorns starfish), Linkia (blue starfish), sea urchin, etc.

Please help to preserve the beauty of the reef for future visitors.

- Corals are fragile and grow very slowly. Do not stand on them or break off branches.
- Everything in the reserve is protected. Please do not fish, collect shells or take souvenirs in the reserve.
- Do not disturb the markers on the nature trail. If you cannot read the labels they can be wiped clean.
- Whenever you are on a reef, if you turn a rock over, turn it back again.

Palolo Deep Underwater Nature Trail

Follow the underwater markers for a tour of many interesting features in Palolo Deep (with map or diagram of Palolo Deep showing location of trail).

PALOLO DEEP MARINE RESERVETexts for markers on underwater nature trail

1. Acropora - Staghorn Coral - a common fast-growing coral of protected areas
2. Psammocora - Large coral head - common in Samoa in lagoons and on reef flats
3. Algae - fuzzy plants growing on dead coral are food for fish
4. Halimeda - green algae - make coral sand
5. New corals growing on old
6. Coral rubble and living fragments growing unattached
7. Porites - yellow finger coral
8. Porites - brown finger coral
9. Porites - massive coral - with fish grazing marks
10. Algae - hair-like plants covering the lower coral branches
11. Anemone and clownfish - clownfish is protected by anemone and in return feeds it
12. Psammocora - coral with both knobby branches and shelf-like base to get more light
13. Red algae and other plants at base of pinnacle
14. Coralline algae - pink, cream and grey patches on dead corals make the reef strong
15. Shaded underside of pinnacle has brightly coloured algal crusts
16. Soft corals without stony skeletons
17. Algae - many plants growing among corals
18. Acropora - staghorn coral thickets with several different forms
19. Yellow sponges
20. Soft corals
21. Valonia - shiny green algae in crevices
22. Coralline algae cementing coral rubble
23. Dictyosphaeria - light green bubble algae in holes between corals
24. Dead patches of staghorn coral perhaps killed by disease
25. Acropora - tabulate coral
26. Turbinaria - brown spiny plant in hole
27. Corals filling in to make solid reef
28. New young corals regenerating in dead area
29. Porites - giant massive coral perhaps hundreds of years old
30. Porites - giant head of finger coral.

LAND ECOSYSTEMS (BIOMES) IN THE SAMOA - WALLIS AND FUTUNA BIOTIC PROVINCE

<u>Biomes</u>	<u>Description</u>	<u>Conservation Status</u>
Lowland rainforest	Largely disturbed, several types noted: <ol style="list-style-type: none"> 1) <u>Calophyllum inophyllum</u> littoral forest, le Pupu coast, otherwise uncommon. 2) <u>Diospyros</u> coastal forest, on small offshore tuff islands: Nu'utele (Ofu), Aunu'u, Aleipata islands (Upolu). 3) <u>Dysoxylum</u> (Mamala) forest, secondary growth on alluvium and talus slopes; common but with distinctive secondary species in restricted areas: Ta'u, Aiga Bay (Tutuila), Ofu. 4) <u>Pometia</u> (Tava) forest, with <u>Planchonella</u> and <u>Myristica</u>; widespread on recent volcanics: Tafua (Savai'i) le Pupu (Upolu). 5) <u>Planchonella</u> (Mamalava) forest, with <u>Syzygium</u> and <u>Myristica</u>; on intermediate age volcanics, now mostly destroyed: Lefaga (Upolu), Tafuna (Tutuila). 6) Foothill forest, <u>Planchonella</u>, <u>Myristica</u> and <u>Dysoxylum</u>; on intermediate age volcanics; scattered on Upolu and Savai'i. 	'O le Pupu-Pu'e National Park none none 'O le Pupu-Pu'e National Park 'O le Pupu-Pu'e National Park; Tusitala Historic and Nature Reserve 'O le Pupu-Pu'e National Park; Tusitala Historic and Nature Reserve.
Montane rainforest	<ol style="list-style-type: none"> 1) <u>Syzygium</u> ridge forest; on most island ridges. 2) <u>Canarium</u> ridge forest: <u>Canarium harveyi</u> and <u>Myristica hypargyreae</u>; restricted to ridges on Fagaloa volcanics, south Upolu. 3) <u>Rhus</u> secondary forest: <u>Rhus taitensis</u> and <u>Alphitonia zizyphoides</u>; common at middle elevations, particularly in American Samoa. 4) Montane forest, with many endemics; on Savai'i and Upolu with <u>Dysoxylum huntii</u> and <u>Hernandia moerenhoutiana</u> common on 500-1000 m. 	'O le Pupu-Pu'e National Park 'O le Pupu-Pu'e National Park none 'O le Pupu-Pu'e National Park
Cloud forest	<ol style="list-style-type: none"> 1) <u>Reynoldsia</u> cloud forest, with <u>Dysoxylum</u>; most higher elevations on Savai'i. 2) <u>Spiraeanthemum</u> cloud forest, with <u>Reynoldsia</u>; some Savai'i uplands. 3) <u>Cyathea</u> cloud forest; Ta'u. 	'O le Pupu-Pu'e National Park none none

<u>Biomes</u>	<u>Description</u>	<u>Conservation Status</u>
Riverine forest	Along streams, with <u>Barringtonia samoensis</u> in Samoa.	none
Swamp forest	1) Crater swamp forest, <u>Pandanus turritus</u> ; montane craters of Savai'i and Upolu.	'O le Pupu-Pu'e National Park
	2) Montane swamp forest, <u>Pandanus turritus</u> ; <u>Calophyllum samoense</u> , etc.; possible restricted to Afulilo area (Upolu).	none
Mangrove forest	<u>Bruguiera</u> and <u>Rhizophora</u> , sometimes also <u>Xylocarpus</u> : Gataivai (Savai'i), Masefau, Aunu'u and Pala lagoon (Tutuila), Apia and several sites on south coast of Upolu.	none
Atoll/beach forest	1) <u>Barringtonia</u> forest, widespread on undisturbed rocky and sandy shores.	none
	2) <u>Hernandia</u> forest: Swains Island (disturbed), uncommon elsewhere.	none
	3) <u>Pisonia</u> forest: Rose Atoll, uncommon elsewhere.	Rose Atoll
Scrub	1) <u>Pandanus littoral</u> scrub; uncommon: le Pupu (Upolu), Aunu'u.	'O le Pupu-Pu'e National Park
	2) Littoral scrub, <u>Scavola</u> and <u>Wedelia</u> ; widespread but limited in extent: Maga Point (Ofu), Swains.	none
	3) Fernland, largely secondary: burned over coastal ridges at Luatuanau'u and Tiavea (Upolu), Uvea (Futuna).	none
	4) Montane scrub, restricted to Matafao and Piao mountains (Tutuila).	none
Grassland	1) Crater meadow, <u>Paspalum</u> spp.: montane craters on Savai'i and Upolu, Siga'ele Crater, Upolu.	'O le Pupu-Pu'e National Park
	2) Montane grassland: mid-elevations on Futuna, upland valleys such as Silisili on Savai'i.	none
Fresh water marsh	1) Coastal marsh: Apolimatou (Upolu), Aunu'u, and other disturbed coastal sites.	none
	2) Crater marsh: montane craters on Savai'i and Upolu, le Pu'e Crater, Lake Lanoto'o, Lake Olomaga.	'O le Pupu-Pu'e National Park

<u>Biomes</u>	<u>Description</u>	<u>Conservation Status</u>
Rock desert	Recent lava flows on Savai'i, also with various stages of colonization.	none
Cave	Several on Savai'i, Upolu, Tutuila, with cave fauna.	'O le Pupu-Pu'e National Park

WESTERN SAMOAN CONSERVATION CAMPAIGN

INFORMATION SHEET FOR TEACHERS

What is conservation?

Conservation means protecting something from change or destruction. Conservation of nature is protecting the forests, animals, birds, fishes and marine life of Western Samoa so that they will always be here for future generations to use and enjoy. There are many reasons for conserving our natural heritage. The native plants and animals of Samoa are genetic resources, many of which are found nowhere else on the planet. They have had traditional uses, and they may prove to be very useful in the future. All of our crops, commercial forest trees and domestic animals were originally native species somewhere in the world. Since future civilization will have to depend more and more on renewable resources as our oil, coal and minerals run out, it is essential that we conserve those resources so that our society can continue to grow and develop. Our natural areas are also of scientific interest as places where the principles of ecology and natural history can be studied. The forests of Samoa protect our watersheds; destroy them and we may not have enough water for development. It is nature that makes our islands beautiful places to live, so we must try to protect that beauty for ourselves and for tourism. Conservation is important for education; students can learn more easily about biology, ecology, geography and natural history if they can see examples around them. Traditional Samoan life and culture depend on the land and sea, forests and reefs of Samoa, so conservation also means protecting the roots of our culture.

Conservation and development

Conservation is a part of good development. Both conservation and development try to give people the best possible life that their resources permit. Sometimes a particular development may overlook some long-term costs associated with it, such as a land-clearing project that damages a water supply, or a new factory that pollutes a lagoon and kills fish used by local fishermen. A conservationist would ask if the long-term loss of the water supply or fishery might not be worth more than the short-term benefit from the development, or if the development could not be modified or relocated to reduce the damage caused. Environmentally-sound development is development that continues to produce benefits for the people indefinitely into the future. A conservation approach can thus help to choose wise development that does not steal from the future for the benefit of the present.

Conservation actions

Since conservation really means keeping our resources productive for the future, there are things that everyone can do to contribute to conservation. Government can set aside examples of different kinds of native forest or reef as National Parks and Reserves so that Samoa will always have these in the future for education, scientific research and recreation. Land owners and farmers can plan the use of their land to protect the soil for gardens and to maintain their supplies of food, firewood, forest products and water. Fishermen can avoid using destructive methods like dynamite, poisons or small mesh nets and can try not to overfish any one area. They can even stop fishing for a time in some areas to allow the fish populations to recover, just as was done under the old taboo system. Trees are important, so anyone who cuts one down can plant another.

Traditional life in Samoa paid close attention to the natural environment and managed it wisely, but much of the knowledge that old people have about the forests, medicinal plants, fishes and reef life of Samoa is being forgotten. Since there are many wise things in the traditional ways that can help in managing island resources today, conservation should include preserving that traditional knowledge so that it can be applied to modern problems.

Suggestions to teachers

Conservation is related to many school subjects: science, biology, ecology, geography, social science, nature study, Samoan and English language, etc. The following are some suggestions for school or class projects during the conservation campaign.

- Writing essays or poetry on conservation subjects.
- Cleaning up litter, bottles and garbage around the school, in the village stream, or along the beach or road.
- Planting flowers or plants to beautify the school, the village, or some public building.
- Making a school garden if land is available, learning how to take care of the soil.
- Planting useful or beautiful trees for food, shade or wood on the school grounds, along the road, in the village, to stop erosion, or on land you want to go back to forest.
- Doing science projects or lessons on the forest, stream or ocean, or making collections of forest tree leaves, medicinal plants, etc. while learning their names and traditional uses.
- Collecting legends, stories or traditional knowledge about the plants, animals, land and sea of Samoa, or having old people come and talk to the class about them.
- Learning the Samoan and English names for the trees, plants, birds, animals, fishes, marine life and natural features that should be conserved.