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Cover

Ma'oma'o is a giant forest honeyeater (*Gymnomyza samoensis*) - a native bird of Samoa that is under threat of extinction (Source: MNRE)

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Mulivai's smart house

*Tu'u'u Ieti Taule'alo**

Introduction

Housing in Samoa has undergone tremendous change in the last fifty years. While smaller and less permanent traditional Samoan houses, or fale, are still being widely used the big open round- or oval-shaped fale with thatched roofs have been largely replaced by open rectangular structures with corrugated iron roofs. Within the rural villages more and more families are building European-style dwellings with internal facilities such as kitchens and bathrooms.

In many ways the changes in local housing reflect the wider changes in Samoan society generally and individuals in particular. Greater mobility through international travel has exposed many Samoans to other ways of life while increased disposable incomes have allowed many to adopt non-traditional lifestyles. Amongst rural people there is a growing trend to relocate from the villages to live on private freehold properties in the urban area. Such a situation is likely to have a major impact on the future of the traditional Samoan way, or faa-Samoa, with more and more people moving away from the influence of their extended family, or alga, and the control of the family chief, or matai, as well as the authority of the village council, or fono. While family ties are still very strong there appears to be a general shift in focus from the extended to the nuclear family.

It is in this context that the Mulivai house was developed in the late 1970s. At the risk of sounding fashionable the 'smart' tag highlights a housing approach to building a family home that is appropriate for the local conditions, reflecting the following main considerations: i) selected aspects of the fale; ii) appropriate elements of tropical architecture; iii) relevant engineering design concepts; and vi) the scarcity of housing finance. This paper describes the main ideas behind the Mulivai house, as built by my wife and I on freehold land at Si'usega about five kilometres from the Apia town centre.

Background

My interest in low cost tropical houses went back to the early 1970s when I was studying civil engineering at the University of Canterbury, New Zealand. I read widely about the architectural and engineering aspects of tropical design and from then on developed a strong affinity with the subject.

In late 1976 I returned to Samoa from New Zealand with my wife and baby son. My parents were living in Lepa village about 70 kilometres from Apia but as a returning graduate working in the public service my family was able to rent a government flat in Apia. A friend sold us a half acre of freehold land in early 1978 for \$3000, paid with a loan from the Bank of Samoa. At the time our land seemed isolated with no water, electricity or telephone services and road access was just dirt track. A kilometre back towards town where services were available, one paid the same price we did for a quarter acre.

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Our first task was to identify the location of our house and then plant trees, lots of them. As well as various fruit trees we also planted some big trees closer to the proposed house site for shade. A number of the original trees are still standing including the big red flamboyant tree on the west side, but many were blown down by successive cyclones.

It was decided very early on that the house was to be two storeys. The initial loan of \$10,000 we received from the Public Trust Office in early 1980 was for building the top-storey. Later on when my wife's mother decided to stay with us, she paid for the construction of a self-contained flat downstairs. But with very low income in Samoa generally at the time, there was little chance for the average family to afford a \$10,000 housing mortgage.

My first job was as a building construction engineer for the Public Works Department where I was exposed to carpentry and house construction. Some of the valuable lessons I learned from the local tradesmen included effective ways of utilising available materials and practical techniques to solving problems. Construction was done incrementally with work done mostly during the weekends over a period of about eight years.

Aspects of the Samoan fale

A key feature of a Samoan fale is its openness. It is built on poles around the perimeter, with bigger internal poles for larger houses, which anchor the whole structure to the ground. The open sides permit full cross ventilation on all sides while the high oval or round roof provides plenty of space for internal air circulation.

The Mulivai house captures the openness of the fale while maintaining privacy. The floor space is 12 metres by 12 metres square, the maximum space that our budget allowed. About 40 per cent of external walls on all four sides are openings to provide cross ventilation. Built on a pole grid at 4 metres centres, the poles connect the whole structure from the roof to the ground. The roof is 3.5 metres high at the centre from the first floor, the maximum height allowed by the cost of timber and the lengths of available poles. At 8 metres by 8 metres square the lounge could be used for family meetings or other larger gatherings. It was considered that the combination of maximum floor space, maximum roof height and maximum external wall openings would help maximise the natural cooling effect of the whole building.

Elements of tropical architecture

Located between 13° 25' and 14° 05' south of the equator and between 171° 23' and 172° 48' west longitudes Samoa is right in the middle of the tropics. It is hot and humid averaging 28° Centigrade and 70 per cent humidity. While there is some relief from sea breeze during the day it is always hot in the sun. The design focus therefore is to ensure that the house is as pleasant and as liveable as possible by making it as naturally cool as possible particularly during the day.

To catch the sea breeze during the day and land breeze at night, the Mulivai house was oriented in a north-south direction. The sun setting in the west would heat up that side of the house in the afternoon. Bedrooms were therefore placed on the east side away from the afternoon sun to keep them cooler in the evening while the lounge and dining room were on the west side.



North view



East view



South view



West view

Engineering design concepts

Samoa is affected by cyclones, earthquakes and because it is near the sea it is also prone to tsunamis. Cyclone forces are particular critical on small buildings as witness after previous tropical cyclones that struck Samoa when many buildings were destroyed. As discussed above, a pole structure was used in the Mulivai house, considered ideal to resist lateral wind forces. The 16 poles were local hardwood and extended from the roof to the ground, linking together the whole structure.

To achieve maximum structural integrity, all structural elements were tied together - poles concreted to the ground, floor bearers bolted to poles, floor joists tied to bearers, bottom plate tied to joists, external walls tied to bottom plate, top plate tied to the wall and poles, roof rafter tied to top plate, purlins tied to rafters and roofing iron fixed to purlins.

The square hip roof meeting at the centre provided a smooth shape that helped minimise the uplift pressure on the roof during high winds. This pressure could pull away the roof lining and framing. As well the 300 millimetre openings at the top of the walls eased the inverse pressure at the eaves that could lift the roof structure off the top plate. With a longer than normal roof overhang of 1.5 metres, the roof rafters were braced back to the wall to help hold the roof down.

Limited housing finance

In 1980 when our housing loan was approved, my salary was only about \$2,500 per annum which meant that I had very limited disposable income for mortgage repayments. Innovative ideas were therefore required in order to add value to available funds, it was a matter of balancing functions against costs. The external walls, for instance, were 2.4 meters high as those timber lengths were considerably cheaper. Ideally it could be 2.7 metres to give extra wall height and openings as well as more internal roof space. However that would mean using the next size up of 3 meter lengths resulting in more waste.

External walls were single-lined with 20 millimetre timber fixed from inside. As the framing and lining were all exposed to the weather and light outside, it was latter found that this arrangement helped preserved the timber as termites and ants did not like to live in open space. Internal walls and ceiling were also single-lined with 6 millimetre hardboard, the most practical and cheapest liner boards available although not the most existing. Ceiling rafters were set at 800 millimetres centre and purlins at 600 millimetres so that the 1200 by 2400 millimetre hardboard sheets could be cut into threes and fixed as 1200 by 600 millimetre boards. The smaller size was more convenient to handle and could be fixed by one person as well as being cheaper and easier to replace.

Initially no windows were installed at the external wall openings except for security and insect screens as the extended roof overhangs generally kept the rain out. The screens were fixed from the inside for ease of maintenance. However during tropical cyclone Val in 1991 the driving rain went right through the house both upstairs and downstairs. Louver windows were then installed in 1992 although the openings at the eaves remained.

The floor plan was fairly open to improve internal air movement. Apart from the lounge all other rooms were of minimum size and governed by the pole grid. The polished timber floor used all 2.4 meter lengths of 20 millimetre tongue and grove cut to size. There were no covered kitchen cupboards, shelves or drawers as these provided good hiding places for

cockroaches and other pests. Walk-in pantries were built so all kitchen wares and groceries were kept in one place for easier cleaning and protection.

Overall every task was carefully planned to minimise either material or labour costs. For instance, electrical services were streamlined to reduce wiring and fittings, plumbing services were concentrated in one area to ease the connection of inflows and outflows and the whole house was painted in three colours - mission brown stain for the outside, stain/varnish for floor, outer inside wall and roof rafters and white for all other internal walls and ceiling - to simplify procurement and use of material.

Conclusion

When we planned the Mulivai house, we wanted something that was affordable in the local context, incorporated appropriate aspects of Samoan and tropical architecture and could withstand the strong tropical cyclones that frequented Samoa. We also wished to build a structure that was uniquely us, reflected our ideas and characters and did not stand out from the surrounding neighbourhood. Through patience and the innovative application of common concepts it was possible to provide an affordable and, we think, interesting house.

We have since perused other measures to improve our home's sustainability. All our water needs are met from rainwater collected off the roof and stored in concrete tanks behind the house. A solar hot water system was installed which works adequately without being connected to the power supply. All our green waste is cooked and used as dog food - our five dogs provide efficient home security. My wife's mother moved back to Christchurch and her downstairs flat is now the master bedroom. An art studio for my wife was added downstairs next to our bedroom so she can work from home. Other tasks that are considered include the treatment of grey water and use it to irrigate the garden around the house which is well-shaded by the eaves, and to develop alternative forms of energy to compliment or replace electricity from the national grid. Our house project that started in 1980 looks like it will go on indefinitely.

Acknowledgement

I wish to acknowledge my wife Vanya's involvement in the Mulivai house project and her input in the preparation of this paper.

Human resource development in Samoa – we are what we culture

Esekia Solofa *

Introduction

The process of development basically seeks to add value to the nation's stock of natural resources. Value is added to a given item of natural resource primarily through the intervention of the human mind. In this way, the person as the embodiment of the mind becomes a key development resource. This *human resource*¹ is the most important of all the development resources. It has the rare capacity of being able to add to its own value as well as the ability to improve the value of other resources. This paper is an inquiry into the nature of human resource development (HRD) in Samoa.

A brief overview is provided of the changing education scene in Samoa and the impact it has had on the nation's human resource development. The idea is to help conceptualise possible explanations for observed changes and trends in the personality of the Samoan human resource. The purpose of the paper is to arouse greater and close interest in the policies and methods of HRD in Samoa, and to generate discussion and ideas that could contribute to the further enhancement and consolidation of the sustainable development of Samoa's natural resources.

Underlying themes and definitions

Every society or social system possesses a culture that helps distinguish it from other such systems. This culture is fundamental to the development of the human resource. An infant born into any community is socialised in the culture of that community, as a natural part of growing up. This socialisation takes place through the process of education², formal and informal. Informal education is seen in the way a child learns to adapt its behaviour to that of others around it, to become a member of a group. Formal education is the intentional, more or less systematic effort to shape the behaviour of the child by bringing elements of culture to its attention. Thus in a broad sense, education may be appropriately regarded as the process by which the culture of a social system is impressed upon the child.

The concept of culture defies a single straight-forward definition. Nevertheless we can talk meaningfully about 'elements of culture'³, referring to those symbolic and learned, non-biological aspects of human society by which human behaviour can be distinguished from that of other animals. They include language, custom and convention, knowledge, belief, art, morals and other capabilities and habits acquired by human society. These elements can and do undergo change, allowing us to speak of changes to a culture in an unambiguous way. Changes develop in a culture due to a variety of factors and situations, including the influence of other cultures. The culture of Samoa has experienced many changes since contact was first made with the outside world many years ago.

We referred above to the education process in the context of a child in the formative stages of its development. The process does not end with childhood, however, and education continues

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into adulthood and beyond. UNESCO has made the point emphatically by prescribing 'Education in the 21st Century' as *life-long learning*. The basic notions of formal and informal education remain largely unchanged into adulthood. The main difference is that in adulthood the child learner has been transformed by and through education into a mature learner, but one that is endowed with the unique capacity to affect its own further development, as well as the ability to affect the development of other resources. The learner is now a human resource. Through its capacity to effect self-development, the human resource is also endowed with the ability to empower the education process further, from that of imposing culture on the child learner to one of in addition, reviewing, interrogating and reforming culture by the mature learner. This latter capacity gives a clearer meaning and purpose to the idea of life-long learning. Education has thus shown itself in two phases. Firstly, as a process that seeks to impress or impose culture upon the young learner and, secondly, as an instrument by which the human resource can guide or direct the development of culture and, therefore, of society. The central role of the human resource in the quest for development is now clear.

Major influences in shaping the human resource in Samoa

Many events have influenced Samoan society and its cultural environment over the years, but two will stand out as leaving, perhaps, the most significant impact. One is the arrival of Christianity. The other is the establishment of a formal education system. To help our appreciation of the present status of Samoan culture, therefore, it is proposed to explore how these particular events may have affected its evolution. In doing so, and given the fundamental importance of culture in HRD, it is hoped to gain an insight to the issues and problems of HRD in Samoa and, in the process form an informed basis upon which one might speculate on possible solutions.

The church

Whether divined⁴ or contrived the fact is that the Christian Church found privileged accommodation within the structure of traditional Samoan society from the outset. The clergy (i.e. priest, minister, pastor, etc.) were accorded the same high regard as that commanded by chiefly rank in the traditional hierarchy of village authority. This gave them not only much say in regulating the general affairs of village life but also a status which attracted deference and subservience from the community. Before long, the life of the typical Samoan village would revolve around the service of the Church as it set about its business which, primarily, was that of seeking the salvation of the individual soul⁵.

The following examples give only a hint of the tremendous influence of, and contribution by the Church on village life. Family prayers in the morning and evening were the order of the day, and Sunday was devoted to public worship (although some organized also took place on weekdays). Sunday schools taught children about morals and virtuous conduct through bible stories and liturgical tales. Some church denominations had pastor's "schools" as an integral part of their mission in the village, where the children and youth were introduced to mental discipline through literacy and numeracy lessons, and where bible reading exercises helped establish vernacular language skills. The pastor's house was a centre of socialisation for children and the youth, and where many life skills were taught such as general housekeeping, sewing and needlework for girls; and crop planting, preparation and cooking of traditional foods, and others for boys. Village people went to the pastor for counseling and advice on all sorts of things, spiritual and otherwise.

The privileged position taken by the Church within Samoan society in the early days would appear to reflect, to a large extent, the degree of compliance rather than any real commitment, with which the community as a whole “accepted” the Christian God. The acceptance was total if only in the sense that the worship of traditional gods was no longer practised, at least not openly. In an autocratic system which the Samoan village was and (still is), what the people could or could not do was decreed by the traditional ruling hierarchy (the *pule a matai*), and the “will of the people” was simply what the *matai*⁶ decided it to be. So when the *matai* decided, for whatever reason, that the community would worship the Christian God and no other gods, it was done and no questions would have been asked about it.

As the community later became deeply evangelised the revered regard accorded the Church would appear to have come closer to displaying the true nature of the relationship man is supposed to have with God, and underlined the manner by which man should pay homage to his God. Whether or not this was the actual situation will take some extensive analysis. In any case, the revered status of the Christian religion has remained in the culture of Samoa. The concern many people have is that this privilege is not exploited for the benefit of the man-made institution of the Church and its agents.

The changing education scene

One cannot really talk about ‘development of the human resource’ without discussing education. Neither can one properly conceive of education other than in the context of building human capacity. The terms ‘education’ and ‘HRD’ as used in this discussion may be regarded synonymous. Moreover, ‘education’ is used here in its broadest sense, incorporating ‘training’ as an aspect of it. It should also be noted that the characterisation made above of education as ‘formal’ or ‘informal’ does not preclude other classifications such as ‘non-formal’, ‘technical’, ‘vocational’, ‘distance’ or ‘continuing’ which, in fact, all fit under one or the other of the generic formal/informal classification.

Since the advent of Christianity and the subsequent institutionalisation of the Church, the next major impetus of change to Samoan society came with the establishment of a formal education system by the New Zealand administration a hundred years after the missionaries arrived. Two case studies are presented below of education, again in the broadest sense of the word, as it operated in Samoa at two different points in time. Case Study I covers a period within the decade running up to Samoa’s attainment of independence in January 1962. Case Study II takes place some thirty odd years later.

Case study I

Mose was 12 years old when he was in the second year class at X School, one of two boarding schools for boys run by the Education Department. He was relieved that he no longer had to endure the derogatory title of ‘new boy’ which cursed every new student that entered X School, including those who entered at higher classes. In the ranked citizenship of the student “village” where the fourth and final year boys were royalty, next only in rank to the prefects who were gods, the ‘new boy’ label designated slavery. The ‘new boy’ was expected to obey every wish of his superiors including whimsical ones (for example, doing a silent *siva* on the spot just to satisfy some boastful senior that he could order it). Mostly, however, it meant doing private chores for them such as washing laundry, cleaning rugby gear, running errands, and being re-delegated duties normally expected of seniors (for example, conducting prayers). He recalled now, a little embarrassed, when about this time the previous year he ran away home and begged his parents not to send him back to X School. The fact that he could now exercise some privilege as an “old” boy didn’t really excite him.

He was already looking ahead to his fourth and final year when he would sit the national Primary School Leaving Examination and hope to qualify for the country's top secondary school.

Mose came to X School from his village's school (*a'oga tulagalua*) where his formal education had started at age five. He recalled that he was in class 'standard 1' when he sat his first screening test for selection to the three government schools (which included X School) that took the best village school pupils from throughout the country. He was in class 'standard 3' when he finally made the selection. He recalled the intensive preparation the three of them who had survived the screening tests to the final examination had to undergo. In the last three weeks before the final examination, they were kept back after school each day to take extra classes in arithmetic, English spelling and composition, social studies, health and nature study, and at weekends they had night classes at the headmaster's house. He didn't mind the extra work. In fact he welcomed it: his parents kept telling him to study hard because if he didn't progress past village school, he would likely end up as a plantation worker or carrying sacks of copra on his back at Nelson's for the rest of his life. Actually he wasn't much scared by what his parents had said because he knew he could go to a mission school like some older boys and girls from his village had done after village school. At X School Mose was puzzled to find himself in 'standard 3' again but accepted it when he found out that most of his classmates had come from 'standard 4' in their village schools. It was the policy for all new entrants to start at the beginning level which, at the time, was 'standard 3'. The school roll had reached just above one hundred in Mose's first year; there were 31 in his class. The teaching staff of eight was made up of five Samoan and three New Zealand teachers. The headmaster came from New Zealand. There was a specialist woodwork teacher, and one of the general subject teachers was a trained musician. The latter trained the school brass band and taught introductory music lessons across the school. The teaching of all subjects except Samoan Language and Culture was done in English. Every student had to take the full complement of subjects offered.

School started at eight o'clock each morning, Monday to Thursday, although the day's activities actually began much earlier for everyone. The wake-up bell rang at six and for the next hour all students would be engaged in weekly rostered duties. They included: tidying up the *fale* (living/sleeping quarters), cleaning the ablution blocks, setting up the classrooms, picking up leaves and tidying up the "village" compound, cutting grass (i.e. clipping the lawns) manually using slashing bush knives, milking the cows, preparing and cooking food & etc. By seven thirty, the students were already showered and headed for the school building. Another round of duties followed after the end of school at 1:30 p.m. From 4 p.m. the students were free to engage in leisure activities or private study. Practice sessions for various sports were organised at this time. Prayers were held at six followed by the evening meal and then private study until "lights out" at 10 p.m.

The duties mentioned above were absolutely necessary. The school had no servants so the students provided all the labour, and often the initiative for ideas needed to maintain the welfare of the school community including the teaching staff and their households. The school kept a cattle farm for the supply of milk and the occasional eat, and planted its own self-sufficient supply of staple food (taro and bananas). Because of the need to maintain the farms, one day a week (Friday) was fully taken up with farm work. Friday evening was 'culture night' where the "village" houses (*aiga*) competed among themselves in traditional singing and entertaining.

Mose was able to maintain contact with his peers and friends in the village during the school holidays, and when he visited home on the third weekend of each month as was the practice of the school. On these visits, by habit of his younger days before he joined X School, he would go to the pastor's house and there met his friends. He was pleased that things hadn't changed much at all, even into his later years at X School. On one of these occasions he found that his friends had left him behind in developing certain individual skills. For example, he had to learn from his friends how to dress a pig for cooking in the traditional stone oven (*umu*). X School had made him an expert in making the *umu* but didn't keep pigs to give him a chance at learning about slaughtering and dressing them. He took delight, however, in showing his friends (and a few young women who were around) how to make a pot of mutton stew - a skill he had perfected after many days of rostered duty as cook for the master who was supervisor of his *aiga*. He noted as he grew a little older that an interest in meeting girls was adding increasingly to his reason for calling at each class for the top academic position. In Mose's final year there was the added challenge for him of getting into the country's best secondary school. A few of his classmates were planning to go into teacher training, some to join the Police Force or the Public Service. Others including his best friend Iona were opting for agricultural education, only recently established as a secondary level programme of X School. Towards the end of the year, close to the time of the national examination, Mose's class was excused from afternoon duties to do extra lessons or self-study. Success was important for the students but even more so for the teachers who knew that their reputation and that of the school's were closely tied up with the pass rate. Mose made it to the top national secondary school, and according to the headmaster's report at the end-of-year prize-giving ceremony, X School retained its excellent academic reputation.

Mose lived at home with his parents and siblings while attending high school. He found that his experience at boarding school stood him in good stead as he and his two brothers, both younger, were at an age when general convention expected them to assume responsibility for the family's food-garden and food preparation. Some years later he would tell the young woman he eventually married that the weight of these responsibilities on him was the reason why his rugby "career" never took off. Maybe there was some truth in it as he did give up rugby when he was about to make the school's 3rd XV because he couldn't attend training in the afternoons when he had to be at the plantation or doing other chores. His third year at high school was when Samoa became an independent state. A large contingent from the school presented an item of cultural entertainment at the official celebrations on the first day of January that year. Mose recalled overhearing his father discussing the issue of independence with an uncle at the time of the Plebiscite (referendum) the previous year. His father was saying that the New Zealand administration was doing alright so there was no need to change anything. He remembered thinking that he would have voted for independence if he had had the chance, but he wasn't sure why.

At the end of his third high school year, Mose won a government scholarship to study in New Zealand. On his return a few years later he joined the Public Service where he remained for several years. He is now a member of Parliament - on an independent ticket.

Case study II

Iona completed his twenty-seventh year as a public servant the same year Tevi, the youngest of his three sons, was doing his last year of high school. Iona had joined the Agriculture Department from the start of his career and for several years now had occupied a senior officer position. His career had peaked and he was becoming increasingly aware that he would be facing retirement in five or six years. The prospect did not please him. In fact, it

only exacerbated his concern and disappointment about the way his sons' education, and future career prospects, appeared to be turning out. Often he found himself brooding over the fact that his efforts at giving his children the opportunities he never had appeared to have failed to produce the expected results.

On this particular evening, a week after the 34th anniversary celebration of Independence, Iona was reviewing the form Tevi had just completed to register for the Pacific Senior School Certificate examination in November. It reminded him again of the disappointments and frustrations he had felt over the failure of his older sons to get government scholarships. He sat Tevi down beside him and once again reminded his son of how important it was for him to do well in the examination. He had high hopes that all his children would excel at school and get government scholarships to study in Australia or New Zealand. Two neighbourhood families like his had sons and daughters overseas on government scholarships, and he felt humiliated every time their fathers talked about them, as they often did, at *toona'i* (Sunday lunch) at the pastor's house. (Actually it was the pastor who was always bringing up the subject – three of his children, a girl and two boys, were overseas on government scholarships). Iona saw in Tevi his last hope of salvaging his family's pride, and he was practically begging as he poured out his frustrations to his son.

His oldest son got to Year 10 in the district junior high but failed to get a transfer to a government college. Iona managed to have him admitted to a mission high school but he dropped out after two years. That was four years earlier. He was now married with a 3-year old daughter. Iona's second son did high school at one of the government colleges and went from there to the pre-university programme at the national university. He failed to get a government scholarship so he applied to the Public Service Commission and got a job as a junior clerk in one of the government departments. This year, his second on the job, he decided to enrol as a part-time student to do a course towards the Certificate in Accounting at the national university.

Iona had bought a quarter-acre lot and built a house in a government subdivision not far from the main town of Apia. He wanted to bring up his young family free of the communal life-style of the extended family in the village, and close to good schools and health services invariably located in Apia and the surrounding areas. In spite of the difficult struggle to meet extended family and church obligations and pay their house loan, Iona and his wife managed to provide some small comforts for their children and put them to school.

As the children were growing up, Iona and his wife often recalled and discussed their own experiences of growing up in the village and felt quite proud that their children did not have to suffer village life. They were pleased that their boys didn't have to cut the lawn with bush knives, go to the bush to cut firewood, plant a crop plantation, or cook food in an *umu*. Freed of labour other than some small household chores and with no responsibilities other than going to school, the children were sure to excel in school in the minds of their parents. Iona was now wondering how things went so wrong for his older sons.

Iona ran into his old pal Mose (from back in their X School days) at a hotel bar in Apia late one afternoon. After a while of updating personal histories, the conversation turned into a discussion of Iona's "failure with his sons" as Mose called it.

"Look at what's been happening," Mose was saying. "What do young people do after school these days? What do you expect when they don't have much responsibility at home? Nothing;

they ride around in the town buses or in their friends' cars listening to loud music, go to the video shops, attend some religious youth group revival meeting or just hang around town," Mose answered his own questions. "Young children get bored easily when they are idle so they search for things to do to fill the time," he continued.

"I think my oldest son's problem was rugby," Iona interrupted. "He played too much rugby and neglected school." He was a good player too, and Iona had always suspected that this was the reason why the mission school enrolled his son.

"Yes, sports, that's a big problem," Mose jumped in, "But especially rugby. Ever since that Rugby World Cup tournament in 1991 it's been every Samoan boy's dream, and his father's too, to make the Manu Samoa. Every village, every school, and every church now all vie to get their boys into the Manu Samoa, and so the whole country is gripped by this rugby craze," he explained. "It'll happen in other sports too," he added.

"Why do you have to drag the church into it?" Iona asked.

"You tell me," his friend asked back. "What do they do at your church's youth group? I'm sure it's no different from what they do at ours," Mose went on. "They seem to spend most of their time on sports, and other times learning strange dances and other entertainment items for fund-raising concerts. Did you know that our pastor manages our village rugby team?" he added nonplussed.

Iona brought the conversation back to the situation of his oldest son who now had a wife and child but still largely dependent on his parents' support. "If only there was another chance to upgrade his education," he wondered aloud.

"You mean send him back to school? Of course you can," Mose was getting impatient with his friend's naivety. "Go and see the USP Centre at Alafua. They offer bridging courses that can eventually raise him to university level courses." He downed his glass with one gulp., "On the other hand, maybe you want to talk to your son about learning some technical skills, like carpentry or plumbing. I don't know if they provide after-hours skills training for out-of-school youth at Polytech but it's worth your while finding out."

The conversation flowed (as did the drinks) into other issues as night fell. Two other X School old boys joined them and the conversation turned to reminiscing about old school days. Suddenly there was a power blackout. Iona took the opportunity to make his exit and said goodbye to his friends. As he turned the pick-up truck into his driveway he felt really happy that he had run into his old friend Mose.

Issues in HRD

The above case studies give a picture of some of the underlying factors and symptoms of change brought about by the establishment of a system of education. They also, in a less direct way, raise a number of issues that are pertinent to the development of the human resource in Samoa (e.g. the role of parents, the church or pastor; sports and HRD, and so on - the reader can find out about these for himself/herself). The case studies say nothing, however, of the vast transformation which has overtaken Samoan society as a result. Samoa is no longer the village-centered rural community of half a century ago, based on subsistence agriculture and enjoying the plentiful resources of the its natural environment. It is now an integrated nation, albeit a developing one, with a growing and increasingly sophisticated

population whose needs are putting natural resources under severe strain. Obviously other developments have also been at work - raising other issues to contend with.

The external exposure of Samoan society which began with evangelisation and formal education has brought individualism into Samoan society. Today, Samoan society may be characterised as having a dualistic character, one ruled by *communalism* on one hand, and by *individualism* on the other. How else can one explain the country's ability to tolerate and adopt western values and still maintain its strong social foundation? Or is it perhaps the case that the country is in transition from the traditional to the modern? Whatever the case, the coexistence of communalism and individualism in Samoan society is undeniable. The evolution of Samoan society has evidently produced a human resource with a personality that embraces both communalism and individualism. It is in the interest of future development that HRD recognise and sustain this personality.

But there are fundamental problems to be faced in any attempt to exploit the duality of communalism and individualism in Samoan society. Firstly, traditional governance (the *fono a matai*⁷) at the village level, the seat of communalism, is run on a strict code which essentially bestows authority on a minority, sometimes one person. Even though some will argue that rulings of the *fono* are arrived at by consensus, more often than not consensus means yielding to traditional rank. Secondly, while *matai* do have access to knowledge and information that could benefit decisions of the *fono* much useful information and advice is kept out with *non-matai*. Thirdly, while the *matai* is, in theory, the representative of the members of his/her family to the *fono*, in practice there is usually no consultation of the family's views on issues for the *fono*. Often the representation is viewed by the *matai* as a personal privilege rather than an obligation to the family. Fourthly (and a very important one), the *non-matai* Samoan is conditioned by custom and tradition to be acquiescent and reticent in his/her relationship with the *matai* or other higher authority.

The above is not a condemnation of the *fono* as an institution of governance, nor is there a suggestion that the *fono* in its current form serves no useful purpose. On the contrary: by its very nature the *fono* is an effective regulator of communal (i.e. collectively owned) goods. For example, many nature/environmental conservation efforts around the country owe their success to sanction by the *fono*. Enforcing societal mores is another important responsibility the *fono* has always handled effectively. Rather, the above listing suggests possible areas that are in need of reform.

Take for example the condition mentioned of being "acquiescent and reticent" on the part of the *non-matai* in his/her relationship with the *matai* or other authority. The condition is sanctioned by tradition generally as 'respect for authority' or in the case of children as 'regard for elders'. Young people are chided for talking to adults, and children are brought up 'to be seen and not heard'. The effect of this conditioning is severe and it shows itself in many guises: the student does not ask questions in the classroom; the untitled man would not challenge his *matai's* bad decisions; the lesser *matai* defers to rank in the *fono*: the *matai* yields to the pastor on church matters; the junior officer would not dispute his/her superiors in the work place; and so on. Exploitation of the reverse relationship by the higher ranking party is equally as great a concern. Many problems encountered in development can be traced to this condition: lack of accountability and transparency, corruption, dependency; lack of initiative and drive, lethargy and inertia to name only few.

Communalism implies the concept of collective ownership. Its counterpart will be referred to here as the 'denial or refusal of direct ownership' which, by extension, also means the denial or refusal of direct ownership of responsibility. The concept is of particular concern in development: without direct ownership of responsibility there is no accountability, and without accountability there is no review, analysis or research and, therefore, no real development. Many of the traditions and customs practised in the name of Samoan culture need to be subjected to close examination and review for their relevance to the present. Such practice as to be found in funerals, installation of *matai*, weddings, opening of meeting houses and consecration of churches all, as a rule, call for the expending of huge quantities of material wealth and consumption goods - the more the better, as if quantity makes up for the lack of quality. The conservation of resources that can result from curbing such extravagant practice is already compelling reason for their review.

Towards a resolution of issues

Some of the issues discussed above would appear to belong more to a discussion of institutional reform than of HRD. However, we can justify discussing them here in the sense that institutional reform cannot be sustained without proper development of the agents of change needed for its execution. That development (i.e. HRD), as we have seen, is achieved through education, formal and informal and life-long, and typically expresses itself through the individual. Samoan society has evolved to accommodate individualism (or at least elements of it) in a culture that remains strongly tied to its communal roots. The development of Samoa has advanced with growing and progressive HRD; at the same time the contributions of 'custom and tradition' have been no less beneficial. A development model based upon a balanced interaction of communalism and individualism would appear to be the right one to follow. Finding that balance will involve the reform of a few traditions. The necessary human resource is available to execute the reforms; the question is how.

One way (and only one of many possible) is for the Church to use its potential (some would say a responsibility) as an agent of social reform. Basically this means putting priority on the welfare of the people (i.e. individual members and families of the congregation) and not on the Church organisation. Given the privileged and authoritative position of the Church the opportunity it has for doing this is enormous. And again there is any number of things that can be done - ranging from opening up meetings of the congregation to include matters of family or village welfare to banning church fundraising trips overseas, from individual counseling to opening up the church buildings as venues for programmes of adult education, workshops or seminars for different village groups (persons who seek the peace and solace of a church for private devotion will have a hard time finding it in Samoa as the churches are normally locked up except on Sundays). Another avenue may be found in encouraging interaction between the village *fono* and civil groups.

The role of the human resource in development is pivotal. Education will remain the central pillar of HRD. In Samoa, HRD needs to find the right balance between communalism and individualism. This can be achieved through appropriate programming and management of education. As the process by which elements of culture are transmitted to the person, education, and thus HRD, becomes not just an instrument of acculturation but, for us, a vital tool for cultural reform. We are what we culture.

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¹ Used as collective noun

- ² White, Leslie A. et al, "The Concept and Components of Culture", *Britannica* Vol. 16, 15th Edition, p.880
- ³ Abercrombie, Nicholas; Hill, Stephen; Turner, Bryan S. 1988, *Dictionary of Sociology*, Second Edition, Penguin Books, London
- ⁴ Oral tradition has it that the arrival of Christianity was prophesied by goddess Nafanua as Malietoa's inheritance from heaven
- ⁵ Marshall W. Baldwin, 1953, *The Mediaeval Church*, Cornell University Press, Ithaca, New York
- ⁶ A person chosen by each family and bestowed a title (*matai*) signifying a status of family leader. A family will usually have a number of such persons although there is one who is accorded top rank among them.
- ⁷ The village council whose members are all the village *matai*

Traditional knowledge is the key to sustainable development in Samoa: examples of ecological, botanical and taxonomical knowledge

Namulauulu G.V. Tavana *

Introduction

Samoa, like many small island nations provides special challenges for economic development and environmental management. Samoa's isolation, small size, aboriginal settlement and later contact with European-based colonialism, fragile ecosystem based on a highly endemic flora and depauperate fauna, and contingency on external forces of economic and political power for development create an extraordinary vulnerability. The need for sustainable development with the focus on improving the standards of living and the quality of life for all Samoan citizens of today and for future generations is greater than ever before.

Sustainable development

The World Commission on Environment and Development Report in 1987¹ described sustainable development as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Simply put, poor decisions of how a country can balance social, economic and environmental needs of today can mortgage the future for those to come. But this balancing act is a challenge for most Samoans where one has to juggle between meeting the basic household needs of the family and the demands of the extended *aiga* obligations with the long-term health of the environment.

Social, economic and environmental issues are inextricably intertwined and cannot be independently considered. For example, wasting of human capital by failure to adequately invest in education, both in western ways and in traditional *aganuu*, limits opportunities for economic growth as well as the search for cultural identity, resulting in impoverishment of both the pocketbook and the soul. Deculturated poor, who tenuously hover on the periphery of both the western economic system as well on the edge of the rich tapestry of Samoan culture, are unable to access resources in either western or indigenous infrastructures.

Such individuals, unable to obtain adequate health care from either the western medical system or the village *taulasea*, or better education, either in the western system or from village *matai*, are likely to degrade the environment as they struggle simply to survive, cutting down the rainforest for fuel, filling critical mangrove and estuarine habitats for land reclamation, dynamiting fish and destroying coral, accelerating destructive urbanization while contaminating the environment with waste products they cannot afford to dispose of, recycle or treat. The downward spiral of poverty and deculturation seems only to fuel rather than satiate the desire for imported goods which, unlike our material culture of former years, not only destroy Samoa's environment but also weaken Samoa's currency and internal economic systems.

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Both the village subsistence economy and western economy of Samoa depend on the sustainable use of renewable resources, but their overuse and depletion for short-term gain may jeopardize potential long-term economic future. It is only when environmental, cultural, and economic impacts of decisions are considered together as it is with village *fono* dealings that the probable effect of development on the future trajectory of Samoa can be accurately evaluated. It becomes the challenge for the government and people of Samoa to develop strategies that incorporate traditional knowledge to make a more effective and sustainable use of natural resources while maintaining both their ecological and cultural functions.

In this paper, I discuss that traditional Samoan knowledge, rooted in core cultural values is key to sustainable development of natural resources. Critical audiences within Samoa, however, must recognize the rate in which such invaluable knowledge is diminishing and how it impacts all levels of the Samoan society. As way of example, traditional knowledge of land use and management, healing practices, and identification systems, which have now been externally validated by western science, can provide an appropriate model for sustainable development.

Traditional knowledge

Traditional knowledge of indigenous peoples has increasingly become the center of attention within the past decade.² It encompasses many fields including ecological, botanical and taxonomical knowledge. Worldwide, traditional knowledge is acquired through daily experimentation, and is generally passed from one generation to the next, typically by word of mouth. In Samoa, much of the way traditional knowledge functions is guided by core cultural values of respect for the elders and the *matai* system, communal collaboration, deep care for one another, consensus, and productivity for the welfare of the larger Samoan society.³ Furthermore, traditional knowledge embraces Samoans view of themselves as stewards of sacred natural resources, with a special charge by Deity to protect them as their heritage. We consider our islands as “*O le nuu o lo tatou tofi mai le Atua*” (The land of our heritage from God) and therefore believe that our relationship with the land places upon us a sacred responsibility to kin, ancestors and Deity. These cultural values held central to the individual and collective identity of the Samoan people provide their worldview and guide all facets of their way of life.

Such indigenous knowledge, carried in the vessels of culture, language, legend, myth and folklore, serves as a storehouse for local biological information. *Explicit indigenous knowledge*, that which is easily articulated to outsiders such as the names of reef fish, the breeding times of birds, or the use of medicinal plants, must be combined with *tacit indigenous knowledge*, that which we cannot easily describe to outsiders such as the deep respect Samoans have for the elderly or the process of achieving consensus within a village *fono*. Indeed, many of the core contributions that Samoan culture has to offer to the world are in the form of tacit knowledge. Throughout the world, explicit and tacit indigenous knowledge are of fundamental value in the management of natural resources, in the maintenance of the world’s biodiversity, and in construction of local models necessary for sustainable development. In fact, traditional knowledge provides the basis of modern scientific discoveries and continues to help facilitate new information. Turner et al. confirmed: “traditional knowledge has received recognition as being complementary to, equivalent with, and applicable to scientific knowledge.”⁴ But whether traditional knowledge will survive the new millennium remains a question of time.⁵

Erosion of traditional knowledge

As we enter the 21st century, this traditional knowledge system is changing – the cultures and languages of Samoa are becoming increasingly endangered. Much of it has been significantly influenced by the dual phenomena of early European colonialism and more recently, internally imposed eco-colonialism – the destruction of indigenous culture and village hierarchies in the name of environmentalism⁶ - which inevitably serve to dilute the Samoan religious, economic, cultural and political character. With the loss of traditional knowledge and respect for traditional institutions irreplaceable links with the land and biodiversity are lost as well. We look in vain for examples of western managements systems that have facilitated sustained utilization of natural resources for anything approaching the span of a single Samoan village- in the case of Falealupo, ethnohistorical accounts suggest over a thousand years of uninterrupted political continuity of the village chiefs have maintained a species-diverse lowland rain forest, which has been continuously used for canoes, kava bowls, and medicinal plants. The loss of traditional knowledge is a loss to the understanding of the local biological resources and a threat to a deeper understanding and relationship with the natural world.

Linguist Michael Krauss claimed that half of the 6000 languages spoken at the beginning of the 20th century have disappeared; of the languages remaining, 80% are spoken only by the elderly people.⁷ Deterioration of language has serious implications for the Samoan culture: when elders die, the language, cultures and knowledge die with them. Recent ethnobotanical studies in Samoa (unpublished) confirmed two distinct knowledge realms; the common knowledge and the expert knowledge of the elders that is rapidly fading⁸ and the chance for such knowledge to perpetuate in the future is questionable (Chart 1). A study on generational knowledge involving cultural practices like breadfruit fermentation in the Federated States of Micronesia showed a steep decline with time because these skills – once critical for survival in an area vulnerable to periodic cyclones — have not been successfully passed on from the elders to their younger children.⁹

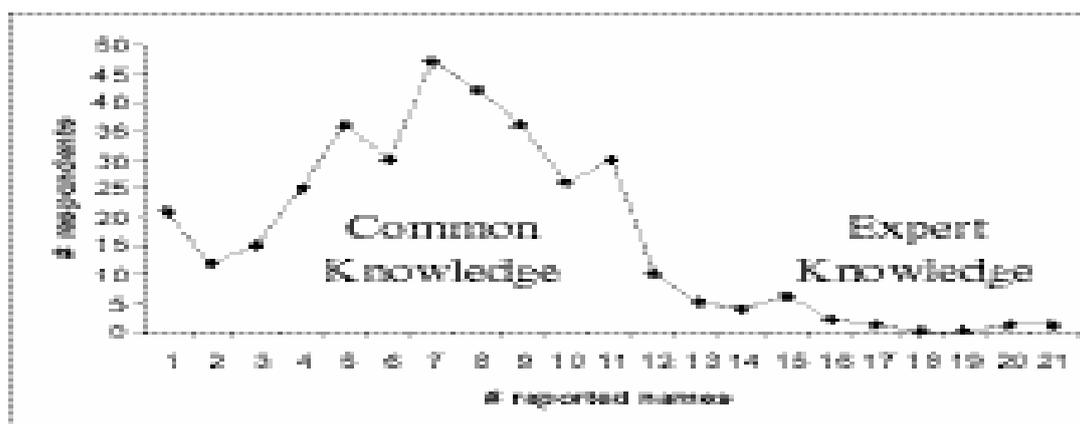


Chart 1. Samoa Ethnotaxonomy – Distinct Knowledge Realms

The loss of traditional knowledge crucial in matters of conservation and sustainable development is analogous to the loss of species and biodiversity: like the loss of lashings on an ocean-going canoe, the loss of each species and each bit of indigenous knowledge imperils our voyage to the future. Unless the real significance of these losses is soon appreciated, efforts to stop cultural extinction sweeping throughout the world are doomed. Unlike some

other indigenous peoples, such as the Penan in Malaysia, or the Kayapo in Brazil, the Samoan people are fully in control of both their land and their political future, so loss of an entire people is unlikely. But given this cultural robustness, it is possible that loss of traditional knowledge will not only reduce the carrying capacity of the entire archipelago, but will also lead to a loss of cultural identity for future Samoans. Already Samoan-Americans¹⁰ face among some of their children, recruitment into gangs, drug abuse, and social decay, which would not occur if a strong cultural identity had been passed on. Similar culturally destructive forces such as crime and suicide rates among deculturated youth in the town areas surrounding Apia, make it even more important to properly value, maintain, and apply Samoan traditional knowledge. Loss of languages and cultures equals the loss of ecological knowledge of traditional land use and management (agroforestry), botanical knowledge of healing practices (ethnomedicine), and classification and naming systems (ethnotaxonomy), containing much information crucial to conservation and sustainable living.

Agroforestry

Many pre-European resource management strategies were practiced and sustained in the Pacific Islands for hundreds of years. Traditional, subsistence agriculture has the advantage of being environment friendly but comparatively low productivity. Agroforestry is a traditional approach to land-use commonly practiced by integrating trees with other crops planted in a multi-storied fashion, which “diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels.”¹¹ These mixed cropping systems create favorable conditions for the soil, water and nutrients and proven excellent for environmental conservation and sustainability.

During the German colonial period, maximum production of cash crops such as copra and cocoa was the primary goal, hence, trees were systematically removed and single monoculture cash crops were introduced. These monoculture systems quickly replaced traditional Samoan multicrop-, rotational systems in Upolu and parts of Savaii, with the land owners and plantation managers sometimes usurping the role of traditional village councils in allocating rewards and meeting out justice. Monocrop systems may generate short-term profits but are very costly long-term environmentally, economically and ecologically. Unstable markets and fluctuation in prices can be a great loss to a single species planting, and similarly, there is a high risk of devastating problems caused by a single pest or disease as experienced by Samoa with the taro leaf plight devastating the entire taro industry.

Research identified benefits of multicrop, agroforestry agricultural systems that far outweigh any possible adverse effects. They can diversify products, optimize use of space, sustain soil fertility, reduce pests and diseases, conserve soil and water, ensure high level productivity and long-term production, reduce carbon dioxide emissions, increase biodiversity, and are culturally compatible with traditional Samoan ways.¹² Convincing evidence shows that smallholder agriculture, can maintain impressive yields per unit of land without degrading the resource base of the environment. Stevens advocated “the success of smallholder cultivation is not only its large and dependable production but its ecological continuity and conservation, its sustainability in the currently popular phase.”¹³

Ethnomedicine

Samoans have lived and used plants for over 2500 years and therefore had experimented, experienced, and provided treatment using their indigenous flora. Although there is a general understanding shared by most Samoans of simple remedies for common maladies, there are individuals with specialized and extensive knowledge of traditional healing practices —

taulasea. The majority of these are women; are highly gifted and have developed the ability to diagnose diseases, identify, prepare and administer herbal remedies, and are plant experts in their own right.¹⁴ The impressive role of a *taulasea* then assumes that of a physician, pharmacist, pharmaceutical company, and botanical explorer. She would attend to her patients with absolutely great devotion, applying the knowledge she had once learned while young, and hoped to have the same knowledge transmitted to her daughter who serves as an apprentice.¹⁵

This formidable knowledge and wisdom of Samoan *taulasea* can certainly provide insight into human health. The National Prescription Audit of 1976 confirmed that 25% of all prescription drugs contain a pharmacologically active compound derived from, or originally isolated from plants, most of which are used in traditional medicine. Despite many leads from plants as identified by *taulasea*, not every compound present is useful or result in therapeutic drugs. Scientists can help discover new drugs through the employment of ethnobotanical approaches and working with *taulasea*.

A survey of the Samoan ethnopharmacopoeia including some 104 plants extracts consisting of 74 different plant species showed a very high correlation between the Samoan traditional knowledge of medicinal plants and the presence of pharmacological activity. Over 86% of the plants tested showed some pharmacological activity sufficient to warrant further analysis. Chemical characterization of the pharmacologically active extracts is conducted through fractionation procedures in combination with bioassays to separate specific active ingredients from other chemicals in plants (Table 1).¹⁶

Family	Species	Plant part	Hippocratic Screen		Guinea Ileum	
Agavaceae	<i>Cordyline fruticosa</i>	Leaves	(+)	(+)	++	+++
Convulvulaceae	<i>Ipomoea pescaprae</i>	Leaves	(+)	+	0	++
Fabaceae	<i>Erythrina variegata</i>	Stem wood	0 (+)	+ (+)	+ +	+c +++c
	<i>Vigna marina</i>	Leaves	0	0	+	++
Moraceae	<i>Artocarpus altilis</i>	Roots	0	(+)	0	0
Piperaceae	<i>Piper methysticum</i>	Roots	(+)	0	++	+++
Poaceae	<i>Cymbopogon citratus</i>	Stem	0	+	0	++
Rubiaceae	<i>Morinda citrifolia</i>	Fruits	0	+	0	0
		leaves	(+)	0	0	+

Table 1. Sample plants surveyed for pharmacological activity (Cox, 1989).

Many new drugs have been discovered through ethnobotanical approaches from the past centuries. About 300 years ago, Linnaeus, the father of ethnobotany, interviewed a *Sami* indigenous healer at Jokmökk, Sweden. Scientist Sean Connery accidentally learns of a cure for cancer while speaking with a *shaman* a native healer in the Amazon. Ethnobotanist Paul Cox's interview with Epenesa Mauigoa resulted in an extensive account that described 121 different herbal remedies from 90 different species of flowering plants and ferns. Similar interviews led to the discovery of the *mamala* plant *Homalanthus nutans* and isolation of the antiviral drug prostratin, effective against the human immunodeficiency virus type 1.

In August 2001, the Aids Research Alliance signed an agreement with the Samoan government that will return to Samoa 20% of all ARA profits on prostratin, even if the drug is entirely synthetically derived. But the ARA also pledged in the agreement to encourage pharmaceutical firms to produce, if economically feasible, prostratin from Samoan plantations of *Homalanthus nutans*, and will credit Samoa with any diplomatic effort to provide prostratin at little or no cost to impoverished countries in Africa. The break-down of the percentages in the ARA-Samoan government is even more revealing: 12.5% of all profits will be returned to the Government of Samoa, 6.7% to the village of Falealupo where the plant was first collected, and 0.4% to each of the two families whose grandmothers instructed Cox in the use of the mamala plant in the treatment of viral disease. This agreement, if prostratin successfully completes clinical trials and is released on the market, could result in millions of dollars being returned annually to Samoa, even if a single kilogram of the plant is never exported.

Ethnotaxonomy

The naming and classification of plants was made necessary because man depended on them since the earliest stages of civilization. As the numbers of known plants increased, it became necessary to group them into broader categories according to some systematic criteria such as using common characteristics. These efforts however led to great confusion because not only unrelated organisms with superficial resemblances were grouped together, but consistency in naming systems was also lacking. In response to the cumbersome 18th century naming systems and classifications, Carl Linnaeus invented what was first published in the *Flora Lapponica* and later expanded in the *Species Plantarum* in 1753, which was then used to organize the Uppsala Garden in Sweden. Known as the binomial nomenclature, this Western taxonomy comprising the *genus* and the *species*, is now being used throughout the world.

Indigenous societies extensive use of plants to sustain life enabled them to create their own traditional naming and classification systems — *ethnotaxonomy*. In the summer of 2000, professors and Tropical Ethnobotany graduate students from the National Tropical Botanical Garden in Hawaii studied the naming systems of plants for the first time, and compiled a comprehensive list of breadfruit varieties and names. Using the morphological criteria, about 350 Samoans were interviewed to distinguish breadfruit varieties. Results show that the Samoan ethnotaxonomy also use both binomial and monomial nomenclature similar to that used in Western taxonomy. In the example *'ulu maa*, "ulu" is the generic term and "maa" is the specific modifier, and in the example *maopo*, the generic term is understood and the specific modifier is unambiguous. Samoan traditional knowledge explains that monomials are used only if the names are unambiguous and binomials are used to reduce ambiguity (Table 2). Specific modifiers provide descriptions to distinguish breadfruit varieties.

Names	Rank	%	Type	Description
maafala	1	90	UM	
puou	2	81	UM	
aveloloa	3	68	UM	
maopo	4	62	UM	
'ulu ea	5	56	AB	'Uvea Island
'ulu ma'a	6	55	AB	solid
'ulu Manu'a	7	37	AB	Manu'a Islands
momolega	8	33	UM	yellow
'ulu sina	9	22	AB	white
sagosago	10	17	UM	

Table 2. Breadfruit varieties - naming and saliency

Conclusions and recommendations

Traditional knowledge is vital to sustainable development of Samoa's natural resources. This knowledge incorporates Samoan culture and language, myths and legends presenting a worldview that contain potent biological information. Using traditional knowledge as the basis, scientific research and information garnered from ethnobotanical approaches can be integrated to provide a model for sustainable development strategies appropriate for Samoa. Unfortunately, this traditional knowledge is imperiled and not much is known about the nature of the interaction between the two. I offer the following recommendations:

Central and local village governments, environmental community advocates and universities could become proponents of valuing, preserving and protecting Samoa's invaluable traditional knowledge before it disappears forever. Tropical ethnobotany courses that encompass laboratory and field instruction in history, interviewing techniques, plant collection, and vouchering herbarium specimens should be offered at the university level. Scientists who have genuinely contributed extensively to Samoa can provide professional consultancy to bridge scientific information and traditional knowledge crucial in sustainable development and conservation. To fully understand and appreciate sustainable development and the impact on our lives, all scientific research papers published must be translated into Samoan. Traditional knowledge should be included at all levels of the school curricula using creative approaches to involve village elders and local experts. Traditional expertise and the voice of the local village communities should be sought during deliberations on the development of policies regarding sustainable development.

Sustainable development and conservation of Samoa's natural resources could be significantly advanced if modern scientific knowledge could be incorporated into traditional knowledge systems. Standards of living and the quality of people's lives of today and the future will greatly improve as they fully understand and become better equipped on how to meet their social, economic and environmental needs.

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Quarantine's non-compliance is a risk to Samoa's sustainable biodiversity

*Asuao Kirifi Pouono**

Introduction

Samoa is gifted with a diversity of flora and fauna, some of which are endemic species. An example of an endemic species is the *Manilkara hoshinoi* or "Pau" species of hardwood which is scarce in the forest at the present time (personal communication with the Assistant Director of Forestry). These endemic species must be conserved using the various methods which have been reported (Pouono and Semisi, 2001).

In our sustained environment, new varieties of taro were released during 1996 (Anon, 1998), 2000 and 2001 (Unpublished information) by the Ministry of Agriculture, Forest, Fisheries and Meteorology (MAFFM). These varieties were selected because of their improved tolerance to the taro leaf blight disease, caused by *Phytophthora colocasiae* Racib., while a new breed of Australian cattle was introduced in the 90s to improve the genetic composition of the local industry. In addition, there has also been an increasing trend in the importation of a wide range of plant species and varieties within the cut flower industry. Another case has been the introduction of bio-agents such as *Telenomus* and *Ooencyrtus* species in 1987 for the fruit piercing moth research purposes (Anon, 1995).

Simultaneously, Samoa's biodiversity is constantly under threat. It is quite obvious that some coconut varieties such as Niu Afa and Niu Vai are no longer common in the rural population. The many types of birds which once graced our skies are no longer visible in numbers as they were 20 years ago. Some taro varieties such as talo manu'a, magasiva, and a host of other local varieties (Anon, 1994) have ceased to be cultivated by local farmers. Such significant changes can be attributed to the action of mankind, and they justify the need for a sustainable environment. This is important because of Samoa's unique environment and the distinctive animal and plant populations which are seen as critical success factors for food security and also as a major tourist attraction. In this regard, the Quarantine and Regulatory division of MAFFM has a major contribution to Samoa's biosecurity.

This paper's emphasis is on the non-conformance issue, particularly its application under biosecurity. It is used in Agriculture Quarantine, particularly, to represent the kind of risk that Samoa's biological diversity is prone to. The main objective is for import consignments to be in compliance with quarantine sanitary requirements, in a preventive approach to maintaining a sustainable biodiversity.

This paper's approach is to reflect on some biodiversity cases in the past, a brief analysis of current potential threats, followed by a discussion on pertinent issues before making the final conclusion.

Past experience

In the 90's, Samoa was devastated by two major catastrophes; the african snail and the taro leaf blight disease. Both pests were present in Tutuila before they were discovered in Samoa.

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This, coupled with the high population traffic between the two Samoas, provides evidence to support the premise that the introduction of these pests could be strongly linked to non-conformity with quarantine procedures between the two countries. Some container consignments from Tutuila were found harbouring the african snail in 1982 and then again in January 1993. The first introduction was successfully eradicated from the Vaitele Industrial Zone (Anon, 1993).

In relation to biodiversity, the damage by the taro leaf blight was devastating to the taro industry. Since the 1993 blight, all of the local taro varieties (Anon, 1994) have been in the state of extinction. This also posed a significant impact on Samoa's economy and the future security of taro as a staple food. It is obvious that these major changes in the totality of the biodiversity were triggered by foreign pests which invaded our environment. This is a priority area of international concern, and it must be prevented while still facilitating trade.

From experience, import and export consignments are high risk avenues, particularly regarding the non-compliance syndromes associated with quarantine preventive requirements. When this first line of defense fails, some other quarantine responses to non-compliance are needed. These would include consignment detention, sorting and reconfiguration, treatment, destruction, reshipment and withdrawal of the import permit.

Non-compliance level at ports of entry

The non-compliance level from January – June 2001 at the main international airport at Faleolo is shown in Table 1.

At Faleolo, passenger consignments without an import permit ranged from 45 percent in March to 62 percent in January. At Fagalii, it was 87 percent for June. The overall average for both Faleolo and Fagalii based on the available information was 60 percent.

Similarly, the consignments which were intercepted at Faleolo without a sanitary certificate ranged from 60 percent in March to 74 percent in January. Those intercepted at Fagalii airport stood at 86 percent, and the overall average non-compliance was 69 percent.

The average number of consignments received per month at Faleolo during January – June 2001 was about 4000, and the amount of these searched was approximately 9 percent. This is about equal to the number of passengers referred to quarantine clearance, which also averaged 9 percent. These figures indicate a high risk, in the light of the many pests which are potential threats to Samoa's biological diversity.

Potential threats to Samoa's biodiversity

A small sample of the pests which are currently at high level status to be prevented from Samoa are presented in Table 2.

The foot and mouth virus, which affects cattle, is a world wide concern due to the loss of millions of cattle in Europe. The taro beetle and other viruses, which affect taro, have the potential to be even worse than the taro leaf blight disease. The mealy bug can cause severe defoliation, and it can easily be introduced via the importation of plant materials. The fruit fly is the sole reason why Samoa has not been able to export fruits and vegetables to New Zealand.

Non-compliance description	Month	Number of passenger consignments	Percent non-compliance	Port of entry
Consignments without the Import Permit	January	367	62	Faleolo
Consignments without the Import Permit	February	272	49	Faleolo
Consignments without the Import Permit	March	349	45	Faleolo
Consignments without the Import Permit	April	374	58	Faleolo
Consignments without the Import Permit	May	341	60	Faleolo
Consignments without the Import Permit	June	367	61	Faleolo
Consignments without the Import Permit	June	121	87	Fagalii
Average Percent Non-compliance description			60%	
Consignments without the Sanitary Certificate	January	367	74	Faleolo
Consignments without the Sanitary Certificate	February	272	66	Faleolo
Consignments without the Sanitary Certificate	March	349	60	Faleolo
Consignments without the Sanitary Certificate	April	374	64	Faleolo
Consignments without the Sanitary Certificate	May	341	67	Faleolo
Consignments without the Sanitary Certificate	June	367	69	Faleolo
Consignments without the Sanitary Certificate	June	121	86	Fagalii
Average Percent Non-compliance			69%	

Table 1. Non compliance level on passenger at Faleolo & Fagalii international airports during January - June 2001

Threat	Location	Risk Analysis
Viruses Foot and Mouth Disease	Europe	Potential threat to the cattle industry.
Taro viruses	Papua New Guinea, Solomon Islands	Potential threat to the taro industry
Mites Varroa mites	New Zealand	Potential threat to the Bee Keeping industry.
Mealy bugs Long-tailed Mealybug	New Zealand	Potential threat to the cutflower industry and many other plant species.
Fruit Flies Mango fly	Papua New Guinea, Solomon Islands Marshall Islands, Gilbert Islands of Kiribati Australia (northern Queensland)	Potential threat to the fruit tree industry.
Banana fly	Australia (east coast) Papua New Guinea Solomon Islands, Vanuatu	Potential threat to the banana industry.
Melon fly	Papua New Guinea, Solomon Islands Hawaii	Potential threat to plants in the family Cucurbitaceae (eg water melon and pumpkin).
Breadfruit fly	Papua New Guinea, Solomon Islands Vanuatu, New Caledonia	Potential threat to breadfruits.
Beetles Taro beetle	Fiji	Potential threat to the taro industry
Frog	American Samoa	Potential threat to drinking water.

Table 2. Some pest and diseases with a potential threat to Samoa's biodiversity

Discussion

Samoa's biological diversity has been invaded by a number of pests and diseases. Such invasions have resulted in the extinction of varieties, and the scope of vegetables is from fruit flies. The avenue for the introduction of these pests into Samoa is a matter of concern. One of the reasons for concern is the proximity of these pests to our shores, in light of the accelerated

world trade and the public global mobility which is emerging at a very fast rate. According to Allwood (2001), some travelers consciously transport fruit that is not certified free of fruit fly eggs or larvae.

The main issue which needs to be highlighted is the level of non-compliance at ports of entry, particularly in regard to the import requirements. The current level of passenger consignments without an import permit and/or the sanitary requirement is extremely high. In a personal conversation with a New Zealand authority, it was stated that passenger consignments are high risk pathways, and high risk pests have been intercepted in this way. Therefore, the current non-compliance level on the importing requirement is unacceptable for such a first line of preventive and/or defensive measure.

The challenge for all Samoans is to bring this non-compliance level down to zero. Unfortunately, the other lines of defense can be very difficult, and the risk to Samoa's biosecurity would be high. There are other related matters that should be considered, but they are beyond the scope of this paper.

Conclusion

Samoa's biodiversity has been sustained through improvements in Agriculture. At the same time, a part of this biological diversity is constantly under threat from foreign pests. The risk of invasion is on high alert, because of the high level of non-compliance at the ports of entry. A strategic approach is to prevent pest incursion through public compliance with importing requirements.

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Urban planning and management in Apia – everybody's or nobody's business in 2002

*Paul Jones & Jude Kohlase**

Introduction

The purpose of this paper is to detail the outcomes of the Urban Planning and Management Project for Apia undertaken from June to December 2001. The Project is a technical assistance project jointly funded by the Government of Samoa and the Asian Development Bank. The paper begins by looking at understanding past attempts to developing an urban planning and management system in Samoa. The paper proceeds to explore the demands for the existence of an urban planning and management system considering the range of key issues that are emerging in light of urbanisation processes occurring in Samoa and particularly Apia. Such issues include the concentration of the urban population and its impacts on the use of land, managing infrastructure, land tenure conflicts, community needs and demands, and the role of the urban economy. Urban management and planning has been identified as a way of carefully managing our resources as we move towards a better future.

The paper focuses on the proposed institutional arrangements for urban planning and management and its core functions, the legislative framework needed to provide the legal support for management of resources, and the budgetary and financial implications of the proposed system. The paper also provides an overview of the approach used by the Project Team in developing a planning system for the Apia urban area with application at the national level. The basic premise of the paper is that urban planning and management for Apia and Samoa generally has been nobody's business to date, with lots of varying interest shown but no responsibility taken. In the light of the current planning project being undertaken, the key question is will urban planning and management be everybody's business in 2002 or continue to be nobody's business?

Attempts at previous projects

There are numerous urban issues and concerns associated with the lack of urban planning and management which can be observed in the Apia central area and in the growing urban fringes - for example, the absence of safe public spaces such as pedestrian footpaths, building on flood prone lands, the lack of building and planning setbacks, and the continual unearthing of infrastructure inter alia that does not consider the views of both the public and other service providers. Over the last half-century, various projects have tried to develop a system to manage these rising urban issues and concerns. One of the consistent themes that have emerged from the analysis of past attempts is that none of these efforts have led to the establishment of an integrated urban planning and management system. History clearly suggests that the pressures to maintain the *status quo* have proven stronger than those attempting to bring about change to manage the urban area. The reasons why past attempts to establish an integrated urban planning and management system for Samoa and particularly Apia have not come to fruition are speculative, but are likely to include:

- a lack of coalition of support for a new system in both Government and the community;

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- lack of consultation in the planning process including the involvement of village level decision makers such as the *pulenuu*;
- emphasis on primarily Government activities rather than the needs of the wider community, of which Government is only one of a number of players;
- the cost of the system in relation to affordability at the household and Government level; -
- the underlying norms, aspirations and values embodied in the system were not representative; and
- an emphasis on physical master plans and land use plans whilst ignoring the social and economic underpinnings of change, especially sustainable human development issues.

Another key reason for the failure of past efforts to establish an urban planning and management system is that recommendations have been ambitious and have not involved an incremental and staged approach. The most recent effort in 1996, for example, was to create a new independent Urban Management Commission at a cost of S\$14.2 million. These recommendations for this new lead agency gave little explanation of how the Commission would relate to existing socio-cultural systems of decision-making at the local village level, the implications of how it would be resourced with staff and overall impact on Government budget.

Key planning and development issues

Attempts at developing an urban planning and management system can be seen to revolve around the constant themes of human activity, their concentration such as within Apia, and the pressures they place within localities. The Apia population combined with the urban sprawl along the North Western Upolu corridor accounts for 47% or 76,492 persons of the total population¹ – that is, nearly half of the national population now lives within this area. Such population growth poses numerous concerns for the environment in that land use developments are generally not controlled and there is minimal infrastructure capacity in place to support developments. There are also rising social concerns with a diversity of people in the urban area and the stresses posed by the cash economy - for instance, unemployment, substance abuse, suicide, lifestyle diseases, crime, mental health, disorderly behaviour, road rage etc. It has been stated during consultations that although the *pulenuu* (that is, the village mayor on customary land) acts as a way of remedying some of the ills on customary lands, their jurisdiction fails to influence those on freehold lands. This is important given there is a mix of customary, freehold and Government lands within the expanding Apia urban area.

With the increased population in Apia, demand for land has led to rapid growth along the urban fringes, namely south towards the catchment areas, east despite topographical limitations, and the majority of the growth occurring along the North Western Upolu coastal corridor. The demand this places on the sustainable capacity and natural threshold of the land on which development activities are * taking place, is far-reaching. Uncontrolled pollution, erosion, sedimentation and flooding have implications on biodiversity, loss of habitats and vulnerability of Samoa's cultural heritage sites and existing built-up environment, are only a few of these far-reaching consequences. The growth areas such as Vaitele and Vailele are increasingly demanding social and physical infrastructure from utility providers and Government. However, with no agreed plan, poor coordination and integration, service providers have been subjected to meeting ad hoc demands. In some cases, the church has played an integral 'stop gap' role in providing social infrastructure in communities such as the school complex at Vaitele.

Observing the current form and structure of the urban area, it is apparent there is no rhyme or reason as to the locations of different land use developments and activities. There are no land use controls or guidance as to desired village character. Landowners can do as they wish with their lands, subject to family and communal obligations that may apply depending on the prevailing land tenure. The Project Team has identified that a clear plan would be beneficial and importantly, would enable both infrastructure providers and the community at large to have greater certainty as to their investments and locations of their utilities. Hence, the costs would be well spent in a system that provides greater certainty and transparency. This will also guarantee the most appropriate use of land, soil and water within the growing urban catchment.

The importance of urban Apia to the Samoan economy cannot be understated. In 2000, total GDP for Samoa in current prices is estimated to be S\$773.7 million. Of this S\$537.2 million or 70% of the total GDP is estimated to have been generated either directly or indirectly by economic activities based or undertaken in the Apia urban area. This implies that an urban area containing approximately half of the nation's population generates 70% of its national income. Clearly, Apia is the hub and driving force in the Samoan economy, being the commercial and industrial centre of the nation. There are no major centres of economic activity outside Apia, all reinforcing the need for an effective planning and urban management system to support and facilitate such economic growth.

Overview of the current planning framework

The current system of planning at the national level is highly developed and is based around the development of the 'Statement of Development Strategy'. The process incorporates an excellent methodology of public consultation undertaken by Treasury. Unfortunately, a key weakness is that it does not provide for a system to set urban objectives at the macro or Apia level. This is a major shortcoming given the high level of population concentration in Apia and the North West Upolu corridor and importantly, the large degree of population mobility between Upolu and Savaii.

The Apia tier involves a range of Government and state-owned enterprise players with activities fragmented across many national agencies such as EPC, PWD and DLSE. Significantly, there is no lead agency to integrate, advocate and facilitate an agreed overall plan to coordinate planning and development. Key issues identified include no planning guidance or direction, minimal building control and no institutional ownership for drainage, sewerage and other rising infrastructure issues. The result is that service provision generally occurs independently, sometimes with little knowledge or care by agencies as to their impact on other developments. At the village level, there is a clear social structure responsible for management of village level activities. On customary lands, the role of the village fono and the pulenuu dominates. However, the type of landholding - customary, fee simple, lease, or church lands - defines the organisational structure dominating the pattern of village decision-making at the Apia level. As such, villages vary significantly in their commitment and organisational arrangements to undertake 'good' village planning where the interests of both the village and landowner can be balanced.

Results and implications of the community consultations

Some of the key findings emerging from consultations have indicated and supported the increasing role of urban drift, emerging social and family breakdown, pollution and other environmental concerns within the catchment, the need for land use controls and guidance, better traffic and pedestrian oriented management such as school drop off points, urban

healthcare and rising sanitation and flooding issues. These concerns will have implications for the planning of the use of land, soil and water to help alleviate some of the public's perceived urban concerns and issues.

A major theme emerging from all consultations is that people need to actively participate in the decision-making processes as it relates to land use and development activities. This will require a mind shift to reveals people's desire for choice within an agreed framework, including balanced development, better coordination, a broader definition of the "urban" environment, an appropriate institution for planning, and importantly, the need for us to consider 'planning for the future' as opposed to the "business as usual" scenario. This can be reflected into the key principles of transparency and accountability so as to reach better urban outcomes.

Considering all the issues and concerns raised by key stakeholders, the overall purpose of the emerging urban planning and management system is recommended *"to improve the quality of life for all Samoans"*. The key outcomes that shall reinforce the purpose can be summarised as:

- safe, healthy and cohesive communities that meet peoples needs and supports and enhances village character;
- sustainable natural resource management in Apia and the catchment;
- a supportive environment for business which assists in economic growth opportunities; and
- appropriate urban structure and form for Apia's development so as to provide equitable access to transport, services, recreational facilities and jobs

These outcomes will be underpinned by guiding principles that need to be reflected in the underlying system legislation and administrative processes. These principles will include incorporation of a community-needs driven approach, ensuring effective community participation, improving coordination of urban service providers, providing greater certainty to business and community via accessibility to information and services, and importantly, creation of a versatile "tool box" for implementing plans and achieving outcomes of the proposed urban planning and management system.

The Project Team have identified a number of key system components² fundamental to achieving these urban outcomes such as goal setting for urban improvement, developing plans and policies, regulating development, mobilising resources for urban improvement, implementing improvement through annual operating plans, achieving the desired urban outcomes, and monitoring and reviewing the process. These system components form the three core functions that will need to be carried out by the system to achieve the agreed outcomes, namely, the making of plans and policies, regulating development and urban management and the coordination of urban services (see Figure 1).

One key planning tool would be the preparation of a structure plan for Apia. This would become an important outcome as it ensures that the location of future land use and development makes the most of existing resources. It also indicates the future distribution and type of development including infrastructure and services, provides certainty for landowners and developers, and reflects an agreed plan by which stakeholders can work within – a physical framework plan, which will have the force of law (see Figure 2).

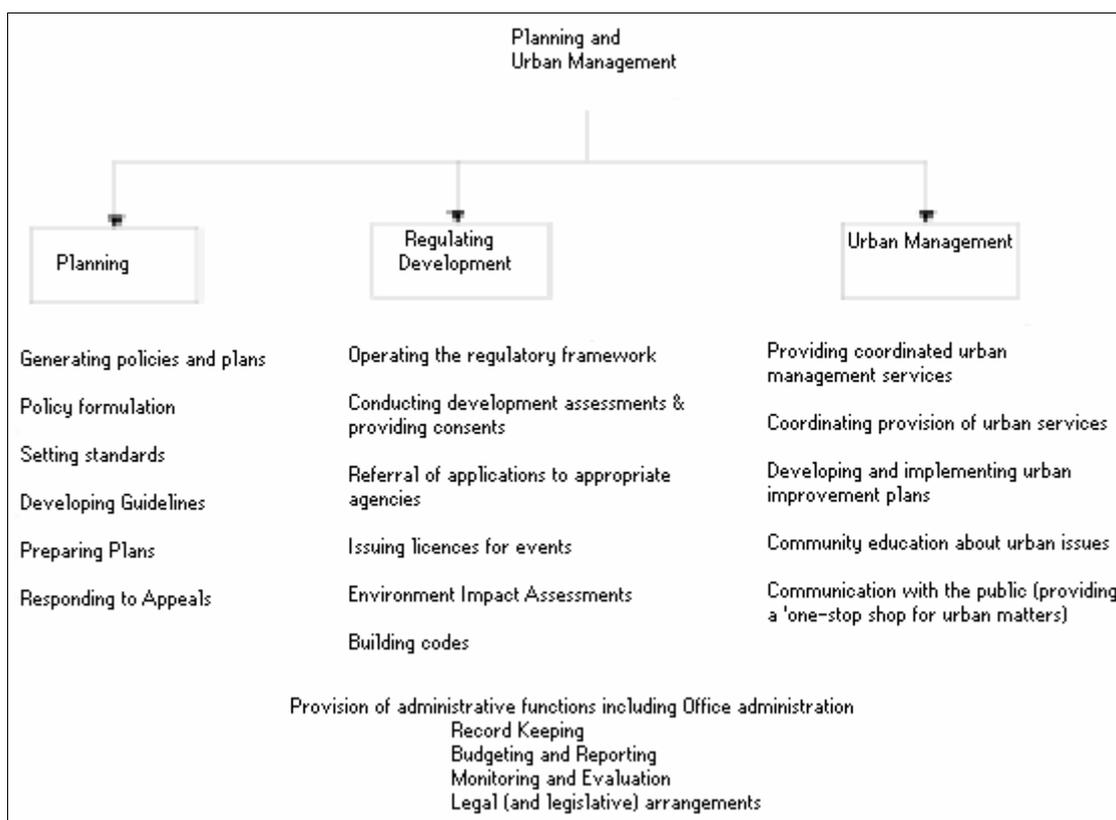


Figure 1 Planning and Urban Management Structure

The major issues that the draft structure plan raises include those regarding the future use of land and development patterns, the distribution of land tenure types, and density and environmental constraints. Because the planning of these resources are of concern to everyone, the public needs to be involved in deciding plans and policies as to the future use of these lands.

A firm commitment by Government will be required to define the true extent of the system application. Should it be applied to special planning areas like the growing Apia urban area, or at the rural level and other developing areas such as Salelologa? Or should it be applied at the national level thus requiring strong deliberation by Cabinet. A strong decision on the urban edge will have political and social ramifications. Regardless of the boundary, a strong decision would be seen as a progressive step towards managing the environmental and natural resources ensuring their sustainability and intergenerational equity for future generations. The establishment of an agency on an urban basis would provide a powerful commitment to decision-making in the urban area.

The Project Team has identified various institutional options such as a local council, a municipal authority and a planning authority/commission as avenues for institutional means to providing an urban planning and management organisation that facilitates and advocates appropriate development. Upon reviewing these, the Steering Committee agreed for an incremental and staged approach within the Department of Lands, Surveys and Environment (DLSE) was the preferred broad option.

DLSE was selected as the preferred home for urban planning and management in Samoa due to the many functions it already carries out. Environmental planning in the context of the

Lands, Surveys and Environment Act 1989 is done within DLSE. DLSE also has mapping, surveying and valuation capacities, and also contains a property and a cadastral information database vital to any planning system. Subdivision, one key aspect of the development process, is already carried out by DLSE. Under DLSE, the Department has broad urban and rural land use responsibilities in which it also carries out some urban improvements. DLSE is also responsible via the Land Board for planning and management of Government lands. These functions provide the basis upon which to build a strong institutional framework for urban planning and management in Samoa and specifically, the growing Apia area.

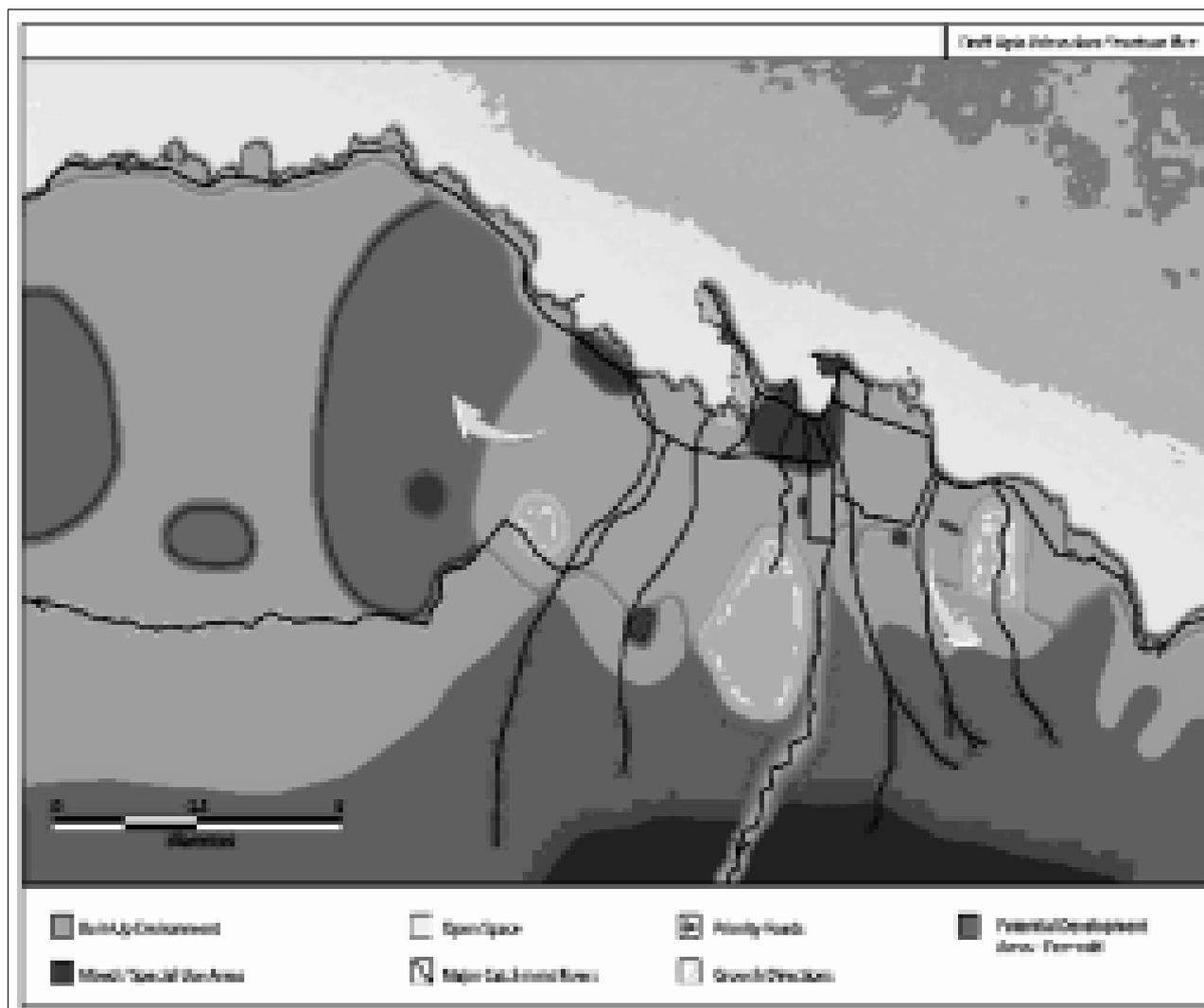


Figure 2 Structure Plan for Apia

The proposed institutional structure shall provide for all three core planning and management functions that have been identified. This body will also provide those services, which could not be provided more efficiently by others. The proposed new structure would be established as a relatively independent body that would be part of DLSE, but must be publicly identifiable. At a later stage, such as five to eight years, the body would be floated off as an authority. This has been supported by the Steering Committee as a pragmatic step to developing an urban planning and management system for Samoa. The above considerations have led to an agreement to establish the Planning and Urban Management Agency (PUMA)

within DLSE as the lead agency for urban planning and management for Apia, with potential application at the national level.

The proposed planning and urban management agency (PUMA)

It is envisioned that the tentative mission for PUMA shall be *“to provide leadership to help ensure that the quality of urban and rural life in Samoa is among the best”*. This mission will emphasize PUMA’s focus on the urban area of Apia principally. The key responsibilities will be to provide plans and policy services for land use and to establish and operate a regulation framework for planning assessment and building control. Significantly, PUMA will also be responsible for establishing and operating mechanisms to ensure urban management services are coordinated and meet the system objectives. PUMA will now be the consent authority for all land use and development matters in the area to be specified by Cabinet.

To meet the purpose of the desired system and operate the above functions, there are certain values that PUMA will need to adhere to. Some of these values shall include accountability to a new Planning and Urban Management Board as well as stakeholders and public. Generally PUMA will also maintain its independence from DLSE as far as practical and importantly, be identifiable by the public as the paramount agency for planning and development matters and coordination of urban management. It is envisaged PUMA will also become accessible as a ‘one-stop’ shop for all urban and rural development and urban management issues, concerns and enquiries. PUMA shall also be supportive of the ‘Statement of Development Strategy’ at the macro level, and be as transparent and cost-effective in all its assignments.

The proposed organisational arrangements³ would see PUMA become a new division within DLSE, accommodating 27 professional staff (seven of which are new positions) and focusing on developing the three core functional areas outlined above. The proposed Board will be the development consent authority for Apia (and possibly other areas as agreed by Cabinet) plus deal with urban management services and issues such as urban improvements and urban development in areas like Vaitele. The Board will also be responsible for approving major plans and policies as well as development applications. PUMA will be modeled on the Land Board, currently comprising six Government representatives and six community representatives, with the chair being the Minister of Lands, Surveys and Environment. There will also be a proposed Appeals Tribunal for the community or individual applicants to challenge planning and development decisions, including planning and building applications and the making of plans and policies.

The major implication of these arrangements for the community is that there will be designated a lead agency responsible for coordinating and managing planning, development and service issues in the urban area. Development will now be assessed in the wider meaning of “environment” - that, social and economic as well as ecological. Stakeholders will now have a say in development matters, thus the community including the village fono, can comment on proposals that affect them during the planning process. The implication of the above is that development and land use decisions will now need to consider the impact on other people, and not be processed in isolation by private or public stakeholders as is current. The community will be represented on the Board and avenues for planning and development appeals will enable legal challenges. This system will adhere to good governance and will also apply to Departments and infrastructure providers. The key service agencies such as EPC and PWD will be represented on the Board, thus improving coordination and integration. It is envisaged that all the above will lead to better urban outcomes.

Proposed budget implications

The budget and financial implications have been identified for PUMA comprising the three functional units. The total budget costs are estimated at SAT\$2.693 million and falling to S\$2.524 million by year two. Of this SAT\$120,000 is included for urban improvements. However, PUMA's incremental budget cost is of SAT\$630,346. A possible user charge is being discussed as funding avenues for PUMA, however this may come into affect in three to five years as the credibility of PUMA is established. A possible scenario where a minimal cost recovery of SAT\$1.915 million is achieved; this comprises existing PUMA revenues plus SAT\$1.5 million raised from a 0.5% payroll levy plus a SAT\$5 per month service charge such as with the EPC account is also likely to fund the system. The implication of the latter is that those benefiting should and would wear the costs or part thereof.

Legislative implications

The establishment of PUMA will require an amendment to the existing legislation, primarily the *LSE Act 1989* and a new Urban Planning and Management Bill. The amended *LSE Act 1989* would deal with the institutional framework for PUMA and PUMB. The proposed new Bill, however, will contain the operational aspects of the legislation to allow PUMA to carry out its three core functional responsibilities. The primary components will contain the objectives that will be crucial to providing links to the contents of plans, strategic planning and development control and assessment. These would all require commitments from landowners in which they agree to give up some individual rights to achieve a broad community benefit. This Bill will be seen to help the new planning and urban management system develop a clear identity.

Conclusion

A way forward for the development of a new urban planning and management system for Apia and Samoa based on the establishment of PUMA has been identified for the next eighteen months, namely, for 2002 and well into 2003. Five core implementation components have been identified as the operating plans and funding, goal setting, planning and policy setting, regulatory setting and urban service coordination and urban management. Currently, a report is going to Cabinet and Government seeking endorsement of the findings presented here and as agreed to by the interdepartmental Steering Committee. It is difficult to hide from the fact that the population and development is continuing to grow, and that PUMA and PUMB provide a window of opportunity to ensure that the adverse effects of this growth are dealt with and managed in an orderly manner. It is important to note that during the extensive public consultation carried out by the Project Team, there was relatively little disagreement with the fundamental philosophy that an effective, transparent and accountable system, such as embodied in PUMA, is needed as a matter of urgency.

The proposed planning and urban management system and establishment of PUMA will provide appropriate tools and processes to enable consideration of a range of problems. Streamlined processes would need to be established to effectively deliver advisory services and infrastructure provision such as that the system requires. This paper has demonstrated the potential of a planning system with respect to its responsiveness to urban issues. However, the system will need to ensure that it listens to its communities in working toward an agreed future for the urban environment. Finally, the system will also need to make sure it does not spend too much time planning without clearly implementing and developing the agreed outcomes for achieving a vibrant and strong community within Apia and other key growth areas in Samoa.

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Tackling land degradation and unsustainable land use in Samoa – with emphasis on the Agriculture sector

*N.S. Tuivavalagi, D.J. Hunter and F. Amosa **

Introduction

This paper starts by introducing the global and local situation regarding land degradation and unsustainable land use. It then defines some basic terms; discusses land use and farming systems in Samoa - with a general statement on the relationship between farming systems and land degradation. The paper then describes the types, seriousness, causes and effects of land degradation in Samoa; discusses ways of tackling land degradation and unsustainable land use in Samoa. The paper ends with a summary, and some recommendations and conclusions.

The global situation

Land degradation is a massive, global environmental problem (FAO/UNEP 1995¹; Howlett 1996a²; FAO/UNDP/UNEP 1994³, Scherr 1999⁴). FAO/UNEP (1995)¹ reported that degraded lands worldwide include 5.8 million km² degraded by deforestation - mainly for agricultural production, 6.8 million km² degraded by overgrazing, 1.37 million km² degraded for fuelwood, 5.5 million km² degraded by agricultural mismanagement (as a result of wind and water erosion; salinization and water logging; and soil nutrient loss) and 0.195 million km² degraded by industry and urbanization. Thus, overall, about 18.1 million km² of land (92% of total degraded land) has been degraded as a result of agriculture, with 32% of it due to deforestation, 30% to mismanagement and 38% to overgrazing.

The local situation

The Pacific islands and Samoa in particular are not immune from land degradation. In fact, the small island ecosystems are especially vulnerable to the problems of land degradation and unsustainable land use because their natural resource base is limited and fragile. Hughes (1998)⁵ referred to a number of issues common to inappropriate land use and management in the Pacific islands. However, according to Howlett (1996a)², four of the key issues that needed addressing in Samoa are: (a) uncontrolled land clearing for agriculture on sloping land, (b) land tenure and land disputes, (c) attitudes of farmers towards impact of their activities; and (d) lack of information and agrotechnology for sustainable farming.

Some basic terms

For the purpose of this paper, the terms “land degradation”, “land-use policy” and “sustainable land management” are defined as follows:

Land degradation - Land which due to natural processes or human activity is no longer able to sustain properly an economic function and/or the original natural ecological function (ISO, 1996⁶ (cited in Choudhury and Jansen, 1999⁷); or, the loss of the productive capacity of the land to sustain life (IFAD 1992⁸ (cited in FAO, 1999⁹).

Land-Use Policy - An expression of the government’s perception of the direction to be taken on major issues related to land use and the proposed allocation of the national land resources

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over a fixed period of time. It has a production and a conservation component. (FAO/UNEP, 1999¹⁰).

Sustainable land management combines technologies, policies and activities that are aimed at integrating socio-economic principles with environmental concerns so as to simultaneously maintain or enhance production, reduce the level of production risk, protect the potential of natural resources and prevent (buffer against) soil and water degradation, be economically viable, and be socially acceptable (Smyth and Dumanski, 1993¹¹ (cited in Dumanski, 1997¹²).

Land use and farming systems in Samoa

Land use

Soils, land and land-use in Samoa have been discussed in numerous publications, including Ali and Murray, 2001¹³; ANZDEC/DSIR (1990)¹⁴; Asghar *et al.*, 1988¹⁵; Hughes, 1998⁵; Ward and Ashcroft, 1998¹⁶; and Wright, 1963¹⁷. In addition, USP Alafua over the years have published a lot of their research results and reviews on Samoan soils (e.g.: Asghar, 1988¹⁸). Table 1 gives the main land use by the agricultural households in Samoa; Table 2 the areas under different crops and Table 3 number of the various types of livestock kept by Samoan farmers.

Land Use	Area (ha)	% of Total Land Used
Under Crops	46,444	87.4
Under Livestock	253	14.8
Under Bush/Fallow	2,304	4.3
Under non-agricultural use	1,880	3.5

Table 1. The main land use of the land parcels: Samoa, 1999. Source: Based on GOS (2000:34)¹⁹

Crop	Single Crop Equivalent Area (ha)	% of Total Area Under Crops
Coconut	18,737	46.2
Cocoa	4,006	9.9
Banana	4,290	10.6
Other Tree Crops	1,538	3.8
Taro and Taro Palagi	4,249	10.5
Taamu	4,816	11.9
Other field crops	2,9144	7.1

Table 2. Area under different crops: Samoa, 1999. Source: Based on GOS (2000:35)¹⁹

Households/Type of Livestock	Numbers Involved / Kept
No. of households raising livestock	15,915
Cattle	28,000
Horses	2,000
Pigs	167,000
Goats	2,000
Chickens	431,000
Other Livestock	2,000

Table 3. Livestocks Kept and Households Involved: Samoa, 1999. Source: Based on GOS (2000:33)¹⁹

Farming systems

Farming in Samoa has always been mainly subsistence with small-scale plots which are usually village based. About 40 years ago, Wright (1963)¹⁷ described the four main types of

land use under “agriculture and crops” as: (a) food gardens only, (b) food gardens with cash crops, (c) commercial plantations, and (d) grassland. However, more recently, Tomane (2001)²⁰ reported that the main farming systems in Samoa may be grouped into four categories, namely: (a) monocropping, (b) intercropping, e.g. cocoa under coconut (c) mixed cropping e.g., banana, taro, yams, taamu and breadfruit under coconut and (d) integrated farming (crop(s) with livestock).

It has been reported that, in general, monocropping (rather than the more traditional systems such as mixed cropping and integrated farming) is more likely to result in land degradation via soil erosion due to rainwater (Tuivavalagi *et al.*, 2001²¹). However, a key factor in the degree of erosion due to rainwater is the amount and nature of ground cover provided under each farming/ cropping system. The greatest damage will be caused on sloping land where land is bare/uncovered during times when the soil is being disturbed (e.g., at time of land preparation, planting or harvesting) particularly in the rainy season.

Types, seriousness, causes and effects of land degradation in Samoa types and seriousness

Various types of soil and land degradation have been explained by previous authors including FAO/UNDP/UNEP (1994)³ and Scherr (1999)⁴. As only to be expected, authors differ in their approach to describing and classifying land degradation. Douglas (1994)²² (in FAO, 1999⁹) recognizes that land degradation has five main components: (a) soil degradation, (b) vegetation degradation, (c) water degradation, (d) climate deterioration, and (e) losses to urban/ industrial development. Each of these major components could be subdivided into more specific types of degradation. Table 4 lists various types of land degradation and their seriousness in Samoa.

Type of Land Degradation	Seriousness (0-100)*
Eutrophication; Pan formation; Salinization; Subsidence; Terrain deformation; Waterlogging; Wind erosion	<5
Crusting/Sealing; Pollution	5
Urban and industrial encroachment onto agricultural lands; Agricultural lands covered by volcanic lava flows	5-10
Aridification; Compaction	10
Biological degradation; Rangeland degradation	15
Acidification	20
Water erosion	60
Fertility decline/Nutrient	70
Depletion	
Deforestation	80

Table 4. Types and Seriousness of Land Degradation in Samoa

*Based on authors' rough estimates using a scale of 0 (not a problem in Samoa) to 100 (an extremely serious problem in Samoa)

The ranking in Table 4 seems to agree with Peteru (1993:45)²³ who stated that “Deforestation is perhaps the greatest single threat to Samoa’s environment. The ranking also seems to agree with the results of a PRAP workshop held in Suva about five years ago (cited in Hughes, 1998)⁵. In this workshop, participants considered six land/ soil problems in the Pacific and, for the Samoan situation, ranked them, in descending order of importance, as follows:

Land pressure > soil fertility decline > soil erosion > poor soil drainage = water logging > drought

where “*land pressure*” may be equated with “*deforestation*” as “*land pressure*” is a major cause of “*deforestation*”

Causes of land degradation

While discussing the causes of land degradation in the Pacific, including Samoa, Hughes (1998)⁵ recognized and distinguished between (a) natural degradation hazards, (b) direct causes of land degradation, and (c) underlying causes of degradation - as given below with some modification:

(a) Natural degradation hazards

- Cyclones
- Drought
- Volcanic activities

(b) Direct causes of land degradation

- Overcutting of vegetation
- Shifting cultivation without adequate fallow periods
- Overgrazing
- Non-adoption of soil-conservation management practices
- Extension of cultivation onto lands of lower potential and/or high natural hazards
- Improper crop rotation
- Unbalanced fertilizer use
- Overpumping of groundwater

(c) Underlying causes of land degradation

- Population increase
- Attitudes
- Economic pressure
- Land tenure
- Land shortage
- Poverty

Effects of land degradation

FAO/UNDP/UNEP (1994)³ has grouped the effects of land degradation as “effects upon production” and “consequences for the people” as shown below:

Effects of Land Degradation Upon Production

- Land is abandoned (where degradation is severe)
- Crop yields are reduced
- Inputs and costs of production are increased (where farmers attempt to combat reduced yields by increased inputs)
- Responses to inputs are decreased
- Flexibility of land management is decreased
- Risk is increased
- Labour, and technical and financial resources are diverted to reclamation

Consequences of Land Degradation for the People

- Landlessness is increased;
- Food supplies are reduced or less reliable;
- Labour requirements are increased; and
- Incomes are decreased.

However, there are other possible consequences of land degradation, e.g. reduced vegetation cover to the soil, reduced return of organic matter, and less biological activity in the soil; increased pollution from increased use of agrochemicals; and migration of young people elsewhere to search for employment opportunities. While referring to deforestation, Peteru (1993:45)²³ reported that: *“Its effects include: top-soil loss; watershed destruction with subsequent water shortages; drinking water contamination; biodiversity loss; coastal flood damage during the rainy season; marine pollution; and cultural impoverishment”*.

Tackling land degradation and unsustainable land use

There are two major objectives in tackling land degradation and unsustainable land use. The first is to regenerate degraded land; and, the second objective is to promote the use of sustainable land management practices.

Land-use policy and land use section

Farmers and other land users and stakeholders sometimes place emphasis on production and output and neglect issues relating to sustainability of land use. For this reason, Samoa’s development of its Land-Use Policy and its intention to establish a Land Use section are steps in the right direction.

National task force

In addition to the above steps, it is suggested that Samoa consider the establishment of a task force at the national level. Such a task force may include staff of appropriate government departments (e.g., DLSE, Agriculture, Forestry, PWD, etc.), NGO representatives and traditional representatives. Initially this task force may act as a watchdog - monitoring the sustainability of land use practices and keeping the government and public informed. Later on, particularly when adequate funding is available, the task force may take a more active role in the implementation of the land-use policy and in identifying and tackling land degradation and unsustainable land use in Samoa.

Causes versus symptoms of problems

In many cases, land degradation and unsustainable land use are simply symptoms of the real or underlying problems which may be population increase, poverty, attitude, etc. (see Section III). In order to successfully tackle land degradation and unsustainable land use, their underlying causes should be understood and addressed. Friedman (2000)²⁴ and others have reported how environmental projects around the world have failed because they did not consider the underlying causes of the problems.

Publications

DLSE and SPREP have a lot of resources regarding the Samoan environment including its land resources (e.g., DLSE, 1994²⁵; Peteru, 1993²³). In addition, others who have discussed ways of tackling the problems of unsustainable land use and land degradation include Bouma (1997)²⁶, FAO (1993a²⁷; 1993b²⁸; 1995²⁹; 1999⁹; 2000³⁰), Howlett (1996a²; 1996b³¹), IBSRAM (1996)³², Lemalu and Baisyet (1996)³³, NRC (1993)³⁴, Pretty (1995)³⁵ and others. It is essential that those interested in tackling land degradation and unsustainable land use in Samoa should first go through these published literature. Some are produced specifically for the Samoan situation, e.g. Peteru (1993)²³ and GOS (1994)³⁶. However, it is important that frameworks developed outside Samoa (e.g. the FAO/UNEP 1995¹, 1997³⁷, 1999¹⁰ framework) have to be adjusted or modified to suit the local situation. For this reason, it is important to involve local persons in management or advisory positions in projects involved in tackling land degradation and unsustainable land use.

Bodies and organisations

In Samoa, a number of organizations and government departments have been or could be involved in tackling the problems of land degradation and unsustainable land use. Some could play a more significant role while others have yet to be involved. Table 5 shows some of the bodies or organizations that have been and could be further involved in tackling the problems of land degradation and unsustainable land use in Samoa. It is important that these bodies and organizations, together with representatives of farmers and other stakeholders be identified and involved in the efforts to tackle land degradation and unsustainable land use.

Body/Organization*	Selected (Potential) Activities
DLSE	Field Projects; Publications; Environmental Forums
Agriculture Department	Research; extension; in-service training for staff; publications
Forestry Division	Extension work in agroforestry and watershed management
Education Department	Primary & secondary schools; Teachers College; Agriculture Projects
NUS, USP Alafua, FAO	Teaching; research; publication; training workshops Technical Assistance
Embassies; UNDP; UN Theme Group(s) IBSRAM	Funding Research; workshops for farmers, government and NGO staff; extension; publications
METI; OLSSI; WIB	Research, extension; training/workshops for farmers
SPC; SPREP	Publication; field projects
Forum Secretariat	Coordination

Table 5: Some of the Bodies (That Could Be) Involved in Tackling Land Degradation and Unsustainable Land Use in Samoa and their (Possible) Contribution

*Other bodies include Faasao Savaii, Health Department, SLC, STEC, private sector and traditional representatives and other bodies identified in Peteru (1993)²³

Geographical information system and remote sensing (GIS&RS)

GIS and RS are extremely powerful tools that could play a significant role in tackling land degradation and unsustainable land use. There will be an increased need for people trained in these areas. In addition there is a need to coordinate the activities of those currently having access to GIS technology. Further details regarding the current situation and future needs regarding GIS/RS have been compiled by Crawley (2000)³⁸.

Technical solutions to major problems

It is most likely that technical solutions to the problems of land degradation and unsustainable land use are already known, e.g., agroforestry, mulching, cover crop, crop rotation with legumes, etc. For this reason, it is important that the huge body of literature in this field be thoroughly reviewed so that workers in Samoa do not end up spending scarce resources trying to “re-invent the wheel”. The challenge is to identify and fine-tune technical solutions that are appropriate for the Samoan situation in terms of the country’s biophysical as well as socioeconomic and cultural makeup. For this reason it is important to engage social scientists in projects and activities that try to tackle the problems of land degradation and unsustainable land use, as has been pointed out by Lawrence *et al.* (2001)³⁹ and others.

Section III of this paper shows that the three main types of land degradation problems in Samoa are (a) deforestation, (b) fertility decline/ nutrient depletion; and (c) soil erosion due to rainwater. With our limited resources, it may be wise to focus our activities on tackling these three major problems. Possible activities that we may consider are given below.

Deforestation: According to Peteru (1993)²³, there are two causes of deforestation in Samoa apart from natural degradation hazards or “acts of God”. These two causes of deforestation are agricultural clearing or agrodeforestation and, only on Savaii, commercial logging. To tackle the problem of agrodeforestation, the following activities could be considered:

- Practice agroforestry;
- Practice corridor clearing (where corridors or strips of forests rather than the whole forests are cleared);
- Increase the intensity and/or effectiveness of current farming/cropping practices to reduce the need for more clearing;
- Increase public awareness of this problem; and
- Put in laws and regulations at the national, sub-national and local levels.

Fertility Decline/ Nutrient Depletion: To tackle this problem the following activities could be considered:

- Use of organic (composts, prunnings, farmyard manure, etc.) and inorganic inputs;
- Intensive fallowing (which includes application of lime, planting of legumes, etc. on fallow lands - to quicken rejuvenation of degraded lands);
- Practice agroforestry, particularly with the use of nitrogen-fixing trees such as *Erythrina* species (dadap or *gatae*), etc;
- Crop rotation using nitrogen-fixing plants (such as peanuts etc) in the rotation; and
- Liming where appropriate (i.e., especially where pH<5.5).

Soil Erosion: To tackle this problem, the following activities could be considered:

- Practice agroforestry; consider planting of trees and shrubs along contours;
- Practice bench terracing where appropriate;
- Plant grassy strips;
- Contour ploughing and/or planting;
- Conservation (/minimum/zero) tillage; and
- Consider introducing vetiver grass if not found locally.

Vetiver has been used very effectively to control erosion in many countries in the world - including some in the Pacific. According to NRC (1993)³⁴, the vetiver grass grows in Samoa but this has to be confirmed as the authors have not seen any vetiver grass growing in the country. If not growing locally, it can be safely introduced because the plant does not produce viable seeds and its growth habit is always localized.

Free trade and globalization

Numerous authors (e.g. Buttel 2001⁴⁰) have warned that the globalization processes need to be taken seriously - particularly with regard to their possible negative effect on the environment. And, as pointed out by Friedman (2000)²⁴, individual countries should have their “internal wiring” (e.g. Land-Use Policy, etc.) properly in place before plugging in directly into this new powerful system of globalization, otherwise the result will be a meltdown leading to poverty rather than growth and development leading to wealth and prosperity.

Conclusions

From the above presentation, the following summaries, conclusions and recommendations can be made:

- Land degradation and unsustainable land use is a serious problem worldwide, in the Pacific and also in Samoa;
- The most serious types of land degradation in Samoa include (a) deforestation, (b) fertility decline/ nutrient depletion, and (c) soil erosion by rainwater.
- In order to successfully tackle land degradation and unsustainable land use in Samoa, it is important to understand the underlying causes and to go through the large volume of literature that has been produced in this area.
- There are a number of organizations and bodies (national, regional and international) in Samoa that are involved in tackling the problems of land degradation and unsustainable land use in Samoa and there is a need to coordinate the activities of these different bodies.
- FAO, in collaboration with UNEP, has come up with a framework for land resources development and management (FAO/UNEP 1995¹; 1997³⁷; 1999¹⁰). This and other frameworks have been put together by experts at a great expense and could be considered, with appropriate modifications, for the Samoan situation.
- It is recommended that Samoa consider the establishment of a national task force - initially to act as a watchdog monitoring land degradation and land-use sustainability in the agriculture sector, but the task force may later play an important role in the implementation of the country's land-use policy, particularly when adequate funding is available.

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Samoa's development paradox: diversification away from the agriculture-based economy

*Tuaopepe F.S. Wendt**

Introduction

This paper highlights several key issues that are fundamental to any review of the sustainable development of Samoa's natural resources. In this context, the following distinctions need to be made.

Natural Resources and National Resources are synonymous. Both refer to actual and potential forms of wealth supplied by nature to Samoa, such as land, plants, forests, animals, sea and marine life, water, people, and energy. (Websters New World Dictionary, 1998:903). These are the materials or conditions occurring in nature (in Samoa) capable of being exploited. (Oxford Dictionary, 1998).

Collectively, these Natural/ National Resources give rise to the country's National Wealth, the value, the possession, and the ownership of which constitutes Samoa's national assets. The focus of this Forum is "the sustainable development of these same natural resources," making it necessary to pose a couple of important questions.

- (1) What does the sustainable development of Samoa's natural resources mean in action based terms?
- (2) How has Samoa fared in the development of its natural resources to date?

The agriculture-based economy

Samoa's agriculture-based economy was first described in the early seventies by development experts as the "coconut-based economy", because coconuts, cocoa and bananas, made up over 90% of all exports, provided the largest source of employment, and the principal foreign exchange earner for the country. However, throughout the seventies, the state of this coconut-based economy was on the decline, reaching a critical state in the early eighties. This forced the Government of the day (1983), to institute stringent measures in a stabilization programme.

By 1986, the results of this programme was evident in the curtailment of inflation (to some 2.7%); the national budget was in surplus; the arrears of government debt was paid off and debt servicing was substantially reduced; international reserves rose by more than 69%, and a growth rate of some 2.0% was achieved. But the key question still remained to be answered, **thus the Paradox:**

"Why has national development faltered so far below the desired expectations? Despite the country's favorable endowment of natural resources, its people and its lands, the generous amounts of aid monies as well as the huge remittances it received from Samoans living abroad, why has it been so difficult to achieve national development targets?"

Experts and policy engineers concluded that it was due to the limited potential and the inherent instability of the "agriculture/ coconut-based" economy. It was limited because

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production and productivity, or wealth creation, cannot be assumed to increase continually in money earning terms. But contrary to this view, it must be reiterated that this coconut-based economy was none other than the country's agriculture- village based subsistence economy, which at the time possessed very clearly defined characteristics, most of which are still very relevant today:

- (a) It controls up to 80% of all the country's natural resources
- (b) It accounts for over 50% of the country's GDP.
- (c) It receives and controls 80% and more of all the money remittances that come into the country. This amounts to upwards of SAT\$100 million tala annually. It is the number one revenue earner for the government budget.
- (d) Because it controls over 70% of all agricultural production, inclusive of crops, forestry, Livestock, fisheries, in the country, it therefore controls food production for all internal and home needs for over two thirds of all Samoans. This is the sector that provides the basic food requirements of this country. In effect, this coconut-based economy controls and guarantees the nation's food security, and its very survival.
- (e) Since it constitutes 70% and more of the country's population, this same sector has the greatest political influence.

The choice of development alternatives

It is against this background, with the overwhelming dominance of this so-called coconut based economy, that makes the search for sustained economic growth and stability so great a challenge. The policy engineers have opted for "Diversification and increased private sector participation, and corporatization with greater foreign investment." Diversification is clearly interpreted here as "moving away from agriculture into such things as tourism, light industry and manufacturing, to environment resource management and regulatory control of the use of the country's natural resources."

In some quarters, diversification is interpreted as crop diversification – shifting away from the traditional crops of coconut, cocoa, taro and bananas, to new crops (Misa 1995:2) or that diversification is simply to change traditional village producers from low production units to high productivity, profit – oriented commercial producers (Leonard & Fong 1995: 6-10)

But whatever the interpretation, diversification is still confronted with the same constraints, whose root cause emanates from the same islandness of Samoa – its small size, small population, isolation and long travel distance from available markets, both for manufacturing products and the source of the tourists.

By the early nineties, the Samoan government instituted a reform programme as the logical follow up to the stabilization programmes of the mid eighties. As summed up by Kolone Vaai: "Samoa became the exception among the Pacific island states: Positive growth has been posted when others have experienced negative results."

Driving the optimistic outlook, rare in the South Pacific, has been a reform policy that has embraced getting the private sector underway by removing constraints to its development. Reforms have been wide ranging, covering the financial sector, privatization and corporatisation, trade reform, broadening the tax base, government budgetary process and public sector institutional reform (Vaai 2000:1).

Samoa moved from the nineties into the new millennium, with the choice and selection of development alternatives continuing to be challenged by the question. "How do you convert

this economic stability into sustained economic growth with continued stability?“ Kolone Vaai duly records this concern, noting that from the peak of 9.0% growth during 1995, there has been continuing decline to 1.1% during 1998; while in external trade and BOP, total exports amounted to a mere SAT\$ 50.9 million tala for 1998, compared to total imports of SAT\$ 285.7 million tala for the same year. This worsening in the trade deficit is attributed largely to the continuing poor production levels from the agriculture sector (Vaai 2000:3).

In spite of the significant improvement in the national economy, it is obvious that reforms alone cannot guarantee continued growth and stability. While it is necessary to continue the forward progress of the reform programme, this progress must be accompanied with significant improvements in agricultural production. Sandy Cuthbertson of the Australian National Center for Development Studies (2000: 13) warns that “ having come this far, Samoa must now tackle the difficult problems that remain outstanding on the home front – the most significant being agriculture.”

The logical conclusion is clear, diversification alone is not the solution. The mere change away from agriculture to other potential growth areas does not negate the fact that all that Samoa has to effect its development are its natural resources. Therefore, in the context of this perception, the more correct challenge facing the reform policies is thus phrased: **You cannot achieve sustained economic growth and continued stability without acknowledging that the coconut – based economy is the priority national resource, the national asset in which the nations food security and survival rests.** As one wise Samoan matai said: “ **Aua e te u ina le aao e tausia le fofoga taumafa ole atunu’u . Don’t bite the hand that feeds the mouth of the nation.**”

National wealth creation

This writer puts forth the thesis the “ the sustainable development of Samoa’s natural resources must first and foremost, be predicted on the principles of **productivity increase and the creation of national wealth (tamaoiga ole atunu’u)**. That sustainability, whether fiat or ethic, is not just the sustainable maintenance and or management of the country’s natural resources by regulation; nor the perceived improved environmental controls, some of which will impose limits on growth and productivity (Jones 2000:169). This perception of development as wealth creation from productive work is the prevailing view of traditional Samoan society, as one village elder expressed below: E iai le toeaina faifeau o lo matou nu’u. O so’o se taimi lava ma te o ai i lotu a le Ekalesia, fai mai le toeaina, "Fui aisea le mea e le faatele ai a tatou tupe?" Ou fai atu "o le a le uiga o lau tala?" Fai mai a ia, "Se aumai sa tatou masini tupe fa’atele ; aumai ni mea e fai ai tupe" Ona ou fai atu lea iai. "E sa’o a oe. Ae ete iloa o au na ou aoga i mea tau tupe. Sa ou aoga i sina taimi puupuu lava. O le talaaga ole tupe, o se tagata e tele lona galue, e tele foi ana tupe. O so’o se tagata e galue le eleele ma fai ana mea, e tele ana tupe."

Ua ou fai atua leni faamatalaga aua ua tele lava tupe a tatou, a ua le mafia ona faatino. A ou vaai nei ile popo ua fau faapea, ua matua tele lava, ua le iloa se mea e ave iai, e mafia ona ou aumai e tuu ile faletupe, aua o le la ua laulau ai lava, ma uma ai lava lena vaega a tupe. E faapena i koko ma isi vaega. E faapena i ava o la e iai, o au tupe ua le mafia.

O le fesili, o ai na te fa’aliliuina tupe nei i ni tupe? Aua e le mafai ona aumai popo, ona fau lea i talaane o fale o tagata ma tuu ai, e le mafai. A la’u la’u le tumu leni mea, ona ola ai lea o popo, ae na ala ona fai e le papalagi le tupe e faaitiiti ai, ma faaoga ai le poto o tama fanau

ale atunuu, ma le poto o e faia le Malo ina ia mafia ona fa'aitiitia ai le mea a ave i ai lau tupe e teu i le faletupe.

According to this Samoan matai, the goal of developing the land is to obtain increase in the enterprise being undertaken. Then to exchange the product of that enterprise for money which you then put into the bank. Therefore, contrary to established economic belief that the need is to change Samoan society from the traditional into the more dynamic monetary economic, it is argued that Samoans have always viewed development and progress as the acquisition of material goods. That the ultimate goal in the development of his villages' natural resources is exactly the conclusion reached by professor Crocombe when he stated, ' Development (for Pacific countries) is to achieve the greater good, which is access to material goods, welfare, and the amenities of modern life, without the sacrifice of traditional values and institutions that provide material security' (Crocombe, 2000: 38).

Surely this is the proven method for the sustainable development of the country's natural resources.

There is every indication that the Samoa of today is a money – based traditional society, with money, cash income, wages, savings, remittances (take – home pay), investment, credit, and profit are now all very much an integral part of the Samoan ethos. Maybe the coconut – based economy was always money based, and material possessions were the items of exchange, the mode of buying, selling, paying, and rewarding relationships. In this assessment of money, markets, moralities and mentalities in traditional societies, Marshall Sahlins concluded that in certain conditions, money could increase kinship bonds, thereby “develop “ the so – called traditional societies in the sense of obtaining more and better of what they consider to be the good things (Sahlins, 2000:52).

Clearly, Samoan society is well versed and integrated into the money economy, ready to develop their natural resources, but provided their work will be fairly rewarded. Samoans will invest their own moneys (including remittances) when they are certain there is a good return on their investment. When the village matai therefore says, “Afai e 200,000 a'u popo, ona ave lea na o sina tamai tupe laititi, po ua maua sina 10,000 tala e teu ile fale tupe”, he knows very clearly what the returns on that i.e. 200,000 coconuts makes 40 tonnes of copra, which at \$800 tala per tonne, returns \$32,000 tala. But he calculates to get \$10,000, which is a price of \$250 tala per tonne of copra. Even at that much lower price, \$10,000 tala is still a very large amount of money to put into the bank.” This is the essence of production and wealth creation from our natural resources. But to attain this goal, the political will to develop must accept that the sustainable development of our natural resources is a national necessity, approached and actioned with the same determination and commitment as today manifested in the economic reforms now in operation.

To that end, it is accepted that diversification into other economic activities should be a part of overall policy, but it must not be at the neglect of agriculture, since some policies are difficult to achieve in practical terms. For instance: (1) Economic growth through diversification and greater foreign investment is not compatible with the goal of increased local food production; (2) with the reduction in tariffs imported foods are much cheaper and now available in greater abundance, thereby giving a clear message – the import business is more profitable, while local production is not; and (3) the proposition that traditional producers (i.e. primarily subsistence production) must be changed to commercial producers (i.e. production mainly for exports) in order to effect greater production levels, is not correct.

Production levels are increased markedly when the rewards to the producer are available – in other words, guaranteed market outlets and fair commodity prices. And this condition does not, nor have any need to differentiate between traditional and commercial producers, an argument now widely mooted to justify more alienation of Samoan customary owned lands.

One of the stated intentions of the diversification policy is to create more employment opportunities within Samoa, so that there are more jobs for the unemployed and the underemployed, as well, as deterring the large migration of Samoans abroad. Unfortunately, the issue is not just one of the job creation. After more than a century of western influence, all Samoans today, whether rural, urban, subsistent or commercial, see their horizons for living as including the wider environments of New Zealand, and the United States. Migration has its roots very much in the Samoans perception of the good life and is money/ wealth motivated – it is money oriented. In their desire to maximize real cash incomes, especially when the earnings from the family lands are pitiful, Samoans are simply behaving rationally and sensibly in seeking more profitable occupations elsewhere, in Apia and overseas.

The earned incomes are take home pay, just as wages earners anywhere in the world take their wages home. So when sons, daughters, families, send their wages to Samoa, it is fallacy to call these remittances and classify them as a ‘constraint to production,’ as so believed by development economists. What is necessary is to acknowledge that Samoan society, with the failure of the agriculture sector to provide decent monetary prices and earnings, that that same society did take the initiative themselves and seek for and make better incomes elsewhere. The natural resources held by these very Samoans could never then, now and tomorrow, ever return them the one hundred million tala they annually produce in the form of remittances for this country. The challenge then becomes very obvious, 'Is there a way whereby Samoans can be attracted to apply that same ingenuity and entrepreneurship to the development of their own natural resources here at home?'

Effective Development, the National Asset Model.

In 1996, Government released the new policy direction titled "A new Partnership" which designated the private sector to be the principal partner and the engine for the country's economic growth. (Government of Samoa: 1996). This was followed in 1998 with the second directive “ Strengthening the Partnership”, again reinforcing the principle that sustained growth was dependent on a healthy and competitive private sector. The other strategic areas identified are agriculture, education, health, and public sector reform. (Government of Samoa: 1998).

But it is extremely important to reiterate that the agriculture sector is by far the biggest private sector of all. Its dominance is confirmed by its control of some 80% of the country's natural resources: over 50% of GDP; contributes some \$100 million tala annually by way of remittances; engages some 80% of the population; and produces over 70% of all agricultural food production. There is no doubt this is Samoa's biggest and most important private business, ranking even ahead of our national airline business. **It is our principal national asset.** It assures national food security. Rightfully, by whatever measure so determined, it is entitled to national development priority. No doubt, this is the very basis for the latest policy initiative “Partnerships for Prosperous Society,” the SES for 2000 to 2002, to restate emphatically that ‘Agriculture and Fisheries’ are backbone of the village (national) economy. (Government of Samoa: 2000).

Samoans own and control the greatest portion (some 80%) of all natural/national resources in the country. As owners of these resources, Samoans want to develop them to obtain productivity increases for food and commercial reasons- for cash income and for socio-cultural needs. The extent and variations to which these natural resources can be exploited are already known collectively as the agricultural sector, inclusive of crops, livestock, forestry, and fisheries. The technologies and methods for cultivation, rising, management, the harvest, processing and the marketing of the products of these resources, are known to, available to, accessible to all Samoans who own them.

But what remains as the critical factor that will make Samoans make effective use of these resources? The answer - "It is increased productivity, with assured market outlets wherein to sell/give/exchange their products for real value, real money, fair prices, and more wealth. And this is the exact area where planners, the policy engineers, the experts, the decision makers, the politicians, and all, of opinion, and us who have a view or want to express come through with differing perceptions, theories, assumptions, and conclusions. Thus we have the range-cash crop development and diversification; traditional food production; more intensified fishing; encourage greater production in agriculture; enhancing of farmers incomes, etc. But after three decades of development activity, the one area of agreement is to acknowledge the failure and stagnation of the agriculture sector. This admission of our own inadequate perceptions and confusions is well described by Philip Muller:

I was closely associated with efforts to improve the general well – being of our villages, by a variety of projects and programmes in agriculture, forestry, and fisheries. There were ever present efforts to rehabilitate the copra, cocoa, and banana industries, which, for whatever reason, were directed towards harnessing the efforts of village smallholders. Very soon, a mentality of providing incentives arose, where support was provided in bush clearing, planting, weeding, fertilizing, spraying, and whatever else was needed. Access roads, transport and centralized produce marketing soon followed. In fact, it almost seemed that the incentives were all set in place to prevent any sort of entrepreneurship from developing. Our planning had forgotten why villagers expended effort and if it was for money, what that money was going to be used for?

Another early lesson I have learnt was that we, the educated privileged were almost systematically desensitized to the needs of our people. Planners often neglected the needs of stakeholders and at their own peril.

We often enunciated noble goals such as job creation, foreign exchange earnings, improved balance of payments, and even more equitable distribution or redistribution of wealth and involvement in development. We should have been attempting to understand motivating factors such as family dignity, the pressure of politics, the community, the church, Education, and events such as Children's Sunday, and other matters of relevance to the individual and extended family. Everything was coming from a faceless government that was progressively becoming distressed by its lack of success, and being carried out by officials who were hard pressed and under – resourced. Yet all that people wanted to know was, what to produce, how to produce more, and how to get the best from the markets. (Muller, 2000).

In not as many words, our traditional matai producer/commercial farmer, Mimio, presented the very same message in the national Parliament when he stated: "The story of money is the picture of power. Every person with lots of knowledge has lots of money. Every person who

works hard has lots of money. Every person who cultivates the land and develops many things will make lots of money. I am telling you this because we have lots of money. But we are not generating it, when I see coconuts piled up everywhere, and we have nowhere to take them to turn them into money to put in the bank. Then they go to waste and we lose all that money. It is the same with cocoa, likewise the kava in the fields. It is your money you are not able to receive. The question is - Who will change this money to be into real money? Because the people cannot bring the coconuts and pile them by their houses, and keep them there. That's not done. Because if you fill up the space, the coconuts will start to grow And the reason why the palagi made the money is to make things smaller, so the sons of the country will use their brains, together with the knowledge of these persons running the government. To make the coconuts into money you save in the bank."

The current policy directive, the national Statement for Economic Strategy (SES), 2000-2001 titled "Partnerships for a Prosperous society, " has confirmed that the country's natural resources are its principal assets. It has accepted that the sustainable development of these national assets, in particular those collectively termed the agricultural sector, is a national necessity. Agriculture is a national asset the biggest private sector economic activity, a critical component in the engine of economic growth, desperate for intensive investment from its local owners and stakeholders. **A national asset has Government as its ultimate stakeholder because of the prime national interest of national survival.**

It is just inconceivable to think that Samoa will survive solely on food importation, no matter how economically viable such a policy might become. At the same time, the prime requisite for continued economic growth and stability is for increased exports – and this can only come the agriculture sector. In fact it is true to state that for Samoa to survive and benefit from joining the World Trade Organisation (WTO) there needs to be significant increase in agricultural production for export.

It is the contention here in this presentation that the current existing "stagnant" state of the agriculture sector is rapidly going from a national dilemma to becoming a national disaster. Its continuing downward decline will soon reach a point of no return, when its owners * – and that's 70% of the population who hold 80% of all natural resources – will have evolved into mere landlords with rights to vast areas, wherein the only sustainable development is the return to bush and natural growth. Over the past two decades some 40,000 plus acres of the most productive lands, producing well over one third of all copra, two thirds of all cocoa and coffee exports, have been taken out of production, because its owners (WSTEC and SLC) decided agriculture was not financially viable. It was more profitable to go into the land trade business. Their behavior thus, is no – more – no – less rational and money sensible than the village producer. In this same vein, we will be hard pressed to find one acre of Government land today, from amongst the total 18% of all the country's land resources held by Government that is producing for exports.

Conclusion

The sustainable development of Samoa's natural resources is a fine ideal. But first and foremost for national survival, production for food security and export must take precedence. Therefore the goal of productivity increase must become the determinant principle in all development strategy for the country's agricultural resources. In the national interest, the time is at hand when the ultimate responsibility and take the required actions. The situation with agriculture is not very different from the recent state of the national airline, wherein Government, as the ultimate stakeholder, intervened to ensure the continued viability,

survival and sustainability of Polynesian Airline, in the nations interest. The price tag this year alone is over 30million tala, just to keep the airline flying until international economic conditions improve to where it will pay its own way. In this instance Samoa is not alone – many other countries are doing likewise with their national airlines.

The coconut industry like the airline industry (Polynesian) is a national asset. In the policy statement detailed in ‘ Partnership for a Prosperous Society 2000-2001,’ the pronounced aim is to enhance farmers’ incomes and sustain coconut production through cash crop development, traditional food production, improved research, extension and market information. This is all very nice on paper. But clearly, more convincing action should be taken, to confirm to producers that government duly recognizes the industry to be a national asset, and is committed to it by guaranteeing a permanent market outlet with fair and just prices. To reflect again on the economic growth and stability impact of this industry, the following is to be noted:

The policy confirms there are about 80,000 hectares (197,000 acres) of coconuts in Samoa, (Aveau & Pouono, 1999). This equates to some 49,500 tonnes of copra annually. Using the conservative figure of 30,000 tonnes, this will produce 18,000 tonnes of coconut oil with a potential value of US\$9.0 million dollars (US \$500 per tonne of oil), or some SAT\$ 29.0 million tala annually. A purchase price for copra to the farmer of SAT \$600 per ton (SAT\$26 for a 100lb bag), requires SAT\$18 million tala fro the year, which is SAT\$1.5 million tala per month. In effect, a revolving fund of \$1.5 million tala is all that is needed each month to guarantee the price of \$26 tala for one bag of copra.

The sale of the copra and/ or the oil each month will ensure that the fund payments for copra will be recovered. Without going into the costing ramifications of the industry at this discussion, the principle being put forward here is that “Samoan owners of the resources will themselves invest their time, their effort, and their money, in the continued development of their coconuts and coconut plantations, when they are assured of a permanent market with fair and just prices for the coconuts and copra.” It is important also to reiterate the following key features of the industry in Samoa. The industry is run primarily by women and children. One bag of 100 pounds of copra requires 216 coconuts, which are readily collected during the week and made into copra by sun – drying. So the price of \$26 tala for the one bag represents what may be the only source of cash income each week for the thousands of families who make up the 80% of the country’s population associated with agriculture.

For its investment as the ultimate stakeholder, Government gets guaranteed production from 36% of its land resources (some 197,600 acres) now under coconuts. This production potential ranges anywhere from 30,000 tonnes to 49,000 tonnes of copra annually, for which only an export market exists. During the past five years, production has ranged from a few tonnes to barely 12,000 tonnes in 1996. Clearly, the existing situation raises questions as to the interpretation of the ‘concept of the sustainable development of Samoa’s natural resources?’ What acreage constitutes sustainable development? What production levels constitute sustainable development? If the measures are not specific levels, then what other measures are to be used – declining, stagnation, increasing, non- productive, individual and private rights for people not to use their lands or to use them as they feel inclined?

Naturally, if productivity is the determining factor, then sustainable development strategy must state how these are to be achieved, maintained, sustained, and for how long? If guaranteed markets and fair prices are the requisite factors to ensure use their resources –

their lands, their labour, and their money – to attain sustainable development, then the government is the only stakeholder so able and must do that. It is a matter of national interest, national survival. Every other country does the same thing, whenever they determine the situation is undermining the national well-being. Recently, the United States House of Representative passed a multi- billion dollar farm prices bill, stating it was necessary to keep American farmers afloat in a global economy where commodity prices have plunged. In essence, the US Government is guaranteeing the markets and fair prices to farmers for those crop commodities considered critical to the country’s economic growth and stability. This of course is part and parcel of the overall national strategy to sustain and maintain agricultural productivity at clearly identified set levels (targets) predetermined as necessary to the overall nation’s economic strength. In like manner, countries like Australia, New Zealand, Japan, and the European Union Members continue to put priority support schemes into their agricultural sector. **There is every valid reason on hand for Samoa to do likewise with its own agriculture/ coconut – based industry.**

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Planning for coastal hazards in Samoa

*Tu'u'u Ieti Taulealo & Tagaloa Bismarck Crawley**

Introduction

Samoa is comprised of two relatively large islands, Upolu and Savaii, two smaller inhabited islands, Manono and Apolima plus a number of smaller uninhabited offshore islands (see Figure 1). The islands stretch over a distance of about 200 kilometres covering a total land area of about 2900 square kilometres and an exclusive marine economic zone of approximately 130,000 square kilometres. Total island perimeter is 573 kilometres.

The climate is generally hot and wet with a distinct dry season (April to November) and wet season (December to March). Moisture-bearing south-easterly trade winds cause rain shadow areas in the north west parts of the main islands, as well the south east side of Savaii. Annual rainfall is about 3,000 millimetres (varying from 2,500 in the rain shadow areas to over 6,000 in the Savaii highlands), with most of the precipitation occurring in the wet season. Heavy rains in the higher inland regions have often caused severe flooding in the lower and coastal areas.

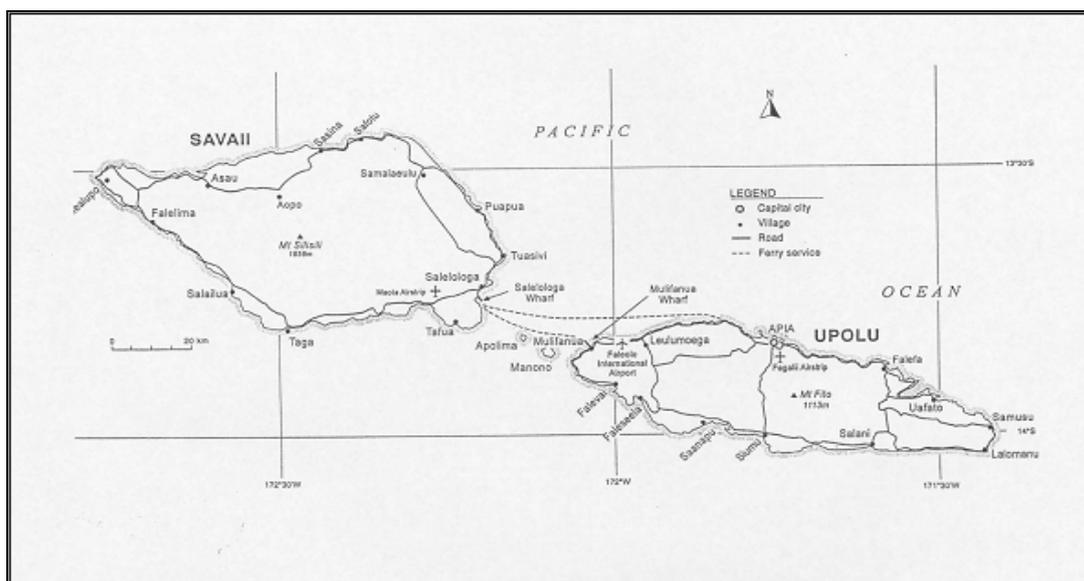


Figure 1: Samoa Islands

As the country lies between 13° 25' and 14° 05' south of the equator and between 171° 23' and 172° 48' west longitudes it is strongly affected by tropical cyclones, created by storm patterns in the southern Pacific. These originate from three main sources during the wet season; tropical easterlies cause storms from the south-east, cold fronts from the Australian system cause cold air flows and rain from the south-west; and storms from the south-west Pacific generate cyclones at the contact zones of the easterlies and westerlies. Generally most

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cyclones which have affected Samoa in the past moved in from the north but occasionally from the east or west and were usually accompanied by extreme heavy rain and widespread flooding. The country was last hit by tropical cyclones Ofa and Val in 1990 and 1991 respectively, causing widespread damage to agriculture and infrastructure facilities particularly along the coast.

Samoa's vulnerability to natural hazards in coastal areas is largely due to its location in the mid-Pacific where it is subject to high rainfall causing floods and prone to tropical cyclones. Its small islands, surrounded by sea, are directly affected by storm waters. Most of the population as well as the bulk of the social and economic infrastructure are concentrated near the sea and are also greatly affected by coastal hazards.

The situation is exacerbated by climate change due to global warming with current knowledge suggesting strong links between climate change and the severity of coastal hazards. The third assessment report¹ of the Intergovernmental Panel on Climate Change, for instance, documents a growing body of evidence - increase in global average temperature; decrease in snow cover and ice extent and a rise in global average sea level - that supports increased global warming as a result of human activities. This paper explores the current efforts to plan for coastal hazards in Samoa through a project implemented by the Department of Lands, Surveys and Environment (DLSE). The project objectives were to identify the various coastal hazard zones, formulate policies for sustainable coastal management and develop plans of appropriate solutions to address the risks from natural hazards.

Project

The Infrastructure Asset Management Project (IAMP) was financed by the World Bank and the Government of Samoa. Its main goal was to improve the management of public infrastructure assets including airport facilities (under the Samoa Airport Authority) and roads and bridges (under the Public Works department). But to deal with these assets, located mainly along in the coast, it was important to first understand the natural hazards that were inherent in the coastal areas and how they impacted on those facilities. This was the focus of the DLSE component of the IAMP - to develop the tools for coastal asset management which would apply to both public and private infrastructure.

As shown in Figure 2, the first task for the DLSE component was the production of new aerial photographs for the whole country. These became the base maps for the next task of coastal hazard zone mapping. A national coastal management policy was also formulated. The hazard maps and policy were then applied in the development of coastal management plans. During the hazard maps, policy and planning stages; wide consultation was conducted amongst the affected stakeholders. The final stage of plan implementation was on-going with the approved plans used to guide the government's capital works programme as well relevant private sector development in affected areas.

Coastal hazard zone mapping

This was a highly technical exercise² involving both theoretical and empirical analysis to establish the different coastal hazard zones (CHZ) throughout the whole country. As shown in Figure 3 the first task for hazard zone mapping was the development of the hazard database which compiled all the data from field surveys and previous aerial maps. Amongst the most interesting data collected were the recollections of villagers on details of previous hazard events and their impacts. The hazard database was directly linked to the DLSE geographic information system (GIS). Step two involved the development of a system of

costal sensitivity index (GSI) to hazards, from which the four hazards zones were derived, namely areas sensitive to coastal hazards (ASCH), coastal landslip hazard zones (CLHZ), coastal flood hazard zones (CFHZ) and coastal erosion hazard zones (CEHZ).

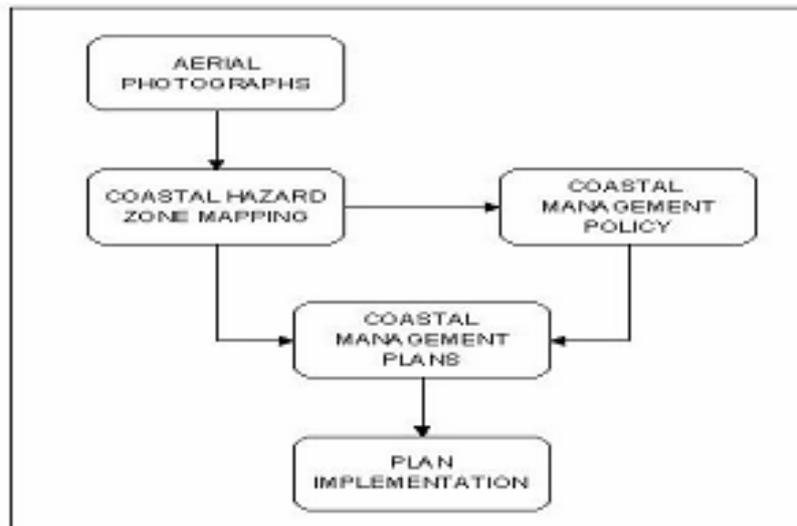


Figure 2: Framework for the DLSE component of IAMP

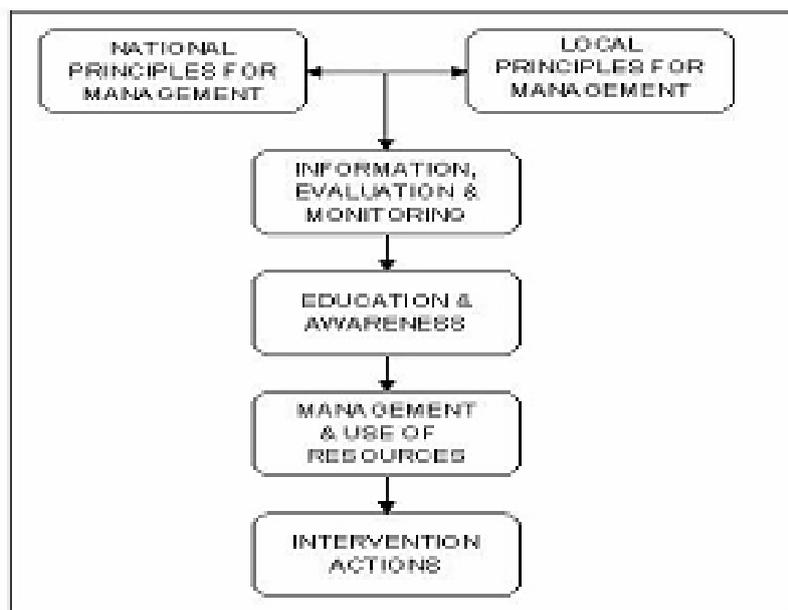


Figure 3: Framework for coastal hazard mapping

The primary objective of CHZ mapping was to identify the areas of coastal hinterland that were, or likely to be adversely affected by natural coastal hazards over an assessment period of up to 100 years. Previous CHZ studies had found that a hazard assessment period of 100 years was more appropriate than shorter periods. In Samoa this is particularly relevant to accommodate both ongoing family ownership of coastal land over many generations and the potential long-term effects of climate change from an enhanced greenhouse effect³ up to the year 2100.

CSI

Eight factors were used in the assessment of CSI: 1) Elevation - measured in the field; 2) Storm wave runup - assessed from field surveys; 3) Gradient - determined in the field and from old maps; 4) Tsunamis - assessed from available overseas data; 5) Lithology - assessed in the field and from past geological surveys; 6) Natural landform - determined both in the field and from old maps; 7) Long-term shoreline trend - determined from field surveys and old records; and 8) Short-term shoreline fluctuation - estimated from field surveys. So to derive a CSI for any station, each of the eight variables was ranked into 5 sensitivity classes (1 to 5) and the rankings summed up to give the CSI, ranging from a minimum of 8 (very low) to a maximum of 40 (very high)

ASCH

These were the coastlines where there was inadequate data to assess their sensitivity to hazards. They had major physical limitations to coastal access due to dense forest and undergrowth with an uneven ground surface. It was possible, however, to cover sufficient strips of the coastline to provide adequate data for assessment. The ASCH covered about 110 kilometres 19 per cent of the total coastline (see Annex 1).

CLHZ

These areas covered 92 kilometres or 16 per cent of the total coastline (see Annex 2). Landslips occurred where rock bedding failed or where the waves undermined old formations. The entire seaward slopes of the smaller islands were affected.

CFHZ

These areas included parts of the coastal hinterland that were or were likely to be subject to flooding either by sea or from freshwater runoff during heavy rains. The sensitivity of low-lying coastal hinterland to flooding was largely a function of the elevations of the storm or tsunami wave runups on the coast and the crest of the beach. In total CFHZ covered 373 kilometres or 65 per cent of the coastline (see Annex 3).

CEHZ

These areas were sensitive to erosion and covered 366 kilometres or 64 per cent of the total coastline (see Annex 4). Rates of erosion or accretion were calculated by GIS. CEHZ widths ranged from a minimum of 10-15 metres to a maximum of 225-250 metres, the width was proportional to the sensitivity of an area to actual and potential erosion.

Coastal management policy

A coastal management policy was formulated, setting out the government's strategic direction on sustainable coastal development and protection. The vision⁴ was for 'resilient coastal infrastructure and communities resilient to natural hazards'. To be resilient was to be adaptive, responsive and quick to recover; so that communities could be environmentally, socially and economically sustainable.

Developed through wide consultation amongst stakeholders, public and private, the policy was finally adopted when approved by Cabinet. The first components of the policy formulation process were the identification of national and local management principles (see Figure 4). At the national level the focus was to: build government capability for coastal management and planning; develop partnership between public and private sectors; adopt a work with nature philosophy; observe the precautionary principle; and fund programmes. For the local communities the priorities were to: enhance community leadership; build

partnership to achieve sustainable use of resources; encourage local decision making; and prepare coastal management plans.

The emphasis for information, evaluation and monitoring were to define coastal hazards; allocate responsibilities for data management; improve data collection; recognise the range of information and sources; develop a framework for monitoring and evaluation of the policy; and disseminate economic data on coastal infrastructure while the focus for education and awareness included: raising community awareness; promoting community leadership; encouraging community participation in coastal planning; improving infrastructure service provision; and education in plan implementation.

Coastal management plans

In the management and use of land and other resources the issues were to incorporate the impacts of resources or land use in decision making; the set back of important land use from coastal hazard zones; and to recognise economic value of the coast. And for intervention actions the goals were to protect natural features of the coast; evaluate options for appropriate solutions; and incorporate environmental, social and economic impacts in decision-making

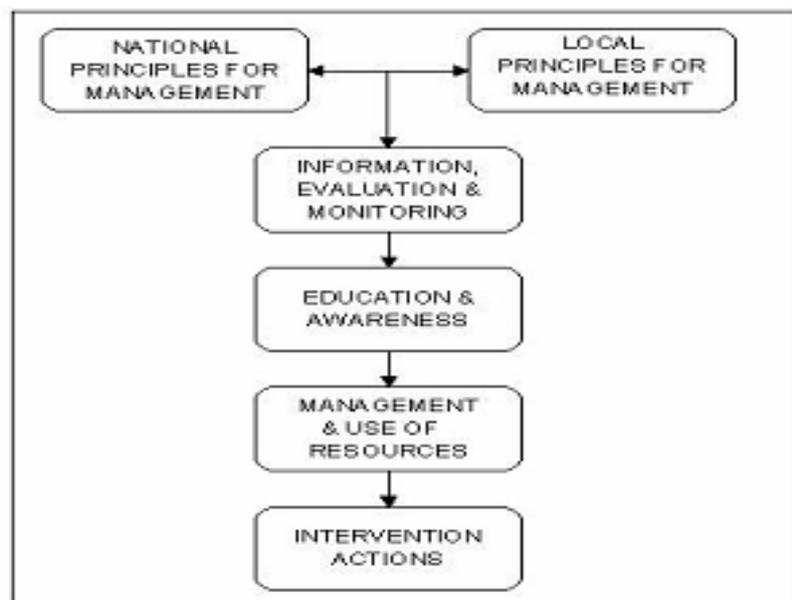


Figure 4: Framework for the national coastal management policy

Coastal management plans

The country was divided into 43 districts for the preparation⁵ of coastal management plans. Based on the hazard maps and coastal policy the management plans developed strategies, solutions and options to sustain and/or protect coastal assets. The alternatives ranged from the 'do nothing' and soft solutions to the hard engineering solutions. The plans were therefore applicable in all situations, from simple coastal re-vegetation to expensive coastal protection works. There were no funding commitments, however, and in this way the plans were not your traditional planning documents with set targets and timelines. The plans once approved were living documents until the next review. As in the development of hazard maps and policy, the emphasis was again on community consultation. Particular effort was made to ensure that the village communities were well-represented and fully briefed on the issues covered in the plans.

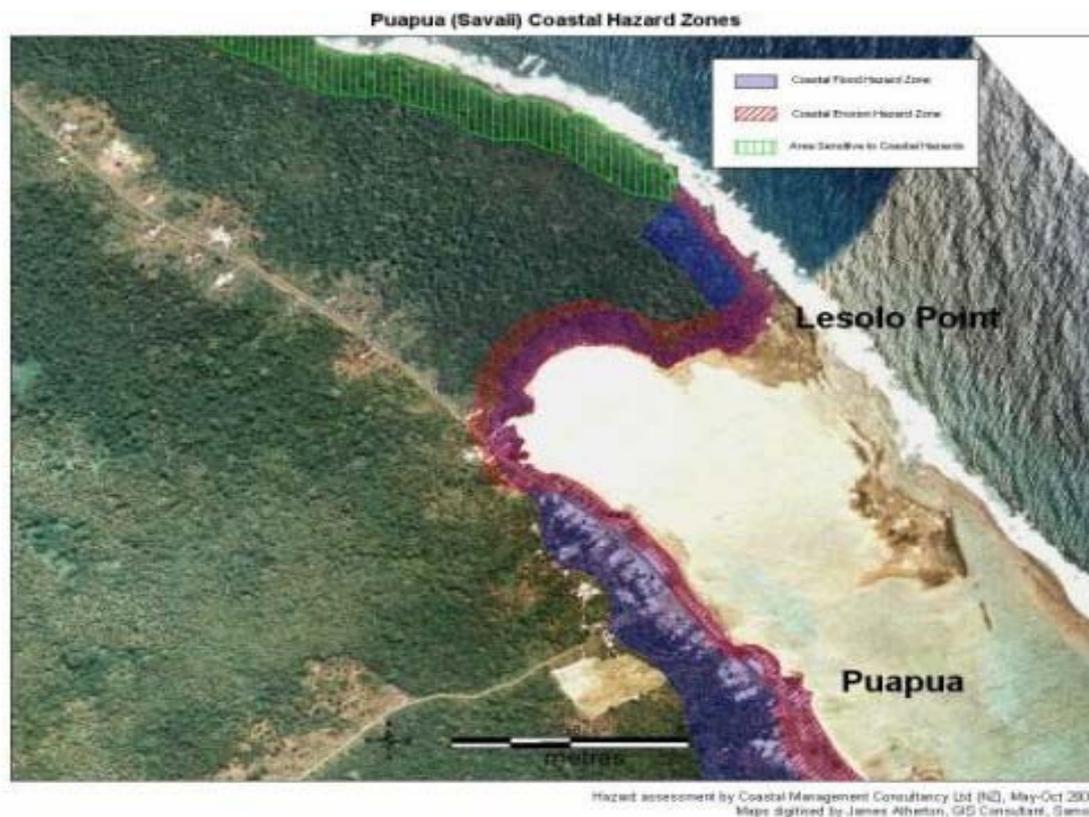
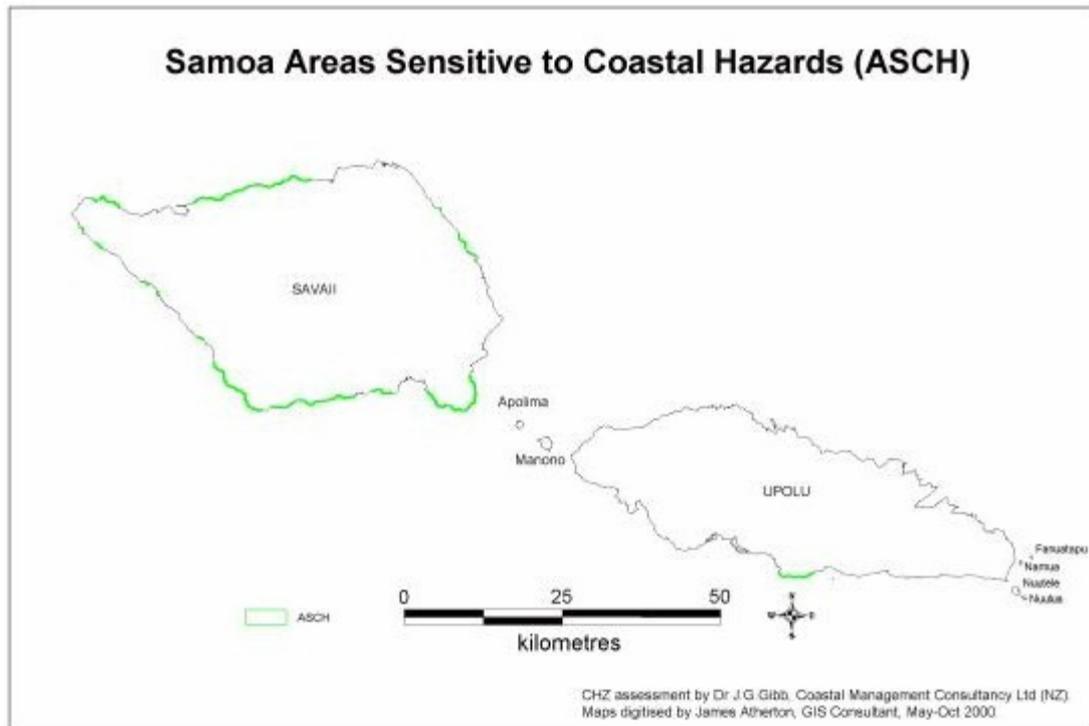
As of October 2002, the plans for fifteen districts had been completed and used in government and private development assessment. For example the Public Works Department has incorporated some of the findings in its coastal protection action plan for north-west Upolu. METI, a non-government organisation, has developed proposals for the conservation of coastal marshland at Apolima-uta; and the DLSE has used them in the determination of applications for sand mining and beach reclamations. Other benefits for Samoa included the utilisation to support proposals for the funding of biodiversity and climate change projects at districts where the plans were completed.

Conclusion

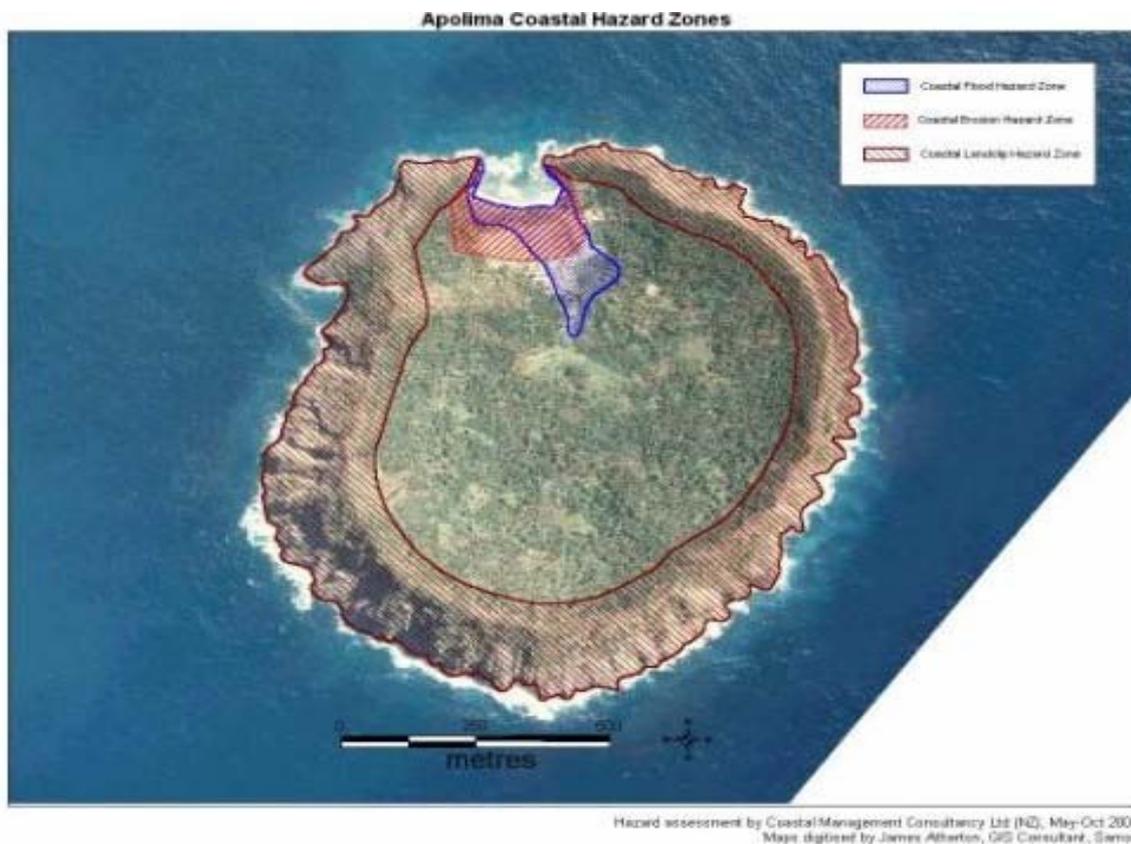
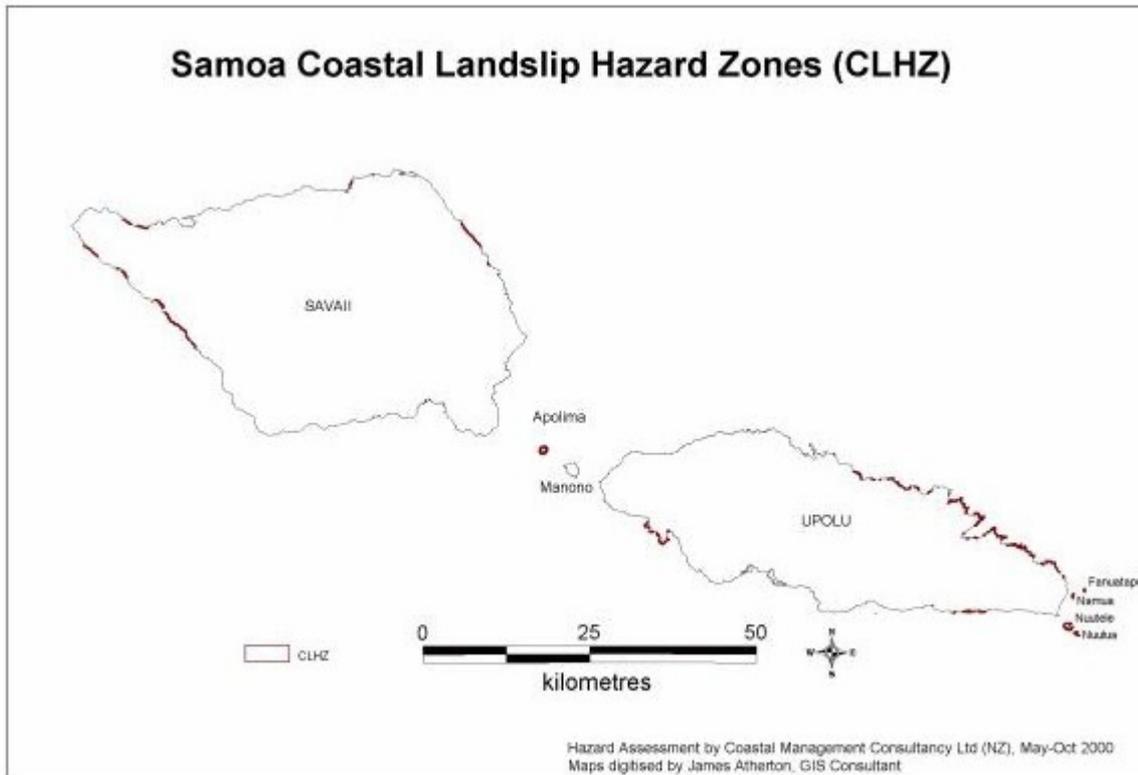
As well as achieving its project outputs, the DLSE component of IAMP also highlighted a number of other important issues with regard to sustainable resource management. First it is multi-sectors requiring the agreement, input and good will amongst all stakeholders. Second it was multi-issues where all community issues were open for discussion even those that appeared unrelated to coastal management. Third it was multi-solutions - all possible alternatives were considered including the 'do nothing' solution. Fourth it was multi-disciplines dealing with social, economic, technical, cultural and planning issues either independently or all at once. And finally it was highly participatory where the ownership of the concepts and plans, critical to successful implementation, was actively encouraged and promoted.

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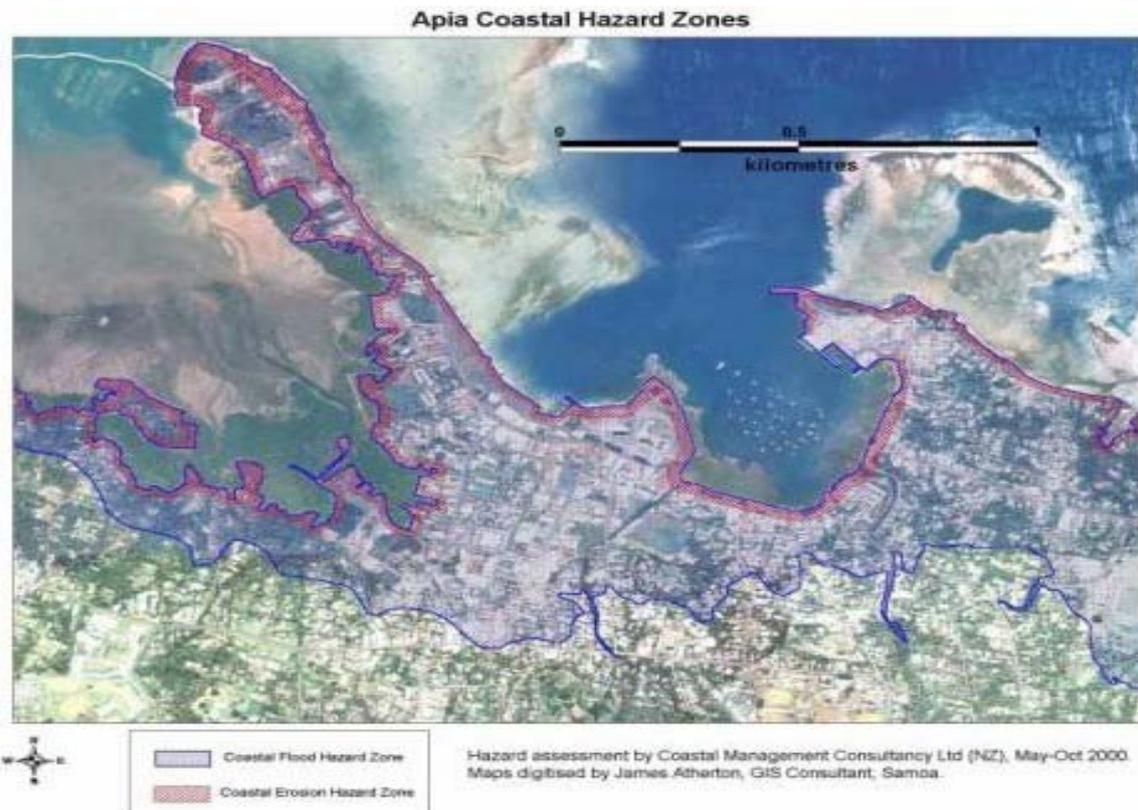
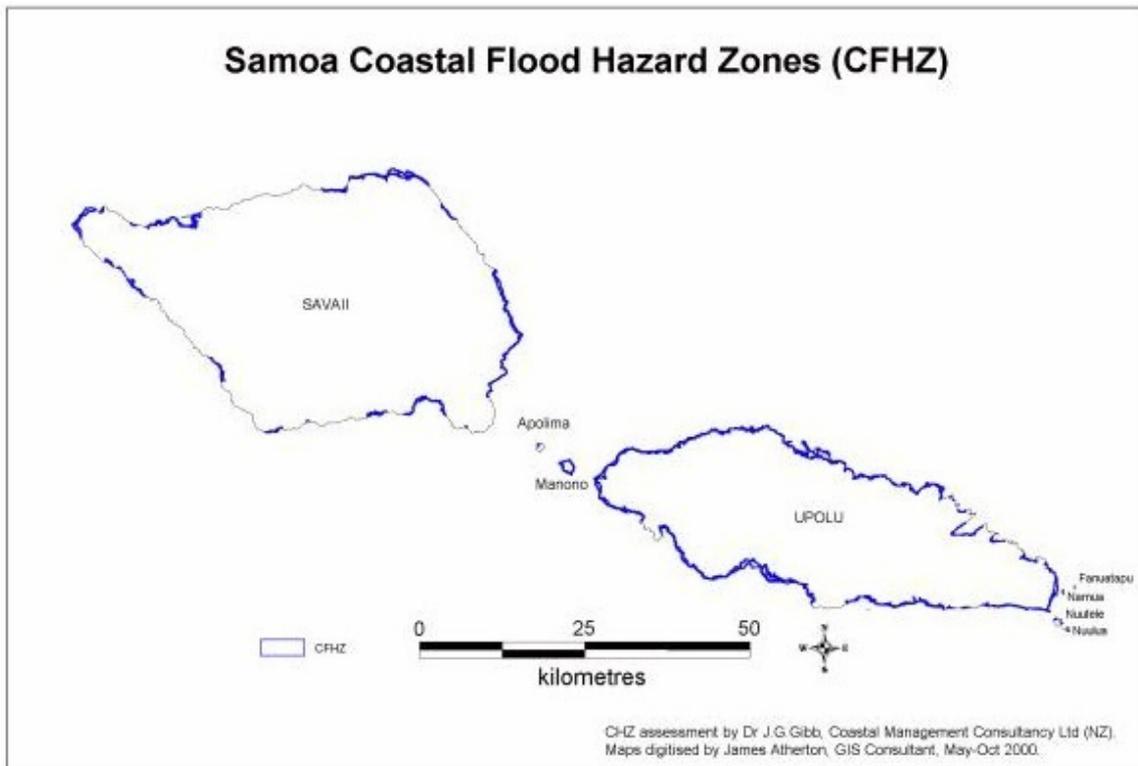
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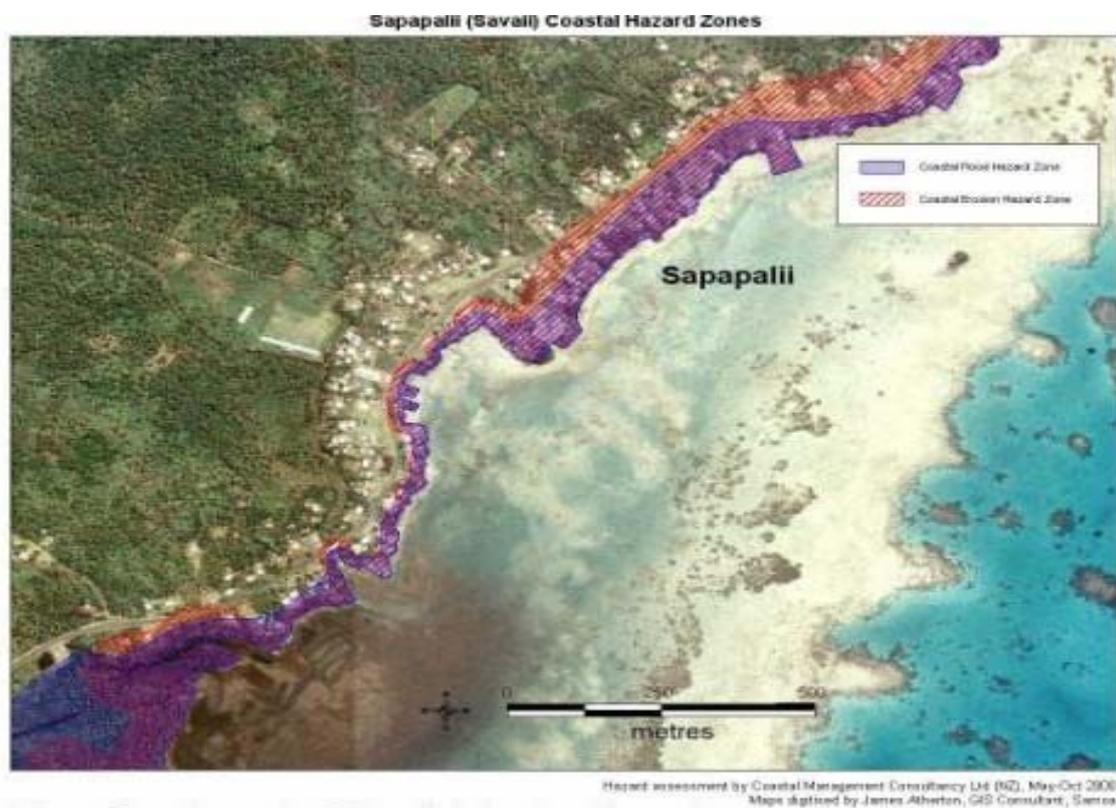
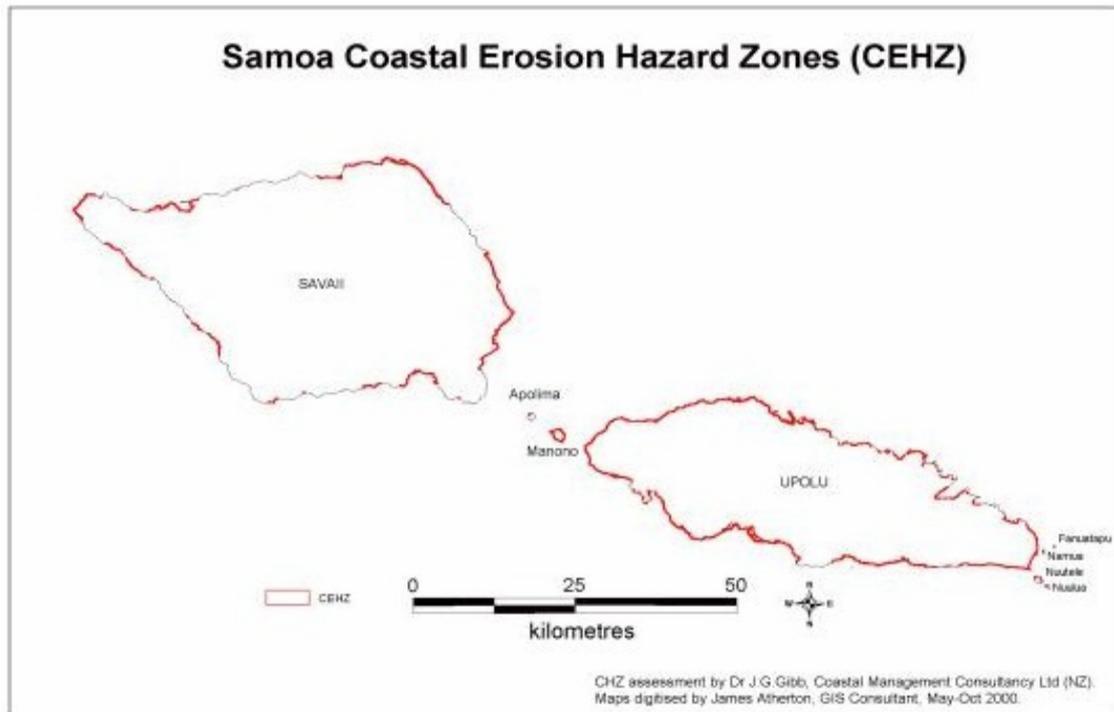
Annex 16: Areas sensitive to coastal hazard - Top: Map of Samoa showing areas sensitive to coastal hazards; Above: Example of area sensitive to coastal hazard, Pu'apu'a village, Savaii.



Annex 2⁷: Coastal erosion hazard zones - Top: Map of Samoa showing landslip hazard zones; Above: Example of coastal landslip hazard zone at Apolima Island



Annex 3⁸: Coastal flood hazard zones - Top: Map of Samoa showing coastal flood hazard zones; Above: Example of coastal flood hazard zone at Apia urban area, Upolu



Annex 4⁹: Coastal erosion hazard zones - Top: Map of Samoa shown coastal erosion hazard zones; Above: Example of coastal erosion hazard zone at Sapapalii village, Savaii

Knowing your environment – a survey of how Samoans view their environment

*Maria Talaitupu Kerslake**

Introduction

This article is based on the results of a survey aimed at measuring the public awareness of Samoans regarding environmental issues. The philosophy behind the survey was adopted from an ardent environmentalist; David Suzuki, who stated – "We are the earth, through the plants and animals that nourish us. We are the rains and the oceans that flow through our veins. We are the breath of the forests of the land and the plants of the sea linked in a web of Community, we are all interconnected."¹

Most people view the world as composed of separate parts sometimes we compartmentalize the world for the purpose of organizing it, but end up actually separating the different sections in our minds.

People are part of the many systems which in turn form large systems in the environment. This interconnectedness promoted the implementation of this survey research to rediscover the – What, When, Who, Why and Where as well as how Samoans perceive their environment. It was also timely to implement a survey of this nature to measure and ascertain the awareness levels of Samoans themselves regarding their relationship with their natural environment and the issues surrounding it.

In 1992 the environment became an issue of global significance. Yet no study was undertaken of the public's awareness of its major issues. The United Nations General Assembly resolved to set the foundation for its conference on environment and development also known as the Earth Summit in June 1992.

The Earth Summit addressed the concerns of sustainability and the relationship between the environment and economic development. The Governments who were convened there produced a prescription for Planetary survival titled Agenda 21 – so called for its projection that all of its recommendations should be met by the beginning of the 21st century. The summit also produced two legally binding conventions on Biodiversity and Climate Change a set of forest principles and the Rio Declaration.

Following Rio, the Agenda 21 called on all governments to participate fully with community organizations in the search for sustainable solutions to the planet's environment and development issues. A new era of partnership was formed between civil society and government in facilitating the implementation of agenda 21. Institutions and local communities were encouraged to participate in taking action needed to ensure a global shift to sustainable living.

This survey was one of our responses to ascertaining the awareness levels of our local community about environmental issues that surrounds them.

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Methodology

A survey of 50 adults was carried out at five locations in Apia. These locations included the Methodist Centre, Chan Mow Supermarket, Post and Telecommunication building, Morris Hedstrom Supermarket and the National Provident Fund Building.

A random selection of people was done, for example, one in every ten adult that walked past the survey area was chosen and interviewed using a questionnaire tool as a guide. Each survey area interviewed 10 respondents. There was no attempt to balance the gender ratio of the respondents. This was deliberate to increase the sample randomness.

The interviewers were students from the National University of Samoa who have had some formal training in interview techniques. The students had an excellent appreciation of environment issues.

Results

The results showed that 21 males and 29 females were selected for interviews. To ensure that nobody was interviewed twice the respondents were asked whether they had been interviewed before that day.

Those that responded Yes – were rejected for further interviews. The detail nature of the questionnaire and the interview meant that people were unlikely to want to be interviewed more than once:

- The respondents consisted of 58% females and in terms of the age spread of the respondents, 50% were 30 years of age or younger. The single largest represented age bracket was the 26-30 year age group with 26% of the respondents.
- About ninety (90%) percent of the respondents did not think the environment was a major concern.
- The younger respondents were more likely to hold this view than the older ones.
- There was no significant difference between the sexes on this view.
- Nearly seventy (70%) percent viewed our environment as either good or very good.

A ratio of 2:1 believed that not only was the environment good but it was also improving. When asked to identify the most important environmental issue to them in that year the respondents nominated depletion of marine resources and waste management as the two most important issues. 60% of the respondents considered that depletion of the marine resources should be the most important environment issue for the government.

An interesting finding was, only four percent (4%) regarded global warming as an important issue for the government. When asked to forecast what important environment issue the government would face in 2007, fifty percent (50%) of the respondents did not offer an opinion. Of those that offered an opinion, the most important issue was global warming 32% followed by depletion of marine resources and deforestation which were both 24% respectively.

When asked whether their behaviour has changed in the five years leading into 1997 and whether this change in behaviour has been beneficial to the environment, about 65% responded in the affirmative. The behaviour change was motivated mainly by personal experience. Most likely the respondents have lived through hurricanes and their devastating effects on the reef and marine life, and the impact of actions like fishermen using dynamites as a method of catching fish.

Over 50% of the respondent, believed that people damage the environment because they either do not understand or are unaware of the impact of their actions. In terms of assisting in providing information to make people aware or better informed respondents nominated radio and television as the two most influential media. In terms of institutions providing environment information. The South Pacific Regional Environment Programme had a higher recognition factor than the Department of Lands, Surveys and Environment.

Policy implications

The study was useful in highlighting some facts about the level of awareness in environmental issues and as such identified some policy implications:

- 1) The government needed to take a more active role in public awareness campaign about environment issues. This is now happening through efforts by the Department of Lands, Surveys and Environment.
- 2) Samoans have tended to be complacent about their environment but are slowly realising their resources are limited. The public awareness and public education campaigns should stress this.
- 3) The change agents should be identified and encouraged again Department of Lands, Surveys and Environment is seen as the main change agent.
- 4) Incentives should be introduced and provided to reward good behaviour.
- 5) Legislations and regulations should be introduced and/or enforced to ensure compliance and to discourage unfriendly behaviour.
- 6) Court action against those selling undersized fish is applauded
- 7) Similar actions may be considered for those dumping rubbish, especially in the rivers, waterways and the sea.
- 8) Highlighting Environmental issues in school curricula in the education system will increase awareness of school children.

This survey points to Samoans having taken sometime to appreciate the most pressing global problems it faces, degradation of the environment. Samoans need to be made to realize that some of their actions may have harmful effects on the environment. The government needs to introduce policies that will change behaviour for the benefit of the environment as further action is needed if Samoa is to contribute effectively to saving the environment for its future generation.

There is an intention to do a follow up study of the same issues in 2007 (ten years later) to measure and compare environmental awareness within Samoa.

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Sustainable forest management programmes in Samoa

*Malagamalii Aukuso Leavasa**

Introduction

The need to save the remaining native forests is one of the central issues of environment and development today. The value of native forests to society and the bio-systems of the planet, are well documented in countless reports by scientists the world over. However, the challenge facing the global community is to transform its current practices and approaches to utilise this key resource in a sustainable and justified way.

In Samoa native or indigenous forests are fast disappearing due to logging and land clearing for agricultural purposes. The remaining forests are on customary land owned by village communities. Several efforts have been carried out with different successes to replant and conserve native forests in the country.

Among these efforts are the government reforestation programme and the forest conservation areas, established by village communities around the country. Despite these, there is yet little or no attempt to seriously investigate, and develop appropriate approaches to educate village communities, who continue to clear the remaining native forests, for timber, agriculture, or another use for their social and economic development. In trying to strike a balance between the needs of the community and the conservation of the remaining native forests in the country the Forestry Division has made several attempts to try and identify possible sustainable forest management solutions to stem the fast rate of deforestation.

The remaining forests, best described by Martel (1996)¹ are presented in Table 1. The forestry sector gained importance with the export of native round wood and timber in 1968 when extensive timber leases on Savaii were granted to US company Potlatch Forests Inc.

Forest Conditions	Upolu	Savaii	Total
Merchantable Forests	6,450	18,434	28,483
Non-Merchantable Forests	4,019	48,858	52,877
Protection Forests	18,114	9,935	28,049
Total Indigenous forest area	28,585	77,227	105,810
Village Conservation Area	1,414	6,486	7,900
O le Pupu Pue National Park/Mt. Vaea	2,864		2,868
Total Forest Reserves/Conservation	4,274	6,486	10,764

Table 1. Indigenous Forests Area Estimates (1996) Samoa (in ha) Source: Martel 1996

Between 1974 and 1987 timber exports range from \$288,500 to \$1,207,000 per year. In recent years the rate of logging has drastically reduced and the export value is now zero. Most of the productive forests both in Upolu and Savaii have been harvested with only a few places in Savaii still being harvested.

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We must acknowledge the big contribution made by forests as a carbon sink. This contribution is a very important global issue when it comes to climate change. Great deliberations have been made on the issue of Greenhouse Gas (GHG) emissions with several developed countries proposing to increase the number of reforestation programmes around the world, especially in tropical island states, to try and reduce GHG levels in the atmosphere. These have been turned down as people saw them as something that the developed countries are using just to prevent them from having to reduce their industrial GHG outputs.

This report provides an explanation of the different projects undertaken by the Forestry Division as to try and counter the problem that hinders the sustainability of our forest resources.

Sustainable development

In the report by the world Commission on Environment and Development, “Our Common Future” (WCED, 1987)², sustainable development is defined as “development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” Another commonly used definition of sustainable development, agreed on by three of the major international organisations working in the field, is “development which improves the quality of life, within the carrying capacity of the Earth’s life support system.

There is a requirement for assessing the level of sustainable land and forest management through the establishment of a set of indicators and related critical threshold values. Mussong (1998)³ calculated target diameters for tree species logging operations based on maximum diameters as an indication of maturity, consideration of the intended utilisation cycle, the wider environmental setting, and the human aspects of land/forest management. i.e. environmental, social, economic, and political aspects.

Smith and Dumanski (1994)⁴ designed a framework to evaluate sustainability of land management, which is considered to be instrumental in assessing sustainability of a certain land-use system. The framework identifies five pillars for sustainability, which are:

1. Productivity
2. Security and stability over time
3. Environmental Protection
4. Economic viability
5. Social and cultural acceptability.

Past history

In the past, forests supplied the majority of the country’s sawn timber needs, poles, building materials, firewood, as well as certain foods and medicines. Paid employment in the forestry sector supported 10% of the labour force not including the non-wood forests products. Notable achievements of the forestry sector include the National Forest Policy, the National Environment Management Strategy, Village Conservation Agreements, and the setting up of environmental NGOs. Thus, the support to forestry development from politicians, policy makers, business persons, and urban and rural communities had been quite encouraging.

Past inventory surveys

Three indigenous forest inventories were completed since 1970, mainly for establishing the level of merchantable forest, for Upolu; Savaii (Gibbs Australia, 1985)⁵ and both islands (Chandler, Larsen & Wallis, 1978)⁶. None of the reports considered indigenous forest management in their analysis and recommendations of proposed annual allowable cut.

However, it was the intention that future studies by the Forestry Division must investigate possible sustainable forest management practices that could be used for future actions and strategies.

The forest resources of Samoa were last assessed in 1992 following cyclones Ofa and Val which severely damaged the indigenous forests and plantations of both main islands. The resource assessment was compiled during the preparation of the National Forest Policy that was completed in 1994 (Groome Poyry, 1994)⁷. This assessment of the indigenous forest was based on forest classification and typing of the 1978 Forest Inventory and photo interpretation of 1990 aerial photographs of the islands.

The indigenous forest resources of Samoa have been identified as having one of the worst rates of deforestation known in humid tropical countries. Between 1977 and 1992 47% of the merchantable forest of Savaii was cleared, at an average rate of 987 hectares per year. Approximately 40 % of the clearance was due to logging and 60% was due to agricultural and other reasons from which sawlogs were not recovered. Over the same period 27% of the non-merchantable forest was cleared, at an average rate of 847 hectares per year. Since 1985 the rate of clearance of non-merchantable forest has averaged 530 hectares per year. Approximately 10% of this clearance is due to logging and 90% to agricultural and other reasons (Iakopo & Suaesi 1998)⁸. The forest resources have always been and still remain a secondary land use to agriculture and a cheap source of revenue to customary landowners.

Partly for these reasons, and despite legislation requiring the government to provide forest management practices on a sustainable yield basis, no indigenous forest management has been put into practice and license regulations were not observed or enforced thus unless remedial actions are put in place in a very short time the remaining marketable forest is likely to be depleted within the next 10 to 30 years (Martel,1996)

Main causes of deforestation

Inland expansion of agricultural lands - The expansion of cash cropping, initially for cocoa and coconuts, and the clearing of large areas of land for cattle farming, was largely responsible for forest clearing prior to 1980. In the 1980's taro production for export was closely associated with forest loss. However, with the outbreak of the Taro Leaf Blight disease in 1993 the taro industry completely came to a stop leaving large areas of land that were cultivated with taro to be fallow and regenerate. The introduction of the new Taro Leaf Blight resistant taro caused the re-existence of the problem of large areas of forest being cleared for the cultivation of taro.

Modified traditional title and land tenure system - A new form of land tenure is developing in rural Samoa that leads to increased forest clearing because land freshly cleared from the forest can now be claimed by the individual/family who cleared the land.

Increase in population - The Samoan population more than doubled between 1936 and 1961. Population increase is closely correlated with the increase in cropped land needed for agriculture. More and more people have moved to and settled upland areas.

Logging of indigenous forest

Between 1978 and 1990, 20% of all forest loss in Samoa was attributable to logging, and 97% of the logging occurred in Savaii. Because most logged areas are in coastal areas near villages, most early logging has been partly converted for village agriculture.

The domestic market is estimated at 15,000-19,000 m³ of sawn timber per year. In 1992, 25 % of the domestic demand for timber was imported, based on the local timber production figure, and in 1996 timber imports accounted for close to 45 % of the domestic demand, a dramatic increase over the last 5 years.

With the diminishing merchantable forests, the industry has made some improvements at their timber processing facilities for better utilisation and improved recovery of timber. It is unfortunate that the industry has just realised the importance of the forest resources for the sustainability of their operations only at the time the remaining merchantable forest is near exhaustion.

Impact of natural disasters to the sustainability of the forest resources

Cyclones Ofa, in February of 1990, and Val, in December of 1991, were two of the natural disasters that have caused severe damage to our forest resources and also had a great impact on our environment. Most severe was the impact to the economy of the country. Forest fires are also one of the causes of deforestation. Major fires were near the end of September 1983 and the latest in August and September of 1999, which affected large forest areas at the Asau region in the north west end of Savaii Island.

Impact of invasive species on the forest

I have identified several species that I know are spreading fast and have killed and caused severe damage to our indigenous trees. These are the *merremia vine* (or the large leaf vine) and *albizia falcataria* (tamaligi palagi - very dominant, fast growing species as a secondary forest type). The formulation of *Samoa's Invasive Species Strategy and Action Plan* will be seen a very important step towards an eradication programme for not only the invasive species but also for feral animals as well.

Government large scale reforestation project

New Zealand Official Development Assistance has provided forestry assistance to Samoa since the late 1970s employing advisers to help plan and implement reforestation. This assistance gradually increased to a stage where New Zealand also provided financial assistance. These funds were used to purchase vehicles, office and forestry equipment for roads and buildings, and to contribute to the costs of wages for forestry labourers employed by Samoa Forestry Division.

The main thrust of the joint project has been the development and maintenance of plantation forests, intended to help reduce pressure on the rapidly diminishing indigenous forests. A wide range of Samoans have benefited from this joint project, including through the employment of many villagers, both men and women. There has been a significant transfer of technical knowledge in the field to past and present officers of the Forestry Division.

New Zealand has provided approximately NZ\$1.25 million in funding per annum for the joint project, which is similar to Samoa's own Forestry Division budget. The Division manages nine forests plantations, six of which are more than 1,000 hectares in size. Seventy percent of the land is government-owned and 30 percent was acquired on renewable 20year leases from customary landowners.

After cyclones Ofa and Val the forest resource was inventoried, eliminating all under-stocked stands. The results were 351 ha. of fully-stocked plantations, only 8 % of what they thought

they had in 1989. Since the cyclones, the Division mounted an impressive campaign to replant these destroyed stands.

The average age of the total planted area is 6 years. 85 % having been planted since 1994. Thus, a severe timber shortage is likely to occur after the indigenous resource is exhausted and before the younger plantations can be harvested. The introduction of the code of logging practice for Samoa will be seen as a more safer and a reliable tool of sustainable forest management. However, with the current limited forest resource we are a bit too late in the implementation side of this code.

GTZ programme on sustainable forest management for rural communities

German Technical Assistance (GTZ)⁹ originally started its programmes and operations in Fiji. The main objective behind the programme is the application of a sustainable forest management programme that is focused on community forestry development.

The involvement and participation of the landowners in looking after their own forest resources is important because they can take the responsibility in managing their own forest resources, and when they manage it well they will have the benefit of receiving money for a long period of time.

Assistance from the project involves training workshops for landowners on inventory methods, mensuration¹⁰ techniques and silvicultural aspects of forest management. The project also bought 2 portable chainsaw mills to assist the villages.

There were a lot of problems encountered in the initial stages of the Samoa programme. One of these was the identification of a suitable site that had the full potential and the necessary requirements needed for the implementation of the project.

Three villages were proposed and were surveyed by the forestry division's staff, these were Samalaeulu, Fatuvalu and Sasina which are all situated at the Northern side of the island of Savaii. Samalaeulu village was then selected. Training workshops were then conducted and a memorandum of understanding between the village and the government was signed.

An inventory survey of the area was conducted with the assistance and participation from both the forestry division staff and the villagers. Unfortunately a land dispute between chiefs in the village resulted in the termination of the project in this village.

The project has now been transferred and established at the village of Pu'apu'a. The project has lost out in funding, because all the operations and activities that were implemented in the past have to be redone.

Community forestry programme

Community Forestry is a tree planting scheme that involves the full participation of the farmers. 100 seedlings are given to the farmer as a probation act to see whether the farmer will plant and look after the seedlings for the first period, and to convince them to get involved with establishing wood lot plantations or any other tree planting activity such as Agro-forestry.

A program was set up in the early 1980's and was funded by the Government of Samoa under a loan grant from the Asian Development Bank (ADB). The programme started with the

establishment of demonstration plots at Falealili and Safata districts to convince all farmers of the validity of the programme.

The establishment of nurseries for the two districts was also one of the important activity that assisted the program by providing support in terms of seedling supply and planting materials in order to meet the demands by future farmers that requested to be involved in the programme.

The programme at its later stages included agro-forestry as one of its supporting activity, and applied assistance to farmers who are mainly cultivating upland areas near watershed. Through this came the existence and the reality of the establishment of the first watershed management project in the South Pacific Region that was funded by FAO from 1996 to 1999.

The concern in re-establishing the same operation as one of the important alternative and possible solution to cater for the problem of divestment of lease lands was taken highly by the forestry management team. A questionnaire survey was again conducted in the year 2000 and focused its attention especially for farmers that were involved in the past community forestry project. The main objective behind this survey was to get an idea whether the farmers still accepts the re-establishment of the project and to assist the project in identifying which species is commonly accepted through out. And to set a strategy and action plan to be used.

Code of Logging Practice for Samoa

The draft Code of Logging Practice for Samoa has not been approved yet but has received great support from both the landowners and the logging companies. The code came into realisation due to several discussions related to recognising the need for a system to reduce the impact of logging on the remaining indigenous forest of Samoa.

The Indigenous Forest Monitoring Unit

A newly proposed, FAO funded project will assist the Forestry Department in its role of assessing the real situation and condition of the indigenous forests of Samoa. This information will help in the planning of decisions regarding future operations. The survey results will allow Forestry staff, especially the Indigenous Forest Monitoring Unit, to have a good, strong collaborative relationship with the stakeholders involved.

Policies and Legislation

Five guiding principles provide the foundation for the forestry policy in Samoa;

1. Optimal and Sustainable use of the forest resources
2. Forest Protection
3. Basic human needs
4. Individual and collective responsibility and
5. Economic development

On the basis of legislation and other national management plans some policy documents have been formulated and approved by Government. These are: National Forest Policy 1995; Watershed Protection and Management Regulations 1992 and National Environment and Management Strategies (NEMS) 1993.

The Watershed Protection and Management Regulations provide the mechanism to improve co-ordination between relevant organisations through the formation of a Committee

responsible for the management of Watershed areas. However, this Committee has met only once since the adoption of the Regulation in 1992.

The NEMS which is administered by the Department of Lands, Survey and Environment attempts to provide a planned and systematic approach to the integration of development and environmental concerns. It also establishes the framework and recommends guidelines for national policies.

Conclusion

In the Forestry Sector, forest production and contribution is restricted to local timber demand and market. The total contribution of the forestry sector in terms of monetary and social gain is not properly accounted for nor documented. Apart from the small revenue generated as government tax, and the amount paid to landowners as timber royalties, there is nothing else. The overall cost and value of forestry sector in terms of how much it is worth now, and how and where it can effectively contribute to the country as a whole in the future remains a question to be answered. We do hope that with the good implementation of these policies, programmes and projects therefore be able to achieve a sustainable production of Samoa's not only timber resources in the long run. But also the other non-wood forest products. And most importantly is the realisation of the overall importance of the forests to the people of Samoa.

Notes

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- ⁹ GTZ: German Technical Assistance on Sustainable Forest Management for the Pacific Region.
- ¹⁰ Mensuration: Terminology used for measurements of trees based on volumes, height and diameter.

Report of a household fisheries and dietary survey October - November 2000

*Kelvin Passfield, Mike King, Mulipola Atonio Mulipola & Etuati Ropeti**

Introduction

Samoa consists of two larger main islands, Upolu (1108 sq. km.) and Savaii (1695 sq. km.) as well as seven small islands, all located in a relatively small area of the Pacific Ocean, between 13° 25'S -14° 05'S and 171° 23'W-142° 48'W. Owing to the proximity of near neighbors, it has the smallest Exclusive Economic Zone in the Pacific, at only 130,000 sq. km. The present population is around 175,000 (Upolu, 132,000. Savaii 43,000), with an urban population in the Apia area of 39,000.

Fisheries play an extremely important role in the economy of the islands. They are a major earner of foreign revenue for the country, with reported fish exports in the year 2000 of around 4500 metric tons (mt) worth SAT40 million¹. This is equivalent to between 60% and 70% of the total value of all Samoan exports.

Apart from their commercial importance, the fisheries of Samoa are also of major subsistence importance, contributing significantly to the health and nutrition of the people. This paper documents the important marine resources, fishing methods, and fisheries habitats, and shows to what level these are significant to the people. It places fresh seafood consumption into perspective with regard to consumption of other sources of animal protein such as meat and canned foods, and allows a value to be estimated for the subsistence resources.

Information for the report was obtained by conducting a survey of 5% of the population from a cross section of villages over a three-week period in late 2000. Some comparative historical information was available from several earlier surveys conducted within the past 25 years^{2,3,4,5,6,7,8}.

A stratified sampling strategy was adopted in order to allow more effort to be expended in surveying households more likely to engage in fishing. One major factor affecting fishing and fish consumption was likely to be the distance of the village from the coast. It was also possible that seafood catches may vary by coastal habitat, e.g. mangroves, lagoons, and cliffs. The survey was designed to take these possible variations into account.

Samoa village demography

The population of Samoa is spread throughout 21,424 households in 326 villages on four islands. About two thirds of these villages are on the island of Upolu, and one third on Savaii, with only a small number of villages on the other two inhabited islands, Manono and Apolima. The Statistics Department classifies about 18% of these villages, containing around 22% of the total number of households as urban.

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The number of households per village varied from a low of four to a high of 575, with an average of 65. The average number of people per household in 2000 was 8.2⁹. This equates to a total population of approximately 175,000. Table 1 gives a breakdown of Samoan villages by strata.

Location	Upolu		Savaii		Total	
	Villages	Households	Villages	Households	Villages	Households
Cliff	0	0	19	971	19	971
Inland	80	5371	18	749	98	6120
Lagoon	87	5502	49	2609	136	8111
Mangrove	57	5374	16	848	73	6222
TOTAL	224	16247	102	5177	326	21424

Table 1. Numbers of Samoan villages and households by strata

Household survey methodology

Survey design

The sampling methodology was designed over a period of several months by project and counterpart staff in early to mid 2000, with additional advice sought from the SPC Statistical Unit in Noumea. The questionnaire was designed by Fisheries Division and Project staff, in collaboration with the Samoa Statistics Department. Careful consideration was given to designing the questions in a way that would facilitate the collection of useable data from the households.

Village and household selection

Using information from the Agricultural Census 1989¹⁰, a fishing index was calculated for each village based on the number of fishing trips per week in the village. This index was used to stratify villages for sampling, so that less effort was afforded strata where fishing was rare, and greater effort was placed in villages where fishing was common. Villages were randomly selected within each stratum. The final number of villages selected was 66, consisting of 40 for Upolu, and 26 for Savaii, which represented 20% of all Samoan villages.

In order to further reduce the number of households to be surveyed to a more manageable sample, the number of households to sample in each village was determined as follows.

- Less than 50 households, sample 50% of all households.
- Between 50 and 99 households, sample 20% of all households.
- More than 100 households, sample 10% of all households.

This resulted in 1092 households in total, or 5% of total Samoan households. Figure 1 shows the distribution of the 66 villages around Samoa.

Enumerators were left to select individual households such that the required number of households in each village was sampled. For example, if 20% of households in a village were to be sampled, enumerators would select approximately every fifth household.

Population

The total number of households surveyed was 1092, consisting of 689 in Upolu and Manono, and 403 in Savaii. The total number of people included in the households was 9090, made up of 5818 from Upolu, including Manono, and 3272 for Savaii.

Appropriate weights were applied to raise all figures obtained for the sampled population to figures representing the total Samoan population. Table 2 shows the figures obtained for the sampled population, as well as the raised figures.

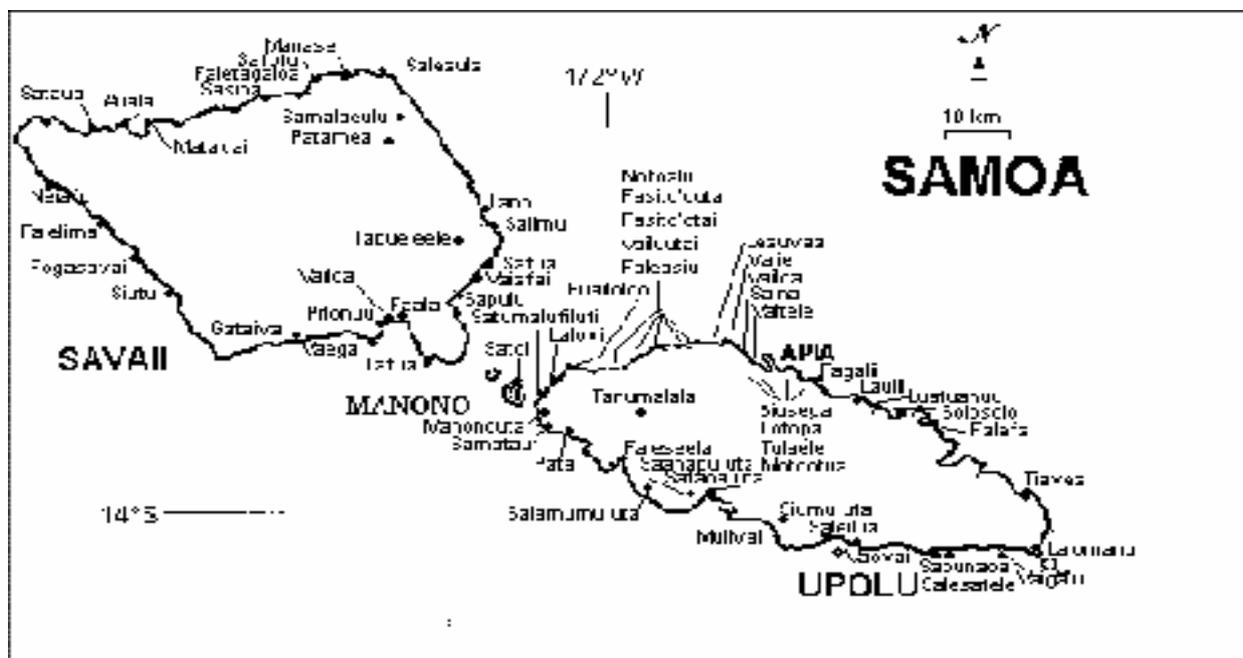


Figure 1. Map of Samoa showing locations of surveyed villages.

Island	Sampled no. of hh	Raised no. of hh	Sampled population	Raised population	Av. Household population
Upolu	689	16,223	5,818	131,866	8.13
Savaii	403	5,240	3,272	42,734	8.16
Samoa	1,092	21,463 ¹	9,090	174,600	8.14

Table 2. Population estimates based on the survey results. Note that there is a slight variation from the number of households reported in Table 1. This is probably due to rounding errors when using P. of S. weights for each village.

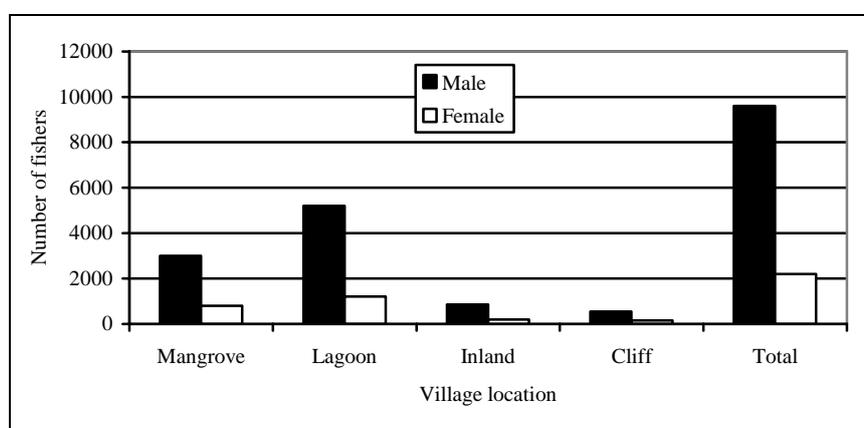


Figure 2. Number of male and female fishers in each stratum

Fishing activities

The survey indicated that there are 8,377 fishing households in Samoa. Within these households, there are 11,700 fishers, made up of 9,600 males and 2,100 females. Figure 2 shows the number of fishers for each stratum for this survey.

Fishing methods

Figure 3 shows the percentage use of the various fishing methods, both by time spent fishing, and the total number of trips. The most common fishing method both by time spent and number of trips is diving and spearing.

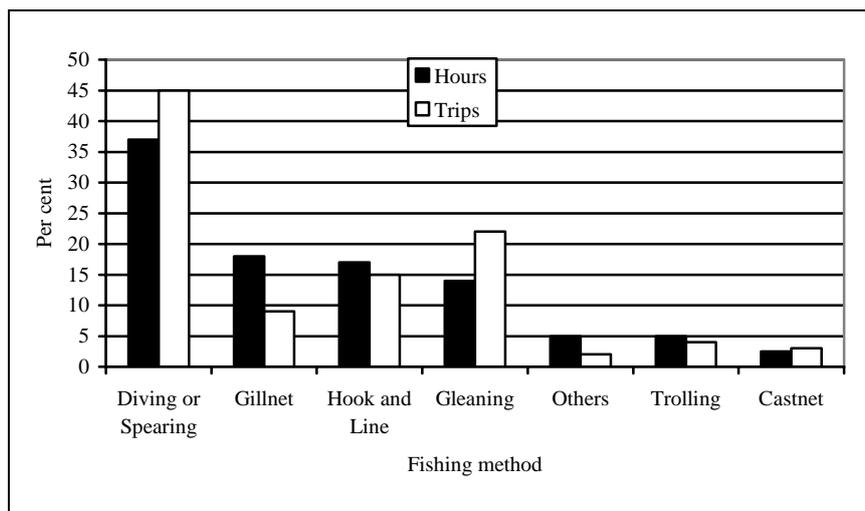


Figure 3. Percentage of each fishing method by number of trips and by total hours

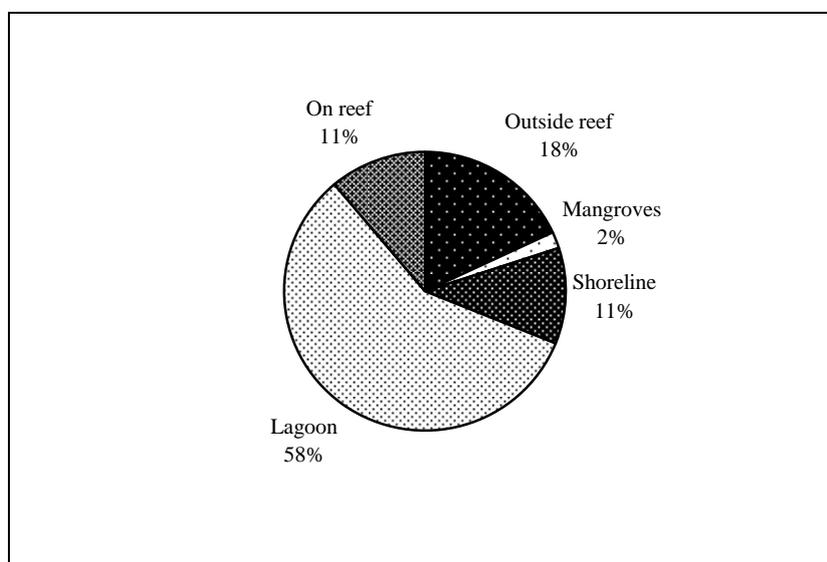


Figure 4. Reported percentage of fishing trips in each type of fishing area

Fishing location

The proportion of total fishing trips undertaken in each of the fishing zones is shown in Figure 4. Inshore fishing trips comprise 82% of the total. Only 18% of trips are undertaken outside the reef. Most of these are likely to be diving and spearing on the reef edge, or

fishing close to the reef from canoes, as very few fishers have access to boats that can safely fish far offshore. Note that Figure 4 represents the frequency of fishing trips, and not the time spent in each location. Time spent in each location is shown in Table 3.

Catch and effort

The total seafood catch reported from the survey was 7169 tons. The average CPUE for all fishing was 2.05kg/person/hr fished. Table 4 gives the breakdown for the seafood catch and the CPUE for the different strata. This shows that 29% of the seafood caught is classed as offshore. This includes bottom fish caught over the reef, as well as tuna and other pelagic species. Villages in the Fisheries Project catch a higher proportion of offshore species, reflecting the fact that they spend more time fishing outside the reef than do Non-Project villages (Table 3). This could be attributable to the efforts of the Village Fishery Management Advisory Committees (VFMACs), to shift effort from the depleted lagoon resources to the offshore resources¹¹.

Village Strata	Mangrove	Shoreline	Lagoon	On reef	Outside reef
Inland	0.8	2.7	59	12	25.6
Cliff	0.0	16.0	57.1	3.0	23.9
Mangrove	2.7	9.5	51.3	10.3	26.2
Lagoons	0.6	11.5	44.8	12.5	30.8
Upolu	1.5	9.9	51.1	12	25.6
Savaai	0.7	11.5	41.4	9.8	36.7
Project	0.7	10.3	38.2	15.6	35.1
Non project	1.5	11.2	51.3	9.5	26.4
Samoa total	1.3	10.3	48.3	11.4	28.7

Table 3. Percentage of total time spent at each fishing location

Village Strata	Inshore fish	Offshore fish	Crustacean	Mollusks	Other Inverts	Seaweed	CPUE kg/hr
Inland	59.8	12.2	4.7	16.9	6.4	0.0	2.25
Cliff	60.2	11.1	0.7	25.9	2.1	0.0	1.63
Mangrove	46.0	34.2	2.3	11.7	5.5	0.4	2.12
Lagoons	41.0	29.4	3.0	17.9	8.2	0.5	2.00
Upolu	46.4	28.7	3.2	13.2	7.9	0.6	1.99
Savaai	40.8	29.6	2.2	22.4	4.9	0.1	2.19
Project	32.9	42.6	1.5	14.2	8.0	0.8	2.80
Non project	50.6	22.3	3.6	17.0	6.4	0.2	1.77
Samoa total	44.8	29.0	2.9	15.9	7.0	0.4	2.05

Table 4. Seafood catch (% of total) by broad category of seafood, and total CPUE

Villages with management plans developed under the Project initiated community based fisheries management programme reported a catch rate of 2.8kg/hr, 40% higher than the average, and 55% higher than that for villages without management plans, as can be seen in Figure 5. This may be attributable to the fact that these villages are effectively managing their own fisheries, but may also be due to other factors, such as villages with the most productive marine areas seeing good reason in joining the village fishery management project in order to maintain what they had.

Women's fishing

The survey found that 18% of all fishers are females, responsible for about 10% of the total fishing effort. The average trip length for women was three hours, compared with four hours for men. Observations in the villages suggest that women mainly glean for invertebrates along the shoreline. Exceptions are women diving, sometimes from canoes, for invertebrates such as sea cumpers, jellyfish, sea urchins, and for seaweed.

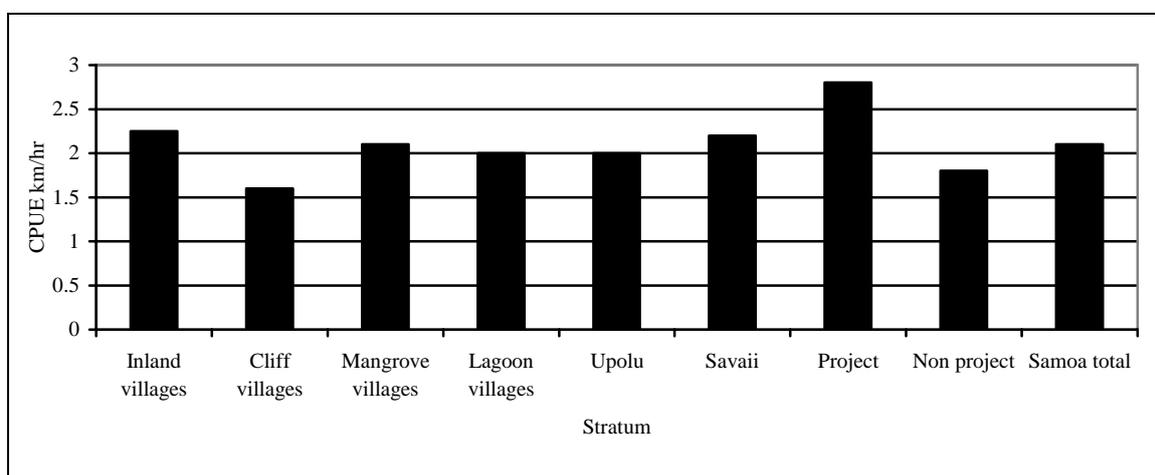


Figure 5: Catch per unit effort (kg/person/hr) for each stratum.

Despite the lower effort expended by women, it is likely that they harvest around 23% of the total weight of seafood, assuming they are responsible for collecting most of the shell fish and other invertebrates harvested in the villages. Women are also the major contributors to post harvest processing of both men and women's catch.

Subsistence consumption

Seafood

Annual subsistence consumption of seafood was estimated to be 9,971 tons for 2001. This was determined by multiplying the total number of meals of seafood consumed by a portion size of 366g per adult, and 188g per child under 15yrs. This portion size was ascertained by a separate questionnaire survey of Fisheries Division staff, and refers to the whole weight of the fish (not flesh only). It is assumed that most of the fish consumed that was in excess of the village catch was purchased through commercial outlets, and came from bycatch from the commercial longline fishery. The survey indicated that 7169 tons of this seafood was caught in the villages. The different seafood varieties consumed are shown in Table 5.

Strata	Crustacean	Mollusk	Other Inverts	Seaweed	Lagoon fish	Red fish	Pelagic fish
Cliff	4.6	7.9	4.9	0.1	28.4	46.2	7.9
Inland	7.3	6.0	6.4	3.1	24.0	35.3	17.9
Lagoon	5.1	8.3	8.0	1.8	30.9	38.8	7.1
Mangrove	5.3	7.6	8.4	3.1	32.1	36.3	7.1
Savaii	5.1	7.7	5.8	0.4	29.3	44.6	7.1
Upolu	5.9	7.4	8.1	2.9	29.4	35.6	10.6
Samoa	5.7	7.5	7.6	2.4	29.4	37.5	9.9

Table 5. Percentage of total meals consumed containing various seafood groups

Figure 6 shows the percentage of total meals made up by each of the various seafood groups for all strata combined. Finfish comprise approximately 77% of all seafood consumed, with invertebrates and seaweed making up the other 23%. The only notable variation across strata is shown in the inland villages, where pelagic fish comprised 18% of the total.

Of the inland villages surveyed 44% were in or near the Apia urban area. It is therefore likely that pelagic fish are more commonly eaten in inland villages because inland villagers are more likely to purchase their fish from the Apia Municipal fish market, where pelagic species are generally cheaper to buy than reef or lagoon fish.

Seafood consumption can be further broken down within these larger groups. Figure 7 shows the nature of consumption in more specific categories. The most commonly eaten seafood species are surgeonfishes, locally known as *pone* *Ctenochaetus striatus* and *alogo* *Acanthurus lineatus*.

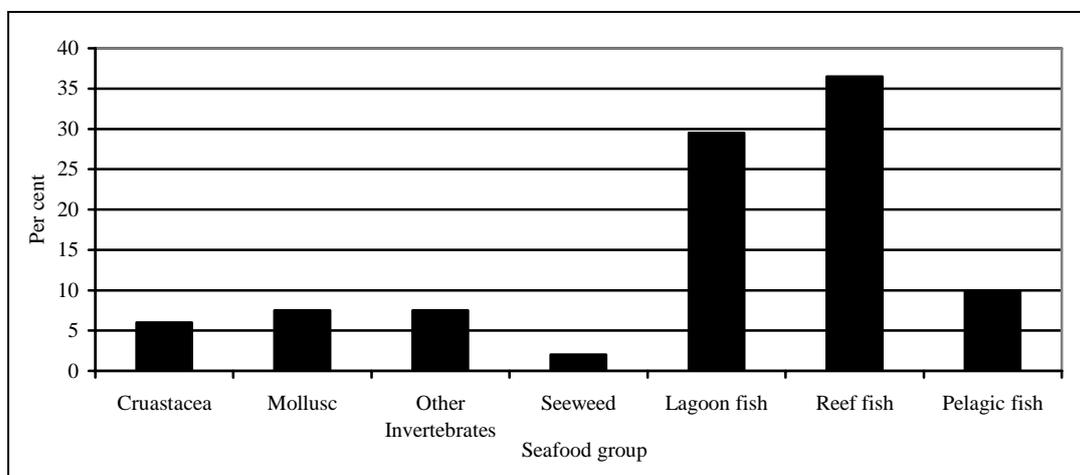


Figure 6: Percentage of total meals containing various seafood groups, Samoa

In the inland stratum, tuna is the single most common type of fish eaten, the only stratum where surgeon fish do not dominate. Other pelagic fish are also more commonly eaten in the inland villages, adding further support to the theory that these villages obtain most of their seafood from the fish market where bycatch from the longline fishery is sold.

Jellyfish (*alualu*), which would be considered by many nationalities as a somewhat unusual food, was reported to be eaten at a surprisingly high number of occasions, and in fact more often than giant clams (*faisua*).

Note that snapshot surveys of this nature are unlikely to pick up any seasonal variation in catches. This survey was undertaken in October/November, and seafood types that were reported to be consumed rarely may be consumed more often at other times. For example, scad consumption was fairly low for this survey, whereas if the survey had been conducted in March/April, when *atule* are abundant, it may have produced higher figures. Another seasonal species is *palolo*, reported to be eaten by 60% of all households, but only once or twice per year, in October and November.

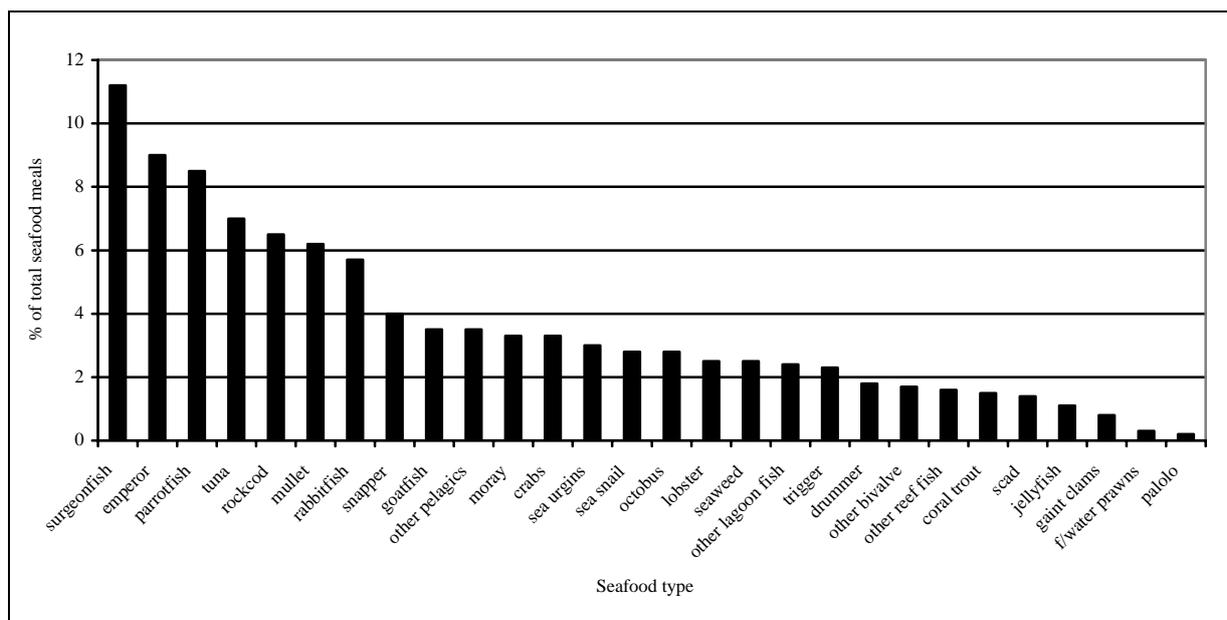


Figure 7. Percentage of meals containing specific seafood types, Samoa.

Seafood consumption per capita

Figure 8 shows the per capita consumption of seafood for the various strata, with 57kg being the overall average for Samoa¹. This is made up of approximately 44kg of fish, and 13kg of invertebrates and seaweed. This is much higher than the world average per capita consumption of fish of around 12kg².

In 1991 it was estimated that fish consumption per capita in Upolu was approximately 21.5 kg per capita, i.e. a subsistence catch of 2,260 mt for the year⁵. The subsistence catch for Savaii has likewise been estimated at around 1400 mt, or 35 kg per capita, for the same period^{6,7}. The total subsistence catch was estimated at 4,600 tons in 1989, or around 30 kg per capita, by collecting data from school students issued with a one week fishing diary⁴.

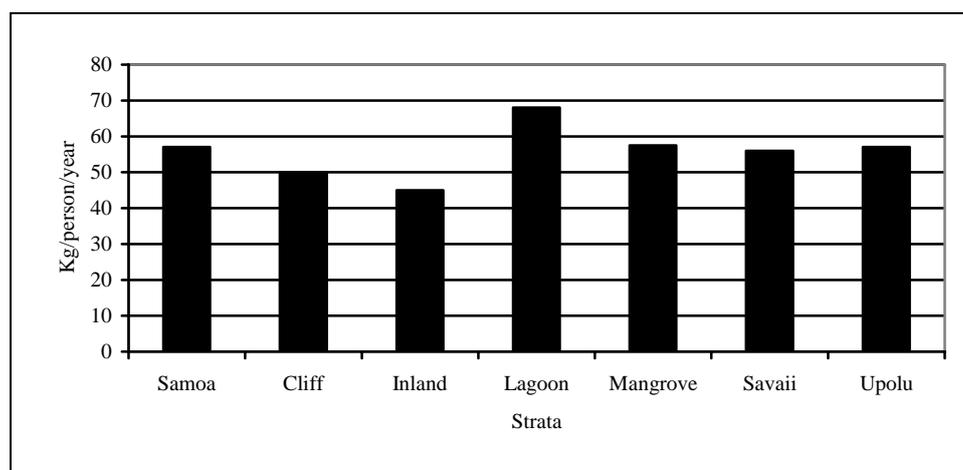


Figure 8: Seafood consumption per capita for each stratum

The higher per capita fish consumption reported from this survey (57 kg) compared to earlier surveys may be partly attributed to the large increase in the commercial longline fishery, and the associated influx of bycatch to the local market. Although high, this consumption rate is not inconsistent with other per capita fish consumption reported for the Pacific³. As would be expected, inland villages consume significantly less seafood than coastal villages.

Other sources of animal protein

In order to determine the relative importance of seafood in the Samoan diet, the survey also gathered information on consumption of other major sources of animal protein. Overall canned fish consumption for Samoa was 14kg per capita, tinned meat consumption was 5.7kg per capita and consumption of other fresh or frozen meat, including mutton flaps, chicken, sausages, salted beef etc was 94kg per capita.

The inland stratum shows the highest consumption of other meats. Rural inland villages are likely to replace fishing activities with farming activities and rely more on local produce such as chicken, pork and occasionally beef than on seafood.

Figure 9 shows the total combined protein consumption (excluding such items as eggs and milk not covered in the survey) for each stratum. This shows an overall figure of 171kg per capita for Samoa. Approximately one third of this comes from seafood. The figures are fairly uniform across all strata though the cliff villages do appear to be a little lower than the others. This may be due to small sample size (2villages, 22 households).

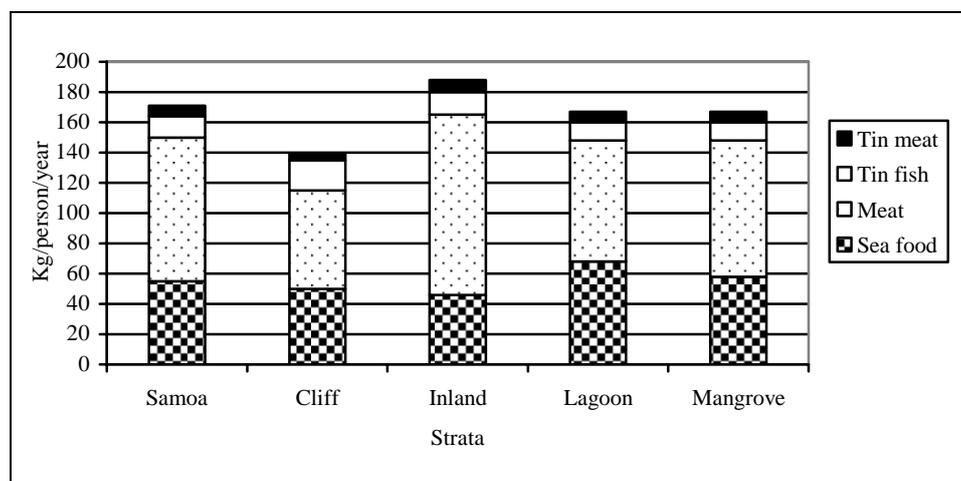


Figure 9: Total annual protein consumption per capita by strata

Values of marine resources

Allocating a dollar value to the consumed seafood allows for an approximation of the value of marine resources to the village economy to be made. A comparison can also be made with the value of other sources of animal protein in the household economy. The following figures are used to calculate these values:

Seafood – An average value of ST16.29 per kg of consumed seafood was calculated, based on the proportions of different seafood types reported to be consumed and a weighted average price for seafood in the Apia markets.

Canned fish – This was valued at establishes an approximate value of the ST4.40 per kg, based on ST2 for a 3453g tin

Canned meat – This was valued at ST15.40 per kg based on an average price of ST7.00 per 450g for the cheaper brands.

Other meat – An average value for meat of ST4.69 per kg based on 362 instances where value and weight of meat consumed were given in the survey, were given, with the 10 highest and 10 lowest excluded as outliers.

Figure 10 shows the relative values of these commodities as well as the total weights consumed. Note that preliminary figures available from the Statistic Department for canned fish imports for the year 2000 are about 30% below those obtained from the survey.

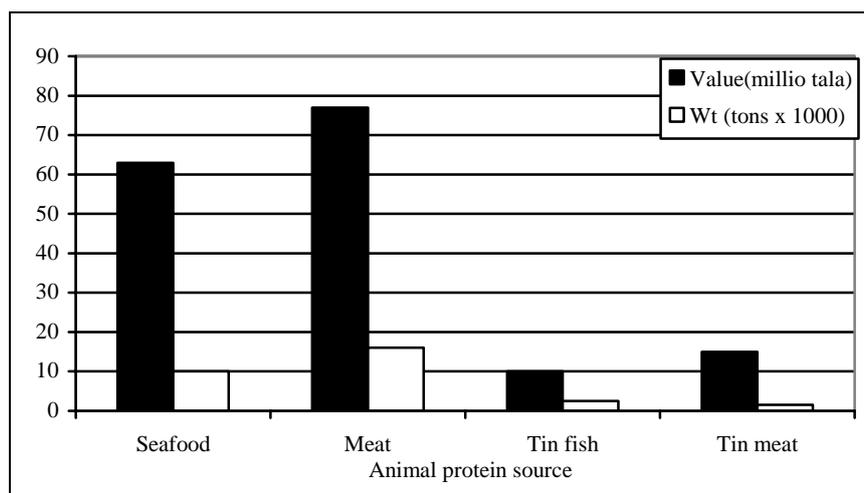


Figure 10: Value in millions of tala and weight in thousands of tons for the major sources of animal protein

Discussion and conclusion

The household survey has documented the importance of seafood in the diet of the Samoan people. It establishes an approximate value of the consumed seafood of over ST60 million per year. When added to the value of fishery exports the gross value of Samoa's marine resources is around ST100 million per year.

The village level fishers harvest seafood weighing 7169 tons, valued at approximately ST145 million. This fishery can be considered to be the most important component of Samoa's fisheries to the Samoan economy. The cost of harvesting the approximately ST145 million worth of seafood is low, with labour being the most significant input. In comparison the cost of harvesting the ST40 million of exported tuna is probably around ST22 million, half of it leaves the country to pay for imports for the industry such as fuel, bait, fishing gear as well as loan servicing.

The value of the seafood to the health of consumers is well documented. The high per capita consumption of fresh seafood in Samoa contributes towards keeping the villagers healthy, saving the country money on health associated costs. The most common fishing methods used are those that require a minimal financial outlay for fishing gear such as boats, nets, etc. These methods include diving and spearing and gleaning. The most popular areas for fishing, again, are those for which a boat is not required, i.e. lagoons.

Considerable time is spent fishing outside the reef. It would be hoped this will in the future, through prudent village-based management relieving pressure on inshore resources. The Fisheries Division can continue to assist by making village fishers more aware of the vulnerability of inshore resources and at the same time increasing their ability to harvest pelagic resources outside the reef through training.

Of the 55 coastal villages and 927 coastal households included in the survey 17 villages containing 303 households had fisheries management plans developed with Fisheries Project assistance. These villages had a catch rate 55% higher than villages without management plans. This suggests that the management plans have had a positive impact on fisheries in these villages, though it may be that those villages that have adopted management were already blessed with more abundant marine resources and thus were more receptive to improved management.

Household fisheries surveys such as this are expensive in terms of labour and associated costs. They can however give an indication of the value of subsistence fisheries as well as provide an indication of the proportion contributed by seafood to the overall subsistence protein consumption of the country. Because of the costs involved, particularly in terms of manpower, they are likely to be repeated only every 3 to 5 years, and it would be useful to obtain some information in these intervening years.

An alternative method to collect subsistence fisheries data, which has been trialed on several occasions, is the use of school students^{4,1,2}. Further consideration should be given to using this method in future, as it can provide a substantial amount of data at relatively low cost, on an annual or even quarterly basis. It has the added advantage that it can be used as a teaching tool to raise awareness about marine resources in school age children. Considerable planning, time, and effort would be required to initiate such a programme, and get it included into the schools regular curriculum. After this initial push, it should require less effort to maintain than a nationwide household survey.

Finally it should be noted that this was a survey based on respondents' recall of their fishing activities and seafood consumption patterns, rather than on direct measurements such as creel surveys or weighing food items to be consumed. Information contained in the report should be viewed with this in mind. However, people's knowledge of their own practices and habits should not be underestimated and may in fact prove more accurate in the long term than other methods of data collection such as 'snapshot' creel surveys and household diaries.

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- 8 Note that there is a slight variation from the number of households reported in Table 1. This is probably due to rounding errors when using the P. of S. weights for each village.
- 9 Passfield, K., A. Mulipola and S. Vaofusi. 1999. *The outer reef slope fishery profile*. Report prepared under the AusAID supported fisheries project. GRM International, Apia.
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