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### Front cover

Community consultation at Lano Savai'i - designed by Sa'olotoga Faasavalu

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## **Samoan customary lands at the crossroads - some options for sustainable management**

*Tu'u'u Ieti Taule'alo, So'oialo David Fong & Patea Malo Setefano\**

### **Introduction**

Land is at the very core of everything connected to the faa-Samoa (Samoa way) - culture, titles, language, aiga (extended family) and people. It is often the cause of major conflicts between individuals, families, villages or districts. Drawn-out disputes are common due mainly to uncertainties over numerous beneficial owners with competing interests. One only has to visit the Lands and Titles Court at Mulinu'u in Upolu and Tuasivi in Savaii to witness the extent in which Samoans would fight to protect the pule (authority) over their customary lands. This forum does not permit legal representation but allows the beneficial owners to argue their own cases themselves before a panel of Samoan judges. For such an important issue in people's lives the subject of land is not openly discussed, except in court, giving the impression that either it is too complex to deal with or too personal to be anybody else's business.

In the mean time customary land while Samoa's main and most important natural resource is also the least utilised. Large areas remain under-developed as traditional owners seem unable or unwilling to determine how to equitably use them. Customary land cannot be used as collaterals making it very difficult to secure development capital. With increased population there is growing pressure on available land and associated resources like biodiversity, water and forests. This paper looks at three aspects of Samoan customary lands - socio-political, legal and economic. It examines the current status of customary lands over these areas and explores ways for sustainable land management

### **Background**

#### *Socio-political characteristics*

The total population in 2001 was 176,848, living in about 330 villages mainly along the coast. Traditional social structures and cultural institutions are very strong in the Samoan society and is based on the aiga (extended family) system. Generally, each aiga is headed by a matai (holder of traditional title) who is responsible for family affairs, particularly in relation to lands and titles. Each village has a fono (council of matai) that controls community order and organisation and provide direction for village development including particular types of land use.

Samoa is comprised of two relatively large islands, Upolu and Savaii, two smaller inhabited islands, Manono and Apolima, and a number of smaller islands. The islands stretch over a distance of about 200 kilometres covering a total land area of about 2,800 square kilometers with about 40 per cent in Upolu and 60 per cent in Savaii. The main feature of Samoan land tenure is the overwhelming majority of land owned by the aiga under customary ownership. Traditionally customary land is awarded through historic claims and by family genealogy and connections. Its utilisation is determined through consensus among all members of the aiga

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who are the beneficial owners. Of the total land area, 81 per cent is held under customary ownership, 15 per cent government land and 4 per cent freehold.

While customary tenure guarantees ownership rights to all Samoans, it is often very difficult, for development purposes, to get agreement from all the different parties involved at any one time. Whenever customary land is affected by any form of development, disputes will invariably arise delaying progress, sometimes for extended periods of time. While knowledge of customary land boundaries handed down by word of mouth are known to family members the pule is often uncertain or disputed

Samoa became independent in 1962 after a period as a United Nations trust territory under the New Zealand administration. It has a Westminster system of government with a Head of State, and a Legislative Parliament consisting of 49 elected members. A Council of Deputies, with three members, is also elected by Parliament. Since 1991 all citizens over 21 years of age are eligible to vote but only matai are qualified to be nominated as parliamentary candidates. The Prime Minister is appointed by the Head of State, being the member that commands the confidence of a majority of members of the Legislative Assembly. The other eight Cabinet Ministers are also appointed by the Head of State from the sitting parliamentarians on the advice of the Prime Minister.

A general sense of political stability is evident, attributed mainly to the security of faa-Samoa and strong linkages to traditional institutions like the aiga, matai and fono. This in turn provides continued backing of the present land tenure, dominated by customary land ownership. Samoans as a group are therefore supportive of the present land system although there have been rumblings by individuals of the need for reforms to ensure that the system serves the national interest generally and the beneficial owners' in particular.

### **Legal implications**

Many aspects of customary lands are enshrined by law as follows:

#### *Constitution of the Independent State of Samoa*

- Article 101 categorises all land in Samoa into customary land, freehold land and public or government land.
- Customary land is defined in Article 101(2) as land held in accordance with Samoan custom and usage and with the law relating to Samoan custom and usage.
- Article 102 prohibits the alienation of customary land except where an Act of Parliament may authorize (a) the granting of a lease or licence of any customary land or of any interest therein; and (b) the taking of any customary land or any interest therein for public purposes.
- Article 103 prescribes the establishment of the Land and Titles Court with exclusive jurisdiction to deal with matai titles and customary land as may be provided by the Act.

#### *The Alienation of Customary Land Act 1965*

- In Section 4, the Minister may lease or license customary land for an authorised purpose such as a public purpose, agricultural, forestry, forest produce, hotel, industrial, commercial or business purpose; as trustee for the beneficial owners.
- Beneficial owner includes any Samoan who is entitled in equity to occupy the customary land or to share in the occupation thereof or to have the income there from or a share in the income paid to or held in trust for him, or who is entitled in equity to any such benefit contingently or in reversion; and does not include any Samoan who holds any such land or interest only by way of trust, mortgage or charge.

### *The Land and Titles Act 1981*

- Establishes the Land & Titles Court with exclusive jurisdiction to deal with all matters pertaining to Samoan titles and Samoan customary land;
- Part III of the Land & Titles Act 1981 deals with customary land:-
- Section 8 defines customary land as: (a) Samoan freehold land (within the meaning of Section 13 of Samoa Land & Titles Protection Ordinance 1934 (SLPTO) declared by the Court pursuant to Section 16 of the SLPTO to be held in accordance with the customs and usages of the Samoan people; (b) Samoan freehold land (within the meaning of Section 13 of the SLPTO where further to S17 of SLPTO, there has been a recital or declaration made pursuant to a Government or other grant, will, conveyance, lease, assurance or other deed or document that such land to be held in accordance with the customs and usages of the Samoan people; and (c) Any land ordered by the Court to be customary land under Section 9 of this Act.
- In Section 9, an Order of the Court made with the consent of all the parties declaring such land to be customary land.
- Section 10 provides for the survey of customary land as required by the Registrar to define any land or boundary the subject of a petition or in respect of an application for a pulefaamau (declared authority).
- Sections 11-13 provide for the registration of customary land. Section 11 requires the Registrar of the court to transmit to the Land Registrar every judgment of the court concerning the title or status of any customary land; and every Order or Declaration made under Sections 8 and 9. The Land Registrar is required by Section 12 to register every judgment, order or declaration received under Section 11; and to enter a memorial in the Land Register to that effect.

### *Taking of Lands Act 1964*

- Provides for the compulsory taking by government of customary land and freehold land for public purposes in return for a fair and just compensation;
- Sets out the procedure for taking;
- Provides for application to be made to Court to determine what a fair and just compensation is in the event that compensation offered by government is not accepted by the owners of the customary land taken.

### *Village Fono Act 1984*

- Section 5 empowers the Village Fono to (a) make rules for the maintenance of hygiene in the village; (b) to make rules governing the development and use of village land for the economic betterment of the village; and (c) the power to direct any person or persons to do any work required to be done pursuant to rules made in accordance with the powers granted or preserved by paragraphs (a) and (b).
- Section 5(3) - Every person is guilty of village misconduct and may be punished by his Village Fono by failing to obey any rule or direction made or given in accordance with the powers granted or preserved by this section.
- Punishment is in accordance with the custom and usage of the village and includes (a) the power to impose a fine in money, fine mats, animals or food; or partly in one or partly in others of those things; and (b) the power to order the offender to undertake any work on the village land.

### **Economic implications**

While land and asset valuation had been practised in Samoa for some time, it is only in recent years that attempts were made to formalise it as a land management tool and incorporate it into national economic development. Some of the main problems faced at present include: (a) absence of a formal valuation system leading to inconsistent results; (b) lack of qualified valuers; (c) absence of legislation to regulate the valuation system and practice.

In 2000 Cabinet approved the valuation practice policy to be administered by the Ministry of Natural Resources and Environment (MNRE). The policy deals with the licensing of valuers setting out the required qualification and experience as well as the procedures for obtaining licences and annual practicing certificates. A Valuation Licensing Committee was established to consider applications and make recommendations to the Minister (on licences) and Chief Executive Officer (on practicing certificates) for approval. This Committee is also responsible for overseeing the work of graduate-valuers until they acquire the requisite experience for licensing.

The proposed MNRE principal legislation reviewed the Ministry's functions and responsibilities and identified land valuation as one of its new functions. Draft land valuation regulations have also been developed and will be submitted to Cabinet for approval once the MNRE Bill is passed. These will facilitate national valuation practices as well as control the valuation sector. In the absence of relevant legislation, however, it is extremely difficult to enforce proper standards or monitor compliance with good practice.

A valuation section has been established within the technical division of the MNRE. Amongst its tasks are the compilation of land transaction prices from the land register into a database and the publication of quarterly average prices for the different valuation zones throughout the country.

In the absence of proper standards there are wide variations and numerous inconsistencies in the estimates of land values. This is a major concern for investment planning where values for mortgagee sales were well below values of associated loans. Customary lands as acquired by the government for public purposes are particularly susceptible to these uncertainties as there are no market values for such. In a recent case involving Salelologa village in Savaii, the government valuer had assessed land for a new township at \$3.2 million while the same land was valued privately at \$44 million.

### **Future options**

The governance of Samoan customary lands has seen little change in the past two thousand years. It has remained firmly under family ownership, controlled by the matai with the guidance of the Village Fono. Land owners have a strong reluctance to compromise their pule to choose what to do with their own land<sup>1</sup>. Such personal attitudes were formed over many years under the present system. Living in an isolated island environment has reinforced the socio-political context of insularism leading to a slow pace of change and democratic reforms<sup>2</sup>. There is an inertia that conspires to stop things getting done and the personal partisan politics can create insecurity and poor institutional memory<sup>3</sup>. Entrenched traditional mindset and cultural values over land have made it extremely difficult to initiate change for sustainable management.

The focus then is to improve the governance of customary lands by engaging the whole community in a partnership for change. Somehow the matai must encourage family participation in land management and promote the transparent allocation of land resources.

Lack of certainty over land access seems to drive people away from the village to the urban area or migrate overseas. The taking of customary lands for public purposes should also be made more transparent so that the beneficial owners are closely involved in the process<sup>4</sup> and share the benefits from such transactions.

A growing trend in customary tenure is the individualisation<sup>5</sup> of customary lands. This is where land is claimed by whoever develops it from virgin bush and can be passed on from parents to their children. While such arrangement would undermine the communal ownership of customary lands and may lead to even more restricted access, there is little evidence that this is a major concern at this stage and that it will necessarily lead to any significant change in family control of customary lands generally.

Through wide community consultation, policies should be developed to ensure the appropriate utilisation and equitable access to family land. Environmental impact assessment is required for land development including the appropriate utilisation of lands in accordance with soil capability. This will ensure sustainable use and the protection of land and other resources.

To avoid uncertainties the ownership of customary land must be clearly defined by law, with the matai as the titular head of every aiga to be the trustee of family land. The matai therefore stands in a fiduciary relationship towards the family members who, along with the 'matai' are the beneficiaries of the customary land trust. In all customary land matters therefore, the matai represents the interests of his family; he acts on behalf of his family and he holds customary land on behalf of his family; so that every member of the family including himself shares in this trust ownership of customary land. There is therefore no room for the matai to act alone for his own personal interest or for the interests of his immediate family only; otherwise this will constitute a breach of trust. This is the common law doctrine of trust that should be adopted in the administration of customary lands.

With the matai assuming full control of customary lands it is not unusual to find a matai using the benefits from customary land - whether by way of leasing, licensing or compensation from the taking of customary land by government for public purposes - for himself and his immediate family at the exclusion of other beneficial owners. While the law is designed for the matai to receive the rents or compensation monies; the law does not provide safeguards on how this money ought to be applied by the matai in recognition of his position as trustee for the aiga. The law as it stands does not go far enough to provide for an equitable distribution of benefits from customary land amongst all the beneficial owners of customary land.

The legal boundaries of customary land vested in Samoan family-titles are not always clearly defined. Much of this problem is manifested in numerous cases coming before the Lands & Titles Court to define boundaries of customary land for disputed parties. Section 10 clearly provides for the survey of customary land whenever the Registrar is of the opinion that a survey is necessary to define any land or boundary the subject of a petition or in respect of which an application for a pulefaamau has been made. However this legal requirement is seldom practised and followed. This failure to follow the requirement of the law to survey customary land has resulted in many of customary land that have become the subject of petitions before the Lands & Titles Court on land-boundary disputes as well as pulefaamau matters in Samoa have not been surveyed to define their legal boundaries.

Equally important is the requirement for the registration of customary land. At present customary land is not registered in the Land Register created and established under the Land Registration Act 1992/1993. Consequently, the legal boundaries of customary land are not clearly defined. Much of this problem arises from the failure to observe and follow the requirements of the Lands & Titles Act 1981 relating to the registration of customary land. This could be facilitated under present legislation where the Registrar of the Court is required to transmit to the Land Registrar every judgment of the Court concerning title or status of any customary land or interest in such land. The Lands & Titles Court, however, would have to ensure that the boundaries approved by its decision are indeed the surveyed boundaries prepared for registration.

The most challenging issue for customary land is - can it be used as security for loans to allow for its development for the benefit of beneficial owners? Given the law as it stands, with the exception provided by the leasing and licensing of customary land, the simple answer is 'no'.

The safeguard for customary land built into the Samoan Constitution is the prohibition of the alienation of customary land. Much can be said of the wisdom of this constitutional safeguard; for without this restriction, much of the customary land would have been lost by sale. Customary land cannot therefore be mortgaged so there is no way under present legislation that customary land can be offered as security for loans for development purposes. One such option would be to involve the government in the leasing process by providing a guarantee that would encourage financial institutions to feel compelled and confident to provide finance for the development of customary land. The Government should develop legal and financial mechanisms to facilitate the use of lease agreements to guarantee loans as is the case with freehold lands. Agreements can also be worked out to allow for the subleasing of customary land so that funds provided by financial institutions could be repaid within the leased term where mortgagees have defaulted on their loans.

Appropriate legislation should be established to facilitate valuation practice, incorporating the licensing procedures as per the Cabinet policy and setting out the professional standards and ethics and compliance requirements. A national valuation system for customary lands should be established based on the local needs and conditions. Investment decisions by financial institutions should then be governed by approved land values incorporating best land use practice. In other words the value of a proposal to plant crops in areas with inappropriate soil capabilities would be lower than otherwise. With only five local licensed valuers the training of more valuers is essential to maintaining standards.

It is expected that in the long-term the private sector will provide valuation services while the MNRE will become the valuation regulatory authority. During the early stages of industry development, MNRE will regulate practice until such time when capacity is available to self-regulate. As part of its functions MNRE will continue to publish the mean land prices on a quarterly basis based on registered sales. Any substantial deviation from such should be carefully assessed and the implication of any assumptions being adopted should be fully considered.

To provide investment certainty it is very important that land values are consistent and based on best practice. Leasing rents should be determined based on land values through open consultations between land owners and lessees and the banks. Reliable land values are critical



to the development of viable market values and the promotion of customary lands for loan guarantees.

### **Conclusion**

The governance of Samoan customary lands is indeed at the crossroads - to maintain the status quo and alienate many of the population who will drift to Apia or migrate overseas, or to embark on changes that will promote community development and nation building. The strong demand for freehold land would seem to indicate that customary lands are not meeting people's needs<sup>6</sup>. To achieve sustainable development there is an urgent need to undertake reforms in the management of customary lands and Samoans themselves must accept the need for such change<sup>7</sup>.

Without popular acceptance for change there is no political commitment to support<sup>8</sup> it. This is the first step in the process of instituting measures to effect change through genuine and wide consultation<sup>9</sup> amongst all affected stakeholders. In this regard the role of the village fono is paramount<sup>10</sup> as it controls the structures of social systems that are responsible for control and management of village level activities<sup>11</sup>. There is an urgent need to adapt traditional attitudes to reflect the expectations and aspirations of the present population. Uppermost amongst these is the need to be inclusive, equitable and for greater democracy in land access and allocation.

Sharing the rewards and benefits from leasing and licensing of customary lands amongst the beneficial owners is central to the new reforms. It will necessitate changing the law to provide mechanisms to ensure the equitable sharing of benefits by customary landowners instead of the matai enjoying a monopoly on these rental monies from the leasing and licensing of customary land. Finally establishing a formal framework for land valuation will ensure investment certainty in the national economy. It should also develop the basis for a financial market in customary lands based on leasing.

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<sup>1</sup> Taule'alo, T.I. 2002. Planning for sustainable drainage and sewerage services in Apia. In Dubois-Taine (ed.) Sustainable development urban services. Noumea semina report, November.

<sup>2</sup> Jones, P. 1996. Changing faces of the islands. *Australian Planner* 33(3),

<sup>3</sup> McEloy, J.I., Albuquerque, K. & Towel, E. 1987. Old problems and new directions for sustainable development in the islands. *Ekistics Journal of Human Settlement*, 323/324.

<sup>4</sup> Peteru, M.V. 2003. Land acquisition and resettlement framework. Report for the Infrastructure Asset Management Project Phase II, MNRE.

<sup>5</sup> O'Meara, J.T. 1990. *Samoan planters: traditional and economic development in Polynesia*. Fort Worth, USA: Holt Rinehart & Wilson)

<sup>6</sup> Fairbairn-Dunlop, P. 2001. Changing perception of land: Samoa 2000. *Samoan Environment Forum* No. 2.

<sup>7</sup> Taule'alo, T.I. 2000. Unsustainable village development: reflections on changes at Lepa. *Samoan Environment Forum* No. 1

<sup>8</sup> Taule'alo, T.I. 2001. Urban Planning in Samoa - issues for decision-making. *Samoan Environment Forum*. No. 2

<sup>9</sup> Taule'alo, T.I. 2000. Planning for sustainable resource management at Uafato. *Samoan Environment Forum* No.1

<sup>10</sup> Jones, P. & Kohlhase, J. 2002. Urban planning and management in Apia - everybody's or nobody's business. *Samoan Environment Forum*, No. 3.

<sup>11</sup> Jones, P., Taule'alo, T.I. & Kohlhase, J. 2002. Growing Pacific towns and cities. *Australian Planner* 39(4).

# Ethnotaxonomy of breadfruit cultivars in Samoa<sup>1</sup>

*Namulau'ulu G. Tavana* \*

## Introduction

Pacific islanders have developed an elaborate system of folk taxonomy used to distinguish between and assign names to different breadfruit cultivars. Distinctions are based on fruit shape, flesh color, presence of seeds, cooking or storage qualities of the fruit, leaf shape, and horticultural requirements (Ragone, 1995, 1997)<sup>2</sup>. Names, and in some cases, descriptions, of up to 30 varieties have been recorded. (Wilkes, 1845; Setchell, 1924; Buck, 1930; Christophersen, 1935; Parham, 1966; and Ragone, 1991, 1997)<sup>3</sup>. The purpose of our study was to determine how many breadfruit cultivars there are in Samoa and how they are named.

## Methods

*Interview Techniques* - In July 2000, 354 Samoans living in Samoa and American Samoa were interviewed about their knowledge of breadfruit types. Villages or towns chosen for the study were Saipipi and Falealupo on Savai'i, and Apia (the capital city) in the independent state of Samoa; and Olosega and Ofu of the Manu'a Group, Pago Pago (the capital city) and Afono on Tutuila Island in American Samoa. Cultural experts in the villages of Tafua and Falealupo, Savai'i, were also interviewed. The interviews were done in the Samoan language by two-person teams and the responses were recorded on a standard form. Interviews were conducted in homes and other areas of work and transit in the town areas. The age, date and place of birth, gender, occupation, place of residence, and marital status of each person interviewed were recorded. Each Samoan was asked to name as many different types of breadfruit as they could, together with information about local availability of each type, and whether or not each type had seeds. The names were then read back to the interviewee to ensure their accuracy, and they were asked if they could think of any more names.

One group interview with 43 Samoan chiefs was conducted during a chief's council meeting after a kava ceremony in Falealupo village. Some of the Samoans, particularly those deemed to be cultural experts (see below), were interviewed at length to elicit detailed information about uses, cultivation practices, descriptions, and naming rules or patterns of rules used to name breadfruit cultivars. Videotapes and/or audio recordings of these interviews were made. Herbarium vouchers of different breadfruit types were made and deposited in the herbarium of the National Tropical Botanical Garden (PTBG).

*Recording of data; definitions of idiosyncratic and expert respondents* - Interview data were entered into a spreadsheet on a portable computer in the field and grouped according to village. A saliency table of breadfruit types (Table 1) was prepared by ranking the breadfruit varieties recorded in the interviews by order of frequency of mention. If there was variation in the binomial or monomial form of a breadfruit variety we chose the form used by the majority of the respondents. Where there were slight differences in spellings or pronunciations, we adopted a standardized spelling/pronunciation used by the majority of the respondents, e.g., 'ulu ea and 'ulu uea were scored together as 'ulu ea for statistical purposes.

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Before analyzing the data, we sought (1) to remove idiosyncratic responses and interviews, and (2) to identify and highlight expert respondents. We regarded any breadfruit name as idiosyncratic if it was mentioned by only one informant, unless that informant was an expert as defined below. We also defined as idiosyncratic any informant who mentioned two or more idiosyncratic taxa during their interview. Idiosyncratic names and interviews were excluded from our statistical analyses. We identified and defined as an expert any individual (1) who reported a number of breadfruit cultivars equal to or greater than one standard deviation above the mean numbers of names reported by all informants; and (2) whose reported names included 90% of those cultivars that were known by at least half of all respondents.

Each breadfruit name in the saliency table was scored as an ambiguous monomial (AM), unambiguous monomial (UM), ambiguous binomial (AB), or unambiguous binomial (UB). This was accomplished by comparing the name to two comprehensive dictionaries of the Samoan language published by Milner (1966)<sup>4</sup> and Pratt (1861)<sup>5</sup> and checking the terms with two bilingual speakers of English and Samoan. A term was regarded as ambiguous if it conceivably could refer to another object other than breadfruit.

## Results

*Interviews* - We found that breadfruit names in Samoa invariably consist of a binomial composed of a generic level term 'ulu modified by a specific epithet (Table 2), or a monomial in which only the specific level epithet is used and the generic level term is understood. Monomials can also sometimes be expressed as several words that form a coherent specific epithet. In a sense, however, all breadfruit varietal names in Samoa are binomials, since when only the specific epithet is used, the generic term 'ulu is understood. This understanding was made explicit to us by many informants, who, if questioned intensely or if they thought we were naïve, would add the generic level term 'ulu to the description to emphasize that they were indeed referring to a type of breadfruit. All persons interviewed used the generic level term 'ulu for breadfruit, with the single exception of the village of Tafua, Savai'i where out of deference for the paramount chief "Ulu Taufua'asisina, the respect word for breadfruit, fa'atau, is always substituted for the term 'ulu.

Table 1. Saliency of Samoan breadfruit cultivar names

Name	Respondents	%	Rank	Binomial/ Monomial	Translation	
ma'afala	(308)	315	90	1	UM	–
ulu ma'afala	(7)					
puou	(283)	286	81	2	UM	–
ulu puou	(3)					
aveloloa		238	68	3	UM	–
maopo	(214)	218	62	4	UM	–
ulu maopo	(4)					
ulu ma'a		195	56	5	AB	solid(iii)
ulu ea	(185)	194	55	6	AB	Uvea Island
ulu uea	(9)					
ulu manu'a		131	37	7	AB	Manu`a Islands(iv)
momolega		116	33	8	UM	–
ulu sina	(79)	80	22	9	AB	white(i)
ulu asina	(1)					
sagosago	(55)	59	17	10	UM	–

ulu sagosago	(4)					
peti	(42)	56	16	11	AM	fat(i)
ulu peti	(14)					
ulu tala	(51)	54	15	12	AB	spiny(i)
ulu talatala	(3)					
fia puou	(34)	38	11	13	UM	like a puou(ii)
ulu fia puou	(1)					like a puou(ii)
fa'a fia puou	(3)					like a puou(ii)
ulu fefelo	(22)	33	9	14	UB	–
fefelo	(11)					
ulu initia		29	8	15	AB	India breadfruit(iv)
ulu fau		26	7	16	AB	fibrous(iii)
mase'e	(21)	23	7	17	UM	–
ulu mase'e	(2)					
ulu se'e		19	5	18	AB	sliding(iii)
ulu kiripati/kilipati		11	3	19.5	AB	Gilbert Islands(iv)
gutufagu	(9)	11	3	19.5	UM	neck of the bottle(i)
ulu gutufagu	(2)					
puou fatu		10	3	21	UM	seedy puou(ii)
ulu falaoa		8	2	22	AB	bread loaf(i)
vasivasi	(5)	6	1	23	UM	–
ulu vasivasi	(1)					
puou tala		5	1	24	UM	spiny puou
ulu fiti		4	1	26	AB	Fiji(iv)
tui tu		4	1	26	AM	spiny(iv)
fia maopo		4	1	26	UM	like a maopo(ii)
puou maopo		3	1	28.5	UM	looks like a maopo(ii)
maualuga		3	1	28.5	AM	high(v)
ulu faga		2	1	31	AM	eel trap <sup>1</sup> or bay
malali		2	1	31	AM	smooth(i)
matatelele	(1)	2	1	31	AM	big eye(i)
ulu matatelele	(1)					
ma'afala tala/talatala		1	1	33	UM	spiny(i)
puou tutunu		1	0	33	UM	roasting(iii)
ulu toso		1	0	33	AB	pull(vi)
ulu to'elau		1	0	33	AB	Tokelau Islands(iv)
ulu tau		1	0	33	AB	pluck(vi)
ulu sasalapa		1	0	33	AB	Custard Apple(i)
puou fefelo		1	0	33	AM	puou like a fefelo(ii)
ulu fagalooa		1	0	33	AB	Fagalooa village(iv)
avesasa'a		1	0	33	UM	–
ulu pase'e		1	0	33	AB	lazy(ii)
ulu mama		1	0	33	AB	light weight(i)
segatoa		1	0	33	UM	–
po'eloa		1	0	33	UM	–
fia ta		1	0	33	AM	wants to be slashed(vi)

(i) appearance, (ii) comparative, (iii) culinary, (iv) geographical, (v) descriptive action, (vi) respect term

There are several different categories of breadfruit names (See Table 1). One type of name reflects the appearance of the breadfruit, such as "ulu sina" or "white breadfruit," while other names are geographical, reflecting the putative origin of the variety such as in "ulu manu'a" or "Manuan breadfruit." Another type of breadfruit name reflects its culinary properties as in

"ulu ma'a" or "hard breadfruit." Some breadfruit names are comparative in the sense that they reflect overall similarities to another variety such as in "fia puou" - "wants to be like a puou. Many breadfruit names, such as puou, are irreducible in the sense that they either cannot be translated or their meaning has been forgotten by contemporary Samoans.

Table 2. Examples of Samoan breadfruit monomials and binomials

Generic term	Specific modifier	
Binomial	'Ulu	sina
Monomial	∅	ma'opo
Monomial with two words in specific epithet	∅	fia ma'opo
Binomial with honorific	Fa'atau	ma'a

∅ - generic term is understood

*Recording of data; definitions of idiosyncratic and expert respondents* - Using the redacted data set (determined by excluding idiosyncratic names and four informants) and by combining monomial/binomial variants (using a majority rule) and cognates, we recorded a total of 46 different names for breadfruit varieties during individual interviews with 350 Samoans. The redacted data set excluded four interviews that were determined to be idiosyncratic yielding a "Babble Statistic" or B.S. level of 1% for the entire data set. The effect of excluding these four interviews (Table 3) had only a small effect in the mean number of taxa reported (6.3 redacted, 6.4 unredacted) and no effect on the median number reported (6), with the number of breadfruit varieties reported ranging from 0 to 20.

We found that 63 of the 354 individuals who were interviewed reported 10 or more names; which is one standard deviation above the mean number of names known by all informants. Three of these individuals were excluded as experts because they did not meet the second expert criterion: they did not know 90% of the cultivar names known by more than half of all informants. Therefore, 60 individuals were identified as cultural experts.

Table 3. Summary statistics: Number of breadfruit names known by Samoans.

	All respondents/ all names	Final respondents/ final names	Experts/ final names
Mean	6.4	6.3	11.5
Median	6.0	6.0	10.5
Minimum	0.0	0.0	10.0
Maximum	20.0	20.0	20.0
Respondents	354.0	350.0	60.0

Since a histogram of all data indicated that the data were not normally distributed and since the data do not come from random samples, we decided to use non-parametric statistics in our analysis.

*Binomiality, Saliency, and Linguistic Ambiguity*:- Using the redacted data set, i.e. the entire data set less idiosyncratic interviews, we sought to study the possible relationship between the saliency of breadfruit names and their binomiality. The saliency table - constructed by ranking the breadfruit names in order of

frequency of mention - was analyzed for prominence of binomial versus monomial ethnotaxa to see if monomials were used to describe more salient varieties. To determine if binomial taxa are less salient than monomial taxa we tested

H<sup>0</sup> = there is no relationship between binomiality and saliency

H<sup>1</sup>= there is a relationship between binomiality and saliency

Using a Wilcoxon rank sum test (Remington and Schork 1970, Snedecor and Cockran, 1989) and testing at the 0.05 level for significance. Ties were scored by using the average of the ranks of tied numbers. The test statistic ( $z = -0.83$ ) was not significant at the 0.05 level so Hypothesis H<sup>1</sup> was rejected: there is no relationship between binomiality and saliency. To limit influence of infrequent names, the two hypotheses were again tested with the Wilcoxon Rank-Sum using only the 66% most salient taxa. In this second test, H<sup>1</sup> was again rejected ( $z = 0.74$ ). A third test, comparing only the top ten most salient names, was again performed, using a W statistic rather than Z because of the small sample size. In this third test, H<sup>1</sup> was rejected a third time, so we can unequivocally state that there is no significant relationship between saliency and binomiality in breadfruit names reported by 350 Samoans.

### The hypotheses

H<sup>0</sup> = there is no relationship between ambiguity and binomiality

H<sup>1</sup>= there is a relationship between ambiguity and binomiality

were tested by constructing a 2 x 2 contingency table, with the columns representing monomial names and binomial names and the rows representing linguistically ambiguous and linguistically unambiguous names (Table 4). An O<sup>2</sup> statistic was calculated and tested at the 0.05 level for significance using Yates correction for continuity (Snedecor and Cochran, 1989)vi.

An O<sup>2</sup> statistic was calculated (O<sup>2</sup> = 22.2,  $p < 0.001$ ); and H<sup>0</sup> was rejected. Binomiality is significantly related to linguistic ambiguity among our 350 informants. However when the saliency table is analyzed for a relationship between linguistic ambiguity and saliency, the relationship is even stronger: 82% of all breadfruit types are either unambiguous monomials (UM) or ambiguous binomials (AB); e.g., binomials where specific epithet alone, out of context, could conceivably refer to another object than breadfruit.

Table 4: 2 x 2 contingency table

	Binomial Observed (Expected)	Monomial	Totals
Ambiguous	19(11.3)	7(14.7)	26
Unambiguous	1(8.7)	19(11.3)	20
Totals	20	26	56

*Age, gender, westernization and cultural competency* - We sought to determine if there is a relationship between the age of the respondent and number of breadfruit names reported by calculating the median number of taxa reported by respondents in each of nine age classes (Class 1 = ages 0-9; Class 2 = ages 10-19; etc.). These data were used to test these hypotheses

H<sup>0</sup> = there is no relationship between age class and number of breadfruit names reported

H<sup>1</sup>= there is a relationship between age class and number of breadfruit names reported

by calculating a Spearman's rank correlation coefficient and testing for significance at the 0.05 level.

Table 5: Knowledge of breadfruit names based on age class.

Age Class (Years)	Mean	Rank	Difference	D squared
1 (0-9)	1.40	9	-7.60	57.76
2 (10-19)	4.10	8	-3.90	15.21
3 (20-29)	6.10	7	-0.90	0.81
4 (30-39)	6.70	6	0.70	0.49
5 (40-49)	7.40	5	2.40	5.76
6 (50-59)	8.00	3	5.00	25.00
7 (60-69)	9.20	1	8.20	67.24
8 (70-79)	8.60	2	6.60	43.56
9 (80-89)	7.50	4	3.50	12.25
				sum 228.08
				r = -0.90

Since at 7 (n-2) degrees of freedom, the two-tailed significance level for the correlation coefficient  $r$  at the 0.01 probability is 0.798,  $H^0$  is rejected, showing a strong relationship between age class and mean number of breadfruit taxa reported.

We wished to determine if the location of one's residence had any influence on the number of breadfruit names that were known as well as whether gender played a role in such knowledge. Ordinarily an analysis of variance would be used to see if such differences were important. However, since our data are not randomly collected independent samples with normal distribution, and since sample variances were not equal for the sub-samples, such an ANOVA analysis with the parametric F statistic would be inappropriate. We therefore used the non-parametric Kruskal-Wallis test, which generates a statistic comparable to that of an ANOVA to test using the  $O^2$  distribution at the 0.05 level of significance for the following hypotheses

$H^0$  = there is no difference between villages in the number of breadfruit names known

$H^1$  = villages differ in the number of breadfruit names known.

This test yielded an H statistic of 123.6. Since multiple ties occur in the data set, we corrected this statistic by dividing by the correction factor

$$1 - (T^3 - T) / N^3 - N = 0.99$$

Where T is the number of ties for each observation and N is the sample size. Our corrected statistic  $H_{corr} = 124.7$ . At seven degrees of freedom, since H exceeds 203, we are able to reject  $H^0$  at  $p < 0.005$ , hence place of residence is highly significant in influencing number of breadfruit names known.

Table 6. Knowledge of breadfruit names based on place residence.

	Ofu	Olosega	Afono	Pago	Apia	Falealupo	Saipipi
Mean	5.1	5.3	5.5	5.0	5.6	7.5	8.7
Median	5.0	5.0	6.0	5.0	5.5	7.0	8.0
Minimum	0.0	0.0	0.0	0.0	1.0	1.0	0.0

Maximum	10.0	11.0	11.0	11.0	11.0	14.0	20.0
Respondents	51.0	52.0	28.0	59.0	34.0	33.0	88.0

We also tested for gender differences using the Kruskal-Wallis test. Our hypotheses were:

$H^0$  = there is no difference between genders in the number of breadfruit names known

$H^1$  = men and women differ in the number of breadfruit names known.

For the total of 192 women and 158 men in our sample, the corrected H statistic was 21.7, allowing us to reject  $H^0$  at the  $p < 0.005$  level. Hence men know significantly more breadfruit names than women.

Table 7: Knowledge of breadfruit names based on gender

	All females	All males	Expert females	Expert males
Mean	5.6	7.1	10.9	11.9
Median	6	7	10	11
Minimum	0	0	10	10
Maximum	19	20	19	20
Respondents	192	158	23	37

## Discussion

All of us were profoundly impressed by the diversity of breadfruit varieties -46- recognized by the Samoans in our sample. We are unaware of any major supermarket in the United States that stocks anything approaching this variety of crop diversity, which the Samoans grow in and about their villages. Our data set though, allows us to do more than to celebrate the richness of Samoan cultivar diversity. The expansiveness of our data set, with a redacted sample size of 350, allows us to rigorously test several hypotheses about folk taxonomy.

We have here adopted the five criteria of Brown (1985, pp. 44-45)vii in determining which Samoan breadfruit names are binomials or monomials: 1) one constituent of the label stands on its own, 2) one constituent is not a major life-form ("tree"), 3) morphologically dissimilar (i.e., sea horse is not a type of binomial), 4) shared generic constituent, and 5) composite terms "mate of", "like", "similar" are not binomials.

The suggestion that monomials should be used in folk taxonomy to label highly salient folk taxa has been repeatedly asserted for the simple reason that "binomial names for lower-salience referents are more easily remembered than unitary lexemes for those referents." Brown (1985, p. 52). In a key paper in the development of the theory of ethnotaxonomy, Brown argues that the relationship between saliency and monomiality should be increased in agricultural peoples: "as the size of a folk biology taxonomy increases with a shift to agriculture, the percentage of taxa labeled binomially is augmented as well... referents labeled by overt marking tend to be less salient... Since binomial labels are overt marking constructions, their referents (biological taxa) typically are of lower salience than biological classes labeled by unitary lexemes." (Brown 1985, p.50)

Such a common-sense result is not immediately intuitive to all observers. Terrence Hays has argued that "binomialization might be common in sets of taxa that are highly salient; i.e., domesticated plants or animals of which varieties or species (binomially labeled) would have



resulted from domestication...binomialization is likely to occur in distinguishing among closely related taxa, and that these are especially common with domesticated plants, where botanical diversity (along few or a single dimension has been fostered and then recognized with binomial expressions." (Brown 1985, in a note on p.52).

To this suggestion, Brown (1985, p.52) responded that from his literature sample, "54% of 163 cultivated plants have binomial labels versus 17% of the 551 non-cultivated ones... Binomially labeled domestic taxa dominated by the same generic class tend to be morphologically very similar, differing from one another only with respect to variables of one, two, or three dimensions at most...Another manifestation of lower salience would be binomialization of their labels."

What is needed to carefully test these competing hypotheses has been a direct indicator of saliency in a folk setting. We have here adopted frequency of mention as a standard interview as an index of saliency of a folk taxon. Using that standard, we were surprised to find no support for either Brown or Hays; there is no statistical association whatsoever between saliency and binomiality for names of Samoan breadfruit varieties. It could be argued that our restricted taxonomic focus (i.e., we here consider only breadfruit varieties), makes our study an inadequate analysis of the broader theory. However, we do note that by restricting ourselves to a single crop, "Intensity of Cultural Use" (Turner 1988) is held constant, so our data on comparative saliency are strictly comparable. Other studies on other crop varieties in other places would add considerable power to this basic approach.

Our data also found some partial support for the argument that there is often considerable disagreement among indigenous societies on folk names. Working with a different agricultural people in New Guinea, Stilltoe (1980:141) found that all Wola hold in common a set of cultivar names, but when forced to apply these names to actual plants, "they only agree about 50% of the time about which name goes with which plant. He surmised that disagreements over naming plants most likely occurs at this taxonomic level since such identifications frequently depend on fine details or morphological variations (Stilltoe, 1995).

Although we did note some slight differences in the use of monomial or full binomial terms (as might be expected when attempting to clarify a plant name for a foreign investigator), we found surprising little variation in plant names, once cognates with superficial differences were clumped together in the analysis. What surprised us further was not the differences in names, but the overall consensus in names which were recorded on islands over 400 km apart. The number of idiosyncratic responses, such as those invented on the spot to please a persistent investigator, was very low. Less than 1% of our interviews were excluded from analysis because of idiosyncrasy. However, in all settings, we did find two broadly different realms of ethnobotanical knowledge: common knowledge and expert knowledge.

A key outcome of our study was being able to quantify what makes an individual an expert. Future ethnobotanical fieldwork in Samoa will be greatly facilitated by the fact that we have identified a large group of experts who we can work with and conduct in-depth interviews about breadfruit and other cultural practices. For example, we will work extensively with some of these experts to ascertain the conservation status of breadfruit varieties in Samoa, especially those that were only known by one or a few individuals. We surmise that varieties such as ma'afala and puou, known by 90 percent and 81 percent, respectively, of the Samoans we interviewed are common in cultivation and therefore conserved in situ, whereas the more uncommon varieties may be at risk and require conservation strategies. This method can also

benefit students and researchers conducting ethnobotanical projects elsewhere. It is possible in a fairly short time to interview a large number of people about a specific topic and from that group quickly and accurately identify those who possess expert knowledge. Working primarily with expert individuals is a useful, and timely, strategy to maximize obtaining reliable, specialized, and verifiable information. In our sample, 17 of the experts were in their 60s, and six were 71 years old or older; several of these were in very poor health. It is critical that the traditional cultural knowledge of these elderly experts be documented before it is lost.

We found that place of residency has a strong impact on the amount of knowledge about breadfruit names that an individual possesses. As might be expected, the traditional villages of Saipipi and Falealupo on the remote island of Savai'i score highest in breadfruit knowledge. We were surprised, however, that Ofu and Olosega villages in the remote Manu'a archipelago of American Samoa scored at about the same rate as the residents of the capital cities of Pago Pago (American Samoa) and Apia (Independent Samoa). This may be due to the prevalence of sending high school age youths off-island for education, where they are removed from participating in daily cultural activities and hence do not have the opportunity to learn traditional knowledge and practices from their elders.

There is, in effect, a brain drain as adults leave the Manu'a islands for Tutuila, Hawaii, or the U.S. mainland. For example, many families maintain residences both in Ofu or Olosega and on the island of Tutuila. Adults in their 30s to 50s are working in the wage economy on Tutuila, providing a home for their high-school-attending children, or caring for their elderly parents in their 60s to 80s who have moved to Pago Pago for medical care and long-term convalescence. The mayor of Olosega posited that since the residents of Ofu and Olosega rely primarily on earned income and family remittances rather than subsistence agriculture, there is little need to keep such breadfruit knowledge alive. In any case, it appears that ethnotaxonomic knowledge is exceedingly fragile, and can quickly disappear, even from apparently remote areas.

Gender differences in breadfruit knowledge reflect gender-based divisions of labor inherent in Samoan society. Men are more likely to work in the plantations, plant and harvest breadfruit, and prepare them in the umu or stone ovens. It is important to note, though, these gender differences, while reflected in the mean and median number of names known by men and women do not reflect expert knowledge. The second most knowledgeable person we met in Samoa was a woman. In the group of 60 individuals we identified as having expert knowledge, 23 were women and 37 were men.

This suggests that villagers who possess strong ethnotaxonomic knowledge should be recruited to oversee conservation and agro-biodiversity programs in Samoa and elsewhere. It is critical that indigenous knowledge about crop diversity guide conservation and agricultural development projects to ensure that traditional varieties, cultivation practices, and cultural practices and knowledge are preserved rather than eroded.

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<sup>1</sup> Adapted from original research by Namulau'ulu G. Tavana Ph.D., Paul Cox Ph.D., Diane Ragone Ph.D., Patricia Stewart D.O., Rebecca Stone, Paul M. Cox, and Joan Stevens of the Institute for Ethnobotany.

<sup>2</sup> Ragone, D. 1995. Description of Pacific Island breadfruit cultivars. *Acta Horticulturae* 413:93-98.

<sup>3</sup> Wilkes, C. 1845. *Narrative of the United States Exploring Expedition during the years 1838-1842*. Lea and Blanchard, Philadelphia.

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<sup>4</sup> Milner, G.B. 1966. Samoan Dictionary. Oxford University Press, London

<sup>5</sup> Pratt 1862. Pratt's Grammar and Dictionary of the Samoan Language. Malua Printing Press. Apia Western Samoa.

# Population development versus sustainable development

*Malaefono Taua Faafeu-Taaloga\**

## Introduction

Sustainable development means meeting the needs of present generations without compromising the needs of future generations. The increasing number of human beings is always seen as a threat with direct impacts on sustainability of natural resources and the environment. Yet, the cry for sustainability largely ignores human beings especially the underlying factors related to their basic needs. In order to fulfil the needs of sustainable development, human beings are entitled to quality education, healthy life and sound economic support to fully participate in sustainable development.

This paper gives a brief summary of population characteristics as identified from the 2001 Population and Housing Census. The first part examines the impacts of population increase on selected socio-economic services and natural resources while the second part focuses on the debate of population development versus sustainable development. The paper concludes with population policy implications for future initiatives in promoting sustainable development in Samoa.

## Population characteristics 2001

Samoa's population reached a total of 176,848 persons as of November 2001. This is an increase of about 10 percent when compared to the last census in 1991 with only 161, 298 persons. Of the total population, 22 percent totalled at 38,336 persons living in the Apia Urban Area (AUA), with 78 percent (138,012) living in the rural areas namely North West Upolu (NWU), Rest of Upolu (ROU) and Savaii Islands.

By age groups, 41 percent of the total population was recorded as below the age of 15 years, 55 percent aged between 15-64 years while 4 percent of the total population constituted pensioners 65 years and over. The same proportions were also identified in the 1991 census. Given the large proportion of young persons, 63 percent of the total population were single or never married, 33 percent married while 1 and 3 percent were divorced and widowed respectively.

## Population growth

Population growth is determined by three major events: births, deaths and international migration. The interaction of these events determines population growth or the number of persons added or taken away from the population in a year.

For Samoa, births are estimated at about 5,000 in a year (29.1/1000), deaths at 1,000 in a year (6/1000) and more than 1,500 persons migrated overseas (-10/1000) every year. Of the three events, births and migration largely influence population growth in Samoa. While births keep increasing the population, migration on the other hand reduces the growth, keeping population growth at a minimum level. This pattern of growth has always been in existence even after Independence in 1962.

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As a result, natural increase (difference between births and deaths) is always very high for Samoa, with migration playing a significant role in narrowing this natural increase. Overseas migration is generally accepted as a good population control for Samoa. In the long run, it may become a real threat when overseas countries eventually reduce the number of migrants from Samoa. On the other hand, the continuous high birth rate contributing to the large proportion of young persons in Samoa indicates the potential of high population growth in the future.

For a small country like Samoa, the number of births is relatively high compared to the socio-economic services and natural resources available. The following sections will highlight the impact of population increase on Samoa's limited resources as shown in the Population and Housing Census 2001.

### **The impact of increasing population on housing resources**

Any population increase will lead to an increase in demand for shelter and better housing. The Housing Census in 2001 clearly indicates a 26 percent increase in the total number of buildings people have in 2001 compared to the total buildings in 1991 (Table 1). With more buildings made, more natural resources such as wood, stones, earth soil and sand, become exploited for housing materials. Likewise, such resources are also exploited to make concrete and bricks for housing materials.

Table 1. Selected housing materials

Selected housing materials	Number of buildings 1991	Number of buildings 2001	Proportion of buildings using item in 1991 (%)	Proportion of buildings using item in 2001 (%)	% Change between 1991-2001
Total Buildings	36,136	45,606			26.2
<u>Floor</u>					
Wood	13,499	15,052	37.4	33.0	11.5
Stone	6,199	6,209	17.2	13.6	0.02
Concrete, sand, others	16,438	24,355	45.5	53.4	48.7
<u>Outer walls</u>					
Wood	11,873	14,596	22.9	32.0	22.9
Brick/Concrete	3,255	6,664	9.0	14.6	104.7
Open wall	20,415	24,051	56.5	52.7	17.8
Metal sheet and others	478	295	1.3	0.6	-38.3

Sources: Population and Housing Census Report 1991, Special Tabulation Report 2001.

Table 1 shows some selected housing indicators from the 1991 and 2001 Censuses. It shows the proportions of buildings by compositional materials and the percentage change of these housing demands between 1991 and 2001. The last column clearly indicates the increasing demand on housing materials for "floors" and "outer-walls". For instance, the number of buildings using wood for housing floors and outer walls has increased by 11.5% and 22.9% respectively, while use of concrete, bricks and other resources have greatly increased by 48.7% and more than 100% respectively.

The data above reveals that, out of all the buildings made, the construction of floors showed that "concrete" was the mostly used material for floors in 1991 and 2001, while the highest proportion of housing walls were made of open walls which are mostly "wood". Housing

information revealed people's tendency to live in better-built houses. This is an indication of the drive to achieve a better quality of living. On the other hand, it also shows the increasing pressure of housing demands on scarce housing resources.

### **The impact of population increase on selected household services**

The increase in population also leads to increasing demands for household basic services. The more demands on household services, the more pressure on available services. Table 2 shows the total number of households in Samoa and the proportions of households using selected services in 1991 and 2001.

Table 2. Selected Household information

	1991	2001	Proportion of households using service in 1991 (%)	Proportion of households using service in 2001 (%)
Total Number of Households	22,195	23,079		
Tap water supply	19,895	20,989	89.6	90.9
Toilets using water	19,684	20,439	88.7	88.6
Lighting-electricity	17,497	21,447	78.8	92.9
Cooking fuel- firewood	15,935	14,321	71.8	62.1
Waste disposal-Truck	-	13,487	-	58.4
Fixed phone	-	5,189	-	22.5
Cellular phone	-	1,946	-	8.4

Sources: Population and Housing Census Report 1991, Special Tabulation Report 2001.

In the total number of households, an extra 880 households had been added to total households in 1991 reaching a total of 23,079 in 2001. Additional households leads to the increasing demands for household services like water, electricity, sanitation, waste disposals, telephones and related-services. Generally, Samoan households have a high standard of accessibility to water and electricity for household amenities. As shown in Table 2, 90 percent of total households in 2001 have access to tap water for use in their homes and almost 90 percent of households also used water for toilet facilities. In addition, the use of electricity for lighting shows an increase in the proportion of households from 79 percent in 1991 to 93 percent in 2001.

Greater accessibility to these services indicates better quality of living. Likewise, it also shows increasing pressure and strain on limited resources particularly water. Quality water management is consistently needed to sustain this natural resource. In other household amenities, cooking fuel shows that firewood is the most used fuel by Samoan households.

While there is a noticeable decline of firewood consumption (72 to 62 per cent), more than half of total households still depend on firewood for cooking. This also calls for effective forestry management to monitor the exploitation of local forestry for firewood. The statistics revealed the strong relationship between the increasing population and the demand on housing materials and household services. The question is: how can we approach the issue of sustainable development?

### **Population development versus sustainable development**

Sustainable development will never be fully achieved if population development is ignored from the full process. Many countries propose that direct population control and family planning are the best remedies to slow population increase in order to reach sustainable development. Evidence show that countries with low population growth rates are the major force behind environment degradation. They consumed the most energy, most water and food and even contributed the highest air pollution. This is particularly true for developed countries with a high standard of living.

This paper emphasises that "sustainable development is better achieved if resources are allocated more to meet basic human needs as a solution to population growth and not reducing population growth to meet sustainable development". This is because population issues like education, health and subsistence living are the main forces behind population control and hence sustainable development. A lot of life experiences and data proves that when people have high quality education, live a healthy life and have sufficient financial support to live comfortably, people are most likely to become aware of their family size and hence sustainable living.

### **Education development versus sustainable development**

Well-educated people generally understand issues regarding large family size, environment degradation, unemployment, healthy living and are able to act upon it. Education gives people the knowledge and skills to understand issues as well as determining their behaviour. The Population Census 2001 shows that of the total population 15 years and over, 30 per cent have completed primary level education, 57 per cent completed secondary level and only 11 percent completed tertiary education. "Education for what?" is the challenge. The question that often comes to mind is: what can you do when you have completed a particular level? Will you be ensured that completing primary or secondary will give sufficient knowledge and skills to live a good sustainable life?

People without good education and knowledge to find employment have limited choices for living. Limited choices cause people to abuse fishing resources, forestry resources, polluting the environment and even turn to abusive behaviour creating more social problems. The point is, sustainable development will never be achieved if young generations do not receive proper education or even sufficient knowledge and skills to create better choices for themselves.

The Population Census 2001 depicts a disturbing picture of young children not attending schools. Table 3 clearly indicates these numbers by single ages. For whatever reasons causing non-attendance, the question is: how can we fight for sustainable development when not everyone is given the equal opportunity to be formally educated?

Table 3: Population 5-19 by school attendance and sex, 2001

Age	Males	Females	Males	Females	Males	Females	Total
5-9	12165	11175	870	720	13035	11895	24930
10-14	10426	9816	535	226	10961	10042	21003
15-19	5665	5460	3829	2670	9494	8130	17624
Total	28256	26451	5234	3616	33490	30067	63557

Source: Special Tabulation Report 2001

A bigger challenge for education is, not only should we aim to make everyone attend school, we should also aim to enrich young generations with the relevant knowledge and skills to live a secure and comfortable adult life. Given limited paid employment, young school leavers need education that comes with the knowledge and skills to earn their own living. Promoting vocational training in the community and even creating community based projects maybe good alternatives for young school leavers who would not be able to get a paid job.

Education is the key to a secured livelihood and sustainable development. Quality education means at the end of 13 or more years of formal education, those years would be sufficient for most if not all to have a strong foundation of knowledge to explore life options in the real world and having the ability to deal with them.

### **Subsistence living versus sustainable development**

Today's standard of living depends on financial income. Without money, people cannot afford education, health services, and all necessities of life. Sustainable development cannot be achieved if people are poor and lack opportunities to make a good living. Given the fragile economy and vulnerability to global trading, it is understandable that Samoa's economy offers a limited number of employment opportunities for the growing number of school leavers.

The Population Census 2001 shows that of all those aged 15 years and over, the rate of unemployment has risen from 2.1 percent (1,175) in 1991 to 4.7 percent (2,618) in 2001. Sadly enough, out of all those being categorised as being employed (people involved in paid and unpaid employment), 47 percent were reported working in unpaid employment meaning that these people were working in activities such as planting, fishing and assisting with the family economic welfare without any form of income. Lack of income is another major source of environment degradation and exploitation of natural resources. Like lack of knowledge, people turn to abuse natural resources such as polluting fishing resources and cutting down trees, and even turn to criminal behaviour due to lack of money.

Promoting small and informal businesses in the community and making access to financial assistance easier, maybe good alternatives to promote more employment opportunities for many. With secured income, people will have the capacity to participate consciously in sustainable development initiatives.

### **Healthy living versus sustainable development**

"Healthy people make healthy nations" is a common phrase. For Samoa, the accessibility to health services is very high and hence not seen as a major barrier. Communicable and non-communicable diseases are well under control by the Health services despite shortages of personnel. This paper argues that the major barrier to healthy living in Samoa is not the lack of health services but it is "the lack of motivation to translate health messages into appropriate actions".

Unbalanced diets, lack of exercise, abusive smoking and drinking, unaffordable family size, unclean environment and poor sanitations are all visual factors that indicate the difficulty in translating health messages into appropriate actions in Samoa. For example, the over-flow drainages in the urban areas, poor rubbish disposals in town and in the villages, poor public utilities at the public hospitals, food markets and town areas are all indicators of unhealthy behaviours. Generally, if people do not practice healthy living in their own homes, they



would never understand the importance of healthy environment in their actions whether they are at home or not.

An interesting example was the question on means of waste disposal in the Population Census 2001. Out of the 23,079 households in the country, 58 percent of total households reported that they depend on public trucks to dispose their rubbish, 4 percent reported burning their own rubbish while 24 percent and 14 percent dispose their rubbish in the sea and the bush respectively. Such factual evidences demonstrate a worrying health and environmental issue. In short, health issues are significant for sustainable development. We will never achieve full sustainable development if health issues are ignored from the full process.

### **Population policy implications**

Population increase is a threat to small and vulnerable countries like Samoa. Likewise, it is a threat to all efforts of sustainable development. This paper argues that achieving sustainable development can only come from quality education, healthy living and a sound financial support and all these will lead to informed decisions on affordable family sizes which will eventually lead to lower population growth. Quality education gives young generations the knowledge and skills to live a secure and comfortable livelihood in their adult years. Education systems must ensure that young generations are entitled to such. Including population and sustainable issues in school curriculum would be an advantage.

Healthy living determines healthy environment and healthy families. Program managers should ensure that people not only receive the services but also have the ability to apply healthy actions in their lives. Community and health workers must ensure that health issues are well understood and applied in the communities. Limited employment opportunities cannot be avoided. Giving people sufficient financial assistance to create their own sources of income is the only alternative to limited paid employments. Small businesses and individual projects should be strongly encouraged to generate income in the informal sector.

### **Conclusion**

The increasing population growth puts pressure on all resources making it difficult for sustainable development to be effective. While many have argued that reducing population growth is the solution for sustainable development, this paper strongly argues that meeting the requirements for basic needs first has more impacts on lowering population growth and not vice versa. It must be said that the population growth is not an issue by itself but a result of unbalanced necessities of life. The paper has provided population facts about the impact of population increase on socio-economic services and limited resources. It has also identified significant population development issues causing unsustainable development. The real challenge is for policymakers and program managers to design appropriate strategies approaching all angles of sustainable development.

There is no simple answer to sustainable development. It is a complex issue hence needs all levels to play their roles starting from the national level, community level, and down to the grass-root level to contribute in one way or another. Asserting quality education, healthy living and subsistence living will lower population growth hence we will be able to meet the needs of present generations without compromising the needs of future generations.

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## Climate change and Samoa - sustainable development

*Tagaloa Bismarck Crawley\**

### Introduction

Weather and climate play a major role in our lives. Weather often dictates the type of clothing we wear while climate influences the type of clothing we buy. Climate determines when to plant crops as well as what type of crop can be planted. Weather determines if these same crops will grow to maturity. Although weather and climate affects our lives in many ways, perhaps their most immediate effect is on our comfort. We build shelters to keep away from the sun; we collect water from rain to take us through dry spells and drought.

With growing evidence of climate change there lies the paradox of weighing out environmental conservation against sustainable developments especially for the small sized, limited resources, sensitive economic capability islands in the South Pacific. What is it that we are to monitor, what will cause the impacts and what we will need to adapt are remaining unanswered questions that Pacific islands are left with. While global climate systems enlightens the interrelationships between climates of different scales which impacts and affects each other, certain climate indicators are monitored in terms of their importance in the sustainable development of island countries. For instance, with most tropical countries having strong water-based economies, natural water quantity and quality are good indicators of changes in the climate.

This paper provides a personal overview on the issue of Climate Change in Samoa. What are the underlying questions and how they can be addressed?

*WHETHER THE WEATHER...  
Whether the weather be fine  
Or whether the weather be not  
Whether the weather be cold  
Or whether the weather be hot  
We'll weather the weather whatever the weather  
Whether we like it or not.*

The simple interpretation that we can draw on is that climate is part of our everyday existence whether we like it or not; there is a sense of unpredictability in its performance and response; it exists in some form of pattern implying a certain system; there is no boundary and affects everyone.

### Climate

Climate in Samoa has two profound seasons, which is the dry and wet season. Seasons are characterized by rainfall and temperature seasonal trends. Dry season is from May to September with an average humidity of less than 90% and often experience rainfall that are below average while the wet season is often very humid with excessive rainfall often referred to as the Tropical Cyclone season which is from October to April.

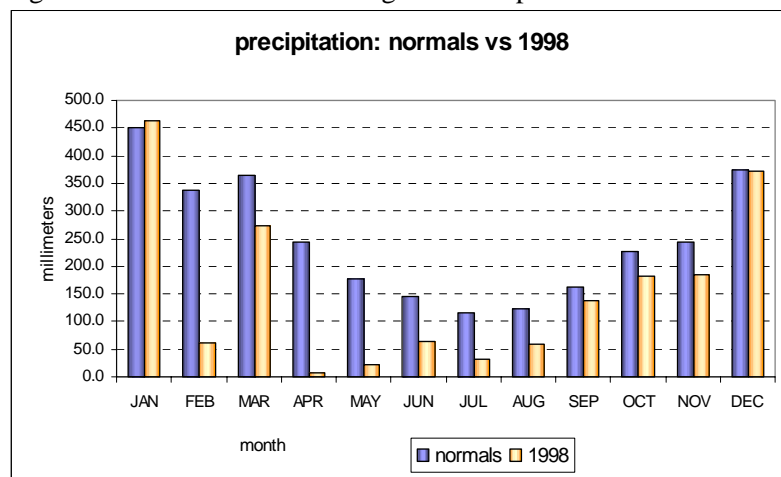
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## El Nino episodes

While there is local variability in climate due to Samoa's location and topography, researches have indicated regional seasonal and inter annual variability associated with El Nino Southern Oscillation (ENSO). Strong El Nino has significant effect on rainfall patterns and duration in Samoa. When sea surface temperatures and pressures are higher to the western part of the Pacific, this implies a higher convection activity, which enhances the possibilities of tropical cyclogenesis. To the Eastern part, drought and below average rainfall is experienced. The following graph compares rainfall observed during El Nino episode of 1997 to 1998 and the normal.

Figure 1: Rainfall observed during El Nino episode 1997-1998



The El Nino phenomenon, which is explained as the difference between pressure between Darwin and Tahiti, has a return period of 2-7 years while La Nina, the normal condition, comes around every 4-7 years. El Nino and La Nina are large scale climate phenomena that originate from the Pacific, with their effects reaching around the global climate

## Rainfall

Like other Pacific island nations, of the many climate indicators that affect development, being a water-based economy, water quantity and quality is a critical element not only in meeting the limited commercial and subsistence activity of the communities but their safety and mortality. While water levels are appreciated for agricultural produce, often islands are not prepared for excessive rainfall which causes, flooding and contamination of water supplies. Across the country, average rainfall ranges from 2000mm in dry areas to 5500 mm in wet areas. El Nino and La Nina events often affect this general pattern in rainfall. Generally La Nina or normal conditions favour cyclogenesis around Samoa, producing average rainfall to above average rainfall while El Nino brings dryness and below normal rainfall.

## Climate variability

Any changes in climate will certainly impact on Samoa in one way or another. Changes in climate will include extreme rainfall periods as well as drought periods. Erosion along the coastline from cyclone generated sea swells and potential sea-level rise due to thermal expansion in the ocean as a result of global temperature increase is to be expected. Enhanced volcanic activity is predicted as the system struggles to provide a cooling effect on the atmosphere to balance the increase in temperature. There is already disturbance in biodiversity as the flora and fauna respond to changes in habitat conditions. Agriculture

production will also be affected as the soils become exposed to extreme dryness, thus reducing their capacity to hold during extreme rainfall periods. Corals and marine life will be exposed to extreme fluctuations in sea surface temperatures. Many vector-, food-, and water-borne infectious diseases are known to be sensitive to changes in climatic conditions. Dengue fever is a vector-borne disease that is increasingly being observed in Samoa. Small islands like Samoa will feel these, among many other adverse indicators of climate change.

### Tropical cyclones

Tropical cyclones are severe weather phenomena experienced on the islands. On average there are about eight to nine tropical depressions in every cyclone season. Of this total, some are formed and diminished on the sea while some have the energy to cross the land causing devastation on infrastructures, residents and the environment. There have been no clear predictions on when and where these tropical depressions favour but studies on the rise and fall of El Nino given thermal variations on the sea surface temperature have assisted some efforts in predicting their possible occurrence. During El Nino periods, SST is warmer than normal across eastern places, for example the Cook Islands; higher probability of TC are expected for these areas whilst the west pacific experience dryness and cooling temperatures.

Table 1: Relative percentages of both coastline length (A) in kilometres (km) and land area (B) in hectares (ha) covered by the 4 different types of CHZ around the 573km-long coastlines of Samoa, determined by GIS from the 1999 Rectified Orthophotomaps.<sup>1</sup>

Type of hazard zone		Savai'i	Upolu	Manono	Apolima	Aleipata Islands
A	CEHZ	131.12 (49.9%)	224.13 (78.6%)	8.79 (100%)	0.36(7.6%)	1.69 (14.2%)
	CFHZ	126.81 (48.3%)	235.45 (82.69%)	8.79 (100%)	0.36 (7.6%)	1.8 (15.2%)
	CLHZ	27.92 (10.6%)	49.37 (17.3%)	0	4.36 (92.4%)	10.19 (85.8%)
	ASCH	103.07 (39.2%)	7.08 (2.5%)	0	0	0
	Total island perimeter (km)	262.77	285.09	8.79	4.72	11.88
B	CEHZ	710.38 (0.4%)	1,221.77 (1.1%)	38.42 (13.4%)	3.19 (3.2%)	7.48 (5.2%)
	CFHZ	1,655.06 (1%)	2,960.64 (2.6%)	39.4 (13.7%)	3.25 (3.3%)	7.31 (5.1%)
	CLHZ	191.93 (0.1%)	449.96 (0.4%)	0	43.77 (44.5%)	63.18 (43.8%)
	ASCH	1,103.53 (0.6%)	72.10 (0.1%)	0	0	0
	Total island area (ha)	170,210.48	112,265.26	286.99	98.46	144.15

Having this information in place plus other research and anecdotal data, Samoa had developed a Coastal Infrastructure Asset management Strategy.

### Concerns and response

As stressed earlier, the extent of Samoa's involvement in mitigating climate change is merely confined to preparedness as they play a minimal role in matching the global increase in greenhouse gasses that have affected the climate system. There should be continual efforts through international and regional forums on policy directives to bring major players in the cause of climate change to participate and recognize the impacts. Given the limited resources and size of the country, care should be taken in weighing conservation against development, recognizing the potential impact of climate change and the extent of their contribution to mitigate it.

The demand for water is increasing as a result of rapid population growth and economic development. The limitation on water supplies implies Samoa's high level of vulnerability to the impacts of climate change.

### **Adaptation efforts**

There are currently many efforts under the UNFCCC plus others to mitigate and minimize causes of climate change. They have developed regional forums and projects to assist countries not only to understand issues of climate change but also to develop response measures that are appropriate to island countries. Samoa along with many other Pacific island nations have been strong advocates on the issue of climate change due to their isolation and small sizes.

In 2001, a national effort funded by the Government of Samoa and the International Development Association (IDA) through a project known as the Infrastructure Management Program (IAMP) mapped out hazard zones around the Samoa group. Induced waves and potential rainfall intensity were the bases for a 100 year planning horizon. The Coastal Hazard Zones (CHZs) adopted for this study include; Areas Sensitive to Coastal Hazards (ASCH), Coastal Erosion Hazard Zone (CEHZ), Coastal Flood Hazard Zone (CFHZ), and Coastal Landslip Hazard Zone (CLHZ). The lengths of the coastline and areas of land covered by the 4 types of CHZ (2000 Samoa CHZs) are listed in Table 1.

The CHZs Mapping showed that erosion and flooding from the sea are the most widespread coastal hazards on 'Upolu, Savai'i and Manono, and coastal landslip the most widespread on Apolima and the Aleipata Islands. The CEHZs cover on average, 76% of the coastlines of Savai'i, 'Upolu and Manono. The CLHZs cover on average, 89% of the coastlines of Apolima and Aleipata Islands, compared to an average of 14% on Savai'i and 'Upolu.

In that respect, the security for water resources is critical. National strategies and management plans are to be in place. Management efforts should not be confined to distribution but conservation of water as well. Already, water problems have been voiced from many districts on the island of Savaii. The 1997-1998 El Nino experience promoted water management and distribution rationalization. Rainfall is scarce in many areas especially the northwestern parts of the country. Households around these areas should consider water storage options, for example building water tanks to store water. Should water quantity and quality continue to be affected, means for water storage should be enforced as part of building permits for every application. Like wise, reservoirs that serve waterlines, should be well in place in areas where they can maximize collection and distribution of water. Clearance of vegetation from around these sites should be monitored to minimize contamination of water supplies.

Countries like Samoa with the least resources have the least capacity to adapt and are therefore very vulnerable. The ability of human systems to adapt to and cope with climate change depends on factors like wealth, technology, education, information, skills, infrastructure, access to resources and management skills. Communities and the general public vary in their endowments with these attributes.

Conservation areas such as forestry reserves and parks can be combined to enhance the sustainable management of resources. With 80% of the land under customary ownership, communities should be encouraged to allow land for conservation purposes. Government owned lands can also be utilized for government investments or be converted as freehold land

for the general public to purchase. The existing Parks and Reserve Act, allows areas not less than 1,500 acres to be used as reserves.

Most of the coastal areas will be affected by coastal erosion. The CHZ Mapping under the IAMP indicates that most of the infrastructure will be affected. Consultation with communities regarding proposed relocation as an option is recommended. In some areas of extreme vulnerability there were options of looking at hard solutions like rock or cemented sea walls depending on the level of vulnerability. While these are adequate response measures, they are quite expensive. On the other hand, soft solutions like beach replenishment and re-vegetation along coastlines are promoted to minimize the impacts of these hazards. The implementing agencies for the IAMP are compiling a CIM Program that would assemble and prioritise those options agreed upon by the communities to enhance resilience to impact on the coastal resources by climate change.

Agriculture and food security are important issues for Samoa because of its limited resource base and high level of vulnerability to climate change. For example, climate change would prompt prices of imported goods to increase, this would promote the importation of genetically modified goods to meet the demand. However, genetically modified goods are still under research and are therefore considered a health hazard until proven otherwise.

In the case of relocating government infrastructures and homes away from coastal location, the issue of land ownership is critical. Since 80% of lands in Samoa are under customary ownership, any relocation would need to have a clear understanding between the government and communities involved. Under the IAMP, this issue has been recognized and a framework for land acquisition, relocation and resettlement will be developed. The framework will not only look at land but also its contents i.e. vegetation, buildings, roads, fences and other assets.

The commitment from the Government of Samoa under the IAM project to develop the information base and consider adaptation measures is an example of a national commitment to look at climate change. There are a number of regional projects driven through regional organizations like SPREP and SOPAC, but these can only reach out to regional issues and agenda. In most cases, key country priority issues are not well addressed. Countries should be made clear of this and be supported to take the leading role.

### **Summary**

Climate change should be considered with the utmost care. While the physical implications will substantially affect the physical makeup of Samoa, the responding attitude will be equally intruded. The rate in which climate is changing is slow but it shouldn't displace the timing that we need to respond to it. The cost will be high but will be effective when good, coherent, integrated management and response plans are in place.

### **Suggested readings**

BECA IAMP, Coastal Hazard Mapping Report 2001  
Climate Change, The IPCC Impact Assessment 1990  
BECA IAMP Coastal Hazard Mapping 2001

## Urban development and uncontrolled discharge in Apia, Samoa

*Paul Jones & John Cocks\**

### Background - growing pacific towns and cities

The Pacific region comprises great diversity and complexity in the three geographic divisions, namely, Melanesia, Micronesia and Polynesia. While the scattered islands in the Pacific region contrast in their socio-economic settings, geography, culture and resource base, high rates of urbanisation and an absence of urban management practices, skills and commitment to comprehensively tackle urban problems are commonplace ( Jones, Taulealo and Kolhase, 2001; Jones, 1996). The growing need for effective urban environmental management as a result of urbanisation will become one of the most significant development issues for Pacific Island countries in the 21<sup>st</sup> century as Governments and communities are increasingly unable to keep pace with the rapidity of urban growth. Approximately 40% of the populations in Pacific Island countries are now living in urban areas, a trend that continues to rise. Of increasing concern is the fact that urban growth rates continue to outstrip national growth rates in most Pacific Island countries (see Figure 1). Education, lifestyle choices, increasing centralisation of Government sector bureaucracy, moderate industrialisation and private sector development have all fuelled the movement of population to Pacific Island cities and towns, further reflecting the permanency of the rural urban transformation (World Bank 2000).

Figure 1: Pacific island populations 2001 – selected countries<sup>ii</sup>

Pacific Island country or territory	Last census	Population as counted at the last census	Urban population (%)	Annual intercensal urban growth rate (%)	Annual intercensal national growth rate (%)
Fiji Islands	1996	775,077	46	2.6	1.6
New Caledonia	1996	196,836	71	2.7	1.8
Papua New Guinea	1990	3,607,954	15	4.1	2.3
Vanuatu	1999	193,219	21	4.3	3.0
Solomon Islands	1986	447,900	13	6.2	3.4
Guam	1990	133,152	38	1.9	1.0
Kiribati	1995	77,658	37	2.2	2.5
Marshall Islands	1999	50,840	65	1.8	2.0
Palau	1995	17,225	71	2.9	2.2
American Samoa	1990	46,773	48	4.6	2.9
Cook Islands	1996	19,103	59	0.6	-0.5
French Polynesia	1996	219,521	53	1.4	1.6
Niue	1997	2,088	35	1.2	-3.1
Samoa	2001i	176,848	35	2.0	2.3
Tonga	1996	97,784	32	0.8	0.6

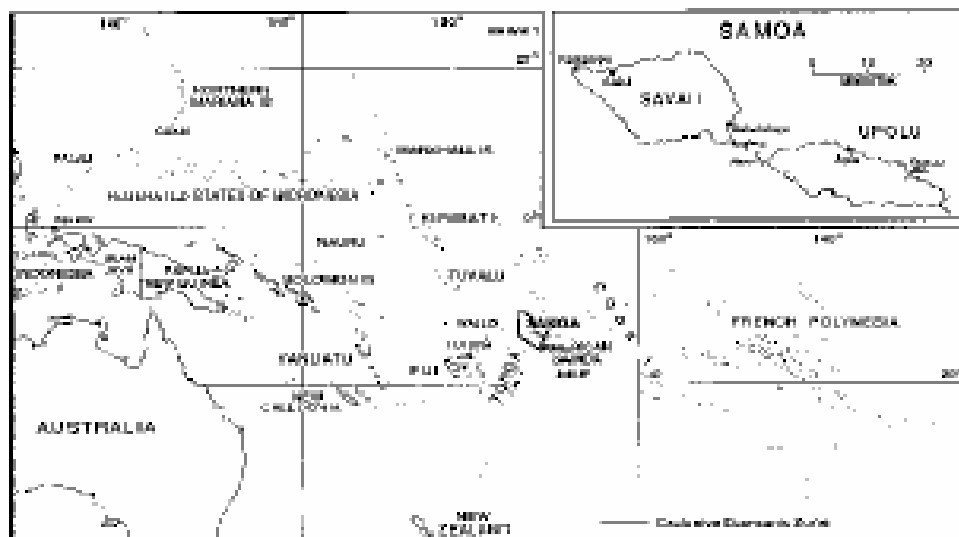
The problems of urbanisation and lack of commitment to effective urban planning and management solutions are evident in many ways in all Pacific island towns and cities. Urban population has grown enormously, squatter settlements are increasing and housing densities

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continue to rise, domestic and industrial waste is increasingly visible as collection systems (if they exist) try to match demand, uncontrolled wastewater discharge and environmental degradation, crime and family breakdowns including youth suicide are now commonplace, urban land cases continue to escalate before the courts, and generally, access to basic water, sanitation and road infrastructure cannot keep up with the demand for services (Connell and Lea 1998: Jones 1995: World Bank 2000).

Figure 2: Location Map – Samoa in the Pacific



### **Purpose of the paper**

In the context of the need to improve urban management including environmental monitoring as a means to tackle rising development problems associated with the process of urbanisation in the Pacific, the purpose of this paper is to

- (i) overview urban development trends in Apia and why they have occurred how, and
- (ii) discuss the implications of uncontrolled wastewater discharge into the urban environment.

The themes of the presentation are that:

- (i) uncontrolled urban development and poor planning leads to uncontrolled discharge of waste and leads to environmental degradation of the biophysical and social and economic environments, and
- (ii) better planning of development and land use including environmental monitoring will mitigate the uncontrolled discharge of waste leading to an improved urban quality of life in Apia.

### *What do we mean by uncontrolled discharge of waste?*

Uncontrolled discharge refers to the discharge of waste that cannot be assimilated into the environment. By assimilated, we mean having an environment that can sustainably absorb waste. By waste, we mean material both liquid, solid and gas - for example, waste from toilets, washing water, oils and chemicals, solid waste from packaging, and exhaust fumes - that is discarded as a result of various land use and development activities. Waste can therefore be from households, villages, industry and commercial operations. A receiving

environment, biophysical or otherwise, receives waste. In Apia, the receiving environments of Apia Harbor and Vaiusu Bay receive water from catchments.

### **Understanding the contextual setting for urban growth and development in Apia**

Apia is the capital city of Samoa, the largest of the Polynesian countries in the Pacific. Samoa comprises two main islands, Upolu and Savaii, where the bulk of the population resides, as well as seven small islands (see Figure 2). The total land area is 2,828 km<sup>2</sup> with an exclusive economic zone of 98,500 km<sup>2</sup>, the smallest in the Pacific. A rapidly growing urban Apia on Upolu Island clearly dominates the settlement pattern in Samoa supported by over 350 smaller rural villages. This includes the small Government designated town growth area focused on Salelologa in southeastern Savaii. The strong development pattern that has emerged is one where both rural and urban villages are generally located close to the coast along the fringing plain. Approximately 98 percent of the population live within this narrow coastal plain and in or around greater Apia with produce gardens and agricultural lands located inland (ADB 2000).

Samoa's population has nearly doubled in the last 40 years, from 97,000 persons in 1956 to 176,848 persons in 2001 (Government of Samoa 2002a). The natural rate of population increase is estimated at approximately 2.3% per annum, a rate that is associated with the relatively moderate population growth. Key features of Samoa's demographics over the last two decades have been sustained out migration primarily to New Zealand, Australia and the United States, a net population growth rate of just under 0.9 % per annum and the dominant influence of Apia and North West Upolu in attracting population from other regions within Savaii and Upolu. On an island share basis, Upolu and Savaii accounted for 76% and 34% of the population share respectively in 2002, noting the population share for Upolu has continued to rise throughout the 1990s.

The rate of urban growth in Apia and the pattern of regional development in Upolu is to a large degree, a reflection of the manner in which the urban boundary of Apia is defined. Like many towns and cities in the Pacific, the issue of defining the urban area of Apia is problematic given:

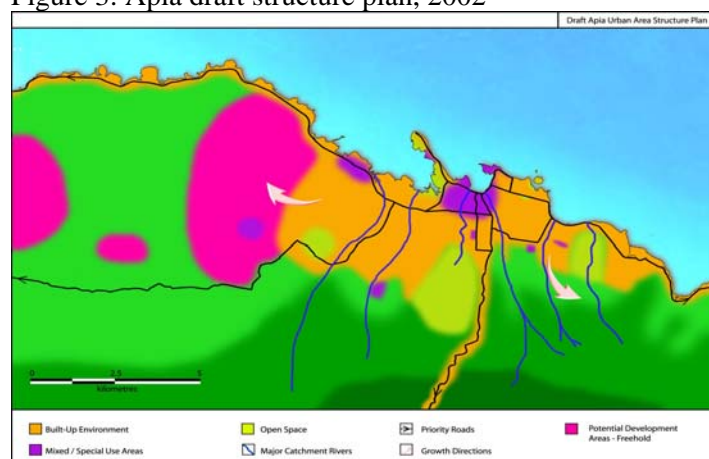
- the coverage of 'urban' type services - water, electricity, transport and waste disposal - is widespread in the Census-defined Apia urban area, North West Upolu and Upolu.
- population is growing both within and outside the narrow Census-defined Apia urban area; and
- the coastal road corridor between the small Census-defined Apia urban area and Faleolo Airport in North West Upolu contains contiguous village development where one village abuts the other, thus complicating defining a precise urban boundary for Apia.

The 2001 Census indicates the population share for Apia and North West Upolu has risen from 46% in 1991 to 52% in 2001. The narrowly defined Apia urban area as defined by the 2001 Census had marginally increased from 35,489 in 1991 to 38,836 persons in 2002. However, if the two census districts to the east and west of the core urban area are added to reflect the contiguous Apia urban area, then the population of the existing built up urban area of Apia is 60, 872 persons or approximately 35% of the 2001 national population.

The implication of the above is that the population of Apia and its adjoining areas are rising and its growth corridor on the undulating coastal plains of North West Upolu will be the area in which this growth is accommodated (see Figure 3). Estimates of Apia's urban share of national growth for planning purposes should be seen in the context of to what extent the

growing North West Upolu corridor including Apia is effectively defined as urban in 'character'. The clear trend is that population growth will lead to continued pressure on the resources of Apia as well as continued economic, social and environmental change within the wider regions of Upolu and Savaii. These changes will continue to lead to increasing demands for land, infrastructure and services, housing, changes in village size, home ownership and village and family social organizations and patterns, as is currently being experienced.

Figure 3: Apia draft structure plan, 2002



The villages are growing rapidly in the urban hinterland, with many having expanded to the extent their village boundaries blur the 'urban rural' divide. As a result, villages now form one linear strip of urban development between Apia and the international airport at Faleolo some 30 kilometres to the northwest of Apia. Traditional housing and plantation lands are being supplemented by modern housing and smaller gardens especially on customary lands, where open walled housing (fale) and large areas for gardening characterize households that support their livelihood based on a contribution from the 'subsistence' sector

There is generally a high coverage of service levels in the provision of water supply - 94% of households in the Apia urban area had piped reticulated water (2001 Census) - as well as main roads in urban Apia, despite increasing concerns of road maintenance. There is also a solid waste household collection service for not only Apia but for both main islands. Significantly, sanitation in Apia is by septic tank, pit latrine or a handful of package treatment plants for commercial buildings. There is no reticulated sewerage system for the urban area of Apia or elsewhere in Samoa. This is despite the Apia central business area (CBA) and adjoining customary villages being built on the floodplain, having a high water table and being subject to annual wet season flooding.

### Land tenure

Land tenure is the most dominant factor in shaping the form and distribution of settlement and land use in the greater Apia urban area specifically and Samoa generally. Understanding the pattern and history of land tenure in the wider Apia area goes along way to explaining the current fragmented patterns of development and difficulties faced in implementing a more formal planning and urban management system. Land tenure and ownership systems introduced and legislated from the mid 19th century and onwards, rather than an integrated planning system, have been the primary influence in Apia's development.

In Apia, alienation of customary lands from traditional owners to freehold and Government lands began in the 1850's as European settlers including missionaries and traders

sought land for housing, churches and warehouses around Apia harbour as well as for agriculture. The largest areas of alienated lands were on the gentle plains and foot slopes on lands above Apia harbour as well as in North West Upolu, the latter lands suitable for development as coconut plantations. In 1893, Britain, Germany and the United States setup a Land Commission under the Berlin Act of 1889 to assess land claims by non-Samoans (Ward and Ashcroft 1998). As a result, freehold as well as Government lands were registered as being alienated, with further alienation except for Government purposes finally prohibited by law under the Samoa Constitution in 1962. Alienation of new lands to freehold has not occurred since this time, notwithstanding that disputes on the status of existing alienated lands continue to be heard by the Lands and Titles Court of Samoa.

There are significant differences between customary and freehold lands that have been the determining factor in **where** and **how** development has occurred in Apia and its hinterland. Customary land can be developed by its customary owners in accordance with the authority of the family matai or chief and any conditions set by the village council or fono. Customary land cannot be subdivided or sold for freehold development - its development potential is severely limited. Conversely, freehold land - representing approximately 70% of the land tenure pattern in Apia and the wider urban fringe - can be sold, subdivided and leased while customary land can only be leased.

Given the above, the urban morphology of Apia constitutes a loose assembly of areas of freehold properties interspersed with villages on customary lands and with no independent local government administration. As a result of a pattern of settlement where development of freehold land 'leap-frogs' customary land, the emerging urban growth trend in Apia is clearly one where:

- the dispersed nature of development means high servicing costs and a major lag in service provision, as is prevalent in the Government's own freehold subdivisions;
- there is an absence of an effective sewerage system for high populated areas within Apia, especially the flood prone Apia central business area where septic tanks empty into storm water drains or directly into the harbour;
- there is a fragmented distribution of freehold land for 'private' development;
- there is a fragmented distribution of freehold land for 'private' development;
- environmental degradation including waste discharge is increasing, being clearly visible in drains and waterways as development encroaches into developable lands in the lower catchments areas;
- an extensive network of water and electricity services in the rural areas which blur a clear division between the Apia urban and rural areas;
- minimum cost recovery and user pay charges for services. User pays is still a foreign concept for many especially those living on customary lands, noting water rates have only been introduced in 2001.

These issues and concerns cut across social structures, community needs and demands, land and land use, services and infrastructure provision, all within an urban area that is the commercial and industrial centre of Samoa. In this context, the importance of urban Apia to the economy cannot be understated with the urban area generating 70% of the national income (UMPT 2001). Increasing environmental degradation combined with population growth, economic development, increasing stress on environmental resources, declining infrastructure levels and concern over community and village well being, are all overlapping themes in the development of Apia. These all contributed to Government establishing the Planning and Urban Management Agency (PUMA) in 2002. The functions of PUMA are:

#### Function 1: Generating Urban Policies and Plans

- Setting goals for urban improvement
- Developing plans and policies

#### Function 2: Regulating

- Regulating development

#### Function 3: Managing urban services

- Mobilising resources for urban improvement
- Implementing improvements through annual operating plans
- Achieving desired urban outcomes, monitor and review

### **Uncontrolled waste discharge and implications**

Factors that are significant to our understanding of uncontrolled waste discharges in an urban development and their effects are:

- the urban environment compared to a rural environment
- the types of waste generated and the effects on the environment
- our knowledge of the plants and animals that live naturally in soils and water and keep these environments healthy.

Typically a traditional, rural environment has a low population density, much open space generally enriched by foliage, and few machines and modern appliances. In contrast, a modern, urban environment has a medium to high population density, little open space with foliage, much land cover with buildings and artificial pavements, and many machines and modern appliances. The consequences of this urban environment are twofold: discharges from people and machines are more concentrated and the natural environment available to assimilate the discharges is limited. For example, a wastewater discharge in a rural environment can be readily absorbed and renovated by the soils and the micro-organisms within them and the plants. A wastewater discharge in an urban environment, if it is uncontrolled, is likely not to have open, natural soils and plants for absorption and renovation.

Waste is composed of materials that can be assimilated by a natural environment where the concentration of the waste is not too high. However, where the concentration is high, the waste load puts stress on the natural systems in the environment and this stress can damage or destroy the natural systems of plants and animals. Examples of waste material and their effects on a natural environment in urban Apia are.

- oils and grease that float on water - for example, in parts of the Mulavai or Fugalei Streams - and prevent oxygen diffusing into the water to keep the plants and animals that live there healthy
- food scraps, human excrement, and litter that settle, covering soil and the base of drains and streams and preventing sunlight reaching the plants and animals that live there naturally
- nutrients, such as nitrogen and phosphorus, that are essential for the growth of plants and animals but which, in high concentrations, can cause excessive growth and dominance by some species and an upset to the natural balance
- pathogens (micro-organisms that cause disease in humans) from human excrement and washing water
- toxins, such as mineral oils from cars and other machines, chemicals from paints, cleaners and herbicides, which kill plants and animals. Tests indicate hydrocarbons are high in parts of Vaiusu Bay including in close proximity to the oil storage tanks on Mulinu'u Peninsula.

The drains and streams in and around Apia receive discharges from septic tanks and laundries, contaminated run-off from markets, roads and vehicle servicing yards, and litter. The contaminants in this waste, as described above, cause the water to become congested with unnatural plant growth or anaerobic (i.e. without oxygen), black and smelly. The contaminants also result in the soils becoming covered and clogged with material and this in turn kills the plants and animals that live there. Similarly, the open areas in Apia that are covered with litter, oils and grease from machines, and other waste material suffer because the small organisms that live in the soils and keep it healthy die.

The plants and animals that live in water and soils naturally have an ability to assimilate small quantities of waste, thus keeping the environment healthy. When they die, the environment loses essential life-generating systems and the results can include bad smells, unsightliness, public health risks, and loss of food sources.

The proposed method of creating a healthy urban environment is to:

- recognise the need for change and this means community awareness of the issues
- plan systems that will result in improvement and that are affordable; these systems will include rules and standards
- build the systems that will bring about change and these will involve institutions, private enterprise and individuals
- operate and maintain the systems so that they remain efficient
- monitor the systems and the environment and continually reassess and development the systems so that they remain effective in creating a healthy urban environment for all to enjoy and prosper in.

### **Conclusion**

Conclusions of this paper are that:

- Apia is growing rapidly with more people, buildings, traffic - PUMA therefore has many challenges
- the urban environment is deteriorating and this reduces the quality of life
- planning and appropriate actions start in everyone's backyard
- the cumulative impact of no action is a worsening environment
- a shared responsibility in addressing the uncontrolled discharge of waste is key to a sustainable urban environment
- community education and awareness must continue so as to modify peoples behaviour and attitudes to the environmental protection in fragile small island systems
- the cumulative impact of positive actions will be a healthy urban environment.

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## **Renewable energy: a renewed approach to sustainable development – a natural source of empowerment for the Pacific Islands**

*Peniamina Doug Leavai\**

### **Introduction**

*Although scientists cannot account for the origin of energy and matter or why the total energy is conserved, the Bible offers an explanation. God alone can truly create. Man can only re-fashion pre-existing materials. Since God has ceased from his creative works, energy can no longer be created. The reason energy cannot be destroyed is because God is “upholding all things by the word of his power”. He preserves and keeps in store his creation (Huse, S.M. 1996. 'The collapse of evolution', 2E. p.76 Michigan, USA)*

Energy is defined as the ability or capacity to do work. In the first law of thermodynamics, ‘energy can be converted from one form into another, but it can neither be created nor destroyed. For example, the heat from your cup of coffee is energy converted from electricity energy that is transformed from hydro energy produced by the hydroelectric power (HEP) plant.

The UNDP (2000) in its world energy assessment report define *renewable energy* as the 'energy obtained from the continuous or repetitive currents of energy recurring in the natural environment'. In other words, it is energy that can be used or utilized over and over again and is found naturally. Sources of renewable energy include traditional fuel like firewood, forests, coconut husks that are termed biomass or biofuel; hydro energy from the HEP plant. Solar energy is energy obtained from capturing the heat of the sun. Wind energy is energy derived from the velocity and speed of wind and similarly, wave energy is energy captured from the velocity, magnitude and amplitude of the ocean waves.

### **Primary energy consumption**

What and how much *primary energy* is consumed in developed and developing countries would help us understand why energy is important in every day living.

The graph above shows developing countries consume 22% of biomass fuel as primary energy compared to the developed countries that consume five times less. Recent studies clearly indicate that the use of biomass and coal as primary sources of energy for indoor and outdoor cooking and heating homes during winter are the main causes of primary and secondary health hazards. These hazards include cancer – lungs, liver, abdomen; asthma and asthma related, cataracts and blindness, and respiratory problems especially among women and children (Baird, 1999). These effects are worse amongst the rural poor and impoverished especially in developing countries. On the other hand, the utilisation of hydro energy in the developing countries is a step in the right direction.

Natural gas is an example of clean and modern energy. The isolation of developing countries from the advantages of technology restricts the availability and use of natural gas and

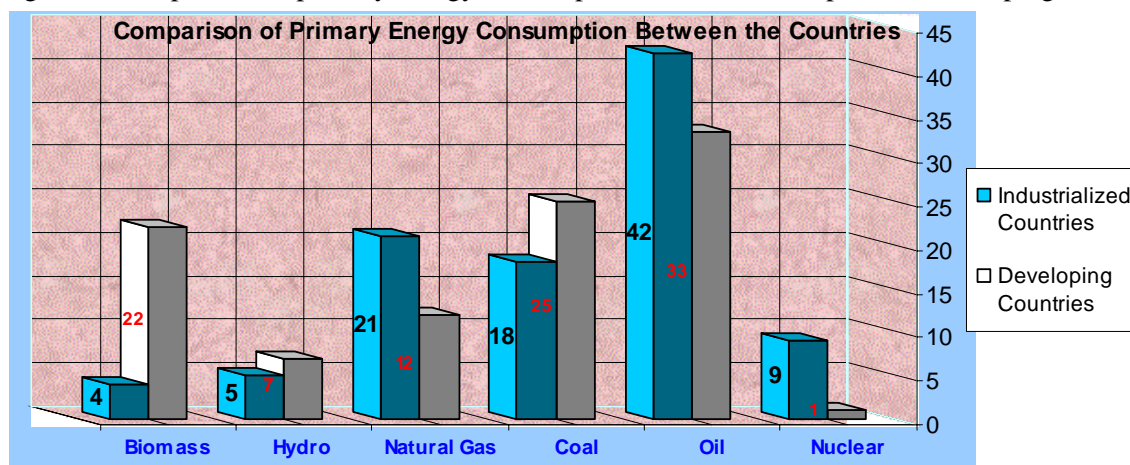
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liquefied petroleum gas for transportation in the developing world. On the other end of the spectrum, coal, an unclean but widely available source of energy, is still in use by larger third world countries like China, India and south east Asia.

Figure 1: Comparison of primary energy consumption between developed and developing countries



Oil, the more popular non-renewable energy source shows continual growth and leading primary energy consumption. However, world leaders predict that in the next decade or so developing countries will lead in oil energy consumption.

### Why is energy important?

#### *Worldwide*

Why energy is imperative to our livelihood anywhere in the world will help us define a more definitive approach to sustainable development that applies to our region given the current climate change discourse.

Energy is important to us because it gives us the means to sustain and control our survival. Throughout the world, two billion people do not have access to electricity and an additional two billion have access to unreliable electricity (UNDP, 2000). Samoa and Fiji are examples of countries that have unreliable electricity mainly because they have little control over the climate, their isolation which makes it difficult and expensive to import the technology to sustain electricity.

There are two billion people that cook using traditional fuels like firewood, or biomass especially in the rural areas. Studies have shown that the use of traditional fuels in developing countries has led to health problems such as mutagenic and carcinogenic related sicknesses (Baird, 1999). It has also shown that women and children are more at risk and many lack the medical facilities and expertise to cure or solve these problems.

#### *The Pacific Region*

A report by the Small Island Developing States (SIDS) to the UNFCCC at the Earth Summit (UNDP, 2000), stated that the Pacific region together with other small islands around the world (Caribbean islands...etc) were the most vulnerable to the effects of climate change although their contribution to global greenhouse gas emissions are but a tiny fraction.

The effects of climate change on the region include cyclones and droughts that are now occurring frequently. Sea level rise would result in coastal land inundation. But the full

impact and implications of sea level rise would be felt more by atolls and low lying islands termed as 'sinking islands'. This can have an impact on social issues such as land conflicts and social disruption in society creating chaos and panic, not to mention the effect on the economy and political uproars.

### **Sustainable energy**

The UNDP and World Energy Council (2000) identified the importance of sustainable energy needed to 'half the number of people living in poverty by the year 2015'. The United Nations define sustainable energy as the energy that is 'produced and used in ways that simultaneously support human development over the long-term in all its social, economic, and environmental dimensions (UNDP, 2000). Sustainable energy therefore not only refers to a continuing supply of energy, but to the production and use of energy resources in ways that promote – or at least are compatible with – long-term human well-being and ecological balance.

### **Characteristics of renewable energy**

In order for any country to apply and achieve renewable energy island (REI) status, it must be able to achieve two important features. That is, renewable energy must be *modern* and *clean*. The former is important in order to overcome poverty while the latter serves to make the air cleaner and healthier thus helping to mitigate the impacts of climate change.

### **Renewable energy islands (REI)**

Faeroe Island, Denmark became a REI because the only energy source in the islands is wind energy, supplying 100% electricity. A renewable energy island is 'an island that is 100% self-sufficient from renewable energy sources, including transport' (Jensen, 2000)

#### *Why islands?*

Islands have the unique potential for renewable energy compared to big landmasses like the US, China and Russia. Many islands for instance, show the right attitude towards renewable energy on the political level, because of the threat of global warming and climate change. Samoa, Fiji, Cook Islands, New Caledonia, Northern Mariana Islands and more have shown great interest in investing into renewable energy projects. There is a strong interest in changing present unsustainable energy patterns to more sustainable patterns. The near absence of fossil fuel resources on islands has prompted governments to invest in cheaper, cleaner and modern alternatives like renewable energy.

Islands are highly visible laboratories for technology. It is open to energy factors like wind, wave, geothermal, hydro and solar. Already, islands like the Cook Islands, Tuvalu and Samoa have undergone preliminary and feasibility studies into wave and wind energy resources.

On the other hand, the fundamental problem that lies with most islands is that their resources have not been fully explored or tapped into. Many islands have no funds allocated for these new REI projects. There is limited or no technology, nor any regional or government support. Another main reason for the laggard attitude towards the renewable energy approach is the expensive and environmentally problematic fossil fuels that are the only energy sources that are heavily relied upon.

### **Finding potential REIs in the Pacific - case study: Samoa islands**

#### General Information:

- Population (1998) - 174,800
- Land area - 2935 square kilometres
- 99% land area on Upolu & Savaii Islands
- About 2/3 of the population live on Upolu
- Location -: between 13° 25' and 14° 05' S and 171° 23' and 172° 48' W

#### Main source of energy: biomass

- Total Energy Consumption:
  - Biomass: 65% (fuel wood and coconut residues)
  - Petroleum / Electricity: 35%
- Electricity Generation: > 50% HEP supplied
- Mineral Resources / hydrocarbon sites: NIL
- Solar Energy: limited use (to heating water)

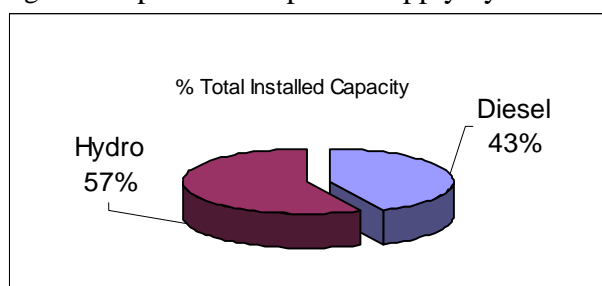
#### Upolu Island

Catered with two sources of electricity supply

- Diesel Oil - maximum capacity: 8.5 Megawatts (or million watts)
- Hydro energy - maximum capacity is 11.4 Megawatts

As shown in Figure 2 power supply for Upolu is approximately 60% hydro and 40% diesel

Figure 2: Upolu island power supply by source 1997



#### Savaii Island

Catered with one source of electricity supply

- Diesel oil - maximum capacity is 2.7 Megawatts

#### Energy sources

Table 1: Capacity vs production

	Renewable energy = hydroenergy	Non renewable energy = diesel
Capacity (how much it can take in)	60%	40%
Production (how much it can give out)	40%	60%

Data in Table 1 shows that although the renewable energy source can take in approximately 60% of the energy to supply, it can only manage to produce 40% of total electricity

throughout the island. The expensive and environmentally polluting diesel with a total percentage capacity of 40% cater for 60% of electricity needs. 40% production by the hydro energy (renewable energy) is made up by the existing Afulilo dam that produces 4MW and five other 'run-off-river' hydro stations - with a total production of 7.4 megawatts. Altogether they produce only 40% electricity.

### **Operation 'REI Samoa'**

If Samoa were to initiate actions to become a renewable energy island (REI), actions include:

#### Potential RE project: Sili hydro hybrid project

Initial planned capacity: 4 MW hydro station - feasibility study completed (funded by the Japan Aid, [Jensen, 2000])

- -Location: Sili River, south of Savaii island
- -Target consumption: 100% electricity supply for the big island, Savaii
- -Potential capacity: >8 MW hydro station
- -Potential target consumption: 100% Savaii, Manono, Apolima and eastern part of Upolu Island supplied
- Problem: customary land ownership issues, land conflicts, limited funds, limited technology, no REI policy

#### Potential benefits - if mission 'operation REI Samoa' accomplished

If Sili hybrid-hydro project is a success: it would yield,

- 100% energy consumption from RE source
- Reliable electricity for the 4 main islands
- 70-100% hydro supplied, 0-30% diesel supplied
- Diesel costs drop, less pollution
- Become self-reliant and self-sufficient
- A sense of self-empowerment
- Well-established renewable energy policy - Pacific friendly policy for sharing
- Lead the region in renewable energy accomplishment and economic self-reliance and energy self-sufficiency

The fundamental problem that Samoa faces like most Pacific island countries is the lack of a comprehensive policy in place although there was assistance from SOPAC to initiate the development of such a policy (Jensen, 2000). Lack of funds has contributed to the unsuccessful completion of sustainable energy projects in a number of Pacific island countries as was the case with Kiribati and Tuvalu.

Islands in the developed countries have led the way into becoming REIs because of the availability of modern technology and sound policy measures provided by the government, for example, electricity production on the island of La Desirade of France is supplied by 100% wind energy. Samsøe Island (Denmark) and Pollworm (France) utilises the same source of energy (see Figure 3).

Leading the way in hybrid hydro and diesel electric power plants in the Pacific region is Fiji Islands and together with the Cook Islands, Solomon Islands, Tuvalu, Tonga and Samoa have taken the initiative to become REIs (Jensen, 2000). However, modern technology remains a challenge for islands of the region, and will be ineffective unless the decision-makers at the

political level are convinced of the economic and environmental benefits of renewable energy.

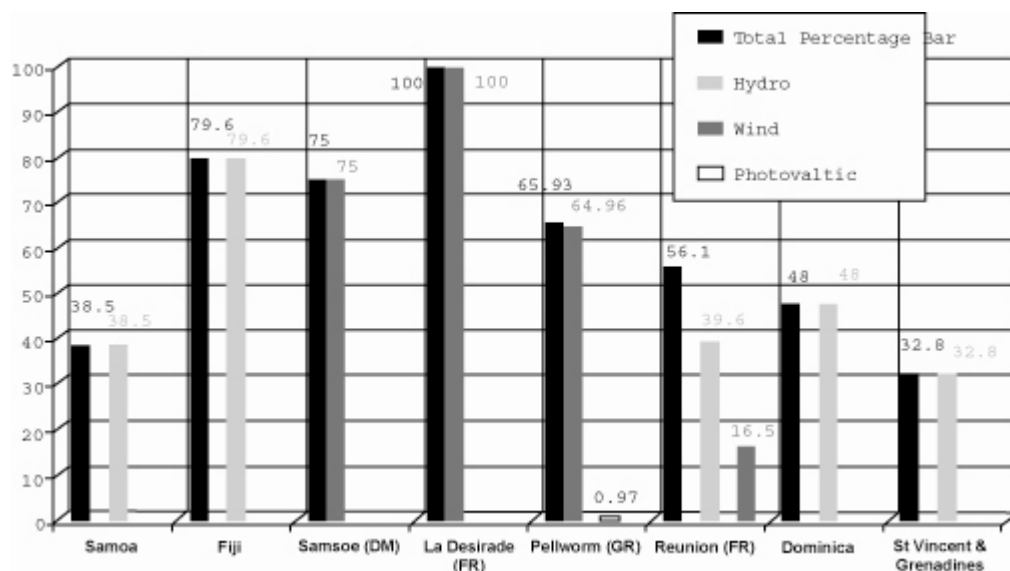
### Conclusion

Energy is important to us because it gives us the means to sustain and control our limited natural resources. Hence, sustainable development objectives and criteria should be clearly defined and practicable. All islands in the world have a unique potential to be the world-premier in renewable energy for self-reliance and self-sufficiency. However, there is a need to be vigilant, cautious and attentive to solutions both local, regional and at the international level.

Samoa which has empowered itself economically in its initiative for economic reform in the Pacific region through its policy action, can further boost this empowerment by becoming a renewable energy island, through a similar positive system. In order for small island states to take it to the regional level, there must be assistance and consensus amongst the island states on capacity building and expanding comprehensive policies to benefit the region as one. Therefore, funds received from developed countries plus assistance from the private sector in each island state should enable access to technology and establish a reality of reaching a renewable energy island status with mutual understanding and help from each other.

Once energy is re-fashioned to suit our survival and well being, sustainable development can be greatly boosted. A sense of natural empowerment is again maintained in the islands as well as the region, and most of all, lead the way to helping others help themselves.

Figure 3: Total percentage of electricity production and renewable energy sources



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# Sustainable agriculture: how do we get there in Samoa?

*Aaron Kama\**

## **Introduction**

Sustainable agriculture, food security and food safety in Samoa and the rest of the Pacific Islands are more urgent goals than ever as we enter the new millennium. In a developing country such as Samoa, the agriculture sector has multiple roles: to help ensure food security, anchor rural development, provide resources for the livelihood and adequate incomes of a majority of people, and to do this without destroying the ecological nature of the environment. There are thus two inextricably linked components, social and environmental, to agricultural sustainability.

## **Worldview**

In industrialized countries, the flaws of the industrial food production system are rapidly emerging. Over the past 2 years alone, the European public have confronted the health and environmental hazards of such a production system, both crops and animal husbandry. At the same time, increasing evidence of ecological and health dangers from genetic manipulation through modern biotechnologies is galvanizing deep public and scientific concern, starting in Europe, and spreading to Africa, Asia, Latin America and recently in North America which is the largest producer of genetically modified crops. Governments in a number of countries including Samoa have taken precautionary steps to halt or curb commercial production and imports, and in some cases, even banning certain types of technologies.

Meanwhile, the ecological, social, health and economic fall-out of chemical-based agriculture continues to unfold despite the acknowledgment in Agenda 21 by the World's political leaders that such production systems were proving to be environmentally unsustainable. Like other countries in the world, Samoa has taken several strategies in making sure its environment is ecologically, socially and economically sustainable.

Such strategies are geared to common challenges such as population growth, food security, conserving limited natural resources, limited arable farming land and the need for a sustainably healthy environment. This has raised the need for strategies for sustainable food security and the need to conserve natural resources as emphasized at the World Commission on Environment (Agenda 21, 1992).

## **Types of farming**

Types of agricultural farming in Samoa can be classified into three categories. These are subsistence farming, semi-commercial and commercial farming. The majority of farmers in Samoa fall into subsistence with surplus sold for cash. The Samoan culture and the land tenure system practiced influence these systems.

The farming technologies in these agricultural farming types however can also be classified as indigenous and introduced and are also the key factors to sustainable development such that they directly affect the sustainability of food security and conservation of natural resources.

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### **The need for sustainable agriculture in Samoa**

The need for sustainable development and the goals for sustainable agriculture in Samoa are fundamental factors in providing the basis for sustainable development programmes. However, one might ask if there is a need for sustainable agriculture in Samoa. This is a crucial question because it will all depend on a number of factors. Such factors include the need for food, household incomes and foreign exchange. Since Samoa is dependent on agriculture for its food and economy, it is significant that sustainable agriculture becomes an important technology in the farming systems.

At times the debate on poverty has become a controversial issue in Samoa. In the world condition, poverty is a day-to-day challenge for 800 million people struggling to meet their basic food requirements. Sixty percent are rural people who live in environmentally sensitive areas of low productivity. Of these, over 350 million are landless or near landless. The question is whether Samoa is in preparation for its future generation in terms of the required land for food security and conservation of natural resources? Does poverty exist in Samoa?

These and others are fundamental questions for Samoa in the new millennium. Many people argue that in most developing countries like Samoa, access to land remains the most viable opportunity for the poor rural households to become self-reliant. An example of this in Samoa is the Samoa Melanesian ethnic group who migrated from Papua New Guinea and the Solomon Islands many years ago. Not having access to land and do farming is one of their major problems living in Samoa.

However, the manner by which land is required is regulated. Rights are assigned and conflicts are resolved determines the incentives and opportunities for the rural poor to i) ensure their household food security; ii) conserve and restore their agro-ecosystems; iii) access to financial services; iv) earn income by producing marketable surpluses; v) accumulate capital and assets; vi) use their own labour and investments to sustain the natural resource base; vii) build reserves to cope with drought and cyclones and preserve their assets during periods of agricultural stress; and viii) invest in alternate livelihood options.

Sustainable agriculture and rural development are essentially about the way people in Samoa organize their social, economic and political systems to make the critical decisions on who has the rights to use which resources, in which ways, for how long and for which purposes. As we enter into the new millennium, the need for sustainable agriculture will intensify and become more important to the Samoan community and society. In the worldview, many organizations such as the Food and Agriculture Organization of the United Nations (FAO) and the Kellogg Foundation are focusing their efforts on sustainable agriculture and food systems. To help get the vision of sustainable agriculture and to understand the rationale, a brief philosophy of sustainable agriculture is given.

### **Philosophy of sustainable agriculture**

Agriculture and the food system are vitally important to the local community, district and Samoa as a whole. They are key contributors to the economic health and viability of the nation, districts and its local communities supplying its citizen with abundant, fresh, and nutritious supply of food.

Sustainable agriculture programmes in Samoa needs to ensure the long-term sustainability and viability of an agriculture and food system that will sustain the economic viability of farms as well as food processing, marketing, and distribution businesses. Such programmes should also enhance environmental quality and the natural resource base. It ensures that the

food and fibre needs of its citizens are met and strengthen communities; and enhance the quality of life of farm and rural people.

### **What is sustainable agriculture?**

There are many definitions but there are common elements in sustainable agriculture that we need to address under sustainable agriculture. For example, a good definition of sustainable agriculture is one like this: It is an integrated system of plant and animal production practices having site-specific application that will, over the long term: i) satisfy human food and fibre needs; ii) enhance environmental quality and the natural resource base upon which the agricultural economy depends; iii) make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls; iii) Sustain the economic viability of farm operations and enhance the quality of life for farmers and society as a whole.

### **Making the transition to sustainable agriculture in Samoa**

Sustainable agriculture is a management-intensive method of growing crops at a profit while concurrently minimizing negative impact on the environment, improving soil health, increasing biological diversity, and controlling pests. Sustainable agriculture is dependent on a whole-system approach as it focuses on the long-term health of the land. As such, it concentrates on long-term solutions to problems instead of short-term treatment of symptoms. One result of such strategy is that use of agricultural chemicals and similar inputs is reduced, though not necessarily eliminated. As a consequence, the land develops diversity and reliance that further reduce the need for agricultural chemicals.

It is widely agreed that a truly sustainable farm system must be sustainable economically, ecologically and socially. To be economically sustainable, our farms in Samoa should generate sufficient equitable returns to support farm families and to provide an economic base for the surrounding community. To be ecologically sustainable, farming methods used in the three farming systems must be modelled on nature to foster energy flow, effective water and mineral cycles, and viable community dynamics. Energy flow is enhanced through increased capture of solar energy and strategies to effectively utilize and store it. Off-season cover crops, perennial vegetation and relay planting are among the tools for capturing more sunlight; feeding livestock on-farm and carefully managing soil organic matter are means of conserving and storing it.

Strategies that conserve fossil-based fuels and/or substitute renewable energy sources also contribute positively to energy flow. Water cycling is improved through strategies and techniques that prevent erosion, increase the infiltration and water-holding capacity potential of soil, and reduce contamination of water resources by pesticides, fertilisers, and suspended matter. The cycling and recycling of wastes on-farm foster the mineral cycle. On-farm feeding of livestock is especially useful, as is the careful management of crop residues, the use of catch crops to reduce leaching losses, and practices that prevent wind and water erosion.

Effective community dynamics is encouraged through increased biodiversity. Crop rotation, companion planting, strip cropping, and the integration of livestock and crop enterprises are all means of increasing farm biodiversity. Community dynamics is also enhanced by the appropriate introduction of perennial crops and trees where possible. To be socially sustainable, agriculture should promote the physical, spiritual, cultural and economic health of farm families and communities.



### **Farming systems in Samoa**

Apart from indigenous systems such as shifting cultivation, a number of farming systems have been introduced to Samoa to provide alternative farming systems. The Ministry of Agriculture, The University of the South Pacific's School of Agriculture, FAO and other Non Government Organizations have played important roles in researching alternative farming systems that will provide sustainable agriculture. A research by Kama & Powell 2002 shows that farmers in Samoa have been using farming systems such as monocropping, mixed cropping, mixed farming, agroforestry and shifting cultivation. The study shows that 66% of farmers in Samoa use mixed cropping, 49% use mixed farming (crops & animals together), 13.6% use monocropping, 5.1% use shifting cultivation, while only 3.4% use agroforestry.

The study also shows that though farmers use introduced farming systems there are still a number of problems that they face. The most important problems are pests and diseases, lack of resources, theft, lack of markets, rocky soil and poor roads. This study shows that there is only a small portion (3.4%) of farmers who have adopted agroforestry. It shows that sustainable agriculture through the use of agroforestry is not easy to adopt and use. Other introduced technologies for sustainable agriculture include organic and hydroponics farming.

### **Some essential steps to a sustainable agriculture in Samoa**

How do we get started in sustainable agriculture? This is an important question for those who are seriously thinking of sustainable development. First, one has to understand the philosophy of sustainable agriculture and the definition and finally move to the various means of making agriculture sustainable. If this is the kind of agriculture we want in Samoa, how do we get there from here? I have formulated eight steps that will get us started. Note that these are not the only steps, there are more steps that are not mentioned here. Just how valuable these steps are will determine by how well they work for the Samoan farmers every day. They are guideposts for thinking about a farming operation, arrows that point the way to long-term viability of a farm.

#### *Conserve and create healthy soil*

In order to reach this step, one needs to stop soil erosion by mulching, cover cropping, terracing, strip cropping, and repairing gullies. The use of organic matter such as green manure, compost, manures, crop residues and organic fertilizer will conserve and create a healthy soil. Other management practices that would also help include crop rotation, intercropping and alley cropping, all these have been introduced in Samoa.

#### *Conserve water and protect its quality*

To conserve water and its quality, we need to address the following management practices: prevent soil erosion in field and pasture. Erosion can be controlled by cover cropping, mulching and improving organic matter content of the soil. We can also conserve water and protect its quality by reducing the use of chemical in farming. Samoa should take precaution in the use of pesticides, weedicides and other chemical such as fertilizers because of its porous soil. Chemical residues can easily leached down to underground water and caused contamination to drinking water. On the other hand, the idea of using biological control method is an alternative way of using chemicals. Another way of conserving water and its quality is to establish conservation buffer areas. One way to do this is to grow crops adapted to rainfall received. For this, a study of crops and their water requirements is important to the selection of crops. Water conservation and quality can also be maintained by the use of efficient irrigation methods. However, irrigation is not a common practice in Samoa. Most crops are rainfed.

### *Manage organic wastes and farm chemicals so they don't pollute*

To manage these one can do the following practices: i) Organic wastes is not really a threat in Samoa however, excess organic wastes will cause pollution to Samoa's environment if not controlled. Thus, it is important to carry out a soil test, apply manures and litters only when needed; ii) Manage compost, animal manures and litters. For example pig manure can be mixed with other ingredients to create a compost soil; iii) Store litter piles out of the rain and sun. This is to stop residue leaking out to recreational and residential areas. iv) Raise pastures and practice free-range poultry system for better ecological control system. v) Raise pigs in hoop or small houses or free-range system; vi) Look for alternatives to chemicals. Always look for other non chemical means to avoid the use of chemicals in farm production. vii) If a chemical is to be used, use the least amount necessary; viii) Buy the least toxic chemical; and ix) Dispose according to label instructions.

### *Manage pests with minimal environmental impact*

Pest management will include the following: i) Weed management. Weed management involves mechanical approaches. The approaches include mowing, burning, and flooding tillage, hand weeding and controlled burns. ii) Cultural Approaches. This includes hand weeding, crop rotation, smother crops, carry out cover crops, allelopathic plants and close spacing of plants. iii) Biological Approaches. This approach includes using multispecies grazing, and rotational grazing; iv) Insect and Disease Management. In this approach, we can introduce or enhance existing populations of natural predators, pathogens, sterile insects, and other biological control agents. Other practices include making traps, maintain wild areas or areas planted with species attractive to beneficial insects, selective insecticides to beneficial insects, botanical insecticides which are less toxic, trap crops, crop rotation, intercropping, strip cropping, maintain healthy soil and keep plants from becoming stressed.

### *Select plants and animals adapted to the environment*

Another essential step to sustainable agriculture is to select plants and animals adapted to the environment. These will include i) growing crops and crop varieties well-suited to Samoa; ii) matching crops to the soil type; iii) experiment with older, open pollinated varieties that do well without chemical inputs; iv) raise hardy breed of livestock adapted to local climate; and v) raise livestock that gain well on grass and native forages.

### *Encourage biodiversity*

Biodiversity is an important aspect of sustainable agriculture. It all means diversify both crops and animals. Preserve habitats for wildlife and maintain the health of stream and ponds. There should be wildlife corridors for wildlife to habitat and crop rotation is also a means of encouraging biodiversity.

### *Conserve energy resources*

Energy resource is conserved when: i) the number of tillage operations are reduced; ii) cut the use of chemicals and fertilizers; iii) develop production methods that reduce horsepower needs; iv) recycle used oil; iv) use solar-powered fences and machines; v) use renewable, farm-produced fuels: ethanol, methanol, fuel, oil from seed crops, methane from manure and crop wastes.

### *Increase profitability and reduced risk*

To achieve this, one can do the following practices: i) diversify crops and livestock; ii) Substitute management for off inputs; iii) Maximize the use of on-farm resources; iv) Work with, not against, natural cycles; v) Keep machinery, equipment and building costs down; vi)

Add value to crops and livestock, and vii) try to direct marketing for farmer's markets, and farm stores if necessary.

### **Standard for sustainable agricultural programmes**

The quality of sustainable agriculture also depends on a number of standards. These standards may include sustainable agricultural programmes and characteristics of technologies used in the farming systems. Standard for sustainable agriculture programmes surrounds the following areas: i) a programme that is based on science; ii) a programme which honours market principles; iii) a programme which increases profitability and reduce risk; iv) a programme which satisfies people's need for fibre and nutritious food; v) a programme which conserves energy resources; vi) a programme which creates and conserves healthy soil; vii) a programme which conserves and protects water resources; viii) a programme which recycles or manages waste products; ix) a programme which manages environmental impact; and xi) a programme which encourages strong rural communities.

### **Features (characteristics) of sustainable agricultural technology**

In addition to sustainable programmes, quality sustainable agriculture in Samoa will also depend on a number of agricultural technology characteristics. The characteristics include:

- i) *Relative advantage*: Technology for sustainable agriculture should be recognized as better than the idea or object it is intended to replace. Relative advantage is usually expressed in terms of economic gain, although smallholder farmers may consider the avoidance of risk more important.
- ii) *Compatibility*: Technology for sustainable agriculture should be consistent with a farmer's existing values, past experience, his management objectives, the level of technology, the stage of farm development and needs.
- iii) *Complexity*: Technology for sustainable agriculture should be perceived as relatively easy to understand and use. The simpler the technology the more rapidly it will be adopted.
- iv) *Trialability*: Technology for sustainable agriculture should be tried on a limited basis. Ideas or on an instalment plan will generally be adopted as part of a package. If a farmer can try an appropriate technology without committing too much money, he or she may adopt it more quickly.
- v) *Observability*: Results of technologies for sustainable agriculture should be visible to farmers. The easier it is for a farmer to see the advantages of sustainable technology the more likely he or she will adopt it.

### **Strategies for change**

Whatever the change is for sustainable agriculture, it will depend on the strategy used for change. Change surrounds farmer's knowledge, skills and attitudes towards sustainable agriculture. Strategies for change may include the reward strategy, giving order strategy, directive strategy and indirective strategy.

#### *Reward strategy*

This strategy is based on the principle that people will change their behaviour if you provide incentives for them to change. For example, the pasture planting competition by the Ministry of Agriculture, the provision of low interest loans or grants for farming activities through local development banks and the subsidy on fertilizers for farmers.

#### *Giving order strategy:*

This strategy consists of making rules, regulations and laws and telling people that they have to obey them. For example, in Samoa a number of years ago the government passed a Bunchy

Top Act in an attempt to control an outbreak of this disease in bananas. Farmers were required to take certain control measures against this disease. Inspectors from the Ministry of Agriculture could inspect plantations and order farmers who were not carrying out the controls to do so. If they refused, they could be taken to court.

*Directive strategy:*

This strategy is based on the assumption that new technology will come from research organizations and people are not important sources of knowledge. In this strategy, the organisation responsible for the programme decides what people need, or ought to know, or do, or how they should behave, and organises educational programmes and provides resources to encourage the target audience to behave in this way. Most programmes run by the Ministry of Agriculture in the region are of this type. For example, the Amelonado cocoa scheme in Samoa, the copra quality programme in Vanuatu, the banana export scheme in Tonga.

*Non-Directive Strategy:*

This strategy is based on the idea that people (like farmers) are important sources of knowledge about the activities they are involved in. It assumes that the farmers themselves know their problems, and the solutions that work.

## **Conclusion**

In summary, sustainable agriculture, food security and food safety are important goals in Samoa as we enter the new millennium. The major roles for agriculture sector are to achieve these goals through the provision of technical services to ensure food security is established and maintained, anchor rural development, provide resources for the livelihood and adequate income for a majority of people. While these are the major goals, it must emphasize the need to maintain the ecological base of the environment. Generally speaking, there is a need for sustainable agriculture in Samoa. This is indicated in Samoa's dependence on agriculture for its food and economy and therefore it is important that agriculture is sustained in the long run.

Agricultural programmes in Samoa must be designed to ensure the long-term sustainability and viability of an agriculture and food system that will sustain the economic viability of farms as well as food processing, marketing, and distribution businesses. Sustainable agriculture is an integrated system of plant and animal production practices having site-specific application that will, over the long term satisfy human food and fibre needs, enhance environmental quality and the natural base upon which agricultural economy depends, make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate natural biological cycles and controls, sustain the economic viability of farm operation and enhance the quality of life for farmers and society as whole.

The essential steps to sustainable agriculture in Samoa are as follows; conserve and create healthy soil, conserve water and protect its quality, manage organic waste, manage pests with minimal environment impact, select plants and animal adapted to the environment, encourage biodiversity, conserve energy resources and increase profitability and reduce risk. Success in sustainable agriculture depends on a number of standards. These standards incorporate well into the programmes, characteristics of technologies and strategies for change. The existence of appropriate government policy on sustainable development is very important to govern sustainable development. In addition, commitments from Non Government Organizations and other related bodies will also enhance sustainable development. Finally, sustainable

agriculture can be strengthened by establishing markets where economic transactions succeed to take into account social or environment costs and strengthen policy where government encourage and promote environmental issues.

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# **Worldviews, concepts, attitudes and awareness with regard to natural resource management in Samoa and other Pacific islands**

*Nacanieli S. Tuivavalagi\**

## **Introduction**

This paper focuses on worldviews, concepts and natural resource management in Samoa and other Pacific islands. For the purpose of this paper, the Pacific islands refer to the 22 developing countries that are members of the Secretariat of the Pacific Community, SPC, including countries from Melanesia (five), Micronesia (seven) and Polynesia (10). Excluded are the relatively big and developed countries of Australia and New Zealand as well as the much smaller (approximately 1-10 sq. km in areas) and mainly uninhabited American islands of the Pacific. It is in accordance with the thesis of Weber and particularly Miller and Guthrie (1990) that “ideas have consequences”. As explained by George Grant (in Miller 1990: 9-11), this paper argues that in development, ideas have the most powerful consequences.

When people have the right ideas driving their actions, everything else will come in its time. But when we are plagued by bad ideas, the best-laid plans will come to naught. Grant pointed out the deleterious results of many of the best-intentioned efforts to aid the poor where vast resources, brilliant strategies, and determined programmes have been frustrated at nearly every turn by inadequate, inconsistent, or iniquitous philosophies

The author is himself a native of the Pacific islands – he is from Fiji but since 1976 he has spent most of his time in Samoa but has also had the opportunity to travel to many other islands of the Pacific and beyond. His observations have confirmed that on a personal, group and even national level, natural and other physical resources and technology are, by themselves, not the key to sustainable growth and development.

The main objective of this paper is to argue that our view of natural resources and how we actually manage our resources is influenced by our worldview, and explain how we may change our worldview to that of a more appropriate one. Apart from this, the paper will also:

- Describe the Pacific islands and some of their characteristics including their resources,
- Describe the various worldviews and concepts held by the peoples of the Pacific islands,
- Explain how concepts and worldviews may be changed,
- Describe that the Biblical Theism Worldview has a sustainable concept for natural resource management which is not understood by the majority of Christians and need to be explained at least firstly to Christians who make up the majority in the Pacific islands;
- Promote collaboration between development workers and the Christian churches and organizations in the Pacific islands in the area of natural resources and their management.

## **Worldviews, concepts, attitudes and awareness**

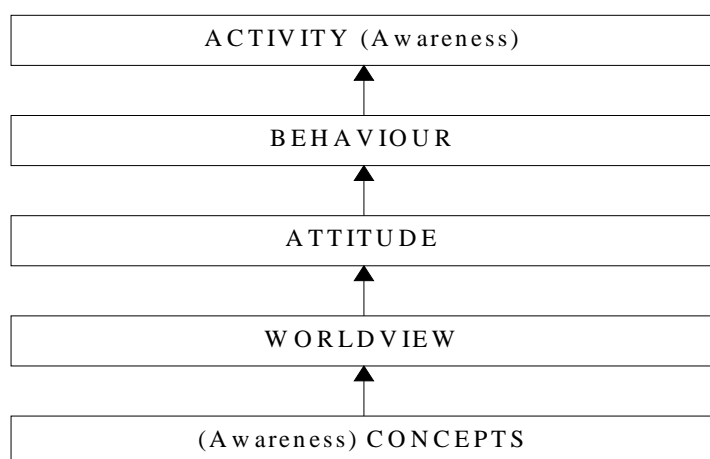
Figure 1 shows a simplified model of how worldviews, concepts, attitudes and awareness influence the sustainability of development activities. A worldview is formed when one becomes aware of and retains various concepts to which he is exposed to via training or experience. The worldview one holds affects his attitude towards various issues which, in turn, affects his behaviour. One’s behavioural mode in conjunction with his awareness of the

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socio-economic situation and the various tools, techniques and equipment available will determine the specific activities carried out – and its sustainability.

Figure 1: A simplified model of how worldviews, concepts, attitudes, and awareness influence the sustainability of development activities: Awareness of various concepts forms one's worldview which influences the person's attitude and behaviour regarding sustainable development; however, the specific activities undertaken will be influenced also by one's awareness of the available options and technology.



The three main worldviews held by Pacific islanders are compared in Table 1 – with regard to (a) who is the ruler of nature including its natural resources; (b) how nature is viewed or “perspectived”; (c) the nature of nature; (d) the nature of man; (e) how resources are viewed; and (f) man’s role in nature.

Table 1: The "nature" of nature according to the three worldviews held by Pacific islanders

	Animism	Theism	Secularism
Ruler	Nature	God	Man
Perspective	Biocentric	Theocentric	Anthropocentric
Nature	Capricious(no system)	Open system (created)	Closed system
Man	A spirit	[Body/mind/spirit]	A mouth, the highest animal
Resources	Limited good	Positive sum	Zero sum
Man's role	Worshipper victim	Steward regent	Consumer miner

Source: Based on Miller & Guthrie (1990)

### Worldviews

As pointed out by Miller and Guthrie (1990), all people and cultures have a particular model of the universe, or worldview. Their worldview does more to shape their development, their prosperity or poverty, than does their physical environment or other circumstances.

As shown in Table 1, Biblical theism, the biblical worldview, holds that because God exists, an objective reality exists that is known and has been established by God. Reality is ultimately personal because it has been established by the ultimate Person. Under Biblical theism, we are seen as living in a positive-sum universe. Resources are limited only by man’s moral imagination, creativity, and stewardship. Theism says that wealth is found

primarily in the minds and hearts of people and only secondarily in matter. The problem of poverty can be solved by creating free societies – societies that allow women and men to create new bounty for themselves and their communities. While some individual resources (e.g., oil) are limited, others (e.g., solar energy) are not. Furthermore, in addition to man's natural inclination to discover, he has an economic incentive when a resource becomes scarce to develop alternatives (e.g., wind, solar and nuclear power are alternatives to fossil fuels; while fibre optics is an alternative to copper cable).

Table 2. The three worldviews and their concepts of knowledge and other phenomena

Concept of:	Animism	Theism	Secular
Knowledge	Mystery	Truth	Information
The Universe	One-ness	Stewardship	Evolution
History	The circle of life	History is going somewhere	"One damn thing after another"
Economic system	Barter	Capitalism	Consumerism
Purpose of work	To survive	To glorify God	To consume
Ethics	Amoral	Moral absolutes	Immoral

Source: Miller and Guthrie (1990)

The mention of God, particularly the Christian God, in this scientific forum on development is most appropriate for two main reasons. Firstly, for development to be sustainable, the development strategies employed must consider the culture and particularly the religion of the local population; and in the case of the Pacific islands, the local population is mostly Christian. Secondly, science grew out of a Christian worldview – even though many in the general population seem unaware while many “scientists” try to deny this intimate relationship between Christianity and science.

Table 2 shows that secularism sees reality as ultimately physical. By definition, this model denies the existence of a spiritual or transcendent reality. Under secularism, one man's gain is viewed as another's loss. Resources are found in the ground, and matter is all that matters. The word “resources” is almost always preceded by the word “limited”. The concept of the earth's “carrying capacity” is prominent. Children are told that some people are poor because others are rich. The solution is to redistribute scarce resources to the poor.

Animism (Table 1) views reality as essentially spiritual. The physical world is *maya*, illusion. It is animated by spirits. Under the animism worldview, nature is seen as existing for itself and is higher than man in the cosmic pecking order; therefore nature is to be worshipped and feared. Man is to submit to nature. The goal of the average animist is to survive in poverty in the short run and then be absorbed by nature in the long run.

### Worldviews and concepts

Rathus (1994) defined “concept” as “a symbol that stands for a group of objects, events, or ideas that share common properties” while Hanks (1986) defined it simply as “an idea, especially an abstract idea”. Each worldview is composed of a set of concepts in relation to how an individual or a group of individuals view the world and how it works. Table 1 for example can be viewed as presenting six different concepts under the three major worldviews of animism, theism and secularism. The six concepts refer to how each of the three worldview views (a) the “ruler” or dominant factor in life, (b) “perspective” or where attention in life is (supposed to be) focused; (c) “nature” (d) “man” (e) “resources”, and (f) “man's role” in relation to nature. Furthermore, Table 2 below describes the three



worldviews' concepts of, or how they view, "knowledge", "the universe", "history", the appropriate "economic system", "purpose of work" and the resulting ethical system.

Some concepts are closely tied to the individual's or group's worldview while others may not be closely tied. Changes in concepts, particularly those closely tied to a worldview will ultimately result in a change in worldview. On the other hand, a change in worldview as a result of change in one or a few basic concepts leads to changes in concepts, particularly those closely tied to the worldview.

It is of utmost importance for development workers to realize that individuals and groups may have different concepts of various issues including natural resources and how these resources have to be managed. Without this awareness, stakeholders can be in a meeting discussing an issue without realizing that they are actually talking about different issues. Development workers should realize that their concept of a certain issue may not match that of a community (s)he serves and that the concepts held by various groups in the community (s)he serves are not exactly the same.

It is important to understand the worldviews and concepts held by the different groups in a country. This should enable development workers to understand the different attitudes and behaviours of the different groups and adapt development strategies to fit into the worldview and conceptual landscape of the country. When people have different concepts of a phenomenon, they are actually referring to different things when they discuss this particular phenomenon even though the use of same terms mislead them into thinking that they are discussing the same matter. For this reason, members of multidisciplinary development teams should be aware of the concepts held by themselves and by the other members of the team.

Based on their experiences in the environmental arena in Australia, Reser and Bentrupperbaumer (2001) have mentioned that "what is very clear to [them] is the yawning gulf between social science assumptions and paradigms, on the one hand, and the assumptions and models of the natural and physical sciences ... on the other." As such, when members of a development team talk about "natural resources" or "natural resource management" they should at least be aware of exactly what each member of the team is talking about.

### **Attitudes and awareness**

Our attitude towards natural resources is very important because it will affect our behaviour with regard to natural resources and their management. However, we should realize that our attitude is influenced by the worldview and concepts we hold. There might be better worldviews and concepts out there that we are not even aware of. This paper argues that most Christians are not aware of the Christian biblical worldview and the concepts relating to natural resources and their management. This is where the local churches can play an important role.

### **The situation in the Pacific islands**

The Pacific islands are characterised by little resources and exports, low incomes and serious environmental problems. It is important that the islands broaden their view and consider other worldviews and concepts.

Development in the whole world and the Pacific islands in particular have been influenced by biblical Christian worldviews and concepts. As a result, how Pacific islanders view their gods, nature and their fellow (wo)men and have been deeply affected. For example, what we now refer to as “fellow (wo)men” in the current Christian worldview era would be considered “potential dinner” not too long ago. In the process of the Christianisation of the Pacific islands, which still continues, local churches have been used as centres and channels of education, training and development. However these activities have tended to focus on spiritual matters, the three R’s (reading, “riting” and “rithmetic”) and even health.

Table 3A: Total area, population and percent Christians in the Melanesian countries

Country	Area (sq. km)*	Population*	% Christians**
Fiji	18,270	844,330	58.3%
New Caledonia	19,060	204,863	82.8%
Papua New Guinea	462,840	5,049,055	97.3%
Solomon Islands	28,450	480,442	96.2%
Vanuatu	12,200	192,910	91.1%

Sources: \*CIA, 2001; \*\*Johnstone et al., 2001

Table 3B: Total area, population and percent Christians in the Micronesian countries

Country	Area (sq. km)*	Population*	% Christians**
FSM***	702	134,597	93.8%
Guam	549	157,557	95.6%
Kiribati	717	94,149	94.4%
Marshall Islands	181	70,822	95.2%
Nauru	21	12,088	90.5%
CNMI****	477	74,612	90.5%
Palau	458	19,092	96.1%

Sources: \*CIA, 2001; \*\*Johnstone et al., 2001. \*\*\*Federated States of Micronesia; \*\*\*\*Commonwealth of Northern Mariana Islands

Table 3C: Total area, population and percent Christians in the Polynesian countries

Country	Area (sq. km)*	Population*	% Christians**
American Samoa	199	67,084	95.7%
Cook Islands	240	20,611	98.0%
French Polynesia	4,167	253,506	85.1%
Niue	260	2,124	94.9%
Pitcairn Islands	47	47	100.0%
Samoa	2,860	179,058	96.9%
Tokelau	10	1,445	99.0%
Tonga	748	104,227	95.2%
Tuvalu	26	10,991	98.0%
Wallis & Futuna	274	15,435	97.8%

Sources: \*CIA, 2001; \*\*Johnstone et al., 2001

In New Zealand, the government and NGO's are also aware of the church as a powerful and effective Pacific island institution and have carried out a number of development initiatives, particularly in health and education, through the church (Momoisea, pers. comm.). This paper argues that the local churches in the Pacific islands can also be used as a channel and centre for ensuring the sustainable management and development of our resources.

One can find in the Pacific all of Miller and Guthrie's (1990) three archetypes of worldviews, namely: biblical theism, secularism and animism (Tables 1 & 2). In the Pacific islands today the dominant worldview is that of biblical theism as can be confirmed by the predominance of christianity in all countries of the Pacific (Tables 3A, 3B & 3C).

Nevertheless, in the Pacific, the concept of a natural resource e.g., land, may vary between countries, ethnic groups, religious groups, age groups, socioeconomic status, educational level, gender and occupation. Other factors that may have a significant effect include one's location within a country, access to the natural resource under consideration, political membership, status in the traditional social structure, closeness to traditional culture and traditions, etc.

In Europe today, the major worldview is secularism which developed from deism (where God was viewed as transcendent but not imminent) which, in turn, developed from theism (where God is viewed as both transcendent and imminent). In the Pacific islands, over a relatively short period of time, i.e., over the last 200 years or so, there has been a change in worldview from animism to deism among the indigenous peoples with a lot of pressure as a result of globalization, education, immigration, etc. for the adoption of a secularism worldview. In all Pacific island countries, a great majority of the population has abandoned its indigenous religions with some or much of its animistic worldview and has adopted Christianity and some or much of its theism worldview.

Table 3 shows that at least on paper each of the 22 Pacific island countries has at least 90% of the population listed as Christians – with the exception of French Polynesia (85.1% Christians), New Caledonia (82.8% Christians) and Fiji (58.3% Christians). However, it would be reasonable to assume that some non Christian concepts are still held even by the Christian segment of the countries' population. According to CIA (2001), a considerable portion of the population are still engaged in their indigenous beliefs, particularly in Melanesia (e.g. Papua New Guinea 33%, Vanuatu 7.6% and Solomon Islands 4%) and to some extent in Micronesia (e.g. Palau 34%).

### **Concepts, attitudes and awareness in the Pacific islands**

Even though Pacific islanders are supposed to have adopted the biblical Christian worldview, they still have clung very strongly to some concepts and beliefs that belong to the animism worldview. This paper argues that this phenomenon is the major reason for the confusion and low level of development and prosperity currently found in many of the Pacific islands.

Many have pointed out that Pacific islanders need to change their attitude if they want to progress or develop. This sentiment has again been recently echoed by Reddy (2002) in a symposium in Fiji where he stated that indigenous Fijians have to change their attitude towards farming, i.e., they have to think commercially, if they want to be successful in sugarcane farming. Such changes in attitudes are difficult for a Fijian still holding the animism worldview or some of its key concepts. For these reasons, it is important that Pacific islanders be made aware of the various worldviews and concepts. This is quite apart

from their need to be aware of the scientific findings and statements with regard to their natural resources, the key issues and options for sustainable management. Kerslake (2001) has pointed out the importance of awareness with regard to environmental issues in Samoa,

### **Effect of environment in the Pacific islands**

It has been argued that Pacific islanders are one-season people who do not come across the need for forward-planning – as compared to four-season people in the cooler regions of the world who need to plan in advance for the winter season . It has been argued that after hundreds or thousands of years of living in a one-season environment has moulded Pacific islanders into relaxed peoples who do not take work seriously in an environment where, during any time of the year, it is relatively easy for nuts, berries and fruits to be collected from trees or shrubs; fleshy edible root tubers to be dug from the ground; fish to be caught from warm waters of streams, rivers and seas; or shellfish to be collected from coastal areas.

This paper argues that after hundreds or thousands of years of exposure to a specific type of environment, the environment is able to affect the people's worldview. And this consequently affects the people's thinking, attitudes and behaviour. However, the paper argues that environment does not have a significant or sustained direct effect on the peoples' attitude and behaviour. For this reason, when one-season people are transferred to a four-season environment, they do not automatically adopt the attitudes and behaviour of four-season peoples. In a similar manner, four-season peoples do not automatically adopt attitudes and behaviours of one-season people when moved to a one-season environment.

### **A strategy for improving attitudes towards and management of natural resources in the Pacific islands**

Firstly, it is important that we determine the various worldviews and concepts held by different groups towards natural resources, the key problems and how to manage or address these key problems. The natural resource management strategies being developed should be adapted to suit the worldview and conceptual landscape of the country concerned.

We also need to determine whether communities we serve have conflicting concepts with regard to natural resources and their management. In such a case, we need to help them develop unified concepts that are not contradictory. Now, when development teams are usually interdisciplinary in nature, it is also important that members of the development team are at least aware of differences in their concepts of the issue being discussed.

It is also important that we also determine the people's attitudes towards natural resources and their management as well as their level of awareness with regard to these matters. Training or workshops developed should be designed in consideration of the people's current attitudes and level of awareness.

Organizations that have been teaching the Christian worldviews should be identified and one or more of them selected to be involved in a 3-group collaborative effort in the Pacific – involving such organizations, local churches and development agencies – in activities such as the running of training courses and workshops to teach the Christian/biblical worldview on natural resources and its development. Irrespective of their worldview, some people use or manage natural resources in an unsustainable manner due to their evil nature. They are lazy, greedy and selfish – personalities that should also be addressed in the design of training courses or workshops.

The vast majority of the population in all Pacific countries are Christian and Christianity already has a sustainable concept of natural resource management which unfortunately is not even realized by most members of the church. There should be a 3-way collaboration between (a) development workers, (b) the local church and (c) a body with expertise in the teaching of the biblical Christian worldview (e.g., Youth With A Mission (YWAM) and others) in the preparation of manuals to promote the biblical Christian worldview with particular emphasis on this worldview's concepts regarding natural resource development and management.

Training workshops need to be conducted to raise the level of awareness of Pacific islanders. Islanders need to be aware of the results of scientific investigations into natural resources and their management. They need to know the various worldviews and the various concepts relating to natural resources and their management – with discussions on their strengths and weaknesses.

Projects should be developed in the form of networks. This will assist in ensuring that members of the network share their knowledge and experience with each other and gain from one another. Also the different networks can encourage and support the growth and development of each other.

There are serious weaknesses in the animism worldview of the pre-Christian era and the secularism worldview of the post-Christian era (Tables 1 & 2) and development workers should collaborate with the church in running seminars as part of extension activities to promote sustainable and appropriate worldviews and concepts in the Pacific islands. As mentioned above a person's worldview may be changed as a result of exposure to a particular type of environment over an extended period of time. However, a relatively sudden change in worldview can be achieved by life experiences gained through other means particularly education and religion.

In Samoa the missionaries were quite effective in shifting the worldviews of the population from animism to biblical theism – partly as a result of effective methods of conversion. Rev. John Williams's Journal of 1832 as described by Meleisea (1987) provides an explanation of the effectiveness of the methodology employed by the missionaries in getting Samoans to dedicate their lives to their new God and also shift their worldview from Animism to Biblical Theism. In those days (1830's), under animism, sacred creatures (birds, animals and fish) represented ancestral or village "aitu" (gods) and Rev. John Williams would arrange for these sacred creatures to be eaten by those who have decided to become Christians – in front of him (Rev. Williams) in large village gatherings. The author of this paper cannot think of a more effective way of getting people to turn their back on an animistic worldview.

## **Conclusion**

In summary, the key points mentioned by this paper are as follows:

- Samoa and other Pacific islands are vulnerable, poor in resources and have critical environmental problems and should not leave any stone unturned in their search for ways to ensure sustainable development;
- Worldviews and concepts decide people's attitude and behaviour, and development workers should be aware of their own worldviews and concepts as well as those of the other members of their interdisciplinary teams as well as those of the groups they serve;
- In all Pacific islands, the (great) majority of islanders have adopted Christianity which, as a religion, has a worldview and concepts that promote sustainable development in the sense

that it views (wo)man as a steward rather than a worshipper or consumer of natural resources;

- Some Christian groups have published and/or are teaching the Biblical Worldview regarding resource management – as well as other aspects of life. The author argues that the Biblical concept of natural resource management is most sustainable and appropriate but has to be taught and extended as it is practically unknown by the majority of Christian communities in Samoa, other Pacific islands and elsewhere;
- Development workers are to be encouraged to collaborate with Christian organizations in developing manuals that clearly present the Biblical Theism Worldview on natural resources and their management and in the usage of these manuals in extension works;
- It should be noted that there are non-Christians in the Pacific islands and their specific faiths should be considered in designing sustainable development strategies that are suitable for them.

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## **Some reflections on a sustainable development strategy for a least developed small island state, just graduated to developing country status**

*Afamasaga Faamatala Toleafoa\**

### **Introduction**

This is not a blueprint for sustainable development for Samoa, but some reflections on how a small country can best meet the challenges and opportunities of today's unsustainable global economic and ecological environment. We know that in the long term, the present world economic system of development and consumption of the world's finite resources, is unsustainable economically and ecologically. It may not even be sustainable in the medium and short term. The destructive impact of climate changes is already being felt around the world and much more is to be expected given the failure of the international community to address the root causes.

But whether the present system is sustainable or not, Samoa is part of it. The success of our economy and ability to improve living standards is dependent on how well we integrate and become part of the world economy. Samoa's application to join the World Trade Organization [WTO] is intended to do just that. It is a system of development which says that a country will progress by exploiting its own natural resources, or someone else's, with the use of improved technology, know how and capital. That way, more goods and services are produced and consumed, thereby raising peoples' standards of living. And the more people produce and consume, the more everyone prospers.

That is why capitalist societies are known as consumer societies. And after the fall of communism, capitalism is now the unchallenged system for everyone to follow. Even China has now fully embraced capitalism. Economic growth is measured by the volume of goods and services that is produced and consumed. The very survival of the global system itself, depends on the demand for goods and services rising sufficiently to maintain production at high levels. A slow down in demand and consumption can often start a downward spiral in economic activity that is damaging to everyone's income and ability to maintain high living standards.

In such a situation, workers start losing their jobs and factories and places of work close down because of decreased demand for goods and services, leading to further loss of demand as workers have less money to spend. If the pattern is not arrested or reversed, this can lead to a full scale recession or depression.

The world is in one of these slow downs in economic activities right now. But it is one of the contradictions that as the world's ecology suffers from degradation from unprecedented industrial activity in the last hundred years, people are encouraged to spend more and consume more in order to maintain the health of economies. The Japanese economy's prolonged recession or slowdown in growth in recent times has been attributed partly to the failure of the Japanese consumers, concerned with job security, to spend more on buying Japanese goods and services.

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But the exploitation of natural resources, whether at the production or consumption end, has an adverse impact on the environment through the emission of greenhouse gasses and other harmful rejects. It is the scale and intensity of this economic exploitation of the world's natural resources for development in the last 100 years, that has placed a question mark on the long term survival of the planet itself. So, when we speak of sustainable development for Samoa, we speak of following this pattern of development, but somehow finding ways to make it sustainable, which is a contradiction.

Having said that, the challenge for small societies like Samoa, is to find ways to survive and prosper in this increasingly open and competitive system, and at the same time protect its own natural environment. On the global level, like many small countries that are more vulnerable to the impacts of environment degradation, it can only hope for a change to these trends and for assistance in dealing with these impacts. This paper seeks to suggest ways in which we can best do this given our small size and economic and ecological vulnerabilities.

### **Exporting labour in place of goods and services**

International trade in goods and services is the conventional means for economies to grow and develop. A competitive edge in exporting goods and services allowed the Japanese economy to quickly catch up and surpass many of the leading industrial nations. The same pattern is being repeated in the case of the newly industrializing economies of Asia. World Trade Organisation and globalisation are all about increasing trade in goods and services and thereby raising the level of prosperity for everyone.

But Samoa has been exporting labour in recent years with considerable success and should continue to encourage it in place of producing goods and services for export. As a result, Samoa's overseas population numbers is in the tens of thousands. In fact some estimates place the figure at close to the number of people living in Samoa today.

Samoans migrate overseas for a variety of reasons, but the main one is in search of employment in the industries of the recipient countries. Industrial processes are the biggest source of pollution, and while the larger land masses can cope with their environmental impact, small islands like Samoa do not have the same ability. Exporting labour saves us from having to attract industrial activity here, which is difficult in the first place, given our relative isolation, narrow resource base, and diseconomies of scale.

Exporting labour places the industrial processes, with all their pollution of the environment, elsewhere. The other benefits from exporting labour as a sustainable development strategy are obvious. It is a ready made solution to the failure of our education system to prepare people for employment in other than menial work, or clerical work. Think of what a nightmare it would have been to find employment for everyone that has gone overseas. It is almost impossible at present to obtain reliable statistics on unemployment in Samoa. For example, official Labour Department statistics puts Samoan unemployment at a misleading 3%. More reliable surveys of urban unemployment among youth suggest an unemployment rate of 40%.

Exporting labour is a solution to our failure to attract investment here. Like unemployment, it is also difficult to obtain reliable information on inward foreign investment. But a look around Apia's skyline and at the major tourism facilities should indicate minimal foreign investment in Samoa. Sending labour overseas has provided a solution to our failure to have a population policy that fits our carrying capacity as a nation. While our natural population



growth is more than 3% per year, net growth in the last ten years has been about 1% annually or less, a result of migration overseas.

The latest census has shown the population of Savaii to have marginally declined while that of the rest of Upolu outside Apia and the North west coast to have remained static in the past ten years. One of the attractions of Samoa at present to visitors is its largely unspoiled natural environment. This will not have been possible with a larger population. People at the lower economic and education scale will always tend to have bigger families. They will be the group more likely to migrate to fill a demand overseas for unskilled labour especially as population growth becomes static in industrial countries.

In addition to providing an outlet for unemployed labour, migration has been a source of cash incomes for families remaining in Samoa, as the migrants continue to remit back millions of Tala every year. Samoa received some \$130 million from remittances last year, which represents the country's biggest source of foreign exchange earnings. Tourism claims a higher level of foreign exchange return, but there is a question over the veracity of such claims.

But having access to high wage labour markets overseas has allowed Samoans to enjoy a much higher standard of living. One need only look around at the standard of housing, transport and ownership of consumer goods for confirmation. Having a large expatriate community overseas has also provided many other economic benefits. Samoans overseas are a market for Samoan traditional goods and services that others do not want. They visit Samoa regularly as tourists. This is not to mention their contribution to sports, to promoting Samoa, and to providing a market for church ministers and other specialist skills peculiar to Samoan communities.

Having access to overseas labour markets in the last fifty years or so, has taken away the necessity to take drastic measures to promote job creation and industrial development in our own backyard. This is beneficial to preserving our environment and way of life. Think of how many more Vaiteles we will have had to create to provide employment and industrial growth for our growing population.

As it is at present, large areas of Samoa are left idle and in their natural state as owners migrate overseas. Where cultivation takes place, there is little pressure to introduce unsustainable intensive methods to raise productivity or to become more competitive. This has done nothing but good to our physical environment.

### **Sustainable foreign aid**

It used to be thought that giving foreign aid was only a temporary measure to help country's get on their feet and become economically self supporting. This is no longer the case. Foreign aid is now a permanent part of economic and political relations between the rich and the poor nations of the world. Giving aid is often preferred by the industrial nations to granting aid recipients' requests for a fairer and more equitable world economic system.

Foreign aid has already enabled Samoa to develop a whole range of infrastructure and services such as roads, shipping, electricity, telecommunication services, health and education services, and drinking water. These have contributed directly to raising living standards.

In fact, many of the things we used to provide for ourselves are now being taken over by aid donors. These include schools, water supply systems, electricity, and village roads. About the only infrastructure we still build ourselves, are churches and pastors houses. Again, this use of foreign aid to meet development and living standard needs has removed to a large degree, the necessity to make drastic changes to our way of life or to exploit more intensively our natural environment.

And as a country, Samoa has placed itself in an even more favourable position to continue to receive more aid in the future. After years of giving away their tax payers money, the donor governments need to show some success stories to justify their own existence and aid policies. And there are not many successes in the Pacific at the moment. The situation in many Pacific countries is worse now than before aid with deteriorating economies, rising crime and lawlessness, and now, unstable governments.

This means that countries like Samoa that have shown a measure of improvement are singled out for praise and for receiving more aid. The new EU-ACP Cotonnu Agreement stipulates that ACP States will receive more aid if they use up their initial allocation quickly. The additional money will be diverted from the slow performers. We should therefore be in a handy position to benefit from the problems of others.

The conduct of our foreign relations has always been guided by the need to secure more aid. For example we have placed our diplomatic missions in capitals such as Brussels, Wellington, and Canberra, where they can play an effective on-the-spot role in facilitating the procuring of more aid for Samoa. In any case, as the world economy becomes more connected, it may be that the industrial economies with their domination and control of the global economy could become the engine to generate wealth for the world. This is then distributed via foreign aid, or by some other redistribution system for everyone to have their share.

The concept of nation state is becoming less relevant in any case as governments are able to exercise less and less control on global forces that show little regard for national boundaries. Such a development will allow small communities like Samoa to continue to enjoy its own way of life and culture and unspoiled environment. This is already happening to a certain extent in the American and French territories in the Pacific, except they have also imported together with aid moneys consumption patterns that go with high incomes and living standards. It is not too late for us to avoid following the same pattern.

### **Sustainable agriculture**

If we should decide to concentrate on finding ways to export labour instead of goods and services, then our struggling agricultural sector can afford to focus on providing food security for Samoa instead of trying to develop agriculture in order to export. There is really not a great deal we can export in great quantities from agriculture in any case.

The latest cash crop to crash is ava. This follows a pattern of many crop failures over the years. According to available government statistics, our agricultural sector has been in constant decline for a number of years in any case. Exporting today really requires a commercial pattern of farming that is different from Samoa's village type agriculture. It will require among other things changes in land tenure systems, with the inevitable repercussions on Samoa's village based way of life.

Intensive commercial farming also involves the use of chemicals and land use methods which are potentially harmful to the environment. That is why the taro blight was a blessing in disguise for our physical environment. The cultivation of taro using intensive farming methods in order to export was too ecologically taxing and damaging to be sustainable. Much of our virgin forest lands were cut down to make way for taro plantations. After a few years, these have been abandoned but without the original trees.

On the other hand, producing food for our own use can rely on proven and sustainable agricultural practices that do not rely on the use of imported inputs or the intensive and unsustainable cultivation of land. The new taro varieties for instance which, incidentally are not suitable for export, can be cultivated anywhere as long as there is soil there.

### **A sustainable economy**

The rest of the economy can develop spontaneously from these foundations. The need for modern services will grow with the continuing process of modernization and with the spread of consumerism. Cash remittances and foreign aid play a big part in pushing this process along. This development will provide employment for people with skills and for labour that is not exported.

This is why construction and wholesaling and retailing have been the leading growth sectors of Samoa's economy in recent years. Tourism will also develop at a sustainable pace without getting into the big numbers that inevitably have an adverse impact on the environment and on local cultures. That will happen later, but for the moment, it's the small type beach fale, the cheaper prices, and the 'unspoilt' environment and way of life that bring visitors to Samoa.

The public sector will continue to be the largest employer, managing the receiving and use of aid monies and the export of labour. Negotiating access to employment opportunities elsewhere should be an important part of government's role. The present citizenship wrangle with New Zealand could provide opportunities for negotiating further access to the NZ labour market for Samoan labour.

Meanwhile the need to help the Pacific in more substantial ways than merely giving aid should provide opportunities for negotiating access to Australia's labour market. Growth in the private sector will be mainly in the area of services as local industries such as manufacturing is stunted, if not undermined completely by cheaper imports coming into the country with Samoa becoming more integrated into an increasingly free trade world economy. Information technology has freed countries like Samoa from the tyranny of isolation and distance. The sector should offer opportunities for development and employment as distance is no longer a barrier, together with Samoa's lower labour costs.

Services are not as polluting as other forms of economic activity and industry. They usually involve the use of clean technology and an educated labour force, which should be the focus of Samoa's human resource development policies.

### **Doing away with Tala as Samoa's currency**

As Samoa's economy becomes more intricately woven into the global economy, the need to manage and maintain our own separate currency will become less and less. Consideration should be given to adopting one of the more widely used currencies of the world such as the US dollar, or the currency of one of Samoa's larger trading partners such as Australia or

New Zealand as our money in place of the Tala. The benefits will be the savings in the cost of international transactions, especially for our business community and Samoans overseas sending money home. Having no currency will also save us the cost of printing money and the cost of running our Central Bank. This will run into millions of Tala.

We have already lifted many controls off the movements of funds in and out of Samoa should Samoa become a member of WTO, even more liberalisation will be required, together with the impact of the new regional trade agreements that Samoa has entered into. One of the justifications for maintaining ones own currency is that it is a tool to manage economies. This management tool is lost once a country adopts a currency that is controlled elsewhere. But the EU single currency has shown what can be done when economies converge or become more integrated. Then, the benefits of a single currency can be enjoyed.

There is a process of economic convergence happening today as a result of globalisation. Economies are being disciplined by competition and by the increasing openness of markets in goods, services and capital. When Samoa joins WTO and other international and regional cooperation agreements such as PICTA and PACER, the economic and monetary discipline imposed by such associations will ensure prudent economic management in line with everyone else, removing the need for Samoa to have its own money.

### **Concluding comment**

I know you have many questions so I will stop here. The main point I wanted to emphasise is that globalization offers challenges as well as new opportunities for small countries like Samoa. Our small size and our remoteness from the main economies of the world have been disadvantages in the past. The evolving global and ecological situation could turn these into advantages for us now and in the future. We have a pristine natural environment that is an asset in an increasingly polluted global environment. This can be maintained by finding new ways to benefit from the new global political economic and ecological situation.

Globalization and new technology are already lowering the man made and natural barriers that used to isolate us from the rest of the world. These processes now present new opportunities to use our human resources more, in place of following a pattern of development that is both unsustainable and beyond our capabilities.

### **Suggested readings**

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The End of History and the Last Man, Francis Fukuyama.

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