CHAPTER 1

THE WESTERN COAST OF SANTO: TRANSFORMING THE MEANS OF SUBSISTENCE

Fabienne TZERIKIANTZ

Figure 1a

Santo Island, northern part of theVanuatu archipelago: settlement areas and transport infrastructures

Santo's western coast was formed by a volcanic outpouring. The mountain slopes are cut by deep and precipitous river valleys. They are subject to landslides which are the result of earthquakes, abundant rains alternating with long dry periods, as well as human exploitation of the areas resources. The pronounced erosion of the hills both at the edge of the sea and in the high valleys, gives the coastal fringe an abrupt aspect. The rare plains are long and narrow, and the access ways to the gardens are often only a series of friable, steep paths.

The vegetation is characterised by semi-deciduous forests associated with "pyrogenic" savannahs (Quantin, 1976). These are typical of hot tropical climates with two contrasting seasons[1]. Above 800 metres, a mountainous forest offers a cooler, more humid climate.

Today, people have settled at the mouths of the rivers. Here, numerous upheavals have created rich coastal terraces 5 to 25 metres above sea level. It is on these coastal terraces that the villages of this study are located: Tasmate, Elia, Kerepua, Wusi and Linturi.

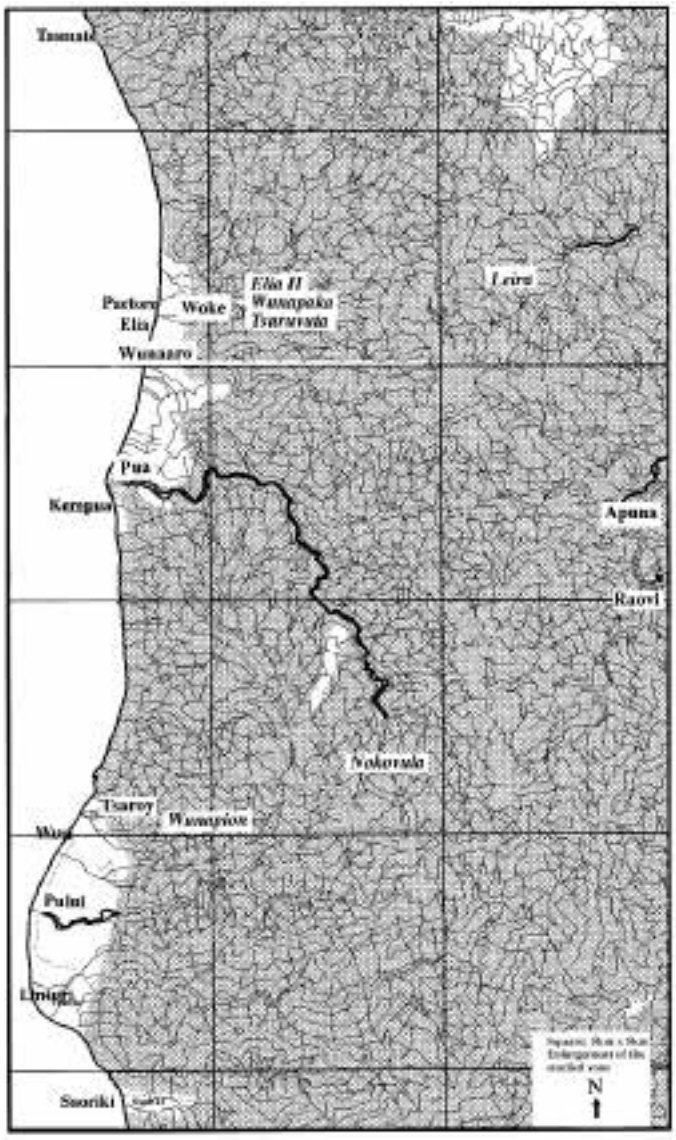

Figure 1b Studied area (detailed)

1. THE PEOPLES OF SANT O

Before European colonisation, the western coast of Santo was settled as far north as Tasmate and as far south as Wusi. Elsewhere there was no human habitation but there were landing points for dugout canoes which were used in the trading of goods between groups[2]. Sometimes, for example at Elia, land was occupied by the yam gardens of the neighbouring inland populations.

Evangalisation of the island began at Nokuku in 1869, reaching Tasmate a few years later and then the back country of Elia in 1918. This led to significant concentrations of people on the coasts, which were swept by epidemics of foreign diseases as well as a resurgence of malaria. Survivors fleeing towards the interior propagated the germs. This resulted in depopulation. The survivors of distinct communities were brought into contact and the social structure was significantly disturbed. These multiple changes transformed the inhabitants, their rhythm and way of life.

The people from along the banks of the Apuna and Raovi Rivers settled in Elia whereas those from the mountainous interior near Mount Tabwemasana settled in Wusi and Kerepua. Once on the coast, these inland people confronted living together with villagers whose culture and dialect were different. They were also faced with a new climate and physical environment. They initially tried to reproduce their previous way of life. However, given the change in milieu and the new demographic pressures, they soon had to modify their agrarian practices, as well as some of their dietary habits and eventually their vision of the world. Each group used its own ingenuity in transforming the physical and intellectual relationships they had with their natural environment, wild and cultivated.

1.1 DEMOGRAPHY

Today, the population of Elia numbers 24 households and 115 inhabitants. Wusi has 22 households and 95 people with a population density that is never more than 1,5 inhabitants/km^2. The table below (Figure 2) records the movement of Elia's population from one residential site to another located on the coast between 1979 and 1998. In contrast, Wusi's population, whose residential site was already determined, has increased steadily since 1979.

Villages	*Hamlets*	*Num. of Households*				*Num. of Inhabitants*			
		1979	*1989*	*1996*	*1998*	*1979*	*1989*	*1996*	*1998*
Elia II	*Elia II*	5	6	0	0	21	30	0	0
	Tsuruvuta	1	?	0	0	6	?	0	0
Elia I	*Elia I*	9	11	20	24	24	61	104	115
	Petlima	1	?	0	0	3	?	0	0
Wusi	*Wusi*	14	14	19	22	50	53	86	95

Figure 2: Principal demographic changes in Elia andWusi from 1979 to 1998

The communities are now relatively settled in stable locations along this coastal fringe. The coast presents certain environmental constraints to which the communities have been able to adapt. The relatively sedentary nature of these two communities is reinforced by the presence of modern infrastructures. At first a church is built, then invariably a shop, rarely well stocked but where preserved meat and fish, rice, sugar, salt, soap and clothes... can be bought. A "Kinda", a sort of day nursery for 2-5 years old, might be built and sometimes an "Aidpost", as in Kerepua and Wusi, or even a dispensary, as in Tasmate and Tasiriki where two nurses form the south of the island are employed. There is always a guest house ("Haos blong Woman", the Women's House) for voyagers, clergy or visiting relatives. These institutions were not always available when the inhabitants lived in scattered abodes along the Apuna and Raovi Rivers. Their presence concentrates inhabitants in a single area and confirms the usefulness of the village through services they propose.

Three primary schools along the coast draw children (6-12 years old) from all over the western part of Santo. At age 12, all return to their native villages. Secondary school education is only available in the southern part of the island or in Luganville and this is generally beyond their parents limited means.

Although it appears that the communities are becoming more settled it is frequently only relative. Many different factors indicate that it is unlikely that these populations will return to their places of origin or will disperse along the coast or inland. However, population is being redistributed through the appropriation of abandoned lands and the displacement of cultivated plots towards the road to the north, a re-organisation of the habitat close to the irrigated plantations, and a partial population explosion along the coasts (Figure 3).

Village	*Locality (Hamlet)*	*Households*			*Male Pop.*			*Female Pop.*			*Total Pop.*		
Year		*96*	*97*	*98*	*96*	*97*	*98*	*96*	*97*	*98*	*96*	*97*	*98*
Elia	*Elia*	10	11	12	26	27	28	23	25	27	49	52	55
	Valpei	1	1	1	5	5	5	4	4	4	9	9	9
	Sewu	1	1	2	7	7	7	3	3	4	10	10	11
	Raolewu	2	3	3	5	5	5	6	8	8	11	13	13
	Wure	1	1	1	1	1	1	1	1	1	2	2	2
	Slakipey	1	1	1[3]	2	2	2	4	5	5	6	7	7
	Wunapo'o	2	2	2	3	3	3	3	3	4	6	6	7
	Kwona	2	2	1	5	5	2	6	6	3	11	11	5
	Wunaruu	0	0	1	0	0	3	0	0	3	0	0	6[4]
	Total	20	22	24	54	55	56	50	55	59	104	110	115
Wusi	*Wusi*	19	20	22	47	47[5]	50	39	42	45	86	89	95

Figure 3: Table showing the demographic changes by hamlet1996 to 1998

There are many apparently disparate forces that will influence future population movements. The desire to be closer to Luganville and the southern part of the island will act as a magnet for some (Wusi and Linturi), whereas others (Elia and Tasmate) will be drawn towards the road to the north. Some will migrate because of the need to be closer to inland mountain gardens or, conversely, the need to maintain a copra plantation on the coast. Finally, the coastal dwellers, although mostly Presbyterian, may be attracted by other religions, such as the Seventh Day Adventists at Big Bay, towards which they may migrate.

1.2 LANGUAGES

With 180.000 inhabitants and about 113 languages belonging to the Austronesian group scattered across its archipelago, Vanuatu has the greatest linguistic density in the world. This is typical of Melanesia and has significant consequences in terms of identity. This diversity and linguistic density is the result of the encounter over time of a number of linguistic groups which have influenced one another (Tryon, 1978). The island of Santo is a good example of this phenomenon.

On Santo's western coast, Tasmate and Wusi belong to two distinct but inter-intelligible linguistic groups. The movement of women between these two groups, where wives go to live in the husband's village, gives rise to the circulation of the languages. Thus, a very great cultural and linguistic diversity can be found within the same residential group whose members are all more or less polyglot[6].

The languages circulate and with them, the inhabitants representations of their world, as well as concepts linked to certain illnesses, to body techniques, material life and social organisation. Thus the relationship between language and culture remains a complex affair here.

On Santo, according to the work of Tryon in 1976, 24 different languages were recorded, 6 of which were present on the western coast. A study in 1998 by Tryon and Walter indicates a certain amount of mobility in these languages and a slight decrease in their number. One of the reasons for this mobility is linked to inter-cultural/language marriages. When the father and mother speak different languages their children, although they have adopted the dominant language of the village, borrow words and even expressions from their mother's tongue. Thus, little by little the languages are modified. Additionally, the ever increasing use of Bichelamar (Vanuatu's common language of communication) has impoverished the vocabulary of local languages.

1.3 SOCIAL ORGANISATION

The villages of western Santo possess social structures similar to those of the northern islands of the Vanuatu archipelago (Vienne, 1984).

The society is divided into two un-named exogamous halves. Each half comprises a dozen named groups and each is linked to an origin myth.

These groups are called Wun in Elia, Kerepua and Wusi, Ta in Tasmate. Their origin myths refer to elements of nature: wild taro, yam, black ants, the king fisher, etc.

Within the same village not all groups are represented at a given moment. In spite of the repeated upheavals due to multiple migrations, the kinship system has sufficiently retained its traditional form that it remains similar from group to group. This has allowed the groups to continue to form matrimonial alliances.

This type of marriage uses a system of relationships that are positive rather than negative. Certain marital partners are defined as preferred but are not obligatory, the ideal union being the marriage of cross cousins. These unions are called 'privileged' as they imply other alliances. Although unions between cross cousins are encouraged, marriages between parallel cousins are prohibited. The ideal form of marriage is the exchange of sisters. The sons and daughters of one family marry the sons and daughters of another. Thus the two families are doubly linked, one to the other, and increase their rights to other lands. However, demographic effects sometimes prohibit a balanced exchange. Thus in the past, there were cases of polygamy (now forbidden by the church), or the differed rather than direct exchange of sisters (the child of a couple was given to the family that had not yet received a woman). Ritual murder was also performed (Tasmate) to insure the continuance of an essential equilibrium based on reciprocity.

Today, the young people respect these traditional rules of matrimonial exchange less and less. Although the exchange of sisters is still practised, a payment of money, pigs or cattle is also involved. Nor do the young people respect the law of exogamy, marrying within the same half, even within the same clan. Although these marriages are tolerated by the community and have little negative impact on the life of the couple, they are nevertheless forbidden by custom and are noted as such[7].

The law of residency is patrilocal, the wife living in the husband's village. The matrilineage has no property of its own. In matters of land holdings, however, it does retain certain rights through the intermediary of the maternal uncle. In brief, it is possible to cultivate the lands of different groups within the same half. In addition to the vast network of co-operative aide between village farmers of the western part of Santo, a wife, although living with her husband, must still maintain, cultivate and harvest the irrigated gardens of her native village (helped by her husband and children).

2. SUBSISTENCE SYSTEMS

From the coastal villages to the sparsely inhabited forest areas, the landscape contains many different types of vegetation. The inhabitants of Elia have always tried to control all of the various ecosystems from the interior valleys to the coast in order to have access to a variety of resources. While still living inland, they cultivated the fertile valleys of the Apuna and Raovi Rivers (200 to 600 metres in altitude) or the hills now situated in their immediate back country (200 to 400 metres in altitude). Their area of influence

extended on both sides of the large rivers and from the mountains to the sparsely inhabited ocean shores. Now settled on the coast, the inhabitants of Wusi and Elia continue to maintain immense forest areas on their native lands, investing work and using the available resources. The cultivation of these 'far lands' - 2 to 6 hours away by foot - is systematic, only now the population climbs upward to the interior. This allows the farmers both to work the fertile lands of their abandoned villages and, by maintaining the areas peripheral to their lands, to slowly push back the limits and increase their territory.

2.1 SEMI-MANAGED AREAS

The food crop gardens are often located between 100 and 400 metres, above the narrow coastal fringe and are separated from the village by coconut plantations and cattle farms. This is because there is more fertile and irrigable land available at higher altitudes. Additionally, the cultivated parcels are slowly being pushed outwards by the advancing plantations and soil degradation.

The 'traditional' and 'modern' means of using and managing the natural milieu have been documented for the villages of Elia, Kerepua and Wusi. The study and mapping of subsistence agriculture areas (both rain watered and irrigated) as well as cash crop areas has highlighted the importance of the intermediate forest zones. These intermediate forest zones contain semi-managed areas, specifically designated for gathering, fishing, hunting and trapping.

The few abandoned settlement sites of the present coastal population continue to be minimally maintained as well as the paths leading to them. They represent 'semi-managed' areas and function essentially as food reserves. They are periodically maintained during forest travel, for example, when the villagers, particularly those of Elia, go to visit their mountain relatives for a marriage, death or even to work in the gardens[8]. They might also be maintained during hunts organised in these same valleys and hills.

> *Within these areas are found various woody and non-woody, food, useful and precious plants: the leaves to make lap-lap*[9]*(Heliconia sp.), fruit trees (*Musa *sp.,* Mangifera indica, Citrus, Carica papaya, Spondias cytherea, Syzygium malaccense, *etc.), nut bearing trees (*Terminalia catappa, Canarium indicum, Barringtonia *sp., etc.), yam variants considered as 'wild' by the cultivators (*Dioscorea *sp.), figs (used for their vines), manioc reserves (*Manihot esculenta*), palm trees for the confection of roof leaves (*Metroxilon warburgii*), Pandanus tectorius (for the making of mats and baskets), various trees used for their wood (for heating or for working:* Gyrocarpus americanus, Hernandia moerenhoutia, Pterocarpus indicus, Kleinhovia hospita, *etc.), and sandalwood.*

By maintaining these trees and plants within the forest and along the paths, the inhabitants appropriate specific forest areas for their use. These areas are distributed along either side of the rivers which long ago they descended on their way to the coast. The primary function of their genealogical knowledge, which rarely extends further than one or two generations beyond their grandparents, is to remember and to reconstruct these previously occupied ancestral territories which are today uninhabited.

These 'semi-managed' areas are 'socialised' both communally and individually. Trees are marked with a machete cut or a vine or rope knotted around them. This indicates that this tree (for example, a sandalwood tree), this plant, these fruits are reserved for a particular person. No one will touch the plant, and if someone infringes on this rule he/she will receive the same treatment. By the same token, along the forest paths leading to gardens and into the forest there are certain trees which seem to be 'natural storehouses'. A woman will deposit some yams in the hollow of a trunk to germinate while waiting to be replanted. There they are hidden by leaves and protected from rats. Elsewhere, someone has hidden two yams that someone else (often a child or an adolescent) will later retrieve to plant in their own garden. Bananas or other fruits gathered while they are still green will be hung from the branches of a tree where they will ripen sheltered from the rodents and away from the nests of snakes that often infest banana trees. This also avoids their frequently difficult transport on the steep and often slippery pathways leading to the villages. A name or a message or the name of the tree may be engraved on a trunk. In this way, the 'forest knowledge'is preserved or a someone leaves a trace of their passage. Thus the limits of the natural wilderness seem to be pushed back or modified by this 'socialisation'of the plants and the zones in which they occur.

2.2 VILLAGE VARIATIONS IN SUBSISTENCE SYSTEMS

The present population of Santo's western area has been affected by a number of social upheavals. These repeated perturbations were the result of numerous migrations which brought into contact distinct communities within the same coastal area. They transformed the rhythm and the way of life of the inhabitants. Once on the coast, these initially inland dwellers had to live with villagers whose culture and dialect were different. They were also confronted with a new physical environment and climate. At first they attempted to reproduce their previous way of life. However, given the environmental differences and new demographic pressures, they soon had to modify their agrarian practices, and hence some of their dietary habits and slowly their vision of the world. Each group used its own ingenuity in the modification of the physical and intellectual relationships it maintained with the natural environment, wild and cultivated.

There are significant variations from village to village in the agrarian systems of Santo's western coast, despite the small distances which separate them (5 to 10 km). They are as much due to environmental as cultural factors. These populations practice slash and burn shifting agriculture in the cultivation of rain watered gardens of yams and taros. They also create vast irrigated and diversified complexes for the cultivation of taro. These are often under tree cover or coconut plantations. Other complementary food crops are also cultivated there such as breadfruit, banana, manioc (cassava), Fiji taro, etc. There are 'agro-forests' where breadfruit trees, numerous mango trees (which tolerate drought well and thus indicate semi-arid zones), citrus trees (grapefruit, orange and lemon), nut bearing trees and other fruit trees are grown and regularly replanted. These 'agro-forests' are cultivated on the outer limits of the villages, on abandoned village sites, along paths or on the peripheries of food gardens.

Figure 4: (See appendix photos)

In collaboration with A. Walter (ORSTOM) and M. Bourke (ANU, Canberra), data have been collected to identify the different agricultural systems that these village inhabitants use. It is principally the methods used in the production of staple foods (taros and yams) as well as the production of secondary plants and, to a lesser degree, commercial plants (coconuts - copra, cocoa and kava) that have been documented.

The factors which differentiate the agrarian systems in the villages of western Santo will be emphasised. Wusi and Kerepua have closely related subsistence systems as do Elia and Tasmate. However, each village has its own techniques for farming and harvesting, methods of maintaining soil fertility and fallow periods. The areas where staple crops are grown, the importance of a crop within the daily diet and the symbolic value that the villagers give them also differs from village to village. It may even differ from one group to the next within the same village. There are also variations in quality, quantity and the arrangement of plants grown in association with the primary plants. Finally, the place given in their agriculture and their diet to introduced species (such as Fiji taro (macabo), *Xanthosoma sagittifolium*) has recently changed in all the villages. These variations are due to both cultural choices and the identity of these migrant peoples living on the coast as well as their adaptation to significant environmental constraints.

This study was specifically interested in two types of plants: those grown in rain water plantings and those cultivated in irrigated plantations. In each case, we looked for the elements that distinguished one village from another. The study of these cultivated plants and their circulation will allow us to highlight the rich diversity of the relationships among the coastal village peoples, and between them and their mountain relatives.

2.2.1 Slash and burn shifting agriculture: 'dry' yam and taro gardens

The inhabitants of Santo's western coast cultivate two types of gardens which they classify as 'dry'(irrigated by rainfall or cultivated on river banks and where mostly yams and taros are grown) and 'humid' (irrigated taro plantations)[10]. Other useful food plants are grown in association with the taro or yams such as the cultivars *Abelmoshus manihot, Piper methysticum, Xanthosoma sagittifolium, Musa* sp., *Pandanus tectorius, Mextroxilon warburgi*i, etc.

In **Wusi,** yams are the dominant crop *(Dioscorea alata)* and occupy more than 33% of the cultivated areas. Manioc *(Manihot esculenta)*, taro *(Colocasia esculenta)*, sweet yams *(D. esculenta)* and coconut palms occupy from 10 to 32%, while banana trees *(Musa sp.)*, sweet potatoes *(Ipomoea batatas)*, breadfruit trees *(Artocarpus altilis)* occupy only 2 to 10%. In 1996, the average surface area of the parcels dedicated to yam cultivation in Wusi was 220 m^2 per person, or 253 m^2 per adult ('adult equivalent'). The regenerated vegetation on fallow parcels (only cultivated one year before being abandoned), is primarily composed of 3 to 4 year old trees (primarily bamboo's) reaching a height of 4 to 8 metres. The fallow time for 'dry' gardens (yams and taros planted in rain watered gardens) does not exceed 3 to 4 years. The density of yams when planted is 0.91 plants/m^2. The production of the *D. alata*, when harvested is 19.1 tonnes/hectare. The yams are planted without any real earthing up of the plants in relatively dense soil, which has nevertheless been cleared of cumbersome stones and roots. They are often planted on steep slopes or in dry soil, which inhibits the lengthwise development of the tubers. Bamboo stakes offer vertical support to the yam vine shoots and thus, according to the farmers, ensure good growth and maximal ripening. These gardens are planted seasonally from September to November. The first early yams ripen in April (*D. esculenta* and *D. rotundata* called "six month" in Bichelamar) whereas the late yams will only be ripe in June. In August and September, the last tubers are harvested. Some are consumed and some are stored on elevated granaries until it is time to plant the seeds. The clearing and burning of new parcels takes place from September to November. Often this is reduced to clearing the undergrowth on an old garden which has lain fallow for the past 3 or 4 years, followed by burning.

In **Kerepua** , slash and burn shifting agriculture is principally used in the cultivation of taro *(Colocasia esculenta)* and yams *(Dioscorea alata* and *D. esculenta)*. These two plants are of equal importance, however, taro is also cultivated in irrigated gardens. Each parcel is used for only one year before being left to fallow. The regrowth includes bamboos as well as trees ("tall woody regrowth") that are more than 15 years old. The secondary food crops are sweet potato *(Ipomoea batatas)*, Fiji taro *(Xanthosoma sagittifolium)*, breadfruit *(Artocarpus altilis)* and coconut.

In **Elia**, irrigated basins used in the cultivation of taro are the primary agricultural system. Slash and burn shifting agriculture plays a secondary role and is used principally

in the cultivation of yams (10 to 32% of the cultivated areas) followed by Fiji taro, manioc and sweet potato. Breadfruit is also an important crop. The regenerated vegetation on fallow plots ("tall woody regrowth") is generally cleared after a fallow period of sometimes more than 15 years. A parcel is planted only once before it is abandoned. In gardens that have been harvested, plants are left in the ground or are replanted to serve as a food reserve for the inhabitants as well as the domesticated pigs *(Manihot esculenta*, coconut palms, *Xanthosoma sagittifolium*, Musa sp., sweet potatoes...). In Elia, the density of yams at planting is 0,89 plants/m^2. As in Wusi, Kerepua and Tasmate, earthing up techniques are rudimentary and staking is important. Planting takes place from September to December, after the first rains, and the plants are harvested from April to October.

In summary, the farmers of Wusi principally use shifting agriculture of yams whereas those of Elia tend to cultivate taro in irrigated basins. Nevertheless, in Elia between 1995 and 1997, the average surface area of new yam gardens significantly augmented (for some families it doubled). Indeed, it has outstripped the results found at Wusi. This does not mean that the inhabitants of Elia have suddenly become yam cultivators but rather that they have decided to increase the size of their coconut plantations. As a first step, they cleared 200 m^2 of land per family in 1995 and 500 m^2 of land in 1997 at the edge of the sea or on the hillsides. Profiting from this clearing and these new fertile lands, the first year they cultivated yams.

> *Most of the yams planted at Elia and Wusi are* D. alata *(52-56%), followed by* D. esculenta *(21-23%),* D. nummularia *(9-13%) and then* rotundata, bulbifera, pentaphylla *and* trifida *(1-3%). Nevertheless, there are more species designated by the cultivators as 'wild' in Elia (4-6%* nummularia*, 1-2%* esculenta*, 1-8%* bulbifera*, 1%* pentaphylla*) than in Wusi.*

2.2.2 The 'humid' garden complex: the irrigated taro plantations

Large hydraulic systems conceived for the irrigated cultivation of taro still exist on the western coast of Santo as well as on several other islands to the north. The intensive and diversified systems of Elia were studied in detail. There, the farmers irrigate 17.000 m^2 of land for the cultivation of taro *(Colocasia esculenta)*. The installation of these systems, whose origin is still unknown, dates from at least 400 or 500 years ago. Over time, the population has rearranged as needed the old taro plantations whose structures remain a visible part of the landscape. These structures, once converted are used continuously for 20 years or so. Then they are left to fallow for a period that is at least

equivalent, but which can be as long as 50 years. The enormous advantage of this type of cultivation is that the farmers are no longer subject to the seasons. Taros are planted every month and continually produce food during the whole year.

Sewu is a large taro plantation of 8,500 m² and 120 basins. It is situated in Elia and has been active for the past 16 years. The size of the basins varies from 10 to 700 m², but on average is between 50 and 70 m². Each year the newly irrigated surface area is 200 to 800 m² and each adult is able to cultivate annually 800 to 1000 m². All the basins are separated by supporting walls. which are themselves cultivated. They provide a surface area of about 1,500 m² for the cultivation of secondary food crops.

The density of the planted taros is 2.5 plants/m². 38 of the 69 recorded clones are observed. This indicates that the biodiversity of this plant within the species has been well preserved. The taros are harvested after about 12 months, the time necessary for the corms to mature. The average weight of these corms is 1.25 kg which gives a yield of 31 tonnes per hectare (20 - 44 tonnes/hectare) or 360 kg/yr/person.

About thirty different secondary food crops are cultivated on the separating walls *(Abelmoshus manihot, Piper methysticum, Saccharum edule,* etc.) as well as fruit trees *(Musa* sp., *Barringtonia* sp., *Citrus macroptera, Carica papaya, Artocarpus altilis,* etc.) with a density of about 83 fruit trees/hectare. At the beginning of the colonial period, the cultivators planted a veritable coconut plantation on these walls. Its density (177 trees/hectare) is only slightly less than that of a normal coconut plantation.

The work of the taro plantation is performed by a group of families. These families are linked through kinship ties and alliances of varying duration. For security, in this area of hurricanes and landslides, a farmer will cultivate several basins in a number of different taro plantations at the same time. The network of alliances allows a farmer to replant old basins, maintain a taro plantation to which he is attached and even to have access to lands which do not belong to him. It is activated in such a way that several families maintain a large taro plantation, whose renown will be passed down from generation to generation.

In Wusi, the availability of irrigable lands as well as the means of irrigation are limited. Although the population is growing slowly (53 people in 1989; 95 people in 1998), it is nevertheless growing at a constant rate (ten births every two years).

Although demographic pressure is small (53 people in 1989; 95 people in 1998) its increase is nevertheless constant (ten births every two years). Additionally, the inhabitants do not possess much rich arable land. The pressure of man on his environment can be seen in the type of regrowth on fallow plots but more especially in fallow periods which have now become too short. As the irrigated terraces are very narrow (1 - 2 metres wide) and the soil friable and stony, this traditionally non-seasonal cultivation has become seasonal here. A basin is only used for a year before it is abandoned. In Kerepua, the situation is similar though less severe. The basins of the irrigated taro gardens are narrow, not exceeding 2.5 metres wide and 10 metres long. They are cultivated 3 to 6 years before they are left to fallow.

2.3 TRANSFORMATION OF DIET

The alimentation has remained traditional in the communities of Santo's western coast. Their diet is almost exclusively made up of the products cultivated in their gardens or more rarely, gathered in the forest. This is partially explained by their isolation and their difficulty in obtaining cash.

Nevertheless, introduced species are used by the different communities but again their specific usage varies from village to village. For example, the quantity of starches consumed per inhabitant is equivalent for the three villages of Elia, Tasmate and Wusi. However, more Fiji taro is eaten in Elia whereas there is a greater consumption of manioc in Wusi and in Tasmate these introduced tubers are almost not eaten at all (Figure 5). In reality, Fiji taro and manioc have not replaced the local tubers, rather they allow the re-utilisation of land already impoverished by cocoa cultivation or the use of poor or infertile land. These communities can thus insure food security through the use of easily cultivated introduced tubers with no negative effect on the cultivation of the primary plants and with less work. While in Elia, the introduced tubers are an appreciated food reserve, in Wusi, they are an indispensable source of food in a very eroded environment. Moreover, in Tasmate and Elia, the daily diet is based on non-seasonal tubers, such as taro, whereas in Wusi, it is based on the cultivation of seasonal tubers: yam and taro. Thus the cultivation of Fiji taro and manioc frees these populations from seasonal constraints and ensures them of a better food security.

Figure 5: Total quantity of starchy products (pealed and ready to cook) consumed daily per person in the three villages studied (numbers are in kg/day/person)

	Elia	*Tasmate*	*Wusi*
Taro	0,808	1,439	0,934
Yam	0,272	0,021	0,114
Fiji taro	0,365	0,000	0,848
Manioc	0,537	0,000	0,838
Banana	0,206	0,272	0,092
Tahitian chestnut	0,090	0,300	0,000
Corn		0,150	0,200
TOTAL	2,279	2,182	2,188

The study was made in January, a month when few yams are available as it falls between two harvest periods. Thus the recorded quantities for yam consumption in the three villages are underestimated. In Wusi, it is during this period that taro is eaten. Paradoxically, in the absence of regular irrigation the cultivation of taro in Wusi has become seasonal. Elsewhere, the consumption of taro is predominant and continues throughout the year. Tahitian chestnuts, corn and later on in the year, breadfruit, are important seasonal foodstuffs that complete the daily dietary intake.

The sources of protein continue to be wild pig, hunted once a week, wild cattle hunted periodically, chickens, goats, fish, eels, bankul worms and certain nuts. Although the quantity of protein remains small, nevertheless it appears to be sufficient.

The amounts of commercial rice, preserved fish or meat, oil or even salt that are consumed appear relatively insignificant. However, these commercial products are difficult to come by both as the village stores are poorly stocked and as there is little money available with which to buy them. It can be observed that Wusi, which is closer to Luganville and has more financial resources that its neighbours, also uses more imported food stuffs.

3. CONTACT WITH THE OUTSIDE WORLD

3.1 COMMERCIAL CROPS

The first Europeans explored the island of Santo with a view to exploiting its sandalwood. It is easy to imagine how little this European expedition would benefit the inhabitants of the island.

Much later. it was the draw of copra production that lead numerous island communities to descend form the mountains to the coast. This production still remains the principal means of obtaining cash. However. as the price of copra has diminished considerably over the past few years (from 30 to 20 vatu/kilo. or from 1,5 to 1 FF/kilo). the income from the sale of copra for Santo's western coast inhabitants is modest. Given an average price of 23.000 - 28.000 vatu/tonne. copra brings in 22.500 to 67.500 vatu/yr/family. that is to say. between 1125 and 3375 FF per year per family. To this revenue can be added occasional income from crafts and the sale of sandalwood. With this money the children's schooling must be paid and everyday needs provided for (soap. salt. sugar. clothing...). Sometimes provision must also be made for exceptional but expensive events such as buying a wife (about 80.000 vatu. 4.000 FF). In Kerepua. the income from copra and sandalwood are similar to that observed in Wusi. In Elia. the income from copra. in addition to a small trade in cocoa. kava and sandalwood. is very small. Nevertheless. if a family manages to sell a lot of sandalwood (20 FF/kilo). as was the case in 1998. it can double its income for the year.

Beginning in the 1970's, besides the commercial crops that were part of the colonial heritage, the inhabitants of the western part of Santo have also become involved in the cocoa trade. However, this trade remains difficult and is still small scale with little productivity. Only the inhabitants of Tasmate and Elia still sell cocoa in small quantities. As a result, the cocoa plantations, generally situated in low altitude forests, have become areas where the inhabitants now plant Fiji taro, corn certain palms, etc. alongside the cocoa.

As a result, the inhabitants now plant Fiji taro, corn, certain palms, etc. alongside the cocoa on the plantations which are generally situated in low altitude forests. The inhabitants are diversifying and hence optimising these areas, which are once again useful.

Sandalwood is still being bought by traders from Taiwan and New Zealand for 350 to 400 vatu/kg (less than 20 FF per kilo). However, this species of tree, cut in quantity at the end of the last century and the beginning of this one, has become rare and as the inhabitants almost never replant the trade is dying out. At this time there is no logging activity on Santo's western coast. However, logging with replanting is taking place in the north-west of the island at Wupoko and Petawat. Most of the trees logged here are cut in the sawmills close to Luganville.

Today, the inhabitants principally of Elia and Tasmate are becoming increasingly involved in the production and trade of kava (Piper methysticum). They plant the kava on the walls and around the perimeters of the irrigated taro plantations as well as on their abandoned lands close to the Apuna and Raovi Rivers, not far from the road to Big Bay. Indeed the kava market is in full expansion. Its development is enhanced by the demand of 'kava bars' in town (more than 50 in Luganville and over 100 in Vila) and of pharmaceutical companies, which are interested in its properties, notably as a tranquilliser (American, German, French,...), and of Melanesian merchants living in Australia (Sydney and Melbourne) where kava is principally consumed by members of the ni-Vanuatu, Fijian, Caledonian and aboriginal communities.

The inhabitants of Elia also harvest small quantities of "nangaille" nuts (Canarium indicum) in order to sell them in Luganville at a price close to that of copra. In the eyes of other Vanuatuan inhabitants (notably those from Malekula and Banks), they are not the major producers of this type of nut but rather seek to promote one more of their natural resources. In the same way, they might become involved in the production of taro for export, if the market were to open up. The inhabitants are attentive to new market demands, are willing and enthusiastic although they remain subject to the limits of their environment whose least resource they exploit. Finally, it is the absence of transport infrastructures that remains a major obstacle to their entry into the modern world.

3.2 Entering the modern world

3.2.1 Transport infrastructures

The south-eastern region and the southern and eastern coasts are connected to Luganville by large roads. Recently, these routes have been extended as far north as Big Bay and to Tasiriki in the south-west. However, the absence of transport infrastructures on the western coast means that this area remains isolated and difficult to reach.

Wusi is the least isolated of the three villages studied. Its more southern location, its more significant financial resources and boats that are in better condition facilitate communication with and travel to the southern part of the island and Luganville. The involvement of the inhabitants in the sale of copra and in a well developed trade of handicrafts as well as growing investments in Luganville all contribute to increased financial resources as well as links to both the coast and Luganville.

For the inhabitants of Elia, on the contrary, travelling to the south of the island or Luganville remains an often hazardous and expensive expedition. The boats are rarely seaworthy and the inhabitants can seldom afford the boat fare from Elia to Tasiriki to reach the road. Instead, they cross Santo on foot from west to east, a walk of one or two days covering about 30 km. This will eventually bring them to the road from Big Bay to Luganville which they will follow on into town. Alternatively, they can also go to Wusi

(12 km to the south of Elia) by following the coast, again on foot. From there they can join the people of Wusi on their way to Tasiriki and finally Luganville.

3.2.2 Handicrafts and Tourism

In Wusi, the production of pottery, mats and baskets to be sold provides another source of income to the inhabitants besides the production of copra. These craft objects are sold to the few tourists travelling along this coast (generally by boat), to visiting sandalwood traders or even to government agents (health care, nutrition,...). When financial resources and good seas allow, the inhabitants travel into Luganville to sell small quantities of their handicrafts.

In Elia, objects are also crafted - wooden dishes, arrows - which are sold with some difficulty through the intermediary of the inhabitants of Kerepua and Wusi.

Finally, in Kerepua, handicrafts - arrows, bows, lances, etc. - either transit through Wusi where they are sold or they are stored until visitors (sandalwood traders) or, more importantly, researchers (botanists, ornithologists, entomologists, geologists,...) and tourists (Japanese, Australian, American, French and ni-Vanuatu) arrive in the village. These outside visitors often come to Kerepua looking for a guide to accompany them to the summit of the nearby Mount Tabwemasana. This service is paid, a guide receiving 700 to 1000 vatu per day (35 to 50 FF/day).

Thus it is that the villagers manage the diverse resources of the forest. They turn its least possibility to their advantage. This includes the cultivation and gathering of products such as kava, nuts and wood, the fabrication and sale of handicrafts and the promotion of specific aspects of their natural environment such as Mount Tabwemasana. Their subsistence system is founded on the management of the biodiversity, its utilisation and hence its conservation, as well as its diversification.

CONCLUSION

The present coastal inhabitants are not mountain peoples, nor are they coastal peoples although they have been living there for several decades. These inhabitants of the coasts were and remain river peoples (Apuna, Raovi and Pua Rivers). They followed these rivers down to the sea, passing through Woke and Wunaaro. Throughout this time they continued to cultivate and maintain the surrounding mountain or coastal lands. This movement along the rivers is still taking place today, the inhabitants now ascending towards the interior forests. It is propelled by the need for land and new demographic pressures (the present coastal inhabitants, previously living in dispersed habitations have now collected into today's coastal Christian communities). Living in relative isolation, these villagers are drawn to the road to the north, accessway to Luganville and to the world. This road runs close to the lands that they have abandoned although they continue to use the lands' resources and cultivate the adjoining areas. They also continue to maintain close relationships with their mountain kin.

It is around these rivers, waterways and springs that the inhabitants articulate their particular ways of using and representing the environment. Thus the rivers are strategic sites for the observation and analysis of many different aspects of these societies. The documentation of the genealogies of these inhabitants has shown that the migratory dynamics of the past, as well as those of today, occur around and along these rivers. The rivers are essential. Not only are they an important source of protein (fish), but they also allow the development of large agricultural networks, are used as a means of transport and determine an area of influence where the inhabitants hunt, fish, and farm. The rivers are also home to numerous spirits which occupy the banks - rocks, trees and roots - and the waters. The rivers thus clearly function as a central axis around which the multiple material and symbolic relationships that these societies maintain with their natural environment (wild and cultivated) are developed, transformed and consolidated. It is also around the rivers that the complex networks of alliances between people are woven.

Today, there are a number of factors which could lead some of the inhabitants to re-ascend 15 to 20 km back towards the interior forests. These include: the isolation of these villages and their distance from the roads, the extremely modest income from cash crops, the erosion of the coastal hills, the progressively increasing distance to the cultivated areas as well as a certain nostalgia for life in the mountainous forest. In these interior forests also live or have returned those communities which did not migrate at the turn of the century and with whom the migrants never lost contact.

It is not clear at this time whether the coastal inhabitants will remain in the settlements in which they presently live. Some villagers wish to leave but they control this demographic scattering by conserving a habitation and plantations. Others want to move back towards the lands and rivers of abundance such as the Apuna and the Raovi, or to settle close to the road to the north tempted by the economic perspectives of the new trade in kava. Indeed, this road, this 'white snake that is sleeping' ("wan waet snak we i stap slip") as the older people call it, is the access route to economic possibilities and the modern world from which the villagers feel cut off at this time.

Some of the coastal inhabitants wish to remain on the coastal fringe. It is familiar, Christian and a modest income is still ensured there. Certain inhabitants refuse to return to the abandoned lands of the interior because they are afraid of 'assassin spirits' hidden in the forests. These inhabitants, such as those of Wusi, have lost the traditional knowledge that protects them against the 'darkness of the bush' ("darkness blong bush"). However, those who still posses this knowledge, as is the case in Elia, have little fear of these spirits.

Today, if a complete and generalised return of these populations towards their initial sites seems improbable, migration linked to the appropriation of abandoned lands and dispersal close to the gardens does seem to be taking place. Thus the population is moving closer to the road between Big Bay and Luganville, the access route to town, and its hypothetical extension to the Apuna River. At this time the inhabitants of the western part of Santo are principally concerned with the forest areas between the coast and the north of the island, areas which they maintain, manage and socialise.

APPENDIX PHOTOS

Photo 1: Wusi village, west coast of Santo

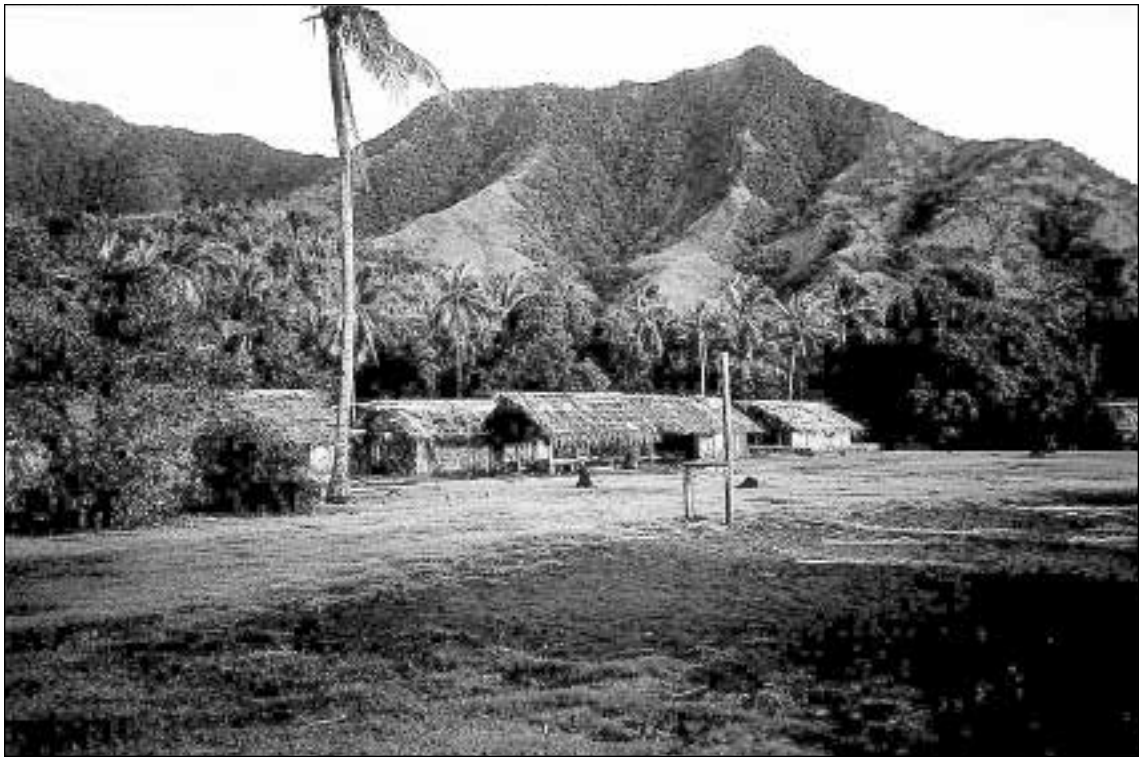

Photo 2 : Elia village, west coast of Santo (located 12 km north of Wusi)

Photo 3: Garden of yams inWusi

Photo 4 : Irrigated plantations of taros in Elia

ENDNOTES

1 Santo's western coast is on the leeward side of the island. It has a hot tropical climate (average temperature of 26° C and rainfall of 1 - 2 metres, Quantin, 1976) with a marked dry season from June to September.

2 People traded along the coast but also with groups further inland. The inhabitants of the present village of Elia traditionally traded with the inhabitants of the south of Santo. They traded their "narawe" (highly valued pigs, hermaphrodite and sterile, whose parents are specifically selected) for pigs without any genital abnormality (a "narawe" is the equivalent of 12 normally sexed pigs).

3 Today this household only lives off and on at Slakipey (Elia locality) which is close to its plantations and for most of the year lives at Totoyere (close to the Tavol River) on the northern part of the island (Religion: Seventh Day Adventists).

4 This family left its mountain village at the end of the 1980's, moving to Anawe in the back country of Elia and then to Kwona (on the coast). In 1998, the family left Kwona for a new hamlet further north on the coast, Wunaruu. The family started a garden (Discorea sp., Manihot esculenta, Musa sp., corn, peanuts...) below a young coconut plantation covering more than 1,000 m^2. This family is planning to move close to the village of Malao soon (Presbyterian and SDA), on the banks of the Apuna River at Big Bay.

5 3 deaths and 3 births. For the villages of Elia, Tasmate and Wusi there were, on average, 10 live births per village between 1996 and 1998.

6 The languages that are spoken on Santo's western coast have been named by D.T. Tryon, Wurm and Hattori according to the village or area where they occur: "Tolomako", "Tasmate", "Wusi", "Akei", "Malmariv" and "Navut". All these languages are related and are inter-intelligible. The "Tolomako" language is spoken in Wunavay (north of Tasmate). The languages of Sulesia and Vasalea, closely related, are also linked to that of Tasmate. In Tasmate, several languages are spoken. The "Tasmate" language group is dominant and is spoken by 70% of the population. The other languages have fewer speakers and include the languages of "Wusi" and Big Bay ("Tolomako" and "Malmariv"). In Kerepua and Wusi languages of the "Wusi" group are spoken (75% of the population). The languages from the "Tasmate", "Navut" and "Akei" groups are also spoken. In Linturi, the dominant language is that of the "Navut" group (80% of the population of about 40 inhabitants) followed by the "Tolomako" and "Malmariv" groups (the village of Winsao). In Linturi one can also hear the language spoken in Narumats, a village close to the Saoriki River (a dialect of the "Akei" group). Elia is a special case as it has a large linguistic diversity. There are six languages distributed unequally amonst the 115 speakers. The dominant languages are "Wusi" and "Malmariv", followed by "Tasmate" (3 women from Tasmate married into Elia from 1996 to 1998). In addition a dialect of "Malmariv" is spoken by three persons, a dialect of "Navut" is spoken by two people, and finally there is one person of the "Tolomako" language group. Thus, in numbers of speakers, there are three major languages and three others of lesser imporance.

7 Such a breach of tradition nevertheless has repercussions for the children of this couple. They are not allowed to use the traditional name normally given by the father to his children (this traditional name is directly linked to the father's lineage). Previously, however, and particularly in Kerepua, the couple, (called "brother" and "sister") that was guilty of such a violation was killed.

8 Conscious of the growth of the kava market (Piper methysticum), some of Elia's inhabitants have planted large gardens of kava close to the villages of their relatives. This is the case in Maaltia or Tovoti, situated close to the Raovi River and fifteen kilometres from the road to Big Bay.

9 Lap-lap is a prepared dish based on tubers (taro, yam), bananas or manioc. These foodstuffs are grated raw then wrapped in the leaves before being braised in a stone oven. They can also be cooked in the same way but pealed and cut into pieces rather than grated. For a feast, they will be accompanied with meat (pig, chicken). On the west coast of Santo, "Nakira" ("Nalot" in Bichelamar) is also prepared. For this dish, the tubers are either boiled and then mashed on a wooden plate with the help of a pestle or they are grated and cooked in a stone oven in small packets formed from the same leaves. They will then be mashed with a pestle until the desired consistency is obtained and the paste sprinkled with coconut milk.

10 See for example: Barrau, J., 1968, "The Wet and the Dry: an Essay on Ethnobiological Adaptation to Contrasting Environments in the Indo-Pacific Area", in : Vayda, A.P. (ed), Peoples and Cultures of the Pacific, New York: Natural History Press.
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