



Why Do They Plant Trees ? : Wana Kaset Agroforestry Practice in Eastern Thailand and People's Strategy

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Why Do They Plant Trees ?

— Wana Kaset Agroforestry Practice in Eastern Thailand and People's Strategy

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Abstract. In Thep Prathan village, Eastern Thailand, there is an increasing interest in wana kaset, a category of agroforestry. Wana kaset is a mixed plantation of useful trees, considered to be an imitation of natural forest by the farmers, however, is of rather artificial characters actually. The purpose of wana kaset is both for sale and for house consumption. Most species in wana kaset are edible trees, eaten as desserts or sweets. Farmers' intention can be said to be the reconstruction of the forest by more sophisticated way, which supplies cash income, foods as a little luxury, and other good living environment also.

Key words: agroforestry / Thailand / culture

Recently in Thailand, a new method of agriculture, so called, wana kaset is interesting people. The term wana kaset literally means 'forest agriculture', and its idea is originally introduced by Mr. Wibul Khemchalern, who lives in Sanam Chai Khet District, Chachoengsao Province, and practices wana kaset there¹⁾. Wana kaset is a category of agroforestry consisting of various kinds of useful trees as a main crop²⁾.

In current Thai context, wana kaset can be thought to be beneficial from two aspects. First, people can stabilize their life, because it aims somehow self-sufficient subsistence. Secondly, planting trees in agricultural land not only extend forest resources but also keep people from exploiting the natural forest. In addition, wana kaset is a part of so called 'alternative development', which, in Thailand, is related to Buddhism ideology (Suehiro 1993: 150-180).

However, the social or cultural background of the 'ordinal people', the farmers who actually plant trees, has not yet been made clear. The purpose of this article is to analyze the people's intention as one of the reactions to the deforestation and the loss of natural resources resulting from their own tradition of frontier clearing, and make clear the reason why they are motivated to wana kaset.

1) On the idea and brief history of Mr. Wibul, see (Khemachalern 1988).

2) Agroforestry, in general sense, is rich in variety. Nair pointed out four items of definition of agroforestry, based on 'in-house' discussions at International Centre for Research in Agroforestry, which is widely accepted: 1) agroforestry normally involves two or more species of plants (or plants and animals), at least one which is a woody perennial; 2) an agroforestry system always has two or more outputs; 3) the cycle of an agroforestry system is always more than one year; 4) even the simplest agroforestry system is more complex, ecologically (structurally and functionally) and economically, than a monocropping system (Nair 1993: 16). The term wana kaset is used in 2 ways; broadly used as a translation of agroforestry in English, and in narrower sense, it means such a type consisting of various kinds of trees just as Mr. Wibul's one. In this article, the author uses this term in the latter meaning.

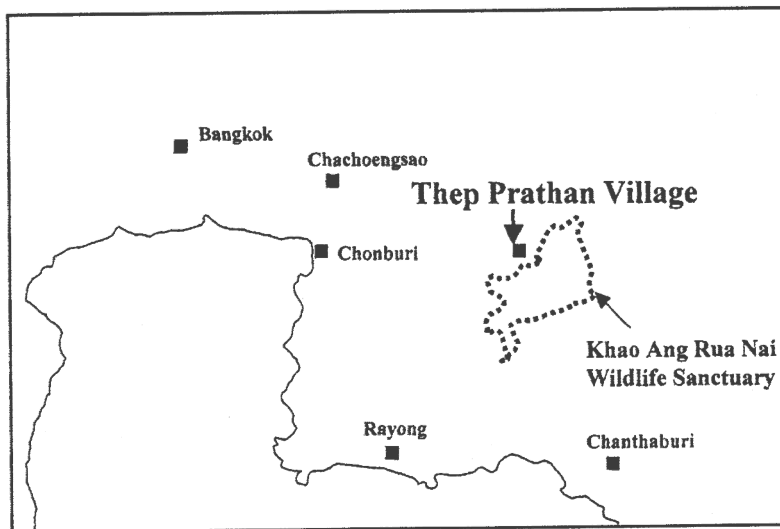


Fig. 1. The location of Thep Prathan village.

This article is based on the intensive field research in Thep Prathan Village, Chachoengsao Province, Thailand, which is a part of the research project on the conservation of biodiversity based upon the agreement between NSTDA (National Science and Technology Development Agency, Thailand), NEDO (New Energy and Industrial Technology Development Organization), and JBA (Japan Bioindustry Association).

The research was conducted mainly from 1995 to 1996. Most of the research phase was spent for observation and interviewing villagers in participating their activities, in order to understand villagers' real attitude to forests or trees, and to collect data on reality and tendency to plant trees and usage of the products of wana kaset.

Thep Prathan Village

Siyat 2 Village, the main research site, is situated about 200km from Bangkok, 100km from Chachoengsao City (Fig. 1). Administratively Siyat 2 Village belongs to Thep Prathan Village, Tha Takiap District. The area around Tha Takiap District was once densely forested. Following commercial logging, farmers come from all over the country to purchase the land abandoned to log for the purpose of cultivation since around 1970.

Administrative Thep Prathan Village consists of 3 villages: Siyat 2, Sam Phran, and Runthasan. The largest one, Siyat 2, is a planned village build by the Royal Forest Department (RFD) of Thailand, in 1991 in the scheme of 'forest village project'³⁾. This plan was accompanied by the resettlement of forest dwelling farmers with the expansion of Khao Ang Rua Nai Wildlife Sanctuary over 5 provinces such as Chachoengsao, Sa Keao, Chanthaburi, Chonburi, Rayong. Thus the villagers in Siyat 2 were previously living in the forest area, and were forced to resettle to Siyat 2. RFD

3) On the detail of 'forest village project' as a national forest policy, see (Chuntanaparb & Wood 1986: 19-40).

Table 1. Useful trees in 50 m square plot.

Interviewed four villagers about 508 trees of DBH more than 12 cm, in the 50 m square plot measured by Prof. Ogino's team. (Nov. 1995)

Details	Variety	Number
villagers could identify	65	326
useful		287
edible	21	106
medicinal		76
timber		143
ornamental		20
others		35

allocated 15rai (1rai=1,600 square meter) per household (1rai for residence, 14rai for agriculture). In 1995, Siyat 2 Village had more than 300 households. There are 4 more resettlement sites like Siyat 2 around Khao Ang Rua Nai Wildlife Sanctuary⁴). After the enclosure of Wildlife Sanctuary, the access to the natural resources in Wildlife Sanctuary is strictly limited even for non-resettled villagers living in Sam Phran or Runthasan.

Most villagers are engaged in agriculture. The main crops are cash crops, such as cassava, maize, cotton etc. Cash economy is common in daily life. A large part of the villagers have their origin in Northeastern Thailand. Others are from Eastern or Central part. Though there are cultural differences between Northeastern part and Central part (including Eastern part), any ethnic conflicts aren't found, and inter-marriage is also popular. However, because previous villages such as Sam Phran (upper half), Khao Raem, Pong Tiu, Sap Khanon, Si Yaek in the forest area were remote with each other, villagers in Siyat 2 are not familiar from each other, which causes social problems in the village.

People's Life Depending on the Forest, before the Enclosure of Wildlife Sanctuary

Thep Prathan villagers, especially those who have resettled to Siyat 2, think of the previous life in the forest area as more comfortable, or better than now. As an aspect of subsistence or daily life, this contains following factors: richness of food resources, holding wider land, and other environmental aspects as beautiful landscape and cooler climate. The biggest factor is the richness of food resources. People appropriated most kinds of food other than rice from the forest. Besides fresh water fish, wild animals, or birds, many kinds of plants were also eaten, and they have folk knowledge on plant usage.

Table 1 and Table 2 show the result of interviewing villagers about the useful trees in 50m square plot set inside the natural forest near the village⁵). Four villagers were interviewed on each of 508 trees of DBH more than 12 cm in the plot. Villagers could identify 106 edible trees (Table 1). These trees supply foods for desserts or materials of dishes. As Table 2 shows, more trees supply desserts than material of dishes.

Wana Kaset Practice in Thep Prathan Village

Wana Kaset in Thep Prathan Village

4) On the detail of the process of this resettlement project, see (Royal Forest Department n. d.).

5) This plot was set for ecological research by Prof. Ogino's team, Ehime University.

Table 2. Edible trees in the plot.

Usage: d-desserts or sweets, m-materials of dishes. (Nov. 1995)

Tree name	Botanical name	Number	Usage
kapho	<i>Licuala spinosa</i> Wurmbr.	34	d+m
maplap don	<i>Diospyros</i> sp.	29	d
rangrong	<i>Diospyros</i> sp.	25	d
phi phuan	<i>Uvaria</i> sp.	10	d
lamduean	<i>Melodorum fruticosum</i> Lour.	5	d
khangkhao	<i>Aglaia pirifera</i> Hance	4	d
khanun pa bai yai	<i>Artocarpus rigidus</i> Bl.	4	d
khayao	not identified	4	d
hamhen	not identified	3	d
samet	Myrtaceae	3	d
som kop	<i>Hymenodictyon excelsum</i> (Roxb.) Wall.	3	d
kankrao	<i>Fagraea fragranse</i> Roxb.	2	d
sai	<i>Ficus</i> sp.	2	d
saraphi	<i>Mammea siamensis</i> Kosterm.	2	d
son oi	<i>Tamarix gallica</i> Linn. var. <i>indica</i> Ehrenb.	2	m
hu kwang	<i>Terminalia catappa</i> Linn.	1	m
kanling	not identified	1	m
kraduk	<i>Suregada multiflorum</i> Baill.	1	d
lamchat	not identified	1	m
lansat	<i>Aglaia domestica</i> Pelleg.	1	d
mahat	<i>Celtis tetranda</i> Roxb.	1	d
wa	not identified	1	d

In Thap Prathan Village, various types of plantation can be found. On the species included, there are ones consisting of diverse kinds of edible 'trees'⁶⁾, monoculture fruit orchards, and eucaliptus plantations. There is also a variety in the number of 'trees': from several number of 'trees' planted in cassava field to more than 500 trees as the main crop in the same 14rai (22,400 square meters).

Among these various types, monoculture eucaliptus plantations and fruit orchards are mostly owned by outsiders. Villagers, on the other hand, tend to plant diverse kinds of 'trees', even in case they have planted just several numbers of 'trees'.

In this article the author defines wana kaset as a plantation consisting of various kinds of 'trees' considered to be the main crop, even though practical farmers are not necessarily conscious that they practice 'wana kaset'. Following this definition, several numbers of 'trees' in cassava field can be thought of as a 'shoot' of wana kaset.

Home Gardens

The most popular wana kaset in the village is home garden. Typical cases are the ones in Siyat 2, where each household was allocated 1rai (1,600 square meters) for house yard. Even after the resettlement to the planned village, most villagers plant trees in their home yards (Photo 1). Table 3 lists up trees planted in 17 home yards in Siyat 2. Each garden is 1rai (1,600 square meters). For just 5 years after resettlement, total 1,077 trees of 62 species (excluding 2330 krathin, ipil ipil trees,

6) In this article, the term 'tree' is basically used in following definition: (1) plants belonging to Thai category of tonmai, which includes most woody trees except small shrubs. (2) plants besides considered to be major components of wana kaset by villagers, such as bananas and papayas, for example.

Table 3. 'Trees' in 17 home gardens.

Each home garden is 1 rai (1,600 square meters). Usage: 1-edible (m-material of dishes, d-dessert or sweets), 2-medicinal, 3-timber, 4-ornamental, 5-others. *-common species to natural forest around. ()--Number excluding 2325 krathin trees planted around a garden. (Feb. 1996)

Tree name	Botanical name	Usage	Number	Frequency (of 17)
chaba	<i>Hibiscus rosa-sinensis</i> Linn.		4	1
chaom	<i>Acacia pennata</i> (L.) Willd. ssp. <i>insuavis</i> Niel.	1m	30	7
chomphu	<i>Eugenia</i> sp.	1d	4	3
dok sangkhang	not identified		4	2
farang	<i>Psidium guajava</i> Linn.	1d	27	9
hang nok yung	<i>Caesalpinia pulcherrima</i> Swartz.		4	1
huangfa	<i>Bougainvillea</i> sp.		4	2
iram	* not identified	1m, 3	1	1
khanun	<i>Artocarpus heterophyllus</i> Lamk	1md	85	16
khe	<i>Sesbania grandiflora</i> Desv.	1m	19	9
khilek	<i>Cassia siamea</i> Britt.	1m	5	2
khun	* <i>Cassia fistula</i> Linn.	4, 5	11	8
kluai	<i>Musa sapientum</i> Linn. ('namwa')	1m, 5	167	14
khoi	* <i>Streblus asper</i> Lour.		2	1
krap	not identified		4	1
krathin	<i>Leucaena leucocephala</i> de Wit	1m	2330(5)	3
krathon	<i>Sandoricum koetjape</i> Merr.	1md, 3	16	6
lamut	<i>Manilkara achrns</i> (Mill). Fosberg	1d	8	4
madan	* <i>Garcinia schomburgkiana</i> Pierre	1d	1	1
maduea	* <i>Ficus</i> sp.	1d	1	1
mafai	<i>Baccaurea ramiflora</i> Lour.	1d	2	1
mafai pa	* not identified	1d	1	1
mahat	* <i>Celtis tetrandra</i> Roxb.	1d	3	1
mafueang	<i>Averrhoa carambola</i> Linn.		1	1
mak	<i>Areca catechu</i> Linn.	5	8	5
makham	<i>Tamarindus indica</i> Linn.		86	21
wan	(sweet variety)	1d	67	13
phriao	(sour variety)	1m	15	7
	not identified		4	1
makham pom	* <i>Phyllanthus emblica</i> Linn.	1d	6	2
makham thet	<i>Pithecellobium dulce</i> (Roxb.) Benth.	1d	3	2
makok	<i>Spondias pinnata</i> (L.F.) Kurz	1d	4	3
makrut	<i>Citrus hystrix</i> DC.	1m	4	2
malako	<i>Carica papaya</i> Linn.	1md	23	6
mali	<i>Jasminum</i> sp.	4	2	1
mamuang	<i>Mangifera indica</i> Linn.	1md	154	16
mamuang hima phan	<i>Anacardium occidentale</i> Linn.	1m	4	2
manao	<i>Citrus aurantifolia</i> (Christm. & Panz.) Swing.	1m	20	6
maphrao	<i>Cocos nucifera</i> Linn.	1md, 5	132	13
marum	<i>Moringa oleifera</i> Lamk.	1m	4	3
mayom	<i>Phyllanthus acidus</i> (L.) Skeels	1md	20	9
mon	<i>Morus alba</i> Linn.	5		1
ngo	<i>Nephelium lappaceum</i> Linn.	1d	2	1
noina	<i>Annona squamosa</i> Linn.	1d, 2	68	6
nonsi	* <i>Peltophorum pterocarpum</i> Back.	3	1	1
nun	* <i>Ceiba pentandra</i> Geartn.	5	21	7
pashonfrut	not identified		1	1
phai liang	* <i>Bambusa nana</i> Roxb.	1m, 3	24	7
phai ruak	* <i>Thyrsostachys siamensis</i> Gamble	1m, 3	3	2
phai sisukh	* <i>Bambusa blumeana</i> Schult.	1m, 3	10	1
phai tong	* <i>Dendrocalamus membranaceus</i> Munro	1m, 3	17	2
phekha	* <i>Oroxylum indicum</i> (L.) Vent.	1m	4	3
phutsa	<i>Zizyphus mauritiana</i> Lamk.	1d	3	3
pradu	* <i>Pterocarpus macrocarpus</i> Kurz.	3	1	1
pusian	not identified		4	1
sadao	<i>Azadirachta indica</i> Juss. var. <i>siamensis</i> Valet.	1d, 2	15	7
salot	<i>Croton tiglium</i> Linn.	2		1
som o	<i>Citrus maxima</i> Merr.	1m	15	3
som kop	<i>Hibiscus surattensis</i> Linn.	1m, 2, 3	1	1
takhop	* <i>Flacourtia</i> sp.	1d	1	1
thapthim	<i>Punica granatum</i> Linn.	1d	16	5
trang	not identified		1	1
wai	* <i>Calamus</i> sp.	1m, 3	2	1
wasana	not identified		4	1
yo	<i>Morinda citrifolia</i> Linn.	1m	1	1
total			3402 (1077)	

Table 4. 'Tree' list of a typical example of home garden.

Showing trees planted in 1rai (1,600 square meter). Usage: 1-edible (m-material of dishes, d-dessert or sweets), 2-medicinal, 3-timber, 4-ornamental, 5-others. (Feb. 1996)

Tree name	Botanical name	Usage	Number
mamuang	<i>Mangifera indica</i> Linn.	1md	25
kluai	<i>Musa</i> sp.	1md, 5	20
maphrao	<i>Cocos nucifera</i> Linn.	1md, 5	16
noina	<i>Ammonia squamosa</i> Linn.	1d	15
thapthim	<i>Punica granatum</i> Linn.	1d	8
sadao	<i>Azadirachta indica</i> Juss. var. <i>siamensis</i> Valetton	1md, 2, 3	5
khanun	<i>Artocarpus heterophyllus</i> Lamk	1md	4
makhham wan	<i>Tamarindus indica</i> Linn.	1d	4
lamut	<i>Manilkara achras</i> (Mill) Fosberg	1d	3
mak	<i>Areca catechu</i> Linn.	1d	2
ngo	<i>Nephelium lappaceum</i> Linn.	1d	2
som o	<i>Citrus maxima</i> Merr.	1d	2
chomphu	<i>Eugenia</i> sp.	1d	1
farang	<i>Psidium guajava</i> Linn.	1d	1
khun	<i>Cassia fistula</i> Linn.	4, 5	1
marum	<i>Moringa oleifera</i> Lamk.	1m	1
phutsa	<i>Zizyphus mauritiana</i> Lamk.	1d	1
total			111

Table 5. 'Tree' list of Mr. W's Wanna Kaset.

An example of 11 rais (17,600 square meters). Usage: 1-edible (m-material of dishes, d-dessert or sweets), 2-medicinal, 3-timber, 4-ornamental, 5-others. (Feb. 1996)

Tree name	Botanical name	Usage	Number
chaom	<i>Acacia pennata</i> (L.) Willd. subsp. <i>insuavis</i> Nielsen	1m	130
kluai	<i>Musa sapientum</i> Linn. ('namwa')	1md, 5	130
sadao	<i>Azadirachta indica</i> Juss. var. <i>siamensis</i> Valetton	1m, 2, 3	101
krathin thepa	not identified	1m	90
mamuang	<i>Mangifera indica</i> Linn.	1md, 5	90
farang	<i>Psidium guajava</i> Linn.	1d	30
maphrao	<i>Cocos nucifera</i> Linn.	1md, 5	30
khilek	<i>Cassia siamea</i> Britt.	1m	28
khanun	<i>Artocarpus heterophyllus</i> Lamk	1md, 5	19
chomphu	<i>Eugenia</i> sp.	1d	15
wai	<i>Calamus</i> sp.	1d, 3	15
krathon	<i>Sandoricum koetjape</i> Merr.	1d, 3	13
phékha	<i>Oroxylum indicum</i> (L.) Vent.	1m	13
fang	<i>Caesalpinia sappar</i> Linn.		11
maphrang	<i>Bouea macrophylla</i> Griff.	1d	10
som o	<i>Citrus maxima</i> Merr.	1d	10
kaeo	<i>Murraya paniculata</i> Jack.	4	6
manao	<i>Citrus aurantifolia</i> (Christm. & Panz.) Swing.	1m	5
madan	<i>Garcinia schomburgkiana</i> Pierre	1d	4
makok	<i>Spondias pinnata</i> (L.F.) Kurz	1d	4
makrut	<i>Leech angulata</i> Korth. ex Miq.	1m	4
ngo	<i>Nephelium lappaceum</i> Linn.	1d	4
kankrao	<i>Fagraea fragrans</i> Roxb.	1d	3
mafai	<i>Baccaurea ramiflora</i> Lour.	1d	2
makhham wan	<i>Tamarindus indica</i> Linn.	1d	2
makhuit	<i>Feronia limonia</i> (L.) Swiong.	1d	2
thurian	<i>Durio zibethinus</i> Linn.	1d	2
lamut	<i>Manilkara achras</i> (Mill) Fosberg	1d	1
mamiaio	not identified		1
matum	<i>Aegle marmelos</i> (L.) Corr.		1
makhham thet	<i>Pithecellobium dulce</i> (Roxb.) Benth.	1d	1
total			777



Photo 1. A scene in Siyat 2 village: 'trees' are planted in home yards.

Photo 2. Mr. N's Wana Kaset in his farmland: newly developed one in Siyat 2 village.

planted around one garden as a hedge) have been planted. There is a shared idea that 'trees' are to be planted around the house.

Table 4 shows a typical case of 'tree' composition of home garden in the village. Diverse kinds of trees are planted. But most are edible 'trees', especially fruit 'trees'.

'Trees' are seeded, grown up from seedlings, or naturally regenerated from thrown seeds of fruit.

Table 6. 'Tree' list of Mr. N's Wanna Kaset

An example of 11rai (17,600 square meter). Usage: 1-edible (m-material of dishes, d-dessert or sweets), 2-medicinal, 3-timber, 4-ornamental, 5-others. (Feb. 1995)

Tree name	Botanical name	Usage	Number
kluai	<i>Musa</i> sp.	1md	550
maphrao	<i>Cocos nucifera</i> Linn.	1md, 5	170
mamuang	<i>Mangifera indica</i> Linn.	1md	120
manao	<i>Citrus aurantiflora</i> (Christm. & Panz.) Swing.	1m	100
malako	<i>Carica papaya</i> Linn.	1md	50
farang	<i>Psidium guajava</i> Linn.	1d	10
khanun	<i>Artocarpus heterophyllus</i> Lamk	1md	7
makhm wan	<i>Tamarindus indica</i> Linn.	1d	7
mafai	<i>Baccaurea ramiflora</i> Lour.	1d	6
krathon	<i>Sandoricum koetjape</i> Merr.	1m, 3	4
lamut	<i>Manilkara achras</i> (Mill) Fosberg	1d	2
makok farang	<i>Spondias dulcis</i> Forst. f. (<i>S. cytherea</i> Sonn.)	1d	2
champhi	not identified	4	1
khe	<i>Sesbania grandiflora</i> Desv.	1m	1
klisna	not identified	4	1
rangchuet	<i>Thunbergia laurifolia</i> Linn.		1
mayom	<i>Phyllanthus acidus</i> (L.) Skeels	1md	1
yo	<i>Morinda citrifolia</i> Linn.	1m	1
total			1034

Table 7. 'Tree' list of Mr. P's Wanna Kaset

An example of 20rai (32,000 square meter). Usage: 1-edible (m-material of dishes, d-dessert or sweets), 2-medicinal, 3-timber, 4-ornamental, 5-others. (Oct. 1996 (not included in Table 11))

Tree name	Botanical name	Usage	Nubmer
sadao	<i>Azadirachta indica</i> Juss. var. <i>siamensis</i> Valetton	1m, 2	250
thurian	<i>Durio zibethinus</i> Linn.	1d	200
mak	<i>Areca catechu</i> Linn.	1d	100
noina	<i>Annona squamosa</i> Linn.	1d	100
makhm wan	<i>Tamarindus indica</i> Linn.	1d	60
mankhut	<i>Garcinia mangostana</i> Linn.	1d	60
maphrao	<i>Cocos nucifera</i> Linn.	1md, 5	36
malako	<i>Carica papaya</i> Linn.	1md	30
mamuang	<i>Mangifera indica</i> Linn.	1md	30
ngo	<i>Nephelium lappaceum</i> Linn.	1d	10
khanun	<i>Artocarpus heterophyllus</i> Lamk	1md	6
krathon	<i>Sandoricum koetjape</i> Merr.	1m, 3	5
total			887

'Trees' in home garden are basically for self-consumption and rarely cared. Villagers tell some portion of trees they planted have been dead in dry season. Except 'trees', vegetables and herbs are also planted. Some vegetables as eggplants or chilies are mixed with 'trees'. Herbs as lemon grass or galangal, on the other hand, are likely to be planted nearby kitchen.

Wana Kaset in Farmland

Wana kaset in farmland, on the other hand, are not yet popular, though there is an increasing desire. In 24 farmlands, which the author has surveyed, each covering 7rai to 14rai, there are only 6, which

has more than 100 trees. This figure, however, still seems to be higher than the average from the author's experience.

Just like home gardens, almost all 'trees' planted are edible ones. Vegetables and herbs are also planted, because mature wana kaset in farmland usually accompanies a house⁷⁾. However, on the contrary to home gardens, high breed seedlings are preferred, fertilizer are used, and 'trees' are watered in necessity. Not only for house consumption, but income generation is also intended. Besides these general tendencies, actual cases are quite different with each other in species planted or in management.

Table 5 is the 'tree' list of one example, owned by a villager named W. Mr. W has planted almost 800 trees for just 3 years, a large portion of which have been supported by the Royal Project and RECOFTC (Regional Community Forestry Training Center, Kasetsart University). He is very good at getting aid from outside agencies. Beside seedlings, he also has got a fund to build a house and dig a pond in the farmland from the Royal Project.

Contrary to Mr. W, another villager, Mr. N, practices wana kaset by his own exertion despite minimum investment. First, he planted rime trees in 1991. He bought rimes in the market, and made seedlings from them. Unfortunately, almost all rime trees were dead of disease. After that, he planted banana, mango, jackfruit or other fruit trees. Table 6 shows the 'trees' planted in his farmland in 1995. He made almost all seedlings by seeding or grafting. In 1995, more than half were bananas, however he was going to expand other species step by step (Photo 2).

Table 8. 'Tree' list of a typical example of old-farmland type.

An example of 5 rais (8,000 square meters). Usage: 1-edible (m-material of dishes, d-dessert or sweets), 2-medicinal, 3-timber, 4-ornamental, 5-others. (Oct. 1996 (not included in Table 11))

Tree name	Botanical name	Usage	Number
mamuang	<i>Mangifera indica</i> Linn.	1md	70
khanun	<i>Artocarpus heterophyllus</i> Lamk	1md	50
maphrao	<i>Cocos nucifera</i> Linn.	1md, 5	40
makhham wan	<i>Tamarindus indica</i> Linn.	1d	30
som	<i>Citrus aurantium</i> Linn.	1d	12
som o	<i>Citrus maxima</i> Merr.	1md	12
farang	<i>Psidium guajava</i> Linn.	1d	10
noina	<i>Annona squamosa</i> Linn.	1d	6
sak	<i>Tectona grandis</i> Linn.	3	6
krathon	<i>Sandoricum koetjape</i> Merr.	1d, 3	5
phai luak	<i>Thyrsostachys siamensis</i> Gamble	1m, 3	4
sadao	<i>Azadirachta indica</i> Juss. var. <i>siamensis</i> Valetton	1m, 2, 3	4
manao	<i>Citrus aurantifolia</i> (Christm. & Panz.) Swing.	1m	3
mayom	<i>Phyllanthus acidus</i> (L.) Skeels	1md	3
makhuit	<i>Feronia limonia</i> (L.) Swiong.	1d	2
rakham	<i>Salacca rumphii</i> Wall.	1d	2
kafe	<i>Coffea</i> sp.		1
kaeo	<i>Murraya paniculata</i> Jack.	4	1
mafai	<i>Baccaurea sapida</i> Muell Arg.	1d	1
makhрут	<i>Citrus hystrix</i> PC.	1m	1
noinong	<i>Annona reticulata</i> Linn.	1d	1
yukha	<i>Eucalyptus</i> sp.	3	1
total			265

7) Some Siyat 2 Villagers who practice wana kaset in farmland do not live in allocated home yards in the settlement, but in their farmland.

Table 9. Three types of wana Kaset practice

	Home garden	Old-farmland	New-farmland
'Trees' planted	fruits trees cultivated species (mostly)	fruits trees cultivated species	fruits trees cultivated species, high breed variety
Seeds/seedlings	both	seeds	seedlings using grafting thchniques
Managemant	lack of active care	lack of active care	watering, fertilizer, insecticize on demandprefering 'natural' techno- logies knowledge of raising trees
Purpose	self-consumption	self-consumption	self-consumption + for sale
Frequency	high	low	low
Recognition	not 'agriculture'	not 'agriculture'	'agriculture'

These two are the cases in Siyat 2. In Sam Phran there is another different case. The owner Mr. P has been migrated into Sam Phran since 1988 from Rayong Province, was not resettled to Siyat 2. First, in 1990, he planted durians and sweet tamarinds. He has been familiar with both species, as he had planted durians in Rayong, and his birthplace, Petchabun, is famous for sweet tamarinds production. After durian and sweet tamarinds, he has planted various kinds of fruit 'trees' or other useful 'trees' (Table 7). He bought all the seedlings, because he had enough capital.

Above cases are all well developed ones with more than several hundred trees, showing vivid difference in management or 'trees' planted. Each villager manages wana kaset according to his own background or knowledge, and exchange of the techniques or knowledge among the villagers is hardly found, in spite that some villagers are very enthusiastic for learning from seminars in the village organized by FAO or at the regional agricultural office, and media as radio programs or magazines. One villager explains it is because all the cases are not mature, lack successful evidences. However, it also reflects the social situation, which lacks mutual trust and fluent communication among the villagers in daily life, supposed to be caused by resettlement.

Old Wana Kaset

In Sam Phran, old wana kaset practice can be found, which is different from above three. They have been planted for more than 20 years. The owners of old wana kaset explain that they began to plant 'trees' to compensate rapid loss of natural forest at that time.

They can be classified as wana kaset in farmland, just because they cover an area of 5rai to 7rai, which is too wide if considered to be a home garden. Table 8 is the tree list of an example of old wana kaset. Almost all the 'trees' are fruit trees, as mango or jackfruit. High breed are never found. Most are seeded or have grown up from thrown seeds. The trees are hardly cared. Fruits are consumed in the house, or given to the neighbors. There are not so many cases of old wana kaset, and some cases have been transferred to be 'new' wana kaset in farmland shown above.

Analyzing Variation, Tendency, and Intention of Wana Kaset

Three Types: Agriculture or Not

As shown above wana kaset practices in Thep Prathan Village are classified into three types: home garden,

Table 10. Natural techniques practiced in Theprathan village.

1. Insecticide
Organic insecticide made from plants
—sadao (<i>Azadirachta indica</i> Juss. var. <i>siamensis</i> Valetton), mash the leaves.
—hanglai (<i>Millettia racemosa</i> Benth.), boil the roots.
Mix-plant the plants which insects dislike, with fruit trees
—takhrai hom (<i>Cymbopogon nardus</i> Rendle)
2. Fertilizer
Mix dung or plants into the soil of the field
—dung of cow or buffalo
—banana stems and leaves cut down after fruiting
---weeds in the field
3. Utilization of the affinity of 'trees'
Mix plant the 'rees' of different root level or consuming different kind of nutrition
—khanun (jackfruit) and maphro (coconut)
—kluai (banana) and mankhut (mangostin)
—thurian (drian) and longkong (<i>Aglaia dookkoo</i> Griff.)
—maphrao (coconut) and lamyai (<i>Dimocarpus longan</i> Lour)
4. Utilization of the natural landscape rather than engineering reform
Select the suitable crops to the moisture of soil

new-farmland, and old-farmland (Table 9). Each of them consists of diverse kinds of useful 'trees', mostly edible ones. There are also some vegetables and herbs, however, people think of 'trees' as major component.

One of the most important differences between them lies in recognition as agriculture or, in other words, the main subsistence. Home garden type and old-farmland type are not realized to be agriculture. The investment is minimal, and 'trees' are left without any care after planting. On the other hand, new-farmland type is managed with clear recognition as agriculture, though it has the purpose of self-consumption and the character of fine living environment surrounding the house. It is intended to sell the products, mostly fruits. High breed seedlings are favored, and fertilizer is used.

Natural or Artificial

Villagers' consciousness of natural forest is an important feature common to all the three types. They explain that mixing various kinds of 'rees' is an imitation of natural forest. In the point that large portion are fruit trees, natural forest and wana kaset in the village share the common characteristic and function.

Moreover, in new-farmland type practice, thamachat, 'natural', techniques, shown in Table 10, are favored as utilizing intrinsic power of nature rather than chemical or engineering. In fact, these techniques are not indigenous ones but are learned at seminars organized by governmental sections or international organizations as Food and Agricultural Organization. In the other two extensive types, home garden and old-farmland, a lack of active care itself can be thought to be thamachat.

However, the wana kaset they practice is far different from natural forest in several points. First of all, wild species are of small portion to be planted. As Table 3 and Table 11 show, 17 in 62 species found in home gardens, and 10 in 49 species found in farmland, are common to neighboring natural forest. Besides this, there remain some naturally growing trees reserved in farmland mostly for

Table 11. 'Trees' in 24 farmland.

24 farmlands (326 rais, about 52 ha) including not only well established wanna kaset, but farmlands with several trees as a shoot of wanna kaset. Usage; 1-edible (m-material of dishes, d-dessert or sweets), 2-medicinal, 3-timber, 4-ornamental, 5-others. #- naturally growing trees. *-common species to natural forest around. (Feb. 1996)

Tree name	Botanical name	Usage	Number	Frequency (of 24)
champi	<i>Michelia alba</i> DC.	4	1	1
chaom	<i>Acacia pennata</i> (L.) Willd. subsp. <i>insuavis</i> Nielsen	1m	130	1
chomphu	<i>Eugenia</i> sp.	1d	16	2
farang	<i>Psidium guajava</i> Linn.	1d	53	6
fang	* <i>Caesalpinia sappan</i> Linn.		11	1
kaeo	* <i>Murraya paniculata</i> Jack.	4, 5	6	1
kank r ao	* <i>Fagraea fragrans</i> Roxb.	1d, 3	3	1
khanun	<i>Artocarpus heterophyllus</i> Lamk	1md	204	10
khe	<i>Sesbania grandiflora</i> Desv.	1m	1	1
khilek	<i>Cassia siamea</i> Britt.	1m	28	1
khun	* <i>Cassia fistula</i> Linn.	4, 5	1	1
klisna	not identified	4	1	1
kluai	<i>Musa sapientum</i> Linn. ('namwa')	1md	994	9
kradon	<i>Careya sphaerica</i> Roxb.	1m	2	2
krathin	<i>Leucaena leucocephala</i> de Wit	1m	1	1
krathin thepa	not identified	1m	85	1
krathon	<i>Sandoricum koetjape</i> Merr.	1m, 3	22	3
lamut	<i>Manilkara acutras</i> (Mill) Fosberg	1d	10	4
rangchuet	<i>Thunbergia laurifolia</i> Linn.		1	1
madan	* <i>Garcinia schomburgkiana</i> Pierre	1d	4	1
maduea	* <i>Ficus</i> sp.	1d	3	3
mafai	<i>Baccaurea ramiflora</i> Lour.	1d	20	5
makham	<i>Tamarindus indica</i> Linn.		50	15
phriao	(sweet variety)	1m	5	1
wan	(sour variety)	1d	27	7
not identified			18	7
makham thet	<i>Pithecellobium dulce</i> (Roxb.) Benth.	1d	1	2
makhuit	<i>Feronia limonia</i> (L.) Swiong.	1d	2	1
makok	<i>Spondias pinnata</i> (L.F.) Kurz	1d	4	1
makok farang	<i>Spondias dulcis</i> Forst. f. (= <i>S. cytherea</i> Sonn.)	1d	8	2
makrut	<i>Citrus hystrix</i> DC.	1m	5	2
malako	<i>Carica papaya</i> Linn.	1md	55	4
mamiao	not identified		1	1
mamuang	<i>Mangifera indica</i> Linn.	1md	388	13
mamuang hima pha	<i>Anacardium occidentale</i> Linn.	1m	1	1
manao	<i>Citrus aurantifolia</i> (Christm. & Panz.) Swing.	1m	115	3
mankhut	<i>Garcinia mangostana</i> Linn.	1d	10	1
maphrang	<i>Bouea macrophylla</i> Griff.	1d	12	2
maphrao	<i>Cocos nucifera</i> Linn.	1md, 5	491	11
matum	<i>Aegle marmelos</i> Corr.		1	1
mayom	<i>Phyllanthus acidus</i> (L.) Skeels	1md	2	2
ngo	<i>Nephelium lappaceum</i> Linn.	1d	64	6
noina	<i>Annona squamosa</i> Linn.	1d	80	1
phai	* Gramineae	1m, 5	7	4
phai tong	* <i>Dendrocalamus membranaceus</i> Munro	1m, 3	6	1
phekha	* <i>Oroxylum indicum</i> (L.) Vent.	1m	28	3
sadao	<i>Azadirachta indica</i> Juss. var. <i>siamensis</i> Valetton	1m, 2	103	3
som o	<i>Citrus maxima</i> Merr.	1d	13	3

<Table 11, continued>

thapthim	<i>Punica granatum</i> Linn.	1d	5	1
thurian	<i>Durio zibethinus</i> Linn.	1d	160	6
wai	* <i>Calamus</i> sp.	1m, 3	15	1
yo	<i>Morinda citrifolia</i> Linn.	1m	1	1
hen	# not identified		1	
khoi	# <i>Streblus asper</i> Lour.	2	4	
krabok	# <i>Iringia malayana</i> Oliv. ex A. Benn.		1	
kraduk	# not identified		1	
mafai pa	# not identified	1d	1	
maru	# not identified		1	
nonsi	# <i>Peltophorum pterocarpum</i> Back. ex Heyne	3	52	
pradu	# <i>Pterocarpus macrocarpus</i> Kurz.	3	2	
tabaek	# <i>Lagerstroemia</i> sp.	3	24	
takham	# not identified		1	
thinnok	# not identified	4	1	
yang	# <i>Dipterocarpus</i> sp.	3	1	
total			3324	
total (planted only)			3234	

Table 12. Usage of five most popular species chosen based on 'frequency' of Table 3 and Table 10.

Tree name	Common name	Usage	Part	Detail
kluai	banana	edible	fruit	raw, material of sweets
			flower	fryed, material of kaeng (Thai curry)
		others (wrapping)	leaf	
mamuang	mango	edible	fruit	raw salad
maphrao	coconut	edible	fruit	fresh juice, raw (when unripe) coconut milk (when ripe)
			shoot	material of dishes
		others (wrapping)	leaf	
		others (culture medium)	nutshell	
khanun	jackfruit	edible	fruit	raw
			seed	nut
			shoot	with nam phrik (chili sauce)
makham wan	sweet tamarind	edible	fruit	raw
			seed	nut

lumber in the future.

This is not only because cultivated species are of higher quality. Table 12 shows the detail of the usage of the five most popular tree species, which are common to both farmland and home garden. All are cultivated species. Even the corresponding wild species⁸⁾ are hardly found in the natural forest around the village nor has been used since before forced resettlement. These popular species have various ways of food usage, both in the parts and the methods, and have been found in farmers' home gardens all over the country.

Seeking Luxury: the Utilization of the Products of Wana Kaset

8) Based on local taxonomy: modifier pa shows wilderness, such as mamuang-pa means wild mango, while mamuang means mango (domesticated species), for example.

Table 13. The materials used in the dishes for five days selected three families, each of which practices old-farmland type, new-farmland type, and home garden type.

Hua hom (small onion) and krathiam (garlic) are omitted because they are bought without exception. Origin; g-from wanna kaset, w-wild, o-from other families, s-bought at shops, h-home made (with bought materials). *-tree. (Oct. 1996)

Y (old-farmland)				L (home garden)			
Material name	'Tree' or not	Frequency	Origin	Material name	'Tree' or not	Frequency	Origin
bai chaom	*	1	g	bai kraphrao		2	g
bai yanang		1	w	bai meangrak		1	g
bai yo	*	2	g	faeng		1	s
faeng		2	o	hua hom yai		1	s
kathi	*	2	g	kha		3	g
kha		3	g	krachai		1	g
krachai		3	g	makham piak	*	1	g
makham piak	*	1	g	makham sot	*	1	g
makham sot	*	1	g	makhuea phuang		1	g
makhuea pro		1	o	makhuea pro		1	g
malako dip	*	1	g	manao		2	s
manao	*	3	g	nomai	*	2	s
phak bung		1	w	phak bung		4	w
phrik haeng		3	g	phak chi		1	s
phrik sot		7	g	phrik haeng		2	g1/s1
takhrai		3	g	phrik kaeng		2	s
tamluen		2	g	phrik sot		6	g
thua fak yao		1	o	takhrai		4	g
yot wai	*	1	g	tamluen		1	g
				ton hom		1	s

P (new-farmland)			
Material name	'Tree' or not	Frequency	Origin
bai horapha		1	g
bai kraphrao		1	g
bai sarane		1	g
fak thong		2	g
faeng		1	g
hom hua yai		1	s
kha		2	g
makhuea pro		4	g
makhuea yao		1	g
makhuea thet		2	s
malako dip	*	1	g
manao	*	4	s
bai maengrak		1	g
phak chi		1	g
phak chi farang		2	g
phiu makrut	*	2	s
phrik haeng		2	g
phrik pon		1	g
phrik sot		8	g
phrik thai pon		2	s
takhrai		3	g
tamluen		2	g
taeng kwa		5	g
thua lisong		2	g
thua phu		1	g
ton hom		1	g
wan phlai		2	g
yot phak khad		1	g

Table 13-Supplement. Material-plant name grossary.

Material name	Material name in English	Plant name	Botanical name
bai chaom	chaom leaf	chaom	<i>Acacia pennata</i> (L.) Willd. subsp. <i>insuavis</i> Nielsen
bai horapha	sweet basil leaf	horapha	<i>Ocimum basilicum</i> Linn.
bai kraphrao	holly basil leaf	kraphrao	<i>Ocimum sanctum</i> Linn.
bai makrut	makhru leaf	makrut	<i>Citrus hystrix</i> DC.
bai maengrak	maengrak leaf (a kind of basil)	maengrak	<i>Ocimum canum</i> Sims
bai sarane	pepper mint leaf	sarane	<i>Mentha cordifolia</i> Opiz.
bai yanang	yanang leaf	yanang	<i>Tiliacora triandra</i>
bai yo	yo leaf	yo	<i>Morinda</i> sp.
dok khe	khe flower	khe	<i>Sesbania grandiflora</i> Desv.
fak thong	pumpkin	fak thong	<i>Cucurbita moschata</i> Decne.
faeng	melon	faeng	<i>Benincasa</i> sp.
hua hom (hom daeng)	small onion	hua hom	<i>Allium ascalonicum</i> Linn.
hua hom yai	onion	hua hom yai	<i>Allium cepa</i> Linn.
kathi	coconut milk	kathi	<i>Cocos nucifera</i> Linn.
kha	galangal	kha	<i>Languas galanga</i> Sw.
khao klua	parched rice	khao	<i>Oryza sativa</i> Linn.
khao niao	glutinous rice	khao niao	<i>Oryza sativa</i> Linn.
krachai		krachai	<i>Boesenbergia pandurata</i> Holtt.
krathiam	garlic	krathiam	<i>Allium sativum</i> Linn.
makhm piak	ripe tamarind fruit	makhm	<i>Tamarindus indica</i> Linn.
makhm sot	unripe tamarind fruit	makhm	<i>Tamarindus indica</i> Linn.
makhuea pro	eggplant	makhuea pro	<i>Solanum aculeatissimum</i> Jacq.
makhuea phuang	eggplant	makhuea phuang	<i>Solanum torvum</i> Sw.
makhuea thet	small tometo	makhuea thet	<i>Lycopersicum esculentum</i> Mill.
malako dip	unripe papaya	malako	<i>Carica papaya</i> Linn.
manao	lime juice	manao	<i>Citrus aurantifolia</i> Swing.
man thet	sweet potato	man thet	<i>Ipomoea batatas</i> (L.) L.
mauek	mauek fruit	mauek	<i>Solanum stramonifolium</i> Jacq.
nam tan pip	palm sugar	tan	<i>Borassus flabellifer</i> Linn.
nam tan (nam tan sai)	sugar	oi	<i>Saccharum officinarum</i> Linn.
nomai	bamboo shoot	phai	<i>Bambusa</i> sp.
nomai don	salted bamboo shoot	phai	<i>Bambusa</i> sp.
phak bung		phak bung	<i>Ipomoea aquatica</i> Forsk.
phak chi	coliander	phak chi	<i>Coriandrum sativum</i> Linn.
phak chi farang		phak chi farang	<i>Eryngium foetidum</i> Linn.
phiu makrut	makrud peel	makrut	<i>Citrus hystrix</i> DC.
phrik haeng	dried chili	phrik chi fa	<i>Capsicum annuum</i> Linn. var. <i>acuminatum</i> Fingerh.
phrik kaeng	Thai curry paste	phrik, kha, takhrai, hom deng, krathiam	<i>Capsicum annuum</i> Linn. var. <i>acuminatum</i> Fingerh.
phrik pon	chili powder	phrik chi fa	<i>Capsicum annuum</i> Linn. var. <i>acuminatum</i> Fingerh.
phrik sot	green chili	phrik chi fa/ prik khi nu	<i>Capsicum frutescens</i> Linn.
phrik thai pon	pepper powder	phrikthai	<i>Piper nigrum</i> Linn.
takhrai	lemon grass	takhrai	<i>Cymbopogon citratus</i> Stapf.
tamluen	tamluen leaf	tamluen	<i>Coccinia indica</i> Wight et Arnott
taeng kwa	cucumber	teang kwa	<i>Cucumis sativus</i> Linn.
thua lisong klua	parched peanut	thuea lisong	<i>Arachis hypogaea</i> Linn.
thua phu		thuea phu	<i>Psophocarpus tetragonolobus</i> DC.
ton hom	leek	tonhom	<i>Allium fistulosum</i> Linn.
thua fak yao		thua fak yao	<i>Vigna sinensis</i> Savi ex Hassk.
wan phlai		wan phlai	<i>Zingiber cassumunar</i> Roxb.
yot krathin	krathin shoot	krathin	<i>Leucaena leucocephala</i> de Wit
yot phak khat	phakkhad shoot	phak khat	not identified
yot wai	rattan shoot	wai	<i>Calamus</i> sp.

Table 14. Villagers' preference of sweet tamarind over sour tamarind.

Based on Table 3 and Table 11. (Feb. 1996)

Sweet tamarind		Frequency	Number
home garden		13	67
farmland		7	27
Sour tamarind		Frequency	Number
home garden		7	15
farmland		1	5

Farmers' daily dishes basically consist of nam phrik, 'chili sauce', usually eaten with vegetables, kaeng, 'curry', tom; 'boiled dishes' or 'soup', as author has observed. As a supplement, eggs are eaten often. Of course, other kinds of dishes as salads or fried dishes are also eaten, but not frequently.

Table 13 lists up the plant materials, which were used for five days in three families, who practices each of the three types of wana kaset. It is common to each sample that less than half materials are tree species (both in variety and total number of times). In addition to it, on the other hand, 'tree' species as the sources of these materials are not popular in wana kaset. No one is contained in the five most popular species in wana kaset, shown in Table 12. Wana kaset, even old-farmland type or home garden type, is targeted to supply fruits, such as fruits eaten while taking a rest in the fields.

Above arguments show the farmer's intention to wana kaset: to seek pleasure, or luxury in everyday life, rather than food supply of least necessity. Farmers' preference for makham wan (sweet tamarind: fruit eaten like sweets), over makham phriao (sour tamarind: fruit used as a seasoning) shown in Table 14, is a clear evidence of this intention.

CONCLUSION

With the enclosure of Wildlife Sanctuary the villagers lost the access to the forest resources, which was partly the result of unsustainable agriculture and forest destruction by the villagers themselves. Wana kaset practice, or preference to it, is a trial to adjust to the change of living environment by restoring the 'rich forest'. All the way through the process, we can find the villagers' idea of the life: for them it is an important to be surrounded with diverse kinds of trees supplying many kinds of foods.

Among the three types, old-farmland type and home garden type are not recognized as agriculture, assuming other farmland for agriculture as the source of income. On the other hand, new-farmland type is clearly recognized as agriculture, and seeking income generation as well as self-consumption. This is an integration of 'forest (artificial though)' and 'agriculture'. Moreover, as is an integration of income generation and seeking diversity in consistent on the limited amount of field, wana kaset is 'an artificially sophisticated natural forest'.

It is true that historically migratory farming has caused deforestation, which is a part of Thai culture⁹). However, the argument so far shows there is another aspect of culture to prefer to be surrounded by 'rich forest'. This aspect will be no doubt an effective foundation to construct the new order of symbiosis between forest and people.

⁹ On the Thai farmers' tradition of migration to seek new farmland, many detail reports have been published. For example, (Hanks 1972; Fukui 1993; Kitahara 1990; Hirsch 1990).

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藤田渡・S. SUKWONG・荻野和彦 なぜ木を植えるのか? — 東部タイでの
「ワナ・カセート」アグロフォレストリーと人々の戦略

タイ東部のテープ・プラターン村では、近年、「ワナ・カセート」と呼ばれるアグロフォレストリーへの関心が高まっている。村人が試みているワナ・カセートは、多種類の有用樹を混栽するもので、自然林を模倣したものと捉えられている。しかし、実際には、人工的な性格も多く見られる。ワナ・カセートは、自家消費と販売の両方を目的にしている。栽培される樹種はほとんど食用となるもので、「おかず」となるものより間食やデザートとなるものが多い。こうしたワナ・カセートを実践する農民は、破壊された森林の再生を、現金収入と嗜好品を生み出し、快適な生活空間をも作り出すより洗練されたワナ・カセートで行おうとしているのである。