

**A Comparative Study on the Feng Shui Village Landscape**

**and Feng Shui Trees in East Asia**

**-A Case Study of Ryukyu and Sakishima Islands-**

**(東アジアにおける風水集落の景観構造及び風水樹**

**に関する比較研究**

**琉球諸島及び先島諸島を事例として )**

**Bixia Chen**

**2008**

**A Comparative Study on the Feng Shui Village Landscape**

**and Feng Shui Trees in East Asia**

**-A Case Study of Ryukyu and Sakishima Islands-**

**(東アジアにおける風水集落の景観構造及び風水樹**

**に関する比較研究**

**琉球諸島及び先島諸島を事例として )**

**Bixia Chen**

**A DISSERTATION SUBMITTED TO THE UNITED GRADUATE  
SCHOOL OF AGRICULTURAL SCIENCES, KAGOSHIMA  
UNIVERSITY, KAGOSHIMA, JAPAN**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE  
DEGREE OF DOCTOR OF PHILOSOPHY IN AGRICULTURAL SCIENCES  
(FOREST POLICY)**

**2008**

This dissertation entitled, “**A COMPARATIVE STUDY ON THE FENG SHUI VILLAGE LANDSCAPE AND FENG SHUI TREES IN EAST ASIA-A Case Study of Ryukyu and Sakishima Islands-**” prepared and submitted by **BIXIA CHEN** in partial fulfilled of the requirements for the degree of **DOCTOR OF PHILOSOPHY**

## **ADVISORY COMMITTEE**

**Prof. NAKAMA Yuei (Ph.D.)**  
(Chairman)  
University of the Ryukyus  
Okinawa  
Japan

**Prof. NAKACHI Soushun (Ph.D.)**  
(Member)  
University of the Ryukyus  
Okinawa  
Japan

**Prof. ENDO Kusao (Ph.D.)**  
(Member)  
Kagoshima University  
Kagoshima  
Japan

**Prof. SHIRATAKE Yoshiharu (Ph.D.)**  
(Member)  
Saga University  
Saga  
Japan

**Prof. SHINZATO Takakazu (Ph.D.)**  
(Member)  
University of the Ryukyus  
Okinawa  
Japan

**THE UNITED GRADUATE SCHOOL OF AGRICULTURAL SCIENCES,  
KAGOSHIMA UNIVERSITY, KAGOSHIMA, JAPAN**

**February, 2008**

## TABLE OF CONTENTS

LIST OF FIGURES	vii
LIST OF TABLES	viii
LIST OF PHOTOS	ix
LIST OF APPENDICES	x
ACKNOWLEDGEMENTS	xi
SUMMARY	xii
ABSTRACT (JAPANESE)	xiii
CHAPTER I: INTRODUCTION	1
1.1 Background	1
1.2 The Significance of Research on Feng Shui	2
1.2.1 Definition of Feng Shui	2
1.2.2 Significance	4
1.3 Purposes	5
1.4 A Brief Introduction of Okinawa Prefecture	6
1.5 Methodology	10
1.6 Structure of the Research	11
CHAPTER II: A SUMMARY OF PREVIOUS RESEARCHES ON FENG SHUI	12
2.1 Anthropological and Folklore Studies on Feng Shui	13
2.2 Ecological and Environmental Studies on Feng Shui	17
2.3 Architectural and Landscape Planning Studies on Feng Shui	20
2.4 Feng Shui Studies in Okinawa	22
2.5 Summary	23
CHAPTER III: FENG SHUI VILLAGE LANDSCAPE AND FENG SHUI TREES	24
3.1 Feng Shui Village Landscape	24
3.1.1 The consideration of Surrounding Physical Environment	24
3.1.2 Ideal Feng Shui Model	25
3.2 Feng Shui Trees	26
3.2.1 Feng Shui Trees in Mainland China	28
3.2.2 Feng Shui Trees in Hong Kong	32
3.2.3 Feng Shui Trees in Korea	33
3.2.4 Feng Shui Trees in Okinawa	37
3.3 Summary	38

CHAPTER IV: A RYUKYU FENG SHUI VILLAGE LANDSCAPE	40
4.1 Introduction	40
4.1.1 Introduction and Development of Feng Shui in Ryukyu Kingdom	40
4.1.2 Village Feng Shui	41
4.1.3 Study purpose	42
4.2 Survey Site and Methods	43
4.2.1 Case Study Area	43
4.2.2 Data Collection	45
4.3 The Feng Shui Layout in Tarama Island	46
4.4 Features of Trees in the Front Forest Belt	50
4.5 Forest Composition on the Back Hill	54
4.6 A Ryukyu Island Feng Shui Village Featuring Forest Planting	59
4.7 The Naturally Regenerated Ho:go Forest of Rich Biodiversity and the Forest in the Rear Hills	61
4.8 Summary	62
CHAPTER V: HOUSE-EMBRACING FUKUGI TREES IN TONAKI ISLAND	64
5.1 Introduction	64
5.2 Methods and Survey Site	65
5.3 General Layout of House-embracing Fukugi Trees	68
5.4 General Layout of Residences	69
5.5 Features of House-embracing Trees	74
5.6 Regeneration of House-embracing Trees	81
5.7 The Reasons of Having Selected Fukugi Trees	84
5.8 Summary	85
CHAPTER VI: HOUSE-EMBRACING FUKUGI TREES IN BISE VILLAGE	87
6.1 Introduction	87
6.2 The General Layout	92
6.3 Analysis by Type	97
6.4 Density and Regeneration	98
6.5 Estimated Age of Trees	102
6.6 Summary	103
CHAPTER VII: CONCLUSION	105
7.1 Features of island Feng Shui village landscape	106
7.2 Feng Shui forests in the rear hill and the front Ho:go	108
7.3 The Practical Use of Tree Planting in an Island Feng Shui Village	109
7.4 Prevalent Fukugi ( <i>Garcinia subelleptica Merr.</i> ) trees	110
7.5 Layout of House-embracing Fukugi Trees	111

7.6 Features of House-embracing Fukugi Trees	112
7.7 Management of House-embracing Fukugi Trees	114
7.8 Summary	115
REFERENCES	117
APPENDIX	126

## LIST OF FIGURES

Figure	Page
1-1 Map of Ryukyu Islands	7
1-2 Map of Okinawa Gunto (Island Group)	8
1-3 Map of Yaeyama Gunto (Island Group) and Miyako Gunto	9
3-1 A 3-D representation of the ancient Feng Shui model	26
3-2 A typical layout of Feng Shui woods in mountainous villages in Hong Kong	33
4-1 Map of Tarama Island	44
4-2 Locations of 8 plots surveyed in Tarama Island	45
4-3A sketch of Tarama Island layout	47
5-1The locations of the seven surveyed houses	67
5-2 Layout of the structure of No. 1 (1877) in Tonaki Island	70
5-3 Layout of the structure of Nos. 2 (1952) and 7 (1953) in Tonaki Island	71
5-4 Layout of the structure of Nos. 3 (1943) and 4 (1944-1) in Tonaki Island	71
5-5 Layout of the structure of No. 5 (1816) in Tonaki Island	72
5-6 Layout of the structure of No. 6 (1837) in Tonaki Island	73
5-7 Frequency of the height of house-embracing Fukugi trees in Tonaki Island	77
5-8 Frequency of DBH of house-embracing Fukugi trees in Tonaki Island	77
5-9 A frequency distribution curve of the height of Fukugi in well-kept and abandoned houses	78
5-10 A frequency distribution curve of DBH of Fukugi in well-kept and abandoned houses	78
5-11Scatter plot of DBH vs. height of all surveyed trees taller than 1m overlaid with the fitted line	80
5-12 Tree density by house	81
5-13 Ratio of sprouts and seedling of trees	84
6-1 Locations of Bise village	89
6-2 Location of survey sites	90
6-3House-embracing tree distribution in Type 1 in Bise village	93
6-4House-embracing tree distribution in Type 2a in Bise village	93
6-5House-embracing tree distribution in Type 2b in Bise village	94
6-6House-embracing tree distribution in Type 3a in Bise village	95
6-7House-embracing tree distribution in Type 3b in Bise village	96
6-8 A frequency distribution curve of height of house-embracing trees	99
6-9 A frequency distribution curve of DBH of house-embracing trees	100
6-10 Scatter plot of DBH vs. height of all survey trees taller than 1m overlaid with the fitted line	100

## LIST OF TABLES

Table	page
3-1 Major Feng Shui tree species in East Asia	36
4-1 The main dominant trees in plots 1-5 in Tarama Island	52
4-2 Characteristics of upper storey trees in the surveyed front forest belt in Tarama Island	52
4-3 A list of undergrowth vegetation species in the front forest belt	53
4-4 Characteristics of upper storey trees in the surveyed back hill in Tarama Island	55
4-5 A list of undergrowth vegetation species in the back hill forest in Tarama Island	56
5-1 Descriptive data of house-embracing <i>Garcinia subelliptica</i> Merr. trees	75
5-2 Descriptive data for the trees in well-kept and abandoned houses	75
5-3 Density and regeneration of house-embracing <i>Garcinia subelliptica</i> trees	82
6-1 Descriptive data by types	96
6-2 Density of Embracing trees	99



## LIST OF PHOTOS

Photo	page
3-1 Maple tree ( <i>Acer buergerianum</i> Miq.) belt planted in the front of the Shicheng village in Jianxi Province	30
3-2 Two tall and old maple trees standing in the Water Gate to Huangcun village in Jianxi Province	31
4-1 An aerial photo of Tarama Island taken by American Army in 1945	44
4-2 Village houses clustered in the northern part of Tarama Island	48
4-3 Feng Shui forest belt, Ho:go, in the front of the village in Tarama Island	49
4-4 An overlook of the remnant house-embracing Fukugi trees in Tarama Island	49
4-5 Forest composition inside the forest belt in Tarama Island	51
4-6 The biggest Fukugi tree in Ho:go, in Tarama Island, which is assumed to have grown from two trunks into one	51
4-7 Forest composition in Plot 6 with little undergrowth vegetation because of a close upper storey	57
4-8 Forest composition in Plot 7 with little a lot of undergrowth vegetation of ferns and liana with an open upper storey	58
4-9 Forest composition in Plot 8 with little undergrowth vegetation because of a close upper storey. The dominant species was <i>Diospyros maritime</i> .	58
4-10 An aerial photo of Hirae Village in the southern part of Ishigaki Island by American Army in 1945	60
5-1 An aerial photograph of Tonaki village	66
5-2 A rebuilt traditional timber house embraced by Fukugi trees	68
5-3 House-embracing Fukugi trees line along the village road covered by white sand	68
5-4 Fukugi trees line orderly in the back of No. 1 (1877) house	76
5-5 Fukugi woodlands in the abandoned No. 7 (1953) house	76
5-6 Sprouts from a stump left after the tree was cut and used to build a house	83
5-7 Seedlings grown in the woods where fallen seeds were kept and planted	83
6-1 An aerial photo of Bise village	89
6-2 An overlook picture of Bise village	91
6-3 A well ordered tree line inside the village	91
6-4 The view of house-embracing Fukugi trees from the entrance to a house	92

LIST OF APPENDIX

	Page
Vegetation composition in survey plots in Tarama Island	124

## ACKNOWLEDGEMENTS

First of all, I wish to express my profound gratitude to my major academic adviser, Prof. (Dr.) Yuei Nakama for his patience, encouragement, and guidance during my stay in Okinawa. I wish to thank Prof. Nakama for many insightful conversations during the development of the ideas in this thesis, and for helpful comments on the text.

My appreciation also goes to the following examination committee, Prof. Nakachi Soushun, Prof. Endo Kusao, Prof. Yukutaki Kiyoshi, and Prof. Shinzato Takakazu, who have provided valuable insights and comments.

I would also like to extend my sincere thanks to many friends in University of the Ryukyus, to all who have helped me with the surveys in the villages of Okinawa, and to all friends who have listened to my complaints when I was frustrated. Special thanks go to Tomoko Uezu and her family for their support during my stay in Okinawa.

My study in Japan would not have been possible without the generous scholarship award from the Ministry of Education, Culture, Sports, Science and Technology of Japan and I am very grateful for that.

As much as I am very grateful to the above-mentioned people, mostly to my major supervisor, for all the constructiveness to which this study appeals, I wish to emphasize that all mistakes, ambiguities, and absurdities are admittedly mine.

Bixia Chen

February, 2008

## SUMMARY

Feng Shui is based on empirical observations of the surrounding landform. Majority of researches on Feng Shui in Okinawa concern the historical study, or analyze village layout from perspectives of history, folklore, and architecture. However, a comparative study of Feng Shui in Okinawa with that in mainland topography is little reported. This study aims to clarify a Ryukyu village's features, focusing on Feng Shui trees and village landscape.

(1) In China, and Korea, Feng Shui trees are commonly symbolical separated patches. Some major species include *Cinnamomum camphora*, *Ficus microphylla*, and *Acer buergerianum* (Mainland China, and Hong Kong) and *Pinus densiflora* (Korea). In Okinawa, forests are functionally used to embrace the house, the village, and the coastline to contain the strong wind. Feng Shui trees include Fukugi, *Calophyllum inophyllum*, *Pinus luchuensis*, *Pandanus odoratissimus*, and *Hibiscus tiliaceus* in Okinawa.

(2) A Feng Shui village landscape highlights the surrounding landform to “contain the wind” and “accumulate the water” in China and Korea. In Okinawa, village houses are encircled by multilayer forest belts of house-embracing trees, *Kusatimui* in the rear and Village Ho:go together to embrace the village, and coastline Ho:go. Such a layout, designed to protect the village from the winter wind and typhoons, is attributed to the environmental difference between mainland and island topographies.

(3) Fukugi trees that embrace all sides of the house are not found in Korea, or China. House-embracing trees and interlaced road network are the features of a Ryukyu Feng Shui village. In Okinawa, there are always one to four houses embraced by Fukugi.

(4) Distribution layout of house-embracing Fukugi was reproduced with HO CAD software. Along with houses mostly backing north and facing south, forest belts in the north, east, and along the coastline are thick in Okinawa. Such layout of Fukugi is assumed as countermeasure to winter wind and typhoons.

(5) House-embracing Fukugi trees are under routine care and management to maintain Feng Shui's function. Tree number in every meter of the woodlands was 3.1 in Tonaki, and 2.7 in Bise, respectively. The estimated mean and oldest tree ages were 40 and 179 in Tonaki, and 46 and 266 in Bise. The mixture of diverse ages of trees, and proper density might be assumed as the result of proper management.

(6) All village roads are not straight, but courteous in Okinawa. No intersections are perfect right angle. Fukugi tree lines are laid out along the roads which decline from the north-south or east-west axes. Such a layout has been planned to contain the wind according to Feng Shui principle of “to contain the wind and to accumulate the water”. The curvuous roads are able to channel and reduce the damage of the strong winds coming to the village.

In summary, Feng Shui in Okinawa, which was adapted to the severe nature of winter wind and typhoons in summer, utilizes tree planting to achieve an ideal Feng Shui environment. Comparing with mountainous Feng Shui practice in China and Korea which highlights the landform and symbolically use Feng Shui trees, Feng Shui in Okinawa is functionally practiced, thus, an “Island Ryukyu model of Feng Shui” is argued in this study.

## ABSTRACT (JAPANESE)

風水地理とは、土地の吉凶を判断する地相術のことで、古来より東アジア地域において、都城・宅地・墓地などの位置を確定するときに応用されてきた技術である。琉球の風水地理に関する研究は、これまで主に歴史・民俗・建築の分野で、歴史資料の分析や集落構造の解析という形で進められてきたが、大陸との比較研究はほとんどなされていない。本論文は、琉球の風水集落を事例に、とくに風水樹と風水景観に焦点を当て、その特徴について比較研究したものである。

第1は、風水樹の利用の仕方である。韓国や中国では風水樹は象徴木としてとらえられ、樹種も常緑樹が幸運をもたらすとされる。樹種も主にクスノキ・ガジュマル・コノテガシワ（中国、香港）、アカマツ（韓国）などが利用される。一方、琉球国内では、風水樹は海岸域から集落・屋敷を囲む林帯として、風向に対して実用的に配置されている。樹種もフクギ、テリハボク、リュウキュウマツ、アダンなどが機能別に植栽されている。

第2は、集落を中心とした風水景観のつくり方である。韓国や中国の風水景観は、一般的に風水地形が「蔵風得水」の配置になっている。一方、琉球の場合は、屋敷林で囲まれた家屋を中心に、集落の北側は「腰当の森」、集落の南側は「抱護」の林帯、海浜側は「浜抱護」の林帯などで囲まれた重層配置になっている。これは冬の季節風と台風に対応したもので、大陸と島嶼という自然環境の違いに起因する。

第3は、家屋を取り囲む屋敷林の存在の有無である。韓国や中国の風水集落には、各家屋を取り囲む屋敷林はほとんど見当たらない。琉球の風水集落の大きな特徴は、フクギで囲まれた屋敷林の存在である。その屋敷林の配置も、1屋敷囲みから4屋敷囲みタイプに分けられる。

第4は、フクギ屋敷林が風向を意識して配置されていることである。HO CADによる密度分布を調べた結果、集落内の屋敷林は、北背南向の屋敷配置に合わせて、北側と東側と海岸側が広く厚く植栽されていることが判明した。これは冬の北風と台風に対応した配置といえる。

第5は、各家屋を囲む屋敷林は、風水機能を高めるために、定期的に手入れされ維持管理されていることである。1m当たりの平均本数は渡名喜島で3.1本、備瀬で2.7本である。平均樹齢は渡名喜島で40年（最大179年）、備瀬で46年（最大266年）となっている。幼木から老木まで混交林立するが、これは適度に密度管理をしている結果である。

第6は、集落内の道路が曲線になっていて、そのため交差点は直角になっていない。それに対応して屋敷林も組み合わせられている。これらの配置は、風水理論の「蔵風」に特化したもので、吹き込む風をたくわえ、そのエネルギーを分散させる構造になっている。

以上のように、琉球に応用された風水地理は、植林によって風水環境が整えられ、冬の季節風と夏の台風という厳しい自然環境によく適応し、その機能が極めて実用的であることから、韓国や中国の「地形大陸モデル」と比較して、本論文では「島嶼琉球モデル」として措定した。

## CHAPTER I

### INTRODUCTION

#### 1.1 Background

Human activities have transformed the environment and landscape dramatically. As people settled near their fields and as populations grew, the burden on the land increased, and at times the ecological pressure grew too great. In agriculture society, crop irrigation led to increased salination and diminished yields, while a loss of forest cover brought erosion and the destruction of precious arable land (Ponting, 1991). Ponting says, environmental degradation increased exponentially through pollution at all stages of the industrialization process-and, in addition, the industrialized societies.

The Rio Declaration on Environment and Development in Earth Summit 1992 indicates a global concern for the symbiosis of the environment and man. In Principle 22, the Declaration states that *“Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.”* The Earth Summit in 1992 has a profound and revolutionary influence on many disciplines concerning a sustainable development. Traditional patterns of thought and belief have been the foci of much research interest for their accumulated environmental information and wisdom.

Feng Shui, undoubtedly, is one of the most common research foci recently, because few ideas in the world are more closely related to the natural environment-humanity relationship than Chinese geomancy (Yoon, 2003; 2006). Feng Shui, also known as Chinese Geomancy is a unique and comprehensive system of conceptualizing landscapes to select propitious sites

and build harmonious structures on them, in order to derive good-fortune from the auspicious location (Yoon, 1976; 2003).

A Feng Shui village might be re-evaluated as an ideal and sustainable landscape model in East Asia. Feng Shui is an art related to landscape management. It is based on empirical observation of land form. It deals with the flow of Qi (living energy) in nature. A Feng Shui village landscape embodies a biological significance and the harmonious coexistence between the environment and man.

To accumulate living Qi, Feng Shui promotes greenery in Dragon Mountain, and a few groves of evergreen trees nearby the village and even fruit trees planting in the yard are common. Tree planting was highlighted to shape a Feng Shui village landscape in particular in Okinawa. Diverse tree species help to improve the micro environment with a rich biodiversity. Feng Shui offers a principled but highly flexible code (Michell, 1973). It has been applied to different topographies in mountainous areas, in the plain, and even in small islands.

## **1.2 The significance of the research on Feng Shui**

### **1.2.1 Definition of Feng Shui**

The research emphasis for over one hundred years witnessed the endeavor to answer the question what Feng Shui is. And these works could be further classified into two periods according to writers' attitude. Eitel and de Groot are of prominent researchers representing a criticism attitude to Feng Shui in the earlier stage. Joseph Needham, Andrew March, C.G. Jung and Lynn White represent the appreciation attitude toward Chinese Feng Shui, which appeared in 1950s and 1960s. Some major definitions given by the researchers are listed as follows:

Ernest J. Eitel (1993/1873):

Feng Shui is a complete amalgamation of religion and science. It is a mere superstition, a farrago of nonsense and childish absurdities.

J.J.M. de Groot (1962/1892):

Feng Shui is “A ridiculous caricature of science”; “A farrago of absurdities.”

Hong-key, Yoon (1976):

Yoon defines the art as ‘a unique and comprehensive system of conceptualizing the physical environment which regulates human ecology by influencing man to select auspicious environments and to build harmonious structures (i.e. graves, houses, and cities) on them ’

Joseph Needham (1956):

Every place has its special topographical features which modified the local influence of the various ch’i (energies) of nature.

John Michell (1973):

Feng Shui offers a principled but highly flexible code which can be referred to over all matters of architectural design, city planning, and the use of the countryside.

Stephen Skinner (1982):

The art of living in harmony with the land, and deriving the greatest benefit, peace and prosperity from being in the right place at the right time is called feng-shui.

Xu, Ping (1990):

Feng Shui, one of earliest forms of landscape analysis, has shaped the landscape of China throughout the ages, determining the sites of common towns and houses as well as royal houses, graves, and sacred temples.

Yu, Kongjian (1994):

As model of place making for the Chinese, Feng-shui builds hierarchies of natural and social order and makes sense of identity, which lead to the hierarchical responsibility coverage of caring for and conserving of the landscape, and the achievement of sustainable environment and communities.

Chris Coggins (2002):

Feng Shui is colloquial term for the ancient Chinese way of conceptualizing and regulating power in the physical landscape. The practice has been used for siting tombs, buildings, and



settlements within the natural and supernatural parameters of the landscape to promote harmony between the human realm and the realm of heaven, or the cosmos. (P196)

I basically agree with the argument that Feng Shui closely relates nature and man. Feng Shui is a systematic knowledge to have elaborate judgments on the nature and plan to establish the landscape compatible to the environment.

### 1.2.2 Significance

Okinawa has become one of the most popular tourist destinations in East Asia with an exotic culture and rich tropical and subtropical nature. About 5,500,000 tourists visited the Okinawa Islands in 2006. Okinawa is located between Kyusyu and Taiwan. Major Asian cities such as Taipei, Shanghai, Hong Kong, Seoul, Manila and Tokyo are all located within a 1,500km radius of Okinawa. Because of its close proximity to the major Asian cities, Okinawa represents the southern gate to China, Southeast Asia and Oceania. A forest tourism project including house-embracing trees in a traditional village landscape is being promoted. Bise village, which has the best preserved woods in northern Okinawa, attracts a large amount of visitors due to its easy access.

Feng Shui was first introduced to the Ryukyu Kingdom in the 14th century and was later employed as a national policy by an eminent statesman named Saion around the 1730's. Feng Shui was applied to guide city planning and village building (Machida and Tsuzuki, 1993) and even mountain forest management (Nakama, 2002). The traditional village landscape was designed under the guidance of a Feng Shui adviser.

Previous researches on Feng Shui mostly focus on its historical development based on literature reviews. It has been studied from the perspectives of anthropology (De Groot, 1963), architecture and landscape, environmental (Yoon, 1976) and ecological views. Many discuss the application of Feng Shui in capital building. However, actual landscape structure of a Feng Shui village and actual composition of Feng Shui forests are little touched.

Comparing to other regions in East Asia, Feng Shui practice is less known in Okinawa Islands for its shorter history and faraway geographical location departing from Continent. Notwithstanding, a study on Feng Shui's application in an island topography under

subtropical monsoon climate is of great significance to understand the sustainability of Feng Shui practice, in particular in shaping a pleasant living environment.

However, most of Feng Shui village landscapes Okinawa disappeared rapidly since WWII. The forest belts which had been planted to embrace the island, several neighboring villages, or one hamlet were burnt during the battle, or cut with the use of machinery and concrete house building. After Okinawa prefecture was returned to the Japanese government, large-scale infrastructure improvement programs have been carried out to build a modern landscape. This particular Ryukyu village landscape disappeared in most islands.

Therefore, in order to restore and rebuild a particular Ryukyu Islands village landscape, it is urgent to clarify the current landscape structure and Feng Shui forest composition in a traditional Feng Shui village.

### **1.3 Purposes**

In order to explore the unique features of Feng Shui village landscape structure in Okinawa, this study is conducted to compare Feng Shui practice in village landscape planning among East Asia. One purpose of this research is to clarify the current existing Feng Shui village landscape structure on islands in Okinawa Prefecture. Another purpose, not less important, is to explore the actual composition of Feng Shui trees used in the Feng Shui villages. In order to probe into the particular practice of Feng Shui in Okinawa Island, a comparative study among East Asia regions are conducted, since Feng Shui was originated in mainland China and prevalently practiced in other regions in East Asia. An ideal Feng Shui village landscape structure in mainland China and Hong Kong is generalized based on literature review. Feng Shui tree species are also discussed based on literature review and my own field trips to some southeast provinces in mainland China and Hong Kong.

#### **1.4 A brief introduction of Okinawa Prefecture**

Okinawa Prefecture, Japan's southwestern most prefecture, is located at lat. 24~28° North and long. 123~132° East. It consists of 49 inhabited and 110 uninhabited islands. The islands are scattered over an area 1,000km from east to west and 400km from north to south, situated approximately between 24 and 28 degree north latitude and between 123 and 131 degrees east longitude. The islands are divided into three major groups: the Okinawa island group (see Fig. 1-1), the Miyako island group, and the Yaeyama island group (see Fig. 1-2). Okinawa (1,202km<sup>2</sup>) is the largest island with Iriomote (289km<sup>2</sup>), Ishigak (222km<sup>2</sup>), and Miyako (159km<sup>2</sup>) Islands following respectively.

The climate of Okinawa is influenced by the latitude, the surrounding ocean, the monsoon, the Black Current, and typhoons (Glacken 1960:19). It has a subtropical climate with considerable humidity. It has a long typhoon season extend from June to November.

The Ryukyu Kingdom was an independent kingdom which ruled most of the Ryukyu Islands from the 15th century to the 19th century. The Kings of Ryukyu unified Okinawa Mainland Island and extended the kingdom to the Amami Islands in modern-day Kagoshima Prefecture, and the Yaeyama Islands near Taiwan.

An organized system of governance first emerged in the islands in the early fourteenth century and by 1310, the main island had three kingdoms: Hokuzan in the north, Chuuzan in the center, and Nanzan in the south. Prior to the age of the Three Kingdoms, village chieftains, or *Aji*, ruled various parts of the archipelago. The Chuzan kingdom eventually defeated Hokuzan and Nanzan and the Ryukyuan kingdom was established around 1429. Although the Yamato state (which eventually became the modern nation of Japan) existed between the fifth and eight centuries, Japan failed to exercise political control over the islands until the seventeenth century. The Ryukyuan Kingdom was a Chinese tributary state during much of its existence and, therefore, had a much closer relationship with China than it did with Japan. The Ryukyu Kingdom lost its independence when the Satsuma armies invaded the islands in 1609.



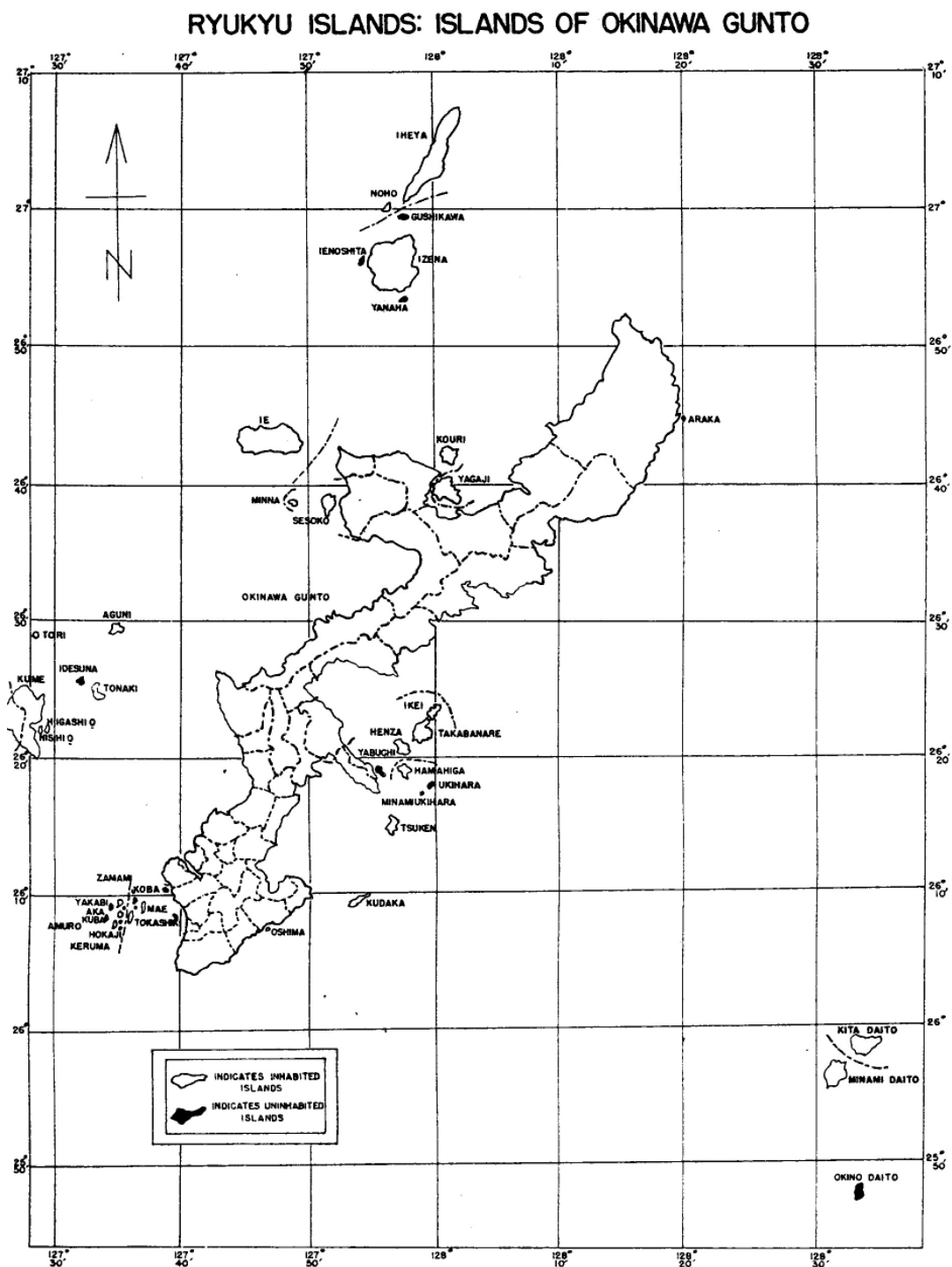


Fig. 1-2 Map of Okinawa Gunto (Island Group)

Source: in *Ryukyu Islands* (1953) by United States Civil Administration

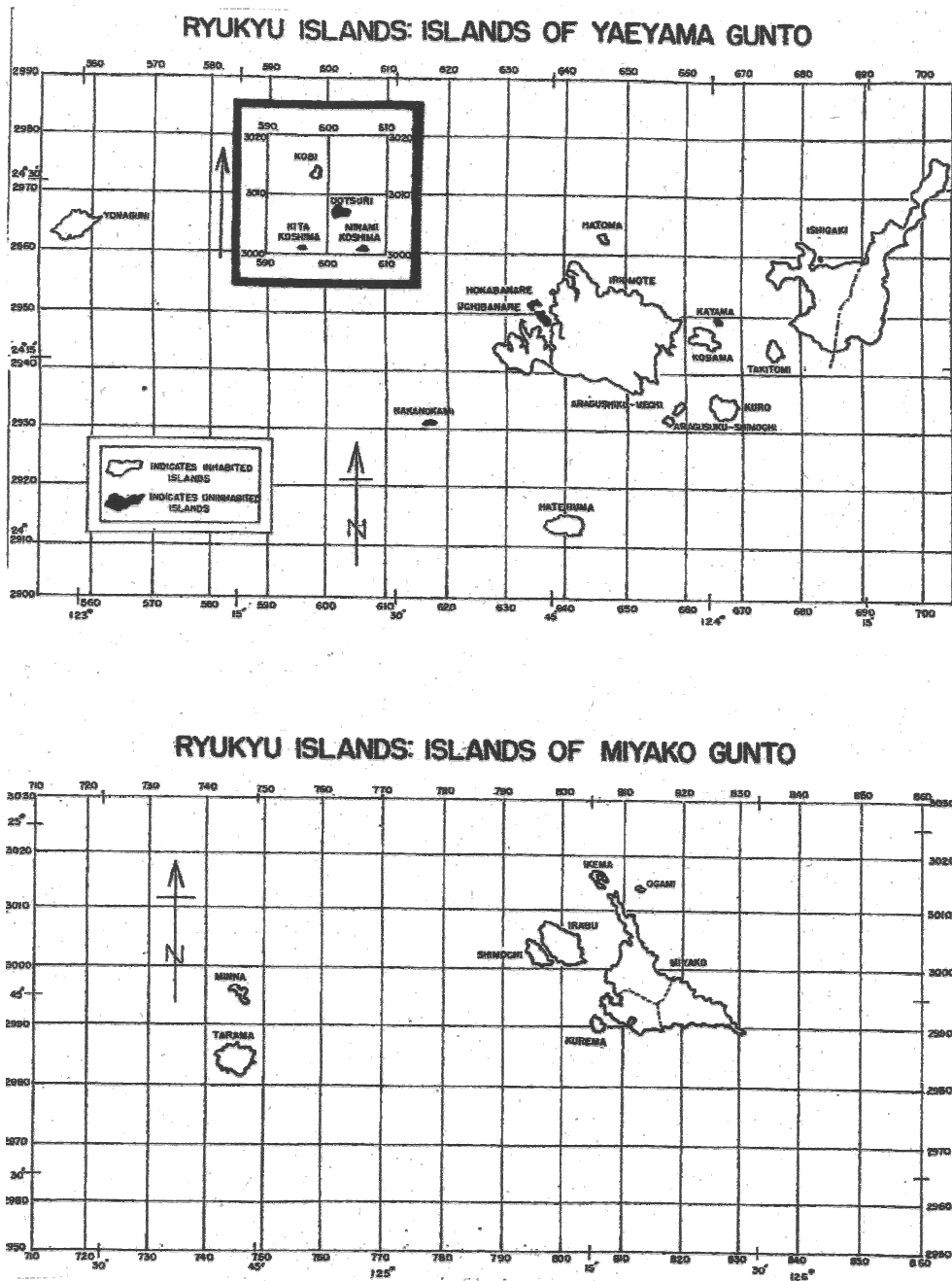


Fig. 1-3 Maps of Yaeyama Gunto (Island Group) and Miyako Gunto  
Source: in *Ryukyu Islands* (1953) by United States Civil Administration

The years between 1609 and 1879, are known as the era of “Dual Subordination” because of the Ryukyans’ dual loyalties to both China and Japan. During this period, the Japanese overlords curtailed the Ryukyans’ trade and taxed them heavily. Following the Meiji Restoration, the Satsuma *han* was abolished and the Meiji government stepped into its place to exert control over the Ryukyus. Under the policy of *Ryukyu shobun* (literally, the “disposition of the Ryukyu Kingdom”), the Japanese government officially dissolved the kingdom and incorporated the islands into the Japanese nation-state as “Okinawa Prefecture.”

## 1.5 Methodology

Three of the best preserved Feng Shui villages of Tarama Island, Tonaki Island and Bise village in the northern part of mainland Okinawa were surveyed to explore the village landscape layout and tree composition. A traditional Feng Shui village layout is best preserved in Tamara Island. House-embracing Fukugi trees have been best preserved in Tonaki Island and Bise village.

In order to comprehend the actual stand structure of house-embracing trees, first every stand tree taller than 1m was numbered, and then height and diameter at breast height (DBH) were measured and recorded. The numbers of sprouts and seedlings were also counted to analyze tree regeneration. Sprouts from the rootstock and the stumps were counted, respectively. Young trees less than 1m were counted as seedlings.

The actual location of every tree in the woodland were also recorded to reproduce the actual layout of the trees with HO CAD software in the figures. On the basis of their DBH, the size of every tree was drawn in circles of proportional size.

Interviews with the local people were conducted to understand the current management problems with the house-embracing trees. Historical records were also used to explore the traditional use of Feng Shui trees.

## 1.6 Structure of the Research

This study has been divided into seven chapters as follows. Background, significance, purposes, methodology of this research, and the introduction of the survey sites is discussed in the first chapter. A review of researches on Feng Shui is summarized in the second chapter. This part is developed from the different disciplines of anthropology and folk lore, environmental and ecological studies, and architecture and landscape planning. Chapter 3 discusses the general principles of an ideal Feng Shui village landscape in mainland China and Feng Shui trees in mainland China, Hong Kong, Korea, and Okinawa respectively. This part is mostly based on the literature review, and some of my extensive investigation in mountainous villages in Fujian, Jiangxi, and Hong Kong New Territory. Data of Okinawa is summarized majorly based on investigations on the islands in Okinawa.

Chapters 4-6 include my original research interest of the actual structure of the particular Ryukyu Island Feng Shui village landscape and Feng Shui trees. These parts are based on my intensive surveys with the assistance of undergraduate and master students in my lab. Chapter four includes two parts of a historical review on the formation of the Ryukyu Island village landscape, and a case study of Tarama Island to clarify the actual layout of a Feng Shui village, in particular, the vegetation composition included in it. Survey results of house-embracing Fukugi (*Garcinia subelliptica Merr.*) trees in Toanki Island are included in Chapter 5. The features of Fukugi trees (layout, composition and density) are discussed in this part. It also mentions the managements of tree lines based on the comparison of abandoned houses and well-kept houses. Chapter 6 presents another case study of house-embracing Fukugi trees in Bise village in the northern part of Okinawa mainland Island. In this part, the features of Fukugi trees are discussed to connect with the historical changes and population increase of the village. Chapter 7 summarizes the features of the Ryukyu Island Feng Shui village landscape and composition of Feng Shui trees, in particular, village Ho:go and house-embracing trees as the conclusion of this dissertation.



## **CHAPTER II**

### **A SUMMARY OF PREVIOUS RESEARCHES ON FENG SHUI**

Feng Shui is ancient Chinese practice of placement and arrangement of space to achieve harmony with the environment. Feng shui has been practiced for thousands of years and applied to many aspects such as city planning, village site choosing and cemetery building in East Asia. It was rooted from Chinese philosophy of harmonious coexistence with nature and human. The sound effect of Feng Shui on environment has embodied a sustainable agricultural society in China for two thousand years.

Feng Shui practice existed in China since the beginning of Chinese ancient culture. Feng Shui has been widely practiced in China, and even influenced its neighboring East Asian areas, such as Hong Kong, Taiwan, Korea, Japan, and Vietnam and etc. However, the academic study of Feng Shui didn't appear until western missionary's coming to China. The superstitious appearance and magic power of Feng Shui has attracted multitudinous research efforts and variant argument. It is worth noticing that researchers' attitudes towards Feng Shui were never independent from their historic background. When western missionaries arrived in China two hundred years ago, having been frustrated at employing their constructing and engineering in the landscape, they were annoyed with the widespread existence of Feng Shui art. Similar point of view was also held by contemporary Chinese native scholars. Not until 1960s was Feng Shui appreciated for its role playing in cultural and social development. The tendency of previous research paralleled with the awareness of worldwide ecological and environmental crisis. Feng Shui attracted researchers' enthusiasm with its sound environmental impact. While, the research achievements on Feng Shui studies mainly constitute of discussions on its intertwinement with Chinese traditional culture, architecture. I summarize the previous research achievements in light of principles as follows.

With the coming of 1960s, the focal point of Feng Shui also changed with the awareness of worldwide ecological and environmental crisis. The ecological and functional effect of Feng

Shui on landscape was noticed, as in trapping sunlight, keeping off wind, avoiding floods and choosing well drained sites while keeping water at convenient reach for daily use and irrigation, etc.

The way modern ecologists deal with the relationship of man and nature has been increasingly closer to that of Feng Shui, which held that man should live in harmony with nature, and that human activities should be “designed with nature.” The same idea is admired and much striven after by modern environmentalists in general and landscape architects like McHarg (1969) in particular, and is still considered to be the “most important question” for today and in the future for the profession of landscape architecture (e.g. Corner 1992).

## **2.1 Anthropological and folklore studies on Feng Shui**

Historically Feng Shui was widely practiced throughout China by the emperor as well as the masses, the sacred and the profane. While, academic research on Feng Shui did not appear until Christian missionaries’ coming to China from 1800s. During the period before 1960s, most researchers described Feng Shui in such words as superstitious, quasi science, natural philosophy, and charlatanism etc.

The research emphasis for over one hundred years witnessed the endeavor to answer the question what Feng Shui is. And these works could be further classified into two periods according to writers’ attitude. Eitel and de Groot are of prominent researchers representing a criticism attitude to Feng Shui in the earlier stage. Joseph Needham, March March, C.G. Jung and Lynn White represent the appreciation attitude to Chinese Feng Shui, which appeared in late 1950s and 1960s.

In 1873 the first treatise on Chinese geomancy in a Western Language was written by E. J. Eitel, the German clergyman and longstanding school-inspector in Hong Kong. In the authors’ closing remarks, about Feng Shui being a mere superstition, a relic of the child-like mentality of the past and so on, were surely added so as to make his book more acceptable to his religious superiors and perhaps to his publishers (Eitel [1873] 1993: afterword by John

Michell). A distinguishing feature is that he looks Feng Shui as an essential part of ancestral worship (ibid: 65). And with the Western self-confidence, he concludes that Feng Shui is, by no means, an insuperable barrier to the introduction of foreign civilization in China (ibid.:68)..

De Groot (1892/1962), an 18th century Sinologist raised his account to a level of timeless authority with his monumental work “The Religious System of China”, defining Feng Shui art as “a ridiculous caricature of science,” a “farrago of absurdities,” and “a quasi-scientific system”. It is likely to impress us today on first encounter as a baffling and silly mishmash of things better sorted out as physical science, religion, esthetics, psychology, philosophy, and sociology.

Such animus arose from the belief that geomancy was to blame for difficulties in promoting Christianity and trade in China, and the “gospel of natural science” which served both (Dukes, 1914). It was the greatest obstacle to Christian activities including construction and engineering in the landscape, which were considered to be necessary by the Westerners for the development of the country (e.g. Dukes, 1914)

In late Qing Dynasty, criticism of Feng Shui aimed to clear away ideological obstacles for building new mining industry and transportation (Guo, 1994). With introduction of Cartesian dichotomy and social evolution theory to China at the turning point of 19th century, Feng Shui was criticized with its mysterious traditional culture marks. Labeled with superstition, Feng Shui tradition was regarded as culture dross, and remained neglected by researchers totally for almost one century.

The Europeans’ detestation of geomancy must have arisen not only from the obstacles it opposed to their activities, but also from their own inability wholly to disbelieve it—they shared the experience but the meaning seemed a parody of their own practice (March, 1968).

With the writings of Joseph Needham, Andrew March, C.G. Jung, Lynn White and many others, Chinese cosmology gradually gained prominence (Bruun, 2003: 236). Needham recognized Feng Shui for its role in the development of Chinese science and technology. Needham (1956) argued that Feng Shui embodied a marked aesthetic component, which accounts for the great beauty of the siting of the so many farms, houses and villages

throughout China. March sees Feng Shui as dealing with landscapes and sites as manifestations of the natural world, while concerned with the psychic properties of the material world (March, 1968:253; 256)

By Feng Shui it is to place oneself spatially and temporally in an appropriate relation to the flow of natural processes (Feuchtwang, 1974). The Feng Shui practitioner seeks to understand the movement of energy (Qi) through a landscape, and how that movement is effected by the altitude and placement of mountains, trees, and rivers, as well as man-made features, through time (Leonard, 2000).

The most prominent research achievements in 1970s lie in its involvement with social and economic issues in China. Through studies on cemetery Feng Shui, March (1968) revealed that Feng Shui is closely associated with ancestor worship and also involved in the formation and development of southeastern clans in China. Since 1970s, Research in Taiwan also showed that Feng Shui has been successfully utilized to prevent economic development activities in southern China, such as mining industry and railway building. In mainland China, Feng Shui research highlights its interaction with native religions, such as Daoism, Buddhism, and etc, maintaining that both of them share the same philosophical creed that is the harmonically coexistence between nature and human being.

Feng Shui, a practical tradition was produced to satisfy humans' enthusiasm for a more prosperous life and a pleasant living environment. Feng Shui also developed and transformed with social and economic process of human history. The influence of Feng Shui was overwhelming in less developed period, and became weaker in modern China (Yoon, 1980). However, Feng Shui art has maintained for almost two thousand years and intertwined with almost every aspects of human life. Many disputes between western colonies and native Chinese showed Feng Shui was successfully utilized to prevent economic development activities in southern China, such as mining industry and railway building.

The close relationship between Feng Shui art and traditional culture was realized since the beginning period of recent Feng Shui researches. It is worth noticing that Feng Shui art research has discovered that Feng Shui art also involved in the formation and development

Southeastern clans. Feng Shui art was utilized by ancient clans in southeast China to expand their power range. And a study of Han nationality in Taiwan found out that Feng Shui art actually performed as a power to promote the formation of destiny community of village fellows (cited by Chen, 2002).

Studies through Feng Shui burial art observe the ancient Chinese ancestor worship tradition. The geomancy of burial considers it appropriate to superimpose two sentiments. One is the feeling at a true site of life breath and “another world”; the other is the emotion directed to the body of a dead parent. So much need mean only that one tries to bury a parent in a landscape of some charm. It must really work in some circumstances. The decision on the part of a family to take pains and spend money to find first-rate gravesites is itself a sign to themselves and their neighbors that they are ambitious and confident. Such a gesture can arouse and concentrate their energies, embody their commitment to the collective good of the lineage, and bind them together by an indivisible investment in their common future (March, 1968).

There are two prominent representable arguments on Feng Shui and ancestor worship; Maurice Freedman and Emily M. Ahern represent the mechanic aspect and automatic aspect of Feng Shui. Freedman (1966: 126) concludes that the dead were passive agents, pawns in a kind of ritual game played by their descendants with the help of geomancers. And several years later, Ahern, with her fieldwork in Taiwan, objects that the people of Chinan see the ancestor himself, not an abstract, geomantic force, as the agent responsible for fortune or misfortune (1973).

Chinese native researchers also represent prevalent animus towards Feng Shui, considering it as a myth. With the research enthusiasm abroad, researchers in mainland China started to reevaluate Feng Shui with a cautious perspective. Many introduced Feng Shui from the perspectives of folklore (Gao, 1994; He and Luo, 1995; Cai, 1995; Wang and Zhang, 1993) or architecture (Wang, 1994).

Japanese scholars have contributed a lot to Feng Shui art research, in particular on folklore significance from the view of a nonnative culture. Japanese anthropologist, Watanabe (1994), argues that Feng Shui exists as folklore knowledge among Chinese people, thus it should be

observed in its folklore background. After thorough field trip comparative studies between Okinawa and Chinese Southeastern part, Watanabe asserted that in Okinawa, Feng Shui art has been transferred from its neighboring China, however, it has shaped its own characterized geomancy tradition. His argument implies that we should turn to probe into the respective particularity of Feng Shui art in Asian countries besides their similarities.

Researches referred in this section have contributed a lot to folklore studies on house building and cemetery Feng Shui.

## **2.2 Ecological and environmental studies on Feng Shui**

Except that Feng Shui contains a lot of superstitious concepts or it always takes a superstitious look, researchers recently began to consider the ecological and environmental concept of Feng Shui. Joseph Needham has been criticized for, in effect, identifying Western science too wholly with a universal science and forcing traditional Chinese thought into our mold; thus geomancy and other such arts, important to many thoughtful Chinese, are to him only pseudo-sciences (cited in March, 1968).

Anderson (1996), a cultural ecologist, links the ecology with Feng Shui. He argued Feng Shui as an ideological and social system which not only have much ecological knowledge, but also created to control the greed, shortsightedness, or selfishness of those traditional people. Feng Shui allows Chinese to maintain a homeostatic relationship with their environment (Anderson and Anderson, 1973). Lovelace (1985) develops a similar interpretation of Feng Shui, but considers Feng Shui as an agent of environmental modification. He argues that Feng Shui provided with a strategy for selecting, occupying, and modifying locales for wet-rice agricultural settlement in Hong Kong.

Hong-key Yoon, who was among the commonly cited researchers, has had a considerable impact on Feng Shui researches in China and Korea (Bruun, 2003). Regarded as an Eastern writer in the West and as a Western writer in China, Yoon serves as an important intermediary between Western and East Asian intellectuals.

Yoon, Hong-key started the environmental reading of Feng Shui in the world wide with his doctoral dissertation, titled “Geomantic Relations between Culture and Nature in Korea (1976).” He (1976, 2006) examines the principles and practice of Chinese and Korean Feng Shui from the perspective of human-nature relationship. Yoon states that Feng Shui “suggests some ameliorations in mans attitudes toward nature in this present period of environmental stress”. He defined Feng Shui as “a unique and comprehensive system of conceptualizing the physical environment which regulates human ecology by influencing man to select auspicious environment (in which) to build harmonious structure (i.e. grave, houses, and cities)”. Feng Shui presents a concept of an environmental cycle, on basis of a tenet that the Yin-Yang energy which is the essence of all environmental phenomena transforms through wind, cloud, rain, vital energy and then returns to wind (Yoon, 1985). He relates Feng Shui tradition with environmental stress in an article through distinguishing concepts and cultural connotations between Eastern geomancy (Feng Shui) and Western Environmental Determinism. According to him, both two concepts place strong emphasis on the primary role of environment in human life. While they both deal with man-nature relationships, geomancy is a much more complex and influencing system. In environmental determinism, the environment is conceived as qualitatively alien and external to man, and objectively existing quite apart from any human wish to change them. In geomancy, by contrast, both man and nature are expressions of one underlying spiritual unity, and man is an active participant in the realization of latent man-nature relationships, correcting the shortcomings of natural landscape and selecting auspicious sites for his activity( Yoon, 1982 ). Yoon argues that Feng Shui represents the East Asian environmental ideas that closely related the nature and the humanity comparing to Western environmental ideas which are based on the dichotomy of humanity and nature (Yoon, 2003). Feng Shui was a powerful way of applying and realizing the Eastern environmental ideas in the East Asian landscape. Yoon’s researches are centered on interpretation and explanation rather than surveying data on geomancy (Yoon, 2006). Some native Chinese researchers (Guan, 2002; Liu, 1995) also report the environmental function of Feng Shui.

Feng Shui principle of village site choosing embodies Chinese traditional philosophical

pursuit and ecological concern. Jia (1998) states ecological principles of Feng Shui as the follows. An ideal village should be located in a recessed position. This would enable the village to be both secluded and sheltered while commanding a view of the fields and distant landscape in front. It should preferably be backed by hills and flanked on both sides by hills. To the front distant mountains can be seen across flowing water. The river or stream flowing on south side of the site should be in curving form like a ribbon. All elements of the environment should facilitate good Qi to flow within the site for the prosperity of the people. The environmental capacity depends on Qi. A flowing stream at the southern side feeds the entire village. The ideal pattern of settlement described in Feng Shui theory clearly demonstrates an ecological concern. Firstly, all the natural elements, including hills, land, water, soil, orientation and climate, are considered as part of the settlement planning. Secondly, as a result of the arrangement of natural elements, a boundary is clearly formed by having mountains at the rear, hills on two sides, and water in the front. Thirdly, the capacity within the boundary, which supports consumption of residents and absorbs their wastes, is symbolized by Qi. The settlement on the inner bank of the river is in accordance with the principle of hydraulic inertia: with the passage of time, deposition would extend the land area. (An ideal village landscape in light of Feng Shui shown as the following figure.)

Feng Shui concept aimed at pursuit of a perfect natural landscape. Facing with the diversified natural configuration, Feng Shui tradition also insisted on Feng Shui remedy measures besides conformity to nature principle (He, 1990). Some major means to repair the defected Feng Shui environment includes ditching to lead water around the village, planting vegetation on the Green Dragon and Sha Mountain and erecting pagoda at the water mouth is one of the two major factors to observe an ideal configuration, water was given a primary status, since water was deemed to bring fortune and prosperity for the villagers. Among the general rule of site selection” hinder the wind and obtain the water”, it is primary to be accessed to water and wind is in the secondary consideration (*Zangjing* by Guo Pu 276-324 AD). Man-made ditch or pond is made to increase the vigor for the village. And it was believed to facilitate the dwellers life with a practical significance (He, 1990). In the plain or



in some areas where there are no huge mountains, vegetation is arranged behind and at the two sides of the dwelling to perform as the imaginary Dragon Mountain and Sha Mountain to remedy the imperfect landscape. However, besides preferring flourishing forests, Feng Shui concept highlights the Yin and Yang balance philosophy. Namely, in a confined space, too many trees should not be planted; otherwise it will increase the shadowiness (Extreme Yin). While for a hollow and sparse space (Extreme Yang), dense vegetation was welcomed to shape a relative personal space (Yang Dwellings Collection). Trees were able to hinder strong wind and concentrate living Qi. Nevertheless, they also increase the vitality of the village and perform to shape a micro-ecological environment. A pagoda were frequently built to hinder the unwelcome Qi or to impetrate a smooth fate for literati. Such three measures have their ecological and ethnic aesthetic significance (Jia, 1998).

### **2.3 Architectural studies on Feng Shui**

During this decade, research papers related to architecture on Feng Shui were brought forward, especially in Taiwan. While, in mainland China, similar study did not appear until 1990s, which witnessed a Feng Shui research boom in Republic China.

Since 1980s, there were voluminous graduate papers involved with Feng Shui culture embodied Chinese traditional architecture in Taiwan, and in American and mainland China in the end of 1980s and 1990s.

He (1990) and Wang (1992) represent the highest achievements on the studies of Feng Shui and Chinese ancient architecture. Dr. He has contributed a lot to Yang Zai (House) building architecture. After investigation in southeastern part of China and reading many genealogies, she gave a historical description of Feng Shui theory on house building. She argues that Chinese people are commonly guided with Feng Shui principle unconsciously during habitat choosing, planning and building in the ancient and even nowadays.

A research collection edited by Wang (1992) is the first most comprehensive research results on architecture theory on basis of Feng Shui culture, including the theory and

methodology of site choosing, planning and building, geographical and geological research, and landscape and ecological research. This book illustrates the ancient architecture culture theoretically. It argues that the core of ancient buildings is to examine the nature thoroughly, to conform to it, and utilize and reform the nature abstinely in order to build a harmonious habitat among the heaven, nature, and human.

Obviously, western architecture could not be completely applied to the attractive Chinese ancient building. This theoretic margin urged architects to turn to Chinese native culture, since none building in China escaped the influence of Feng Shui. A close watch to concepts of recent western landscape architecture and ecological architecture, we will find similar connotations in them with Feng Shui tradition on the aspect of man-nature relationship. Landscape architecture highlights the natural environment protection and the harmonious coexistence between man and nature. While, ecological architecture underlines the wholeness of human being and the environment, on basis of giving priority to nature. Therefore, a few argued that Feng Shui art would provide guideline to look into the future development of architecture research (Wang, 1992 p240; He, 1990) and Chinese traditional architecture.

These researches theoretically bring forward the answer to why Chinese building has been so attractive. However, these researches focus on the application of Feng Shui concept to habitat building, while, more applicable aspects of Feng Shui was neglected.

As for the quality of landscape as the result of Feng Shui practice, even the most vociferous scoffers could not but agree that places selected and arranged with Feng Shui were attractive. "There must be poetry in the Chinese soul after all," Storrs Turner gasped in admiration (cited in March, 1969). But even scoffers noticed that geomantically chosen sites were attractive.

In architectural totality, the aspirations embodied in Feng Shui regarding site selection are a practical reflection of Rudolf Schwarz's notion of a nested hierarchy of dwelling in which "the mountains are walls, the field floors, the river paths, the coasts are edges and the lowest point in the mountain range the door (He, 1995)."

Furthermore, according to the different connotations of Feng Shui tradition, terms of folk Feng Shui and environmental Feng Shui are made to refer respectively to the superstitious and

landscape planning part of Feng Shui (Huang, 1999). Huang argues that folk Feng Shui exists because it meets the social need seeking the consolation of individual nervousness and frustration. He (1999) also describes environmental Feng Shui as an environmental ecological system including the factors of architecture, and agriculture.

During the past decade, Feng Shui research with environmental and ecological concern has been touched upon; however, a systematical research on environmental and ecological concept of Feng Shui has not come into being.

Yu (1992) connects the ideal siting form of Feng Shui with earliest Chinese experience of basin landscape. Yu concludes Feng Shui as a new way of thinking and acting toward sustainable landscapes.

#### **2.4 Feng Shui studies in Okinawa**

Researches on Feng Shui in Okinawa are relatively new, but not a little less important than others in East Asia. Most of Feng Shui researches appeared after 1980s, and contributed from the fields of anthropology, architecture, and folklore.

*Feng Shui in Okinawa* (Noritada, 1990) is one of the most comprehensive collections of researches contributed by geographer, folklorist, and anthropologist. It includes introduction of Feng Shui from China to Okinawa (Mezaki, Tsuzuki), Tortoise Shell Grave (Heshiki, Akata), village Feng Shui (Shimajiri), and city Feng Shui (Teruya).

Nakamastu (1977), in his pioneer research on the Okinawa culture and village, argues that Feng Shui village appeared after 1847 under Jiwarisei (the practice of periodically redistributing rural land) system. He, and other researchers (i.e. Shimajiri, 1990), cited from Kyuyo that some villages were relocated if their locations were judged to be bad in Feng Shui.

Tasato (1983) discusses on the traditional village location and Feng Shui. Two factors of “wind” and “water” in Feng Shui practice have been highlighted in choosing village sites. Protection from strong typhoons has been the priority in village and house building. In general, traditional villages, which were built before 1609 (Tasato, 1983: P3), were located

facing south in the slope of small hills. It was found that villages were clustered around the sites which accessible to water source.

Nakama, based on his researches on the forestry in Okinawa, was the first to argue the significance of biodiversity (2002) and environment conservation of Feng Shui practice in Okinawa. Feng Shui practice in forest management was considered to be particular to the Ryukyu Kingdom (Nakama, 1984, 2002, 2003; Terauti and Kameyama, 1999).

## **2.5 Summary**

Most of researches on Feng Shui are historical review based on old documents, thus receives criticisms that the principles of Feng Shui manuals are not consistent with actual practice of local people, in particular, in mainland China where pollution, and environmental destroy have been conspicuous during these decades. Academic researches on Feng Shui are still very few comparing to the popular enthusiasm in Feng Shui practice in the world. Some recent books (He, 1990; Bruun, 2002; Coggins, 2003; Yoon, 2006), which are commonly cited, mostly discusses on the principles of Feng Shui. Studies on application of Feng Shui to some principles such as architecture are still not systematic. Majority of current Feng Shui researches are from the perspectives of anthropology, folklore, geography, and architecture. However, its practice in village landscape, in particular, under small island topography is still little reported.

## **CHAPTER III**

### **FENG SHUI VILLAGE LANDSCAPE AND FENG SHUI TREES**

#### **3.1 Feng Shui village landscape**

##### 3.1.1 The consideration of surrounding physical environment

There are two main schools of thought and practice in Feng Shui- the Compass school and Form School. The Compass school is based on the metaphorical speculations of cosmology as originated from Book of Exchange (C. I Ching). The Form school concerns the physical form of the site under consideration and its surrounding environment. Its analysis is based on the five geographical factors. Dragon vein (C. Mi Long 觅龙), Sha hills (Cha Sha 察砂), water course (C. Guan Shui 观水), Cave (C. Dian Xue 点穴) are essential steps to find an ideal landform.

##### Dragon Vein

The first step of village site choosing is to find the true Dragon Vein. First, the long sinuous range of the mountains' form is desired to achieve the strong Shi (势). There are many explanations of Shi. In general, it may refer to the general qualities of a range (Xu, 1990). Greenery is vital to produce the living Qi in Dragon Vein.

##### Sha

Surrounding hills, called Sha in Feng Shui terms, are necessary to accumulate Living Qi in the site. The hill in the left is called Azure Dragon, and that in the right is called White Tiger. While, lower hills facing the site in the front are called Red Bird. Azure Dragon Hill must be higher, longer, and bigger than White Tiger Hill. This rule has been set based on the geographical environment and climate in Southeast China (He, 1990). The high hill in the left can protect the site from strong winds effectively.

## Water

A meandering water, which flows towards a site and then winds around, is especially auspicious. Water can connote wealth. In this way, the living Qi is accumulated and fortune flow into the site with the water. It is preferred that the water leaves the site calmly and smoothly. A grove of trees is used to be planted, or a tower, a pavilion was built where the water flows out of the site.

## Cave

Cave refers to the best Feng Shui spot. Seeking the cave is also the final goal of Feng Shui practice. A promising site should be backed by high mountains, and surrounded by hills in the left and in the right, and facing low hills in the far front. Bring Court (C. Ming Tang 明堂) refers to the wide open space before the cave. The requirements for a village site choosing are in value the consideration of environment capacity in modern technology.

### 3.1.2 Ideal Feng Shui model

The ideal model of the Form School is showed as a sketch in Fig. 3.1. As is above-mentioned, an ideal Feng Shui landscape must have the true Dragon Veine covered with lush greenery, surrounding Sha hills, namely Black Tortoise in the back, Azure Dragon in the left, White Tiger in the right and Red Bird in the front, and a meadering water flow into the site. These criterium are presented as Fig. 3.1.



Fig. 3.1 A 3-D representation of the ancient Feng Shui model

Source: Yu, K.J. (1998)

### 3.2. Feng Shui trees

In many Fengshui documents, a Fengshui tree is always defined as an evergreen species, but no special limitation to the species. A thorough reading through the documents and my own field trip found that the actually used tree species were very diverse in different regions (see table 3-1), despite that the Fengshui principle is unified in the theory. Fengshui trees could be classified with their standing points as landscaping trees, trees around houses, and trees around the cemetery and some groves of old and big trees worshipped by the public.

In general, a camphor tree, a banyan tree, and bamboo are very commonly planted in the village landscape in southeastern China. Such trees always grow very fast and lush with a big crown. These tree species are always planted or protected by the earliest ancestors of the

village at the entrance to the villager, water mouth, or some vital point of the landscape. It is believed that the exuberant trees can protect and assure the fortune and the prosperity of the village member. It is recorded that villages in the Ryukyu Islands were surrounded with pine trees to enclose the vital energy for the village in the history (Nakama, 2002). Similarly, it is written in *Korean Fengshui* in detail how and why a pine tree was selected to cover the bald mountain around the metropolis and consequently changed the city and the country to a big fortune. It is also recorded that poplar trees are worshipped in Zhejiang province (Watanabe, 1994).

Compared to landscaping tree species, trees used around graveyard are relative rare, but not a little less important. Trees around ancestors' cemetery are mostly pine and cypress trees. Both the 'mechanic aspect' (Maurice Freedman) and 'automatic aspect' (Emily M. Ahern) of Feng-shui state that that one tries to bury a parent in a landscape of some charm because the ancestors are seen as the agent responsible for fortune or misfortune. With an elegant style and a symbolizing feature of being indomitable, which is revered in Chinese traditional culture, pine trees and cypress trees are planted around the tomb to put their ancestors in a comfortable environment.

Except Fengshui trees in the village landscape, around houses, and graveyards and ancestor halls, there are still some groves of common forests being protected for a long period. Such forests with always standing behind or before or beside the village, regarded as the protector of the good Feng Shui for the villagers. Feng Shui forest commonly with a quite big area and always preserves a very sound sustainable ecological environment, since it is prohibited to enter the forest and any harm or felling is not allowed. The tree species are also very widely diverse.

Greenery on the Dragon mountains and tree planting in Water Gate (C. Shui Kou) of the village has been highlighted in Chinese Feng Shui. Dragon mountain is the first priority in searching a good Feng Shui landscape. Luxurious greening is considered to be the origin of the flow of good energy. Water is used to being considered as wealth. Water Gate is a vital concept in Chinese Feng Shui. It refers to the site where the surrounding water leaves the



village. It is always the lowest site in the village. Artificial buildings such as a bridge, a pagoda, or a pavilion, and a few trees were desired to retain the leaving fortune with water. Thus, Feng Shui forests, in particular, in Dragon Mountains and Water Gate is a symbol of good fortune to village people.

A similar use of Feng Shui trees was reported in other countries and regions in East Asia besides mainland China. The preserved forests form a charming and ecological landscape in the highly urbanized region of Hong Kong (Webb, 1995). Two functions of Feng Shui trees of repairing a defective landscape and enhancing the vital energy in South Korea are reported by Shibuya (2003) and Whang et.al. (2006).

Thus, Feng Shui trees are used in a symbolic means in Mainland Chinese, Hong Kong, and South Korea. In these areas, Feng Shui trees are usually found to be a patch in the village. In contrast, Coastline Ho:go, village Ho:go and house-embracing Fukugi trees in Ryukyu Islands have a practical significance and usually of a larger area and being continuous.

### 3.2.1. Feng Shui Trees in Mainland China

Greenery is considered as one important criterion for good Feng Shui. It is believed that a flourishing forest can keep the Yang Earth Vein (Qi, Living Energy) to guarantee riches and honor for the family. Plants are thought to conduct good nourishing Qi throughout a place. The green of leaves evokes spring, life and growth. Feng Shui tradition believes that when vegetation is flourishing, auspicious energy is flowing. On the other hand, excessive deforestation disperses Living Qi, thus harming the well being of the inhabitant. Namely, the dweller's luck will disappear with tree cutting. Plants are thought to conduct good nourishing Qi throughout a place.

Feng Shui concepts were aimed at the pursuit of a perfect natural landscape. Faced with diversified natural configuration, Feng Shui tradition also insisted on Feng Shui remedial measures besides conformity to principles of nature.

Some early researches report the actual practice of tree worship in rural China. D.C. Graham (1961) reports several single trees which are the focus of Fengshui in Szechwan (C.

Si Chuan province). There are a great many Feng Shui trees in West China. The Feng Shui trees may be a banyan, a cypress, a pine or some other kind of a tree, but it is always a large, old tree. They must not be cut or injured, for that would spoil the Feng Shui and bring calamities instead of good fortune to those concerned (Graham, 1961).

Freuchtwang (1974) states that Fengshui trees are the most ubiquitous and sensitive focuses of interest in Fengshui and are the common Fengshui symbols in practice. In plain country single or groves of trees may substitute the protective function of mountains. Although little of trees is mentioned in the manuals, they are one of the most common Feng Shui symbols in practice. Moreover, they are to be found in urban contexts often as the only pure examples of natural growth (Freuchtwang, 1974).

Illustrations on the function of trees planting to enhance the vital energy and repair the imperfect landscape of a city or a village emerged during 1990s by some Chinese researchers such as He (1990), and Wang (1992).

With a global trend of concern for living environment, Coggins (2003) reports Fengshui forests around villages are well preserved in mountainous north of Fujian Province. He found the four most common types of Feng Shui forests in Meihuashan, Headwater (C. Shui Tou 水头) forests, Water Gate (C. Shui Wei 水尾) forests, Windgap (C. Feng Kou 风口) or mountain-cleft (C. Shan Ao, 山坳), and forest that grow on the knolls, summits, or slopes in or near the village. He (2003 p. 202 ) narrates the function and the compositions of Feng Shui forests in Meihuashan as follows:

*Watergate forests are found along stream banks and upper slopes where the main watercourse flows out of the village. The word “Watergate” is used to represent the Shui Wei forest’s function of retaining or controlling water flow. These forests are said to hold in the village’s wealth, preventing it from flowing away with the water. Watergate forests may be composed of old-growth broadleaf or Cryptomeria trees. Windgap forests are found in ravines or gaps in surrounding ridges, where wind (Sha Qi) can enter the village. These forests are composed of huge cryptomeria trees.*

The tradition of planting trees around the tomb for the worship of the ancestors is from the Chunqiu Period. In China, pine and cypress are generally planted around the grave. These two tree species are always regarded as symbols of the qualities of being lofty and dignified with their characteristics of being evergreen and having an elegant tree form, which perhaps is only admired in Chinese culture and aesthetic appreciation. The lushness of the trees is used to evaluate the Living Qi of the grave.

Maple trees (*Acer buergerianum* Miq.) are commonly found Feng Shui trees in Water gate in the cold areas in Fujian mountainous villages and Jianxi Provinces. It was told that maple trees grows fast and are longevous. It is a good symbol for fortune. Moreover, the leaves fall in cold winter, thus they would not blot out the warm sunshine in winter.



Photo 3.1 Maple tree (*Acer buergerianum* Miq.) belt planted in the front of the Shicheng village in Jianxi Province. This forest belt is said to be able to repair the low hills in the east.



Photo 3.2 Two tall and old maple trees standing in the Water Gate to Huangcun village in Jianxi Province

Some precious tree species, such as yew, are often used as Feng Shui trees. Villager appreciate their long life, wood being hard, big canopy, and beautiful shape of trunk.

An old banyan, or camphor tree is mostly found in the entrance to a village in Fujian province. Such a big tree provide with a cool place for villagers' get-together. It is also an important place for people's communication, as well as kids' play ground. In the cooler mountaneous villages in northern Fujian province, a camphor tree, but not a banyan is planted as a Feng Shui tree. It is said that a banyan tree is doddered in cold winter, thus it would bring bad fortune.

Shicheng village (石城村) in Wuyuan county, Jianxi province is a good case for a windgap forest. A maple forest belt (see Photo 3.1)has been planted to curve in the front of village

houses in the east. It is said that maple trees were planted about 500 years ago. Shicheng village is located in the high sea level. It is chilly in winter and early spring. However, the hill is too low in the east to protect from chilly winter winds. Maple trees provide a natural shelter from chilly winds. Maple trees fall leaves in winter, and come into leaf in spring. Thus, the village can enjoy sunshine in winter and be protected in spring. The mature maple trees are very tall. The maple trees whose DBH are bigger than 30cm accounted for 25 as I visited in spring 2005. People never cut the maple trees in the front.

### 3.2.2. Feng Shui Trees in Hong Kong

In Hong Kong, villages protected the groves of trees that ringed them, because trees attract good influences and also provide shade, firewood fruit, leafmold, timber, and other goods. In Hong Kong, large old small-leaved banyan (*Ficus microphylla*) were the most usually venerated species. It was thought that a huge old tree has accumulated more and more Qi during its long life. Trees like the small-leaved banyan grow fast and are not good for much, so they are left alone to mature (Anderson, 1996).

In Hong Kong, houses are less consistently south-oriented, and the villages are set wherever whirl around, so only near-complete surrounds offer much help, but typhoons usually comes from the southeast, so villages tend to be sited with a hill range southeast of them (Anderson, 1996). Village are built by the slope sites in mountainous or hilly regions. Feng Shui woodlands are mostly found in the lowlands. The presence of trees behind the village was probably a Feng Shui feature considere when selecting sites to build a village.

Indigeneous residents of the New Territories are decendants of early migrants who settled a few centuries ago. When these pioneers first arrived form Southern China, Hong Kong was a spacious and sparsely populated territory. To ensure safety, they lived together in clustered settlements. They lived on an agricultural production and depended heavily on the nature. They chose to settle with a natural forest in the back. The early settlers preserved the native vegetation (trees or shrubs) behind their homes. Later, they planted fruit trees, banyans,

camphors, bamboos, banana trees and other economic plants demanded by rural communities on the edges of native forests.

According to the record in *Venturing Feng Shui Woods*, the area of all surveyed 116 Feng Shui woods ranged from 600m<sup>2</sup> to 6ha. About 80% are located below 100m sea level.

When I visited Mui Tsz Lam and She Shan Feng Shui woodlands in October 2006, I found nearby villages all have a grove of natural trees behind them. I was told that most of the young habitants have migrated to U.K. from MuiTsz Lam. She Shan Village is one of the most ancient Hakka village in Hong Kong. It was built by the brothers named Chen in 1700. I was told by a local people that people used to cut the young seedlings for firewood. The understorey of the trees has been cleared regularly. An old campor tree, which is estimated to be 400 years old, is venerated.



Fig. 3-2 A typical layout of Feng Shui woods in mountainous villages in Hong Kong

Source: Joseph et. al., 2004 in *Venturing Fung Shui Woods*.

### 3.2.3 Feng Shui Trees in Korea

To avoid wind, to have water, compass direction, and configuration of the surrounding hills are four factors for an ideal Feng Shui site. It is hard to seek a site which can meet all

above-mentioned factors. Thus, ideal Feng Shui landscape has to be built or repaired rather than to find a natural perfect topography. Bi-bo (裨補) in Korean means a supplementary measure to repair the defected Feng Shui landscape.

Through document research, Shibuya states two major functions of Feng Shui forests: one type is forests used to repair the Feng Shui landscape for some vital sites such as Water Gate, or Dragon Mountain, and the other is forests planted to enhance the vital energy from the Energy Vein.

Su-gu (水口) is a physiognomically ideal place where water gathers and flows out. If the geographical conditions of this place were wide and open, it must be blocked and protected with artificial woodlands or mounds, called Su-gu-bi-bo (水口裨補) (Whang and Lee, 2006). Su-gu was the most important element in selecting a site for a village in Cho-sun (朝鮮) dynasty. Su-gu should not be an open place where water flows directly. It should be surrounded closely by mountains rising one above another (Kim, 1982 as cited in Whang and Lee, 2006).

Su-gu is a place where two streams converge and could easily overflow or frequently cause soil erosion. Artificial Su-gu-bi-bo in virtue functions to purify the water as well as to prevent flooding (Lee, 2002 as cited in Whang and Lee, 2006). The traditional Korean villages have been built holistically, with symbolic meaning and various practical functions (Whang and Lee, 2006).

Early to 1938, an official survey on the Waterside Forest Reserves in Korean Peninsula (CHYO SEN NO RIN SOU) records the 9 groves among all surveyed 128 groves are forest planted for Feng Shui significance. Among these Feng Shui groves, there were four monoculture forests. Three are Red Pine (*Pinus densiflora Siebold & Zucc.*) woods, and one is chestnut woods. The other 5 groves are mixed forests, mainly consisting of Red Pine (*Pinus densiflora Siebold & Zucc.*), Zelkova (*Zelkova serrata*), Pagoda (*Styphonolobium japonicum L.Schott*), *Salix chaenomeloides Kimura*, Hackberry (*Celtis sinensis var. japonica*), Alder (*Alnus japonica*), *Quercus serrata*, and Sawtooth Oak (*Quercus acutissima*).

**Table 3-1 Major Feng Shui tree species in East Asia**

Region	Siting place	major tree species	Fengshui's significance	Data Source
Southeastern China	Village	Camphor,banyan,bamboo	Lush greening is the origin of the flow of good energy.	A general phenomena
	Cemetery	Pine, cypress	Give an aesthetic view and shade to the ancestor	
Southwestern China(a Sichuan village)	along roads, around houses	beech, maniu	With a stately appearance, their aesthetic and practical value in stabilizing and improving or channelling the positive engergy flows	Leonard (1994)
	inside the village and graveyards	Old and large trees of cypress, pine, and banyan		Graham(1961)
Zhejiang(East China)	Around houses	Bamboo, pine, maple,	A camphor tree implies longevity and grows fast.	Yoshio Watanabe (1994)
		Chinese Juniper, camphor		
	Surrounding graveyards	Pine, cypress	A evergreen species is preferred to better Feng Shui environment.	
	Village landscape	Poplar		
Mountainous north of Fujian Province	Wategate (along stream banks and upper slopes)	<i>Cryptomeria</i>	Retaining and controlling water flow. These forests are said to hold in the village's wealth.	Coggins (2003)
Fujian and Jianxi Provinces	Water gate, windgap	Maple ( <i>Acer buergerianum</i> Miq.)	It is a good symbol for fortune because a maple tree grows fast and longevous.	
	Inside the village	Yew ( <i>Taxus baccata</i> )		
Hong Kong	in the rear of the village	Preserved natural forest and planted fruit trees		Joseph, K.L. et al (2004)
	inside the village	Old small leaved-banyan ( <i>Ficus microphylla</i> )		Anderson (1996)



**Table 3-1 Major Feng Shui tree species in East Asia (continued)**

	metropolis	Pine	An evergreen species. Pine leaves in pairs imply the harmony of Ying and Yan. Good for conservation of soil and water in the mountain slope	<i>Korean Fengshui</i>
Korea	Waterside(wide flat land where two watercourses encounter to one watercourse)	Red Pine ( <i>Pinus densiflora Siebold &amp; Zucc.</i> )	Bi-bo (裨補) woodland: Repair the defective landscape and enhance the vital energy.	Chosen No Rinso(1938)
		<i>Zelkova (Zelkova serrata)</i>		
		<i>Pagoda Tree (Styphonolobium japonicum L.Schott )</i>		
		<i>Salix chaenomeloides Kimura</i>		
		<i>Hackberry (Celtis sinensis var. japonica)</i>		
		<i>Alder (Alnus japonica)</i>		
		<i>Quercus serrata</i>		
		<i>Sawtooth Oak (Quercus acutissima)</i>		
Okinawa	Around houses	<i>Garcinia subelliptica Merr.</i>	Embrace the house to contain the vital energy	Yuei Nakama (2002)
	Around the village	Ryukyu pine ( <i>Pinus luchuensis</i> ), Fukugi, <i>Calophyllum inophyllum</i>	Embrace the village to contain the vital energy	
	in coastline	Ryukyu pine, Adan ( <i>Pandanus odoratissimus</i> ), Ouhamabo ( <i>Hibiscus tiliaceus</i> ), Kuroyona ( <i>Pongamia pinnata</i> )	Embrace the island to contain the vital energy	

Researches, on Feng Shui at the aspects of architecture (Kim 1994 etc cited by Shibuya) introduce basic background information of Feng Shui trees in nation wide Korea.

Pine tree: It is recorded in *Korean Feng Shui* (translated by Chijun Murayama in 1971) that the ancient capital fengshui of Korean Empire is sourced from the Dragon mountain, which was ever renamed Pine Mountain. The surrounding mountains were examined to be perfect to hide from inauspicious winds except that the major mountain, the back Dragon mountain was bald, which is referred to as worst form of mountain by fengshui. Therefore, it was supervised that pine trees were planted all over the southern slope of the mountain. Three reasons as listed following were discussed why a pine tree was selected to generate auspicious energy for the city. First, between the two major species for the conservation of soil and water in the mountain slope, a pine tree and an *Alnus japonica steud*, a pine tree was chosen because that it is an evergreen species, and that pine leaves in pairs imply the harmony of *Ying* and *Yan*.

#### 3.2.4 Feng Shui trees in Okinawa

Ho:go (抱護) is one essential word in the planning of a traditional Feng Shui village landscape in Okinawa Prefecture. The literal meaning of Ho:go is “to embrace and protect.” According to *Kyuyo*, the word Ho:go also refers to a forest belt that encircles a house, a village, several neighbouring villages, or the coastline, and is called House Ho:go (house-embracing forest), Village Ho:go, District Ho:go, and Coastline Ho:go, respectively (Nakama, 2002) (refer to Chapter 3 for more information related to Ho:go). A forest belt, named Village Ho:go, was planted to curve in front of the village and to extend to the east and the west of the village. Along with the preserved natural forests in the rear, Village Ho:go embrace the whole village. Village Ho:go were mainly planted with Ryukyu pine trees (*Pinus luchuensis* Mayr) or Fukugi trees, varying between different regions. Coastline Ho:go are mostly Ryukyu pine trees and *Pandanus odoratissimus* L.f. (Adan in Japanese), *Hibiscus tiliaceus* L. (Japanese name: Ouhamabo) and *Pongamia pinnata* L. Pierre (Japanese name: Kuroyona). *Pinus luchuensis* was desired in Ho:go because it is an evergreen species. One or more Fukugi tree lines were usually planted to embrace the houses.

Among the tree species used in Feng Shui villages in Okinawa, it is worth noticing Fukugi, which is found to be most prevalently planted. About 250 species belong to the *Garcinia* genus, and they are widely distributed in the tropics, in particular, tropical Asia (Hatsushima, 1975). *Garcinia subelliptica* is only found naturally in the Philippines, Taiwan, and Yonaguni, Iriomote, and Ishigaki islands in Okinawa. It is still unknown when Fukugi was first introduced and how it was used in Okinawa. The first record of Fukugi was found in Record of Chuzan (J. Chuzandenshinroku, 中山伝信録) by Xu Baoguang (J. Jo Hoko 徐葆光) in 1921 (Nakama, 2006). It records the natural features of it and mentions that the fruits look like an orange and were edible (Please refer to 5. 7 for more detailed introduction of Fukugi).

It was also found in the old document that Feng Shui adviser suggested tree planting to improve village Feng Shui in 1857 (Nakama, 2006). One advice by the Feng Shui master was to plant Fukugi trees as the borderline of village houses.

### 3.3 Summary

The Form school concerns the physical form of the site under consideration and its surrounding environment. An ideal Feng Shui landscape must have the true Dragon Veine covered with lush greenery, surrounding Sha hills, namely Black Tortoise in the back, Azure Dragon in the left, White Tiger in the right and Red Bird in the front, and a meandering water flow into the site.

In many Feng Shui documents, a Feng Shui tree is always defined as an evergreen species, but no special limitation to the species. Feng Shui trees could be classified with their standing points as landscaping trees, trees around houses, and trees around the cemetery and some groves of old and big trees worshipped by the public. In general, a camphor tree, a banyan tree, and bamboo are very commonly planted in the village landscape in southeastern China. Such trees always grow very fast and lush with a big crown.

Trees around ancestors' cemetery are mostly pine and cypress trees. Besides beech trees, poplar, and maniu trees, fruit trees are preferred to plant around houses to shape a pleasant living habitat.

Greenery on the Dragon mountains and tree planting in Water Gate (C. Shui Kou) of the village has been highlighted in Chinese Feng Shui. Dragon mountain is the first priority in searching a good Feng Shui landscape. Luxurious greening is considered to be the origin of the flow of good energy.

In Hong Kong, villages protected the groves of trees that ringed them, because trees attract good influences and also provide shade, firewood fruit, leafmold, timber, and other goods. It was thought that a huge old tree has accumulated more and more Qi during its long life. Trees like the small-leaved banyan grow fast, and they are left to grow to an big trees and respected as Feng Shui trees.

Feng Shui trees are used in a symbolic means in Mainland Chinese, Hong Kong, and South Korea. In these areas, Feng Shui trees are usually found to be a patch, or a few old and big trees in the village. Feng Shui trees were found to be mostly evergreen species. But some exceptions were also found in the cold area in mainland China.

In Okinawa, forests were planted or preserved to embrace the houses, the villages, and the island in order to protect from the frequent typhoons. Fukugi (*Garcinia subelliptica*) were used as house-embracing trees. Ryukyu pine (*Pinus luchuensis*), Fukugi, and *Calophyllum inophyllum* have been planted in Village Ho:go. Some species of Ryukyu pine, Adan (*Pandanus odoratissimus*), Ouhamabo (*Hibiscus tiliaceus*), Kuroyona (*Pongamia pinnata*) were used as Coastline Ho:go. In summary, Feng Shui trees have been used in a much more practical way in the islands of Okinawa.

## CHAPTER IV

### A RYUKYU ISLAND FENG SHUI VILLAGE LANDSCAPE

#### 4.1 Introduction

Feng shui has been practiced for thousands of years and applied to many aspects such as city planning, village site choosing and cemetery building in China. The Form school of Feng Shui has been widely studied and appreciated by many architects and researchers. Xu (1990) suggests that Feng Shui can be a viable model for landscape analysis and planning. Yu (1998) expounded the cultural and ecological significance of Feng Shui. Mak (2005) also reports that an ideal Feng Shui model is in line with most architects' perception of an ideal landscape based on a questionnaire survey in Sydney, Australia and Hong Kong.

The Form school observes the topographical form of the site. Its analysis is based on the five geographical factors, namely, dragon, sand, water, cave and direction. A favorable spot is recognized to be encircled by surrounding mountains or hills, which are called the Four Emblems (He, 1990). A good Feng Shui place must possess hills or mountains in the back called Black Tortoise, a hill on the left called White Tiger, another lower hill on the right called Azure Dragon, and small hills in the front called Red Bird. Such a Feng Shui place has been considered to bring fortune, prosperity, and happiness to the inhabitants. Such criteria for choosing the site are not hard to find in mountainous southeast China, the place of origin of Feng Shui in China. As is well-known, Feng Shui has also been widely practiced in other regions in East Asia. However, few have reported on the application of Feng Shui in other types of topography besides mountainous regions.

##### 4.1.1 Introduction and development of Feng Shui in Ryukyu Kingdom

Feng Shui was first introduced to the Ryukyu Kingdom with the Chinese immigrants from Fujian Province at the end of 14<sup>th</sup> century. It expanded from Kumemura village to affect many

aspects of life (Tsuzuki, 1990). During the period from 17<sup>th</sup> to 18<sup>th</sup> Century, Feng Shui was employed as a national policy by an eminent statesman named Sai On (蔡温) around the 1730's. Feng Shui was applied to guide capital building, city planning, village building, graveyard site choosing, and even forest management (Machida and Tsuzuki, 1993).

Sai On has played a vital role in the development of Feng Shui and shaping Feng Shui landscape in Ryukyu Kingdom. Sai On is an eighteenth-century administrator exceptional both for creating a lasting foundation of policy and practice and for preserving its essential features in writing. Among the numerous researches on Sai On, it is worth noting Smits (1999), who contributed to a systematic research on Sai On's reshaping the kingdom's ideology, institutions, political culture, and even physical appearance. Sai On stayed in Fuzhou, China for two years. He studied Feng Shui under a Chinese scholarly recluse. Sai On was appointed to the status of Sanshikan (honorary member of the Council of Three). According to the record in Kyuyo (球陽), Sai On observed the surrounding landscape to judge on Feng Shui of Shuri Castle, which was the capital of the Kingdom of Ryukyu, with Moh Buntetsu(毛文哲 C. Mao Wenzhe) in 1713. They suggested tree planting including Ryukyu pine trees to repair the lower topography in Gusukuma in the Northwest (Shimajiri, 1990). Forest planting and preserving was highlighted by Sai On to accumulate living energy for a desired Feng Shui landscape (Tsuzuki, 1997, Nakama and Koki, 2002).

Sai On made his greatest contribution to the area of forestry. Comparing to a high priority on soil quality in *Nogyo zensho* by Miyazaki Yasusada, wind was the major consideration in Ryukyu owing to the high frequency of severe storms (Nakama, 1984). In *Secrets of Foresty* (山林真秘, J. Sanrinshinpi), Sai On states the impact of hill features, such as slopes on forest growth, the place with surrounding hills is good to forest growth with assembling Qi. Another important contribution of Sai On is Fish-scale pattern forest construction method (J. Gyorinkei Zorinpo) (Nakama, 2002).

#### 4.1.2 Village Feng Shui

The traditional village landscape was built under the guidance of a Feng Shui adviser. The

roads in a planned Feng Shui village are laid out in a grid pattern. Houses are scattered in well-ordered blocks that are separated by intersecting roads. It is assumed that such a grid-planned village did not appear until 1737 (Nakamatsu, 1977) under Jiwarisei (the practice of periodically redistributing rural land) system. There existed about 180 grid-planned villages in Ryukyu Islands according to Nakamatsu (1977). Most of them were clustered in the flat land or sand land in coastal alluvion. Old documents in Kyuyo recording the Feng Shui assessments in two villages (Inamine and Makiya belonged to Hiji Region then) in Northern Okinawa Island in 1857, and in all villages in Yaeyama Islands except Hateruma and Yonaguni Islands in 1864 validate a strong influence of Feng Shui in building and improving traditional village landscape. Feng Shui improvement suggestions in Inamine and Makiya Villages includes tree planting in the Feng Shui Spots, Fukugi<sup>1)</sup> trees planting as the bordering line for the adjoining houses, forest belt planting to embrace the village (Tamaki, 1990).

Ho:go<sup>2)</sup> is an essential word in Okinawa Feng Shui concept. Ho:go literally means to embrace and protect. It is desired to enclose Qi (living energy). In Okinawa, another meaning of Ho:go is a forest belt being preserved or planted. Village Ho:go was planted to curve in front of the village and to extend to the east and the west to embrace the village along with the hill in the rear. Ho:go also refers to a forest belt that encircles a house, a village, several vicinal villages, or the coastline, and is called House Ho:go (habitat-embracing forest), Village Ho:go, District Ho:go, and Coastline Ho:go, respectively (Nakama, 2002). Ho:go are mainly Ryukyu pine trees or Fukugi (*Garcinia subelliptica Merr.*) trees, varying in different regions. Village and coastline trees planted around the houses are mostly Fukugi trees. One or more Fukugi tree lines were planted to embrace the houses.

#### 4.1.3 Study purpose

There are a few studies on the Ho:go and Feng Shui village landscape. Nakama (2002) discusses the forest landscape in a Feng Shui village in Okinawa and concludes that a Feng Shui village contains an ecologically significant biodiversity. Nakama and Koki (2002)

reported the strongly positive villagers' perceptions of Fukugi trees and the difficulty of forest maintenance. However, analysis of Feng Shui landscape and the structure of Village Ho:go is still rare.

A probe into the Ryukyus pattern of Feng Shui village landscape will contribute to a more comprehensive understanding of Feng Shui practice and enrich village landscape planning theory in island topography. Thus, we focus our study on the features of a Ryukyu pattern Feng Shui village and the forest composition of Village Ho:go.

We chose to survey on Tarama Island. Sai On commanded Shirakawa Uji Keitusi: (白川氏 恵), who was the head of Hirara, Miyako Island, to plant Village Ho:go in Tarama Island in 1742 (Nakama 2003).

The Village and Coastline Ho:go were prevalent in the Ryukyu Islands before World War II, but were mostly cut in the past decades. Among the islands in Okinawa Prefecture, Tarama Island has the best preserved with most of the village Ho:go having survived.

## **4.2 Survey site and Methods**

### **4.2.1 Case study area**

Tarama Island is located at lat. 24°39' North and long. 124°42' East, about 67 km west of Miyako Island and 35 km northeast of Ishigaki Island (see fig. 4-1). Miyako Islands and Ishigaki Islands are called the Sakishima chain in the southernmost part of the Japanese Archipelago. Tarama village includes Tarama Island and Minna Island, which is located about 12 km Northwest of Tarama Island. We only include Tarama Island in this study. Tarama Island is a flat, elliptical island with low hills, 32.8m at the highest spot in the north (see Photo 4-1). The total area of Tarama village is 20.05 km<sup>2</sup>.

Village houses are scattered in the northern part of the island, close to the foot of the hills in the north. Large areas of flat agricultural land sprawl outside the village. Tarama Island is mostly covered with Shimajiri Mahji soil, weathered from Ryukyu Limestone. The covering soil is fertile but of low water-holding. Sweet potato, barley, and millet were widely planted in



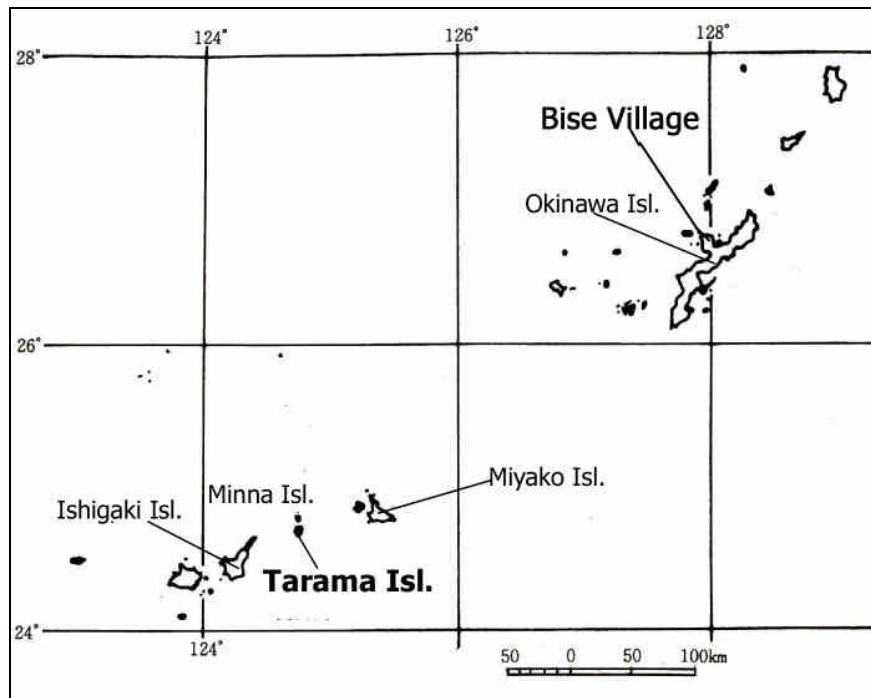


Fig. 4-1 Map of Tarama Island

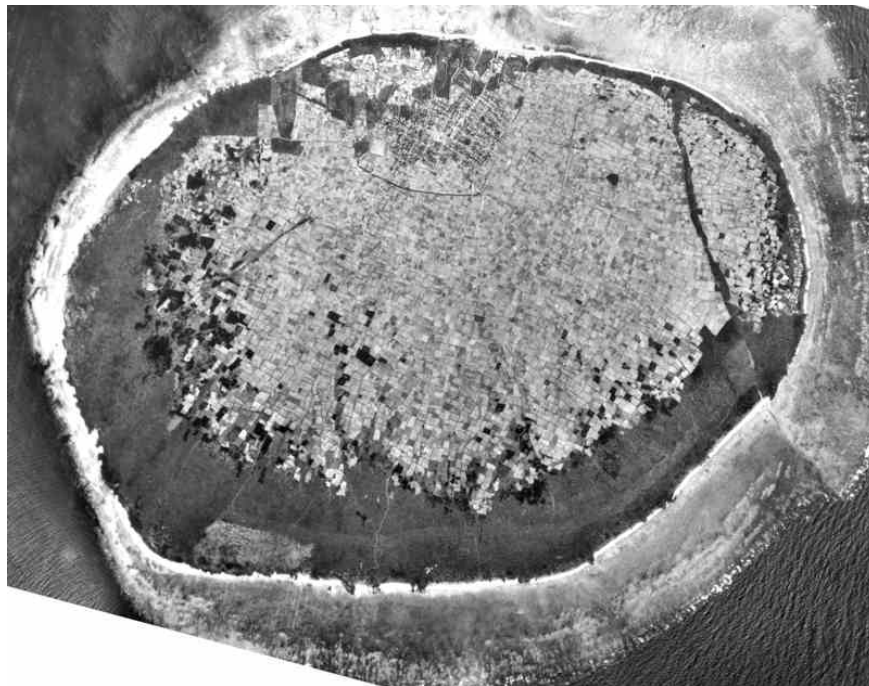


Photo 4-1 An aerial photo of Tarama Island taken by American Army in 1945

the past. Recently, sugar cane is the major agricultural product in Tarama. Cattle and goat breeding become an important industry in recent years. The population was 1,454 with 793 males and 661 females in 2005.

#### 4.2.2 Data Collection

To understand the forest composition, we surveyed 5 plots in the Ho:go and 3 plots in the northern hills (see fig. 4-2). The Ho:go forest was said to be 1.8 km, and was planted in 1742. In fact, certain parts of the forest belt were cut for building the roads to connect the village and the farming land and for the access to the farming surrounding the village. We chose to survey in the least human-disturbed area in the front forest belt. Since the forest belt was about 12 meters wide, and the tallest tree in the forest belt was about 13m, plots 1-5 were rectangular plots with an area of 12×13m<sup>2</sup>. Plots 6-8 were 15m-radius plots. Plot 6 was located in the village cemetery. Plots 7 and 8 were near the coast.

In general, the forest was in a two-storey structure. All upper-storey trees were numbered, identified to species, and their DBHs (Diameter at Breast Height) and height were measured and recorded. All undergrowth vegetation species were also identified to species and recorded.

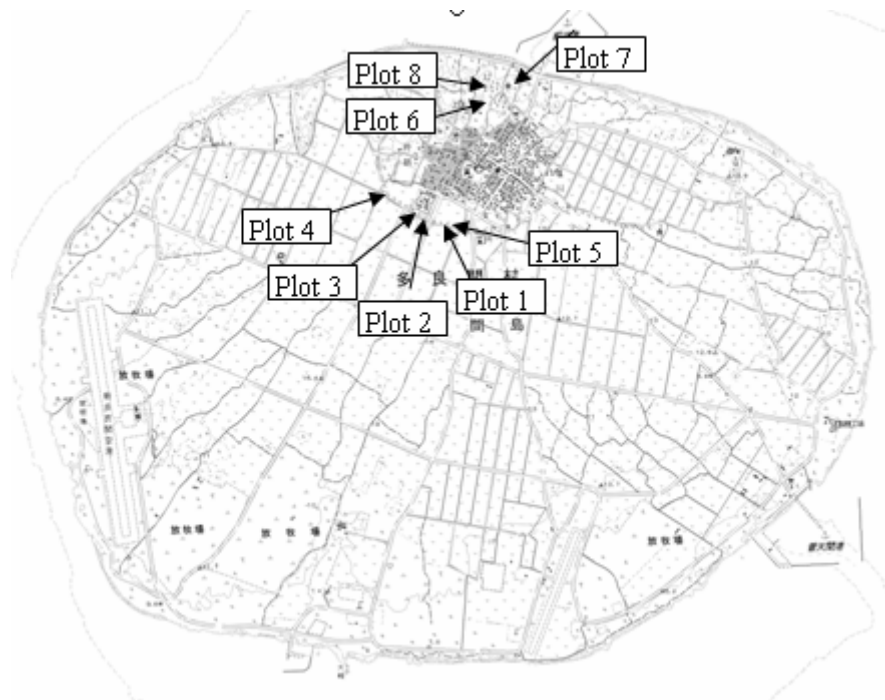


Fig. 4-2 Locations of 8 plots surveyed in Tarama Island

### 4.3 The Feng Shui layout in Tarama Island

According to the historical record, in 1742 Sai On commanded the planting of Ho:go in Tarama Island. In order to better understand the layout of a typical Ryukyu Feng Shui village landscape, we have drawn a sketch here (see fig. 4-3) with key points indicated in the village and include an aerial photo (see Photo 4-2) taken by the American Army in 1945.

From fig. 4-3, we can find many Utaki<sup>3)</sup>, Ungusiku (J. Ungusuku), Tomari and Minema, located on the hill in back of the village. In the Ryukyu Islands, the back hill covered with thick forest is called Kusatimui. Sacred groves, often on the top of the hills surrounding local shrines (Utaki in local word), are never cut (Pearson, 1967:27). On the left side of village is located natural spring waters of Sjuga:ga: (J. Shugahga), Fuſatuga: (J. Fushatugah) and a pond of Are:ki. Jaejama (J. Yaeyama) to:midai, which is located at the highest point of village, along with Mtabaru Ugam stand in the right side of the village. Ho:go was planted to curve in the front. We may assume that the ideal Feng Shui landscape in the Ryukyu Islands has been laid out based on Utaki, which is different unique to other East Asia regions.

From Photo 4-2, we can see that patches of remnant forest in Tarama Island were mostly around Utakis and on the back hill. The forest belt, which is shown as a black line in the photo (see Photo 4-2), curves in the front to connect the two hills in the east and the west.

Comparing the Tarama village layout to a traditional Feng Shui model, we can find that Kusatimui in the north, Pitumataugam (J. Pitumataugam) and ſiogawa (J. Shiogawa) Utaki in the east, and Tukapana and Jaejama (J. Yaeyama) to:midai in the west represent Black Tortoise, Azure Dragon, and White Tiger, respectively. It is obvious that Ho:go has been used to function as Red Bird or the facing mountain. We drew two intersecting lines along the major roads (see fig. 4-3) to connect the Four Emblems. It happens that the old village office, named Bummja: was located at the intersecting point of the four emblems. It might be assumed that the old village office was chosen to be built in the cave, the best Feng Shui spot of the village. Houses of Nakasiſi (J. Nakasuji) hamlet and ſiokawa (J. Shiokawa) hamlet were scattered in the open space around the site of the old village office, divided by the road extending north and south.

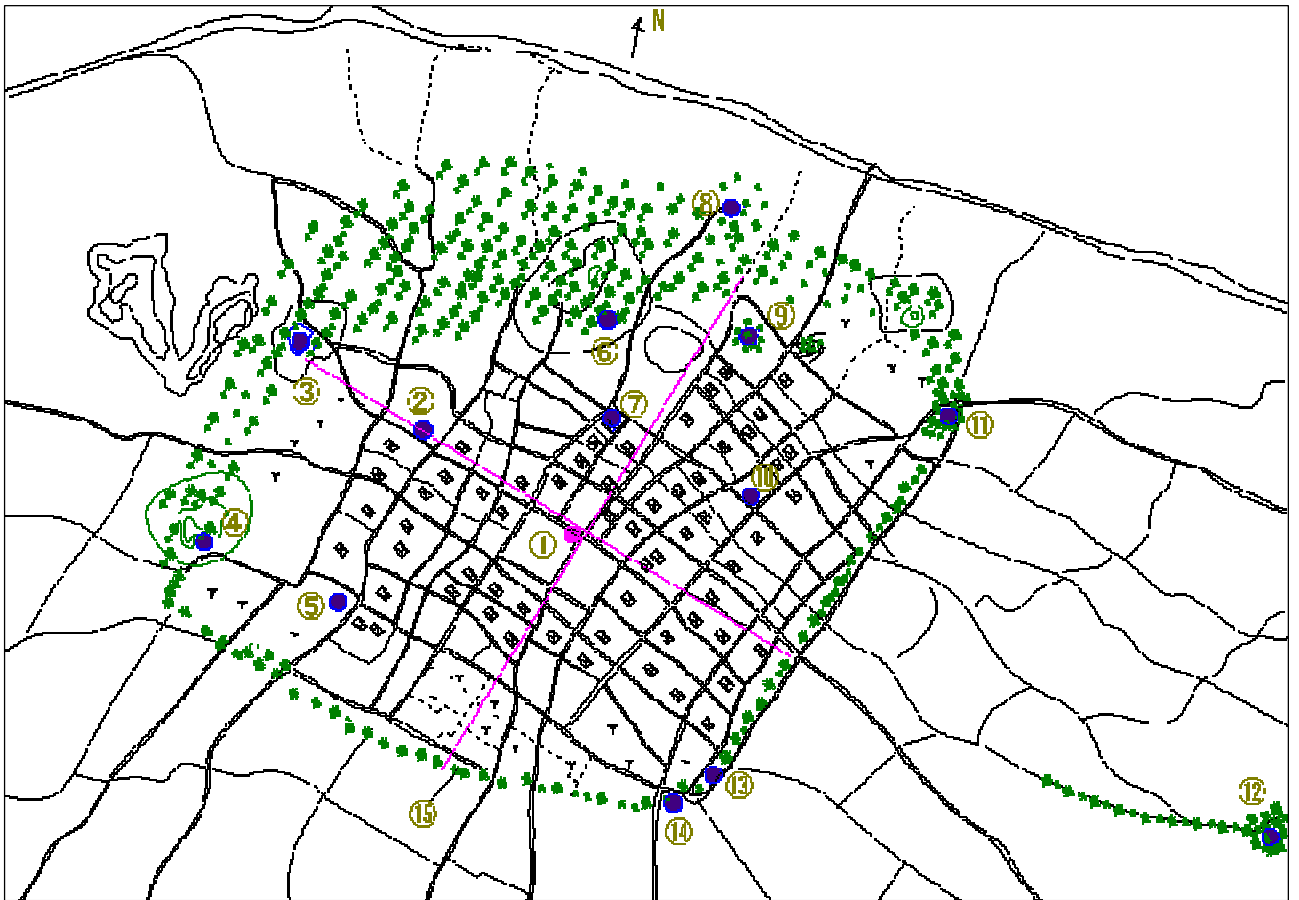


Fig. 4-3 A sketch of Tarama Island layout

Note: ①Bummja: the old village office was located here, which is assumed to be the best site (cave).

②Mtabaru Ugam: the sacred place for Nakasīḍi (J. Nakasuji) Hamlet, where the grand August Dance Festival is held every year.

③Jaejama to:midai: the highest spot used to overview the ships going through the island in Ryukyu Kingdom period

④Tukapana: the sacred place for Nakasīḍi (J. Nakasuji)Hamlet.

⑤Nagaḷiga: (J. Nagashigah): a sacred spot with a spring water from the limestone cave

⑥Ungusīku(J. Ungusuku) Utaki: one of the oldest scared spots to pray for the protection of the sea.

⑦Amaga:: a spring water from the limestone cave

⑧Tomari Utaki: a sacred place to pray for the protection of the sea

⑨Minema Utaki: a sacred place

⑩Pitumataugam (J. Pitumataugam): a sacred place for ŷiokawa (J. Shiokawa) Hamlet, where the grand

August Dance Festival is held every year.

- ⑪ Sjúga:ga (J. Shugahga): a sacred spot with a spring water from the limestone cave
- ⑫ ſiokawa (J. Shiokawa) Utaki: a sacred spot with a 50m front approach planted with a Fukugi tree line at the each side
- ⑬ Fuſatuga: (J. Fushatugah): a sacred spot with a spring water from the limestone cave
- ⑭ Are:ki: A naturally formed pond which gathers rain water.
- ⑮ Ho:go: A forest belt curves in the front to embrace the village along with the forest in the rear.



Photo 4-2 Village houses clustered in the northern part of Tarama Island

- (1) Bummja: (2) The back hill covered with thick forest, where several Utaki (sacred spot) were located. (3) Jaejama to:midai (4) Tukapana: (5) Village Ho:go curving in the front
- (6) ſiokawa (J. Shiokawa) Utaki (7) Sjúga:ga: (J. Syugahga) (8) Pítumataugam (J. Pitumataugam)



Photo 4-3 Feng Shui Forest belt, Ho:go, in the front of the village in Tarama Island



Photo 4-4 An overlook of the remnant habitat embracing Fukugi trees in Tarama Island

#### 4.4 Features of trees in the front forest belt

Forest composition (see Photo 4-5) and features of trees in the surveyed plots in the front forest belt are presented in tables 4-1 and 4-2. *Garcinia subelliptica* was the prominent species in the front forest belt, and accounted for about 64% of all upper-storey trees (see table 4-1). It was followed by *Calophyllum inophyllum*, which accounted for about 20%.

About 2 to 7 species were found in the upper storey in the surveyed plots in the front forest belts. There were 41, 42, 52, 25, and 27 trees, representing 3, 6, 7, 2, and 5 species in the plots from 1-5, respectively. *Garcinia subelliptica* accounted for 68.3%, 73.8%, 71.2%, 52%, and 37% in the plots from 1-5, respectively. *Calophyllum inophyllum* accounted for 29.3%, 7.1%, 5.8%, 48%, and 29.6% in the plots from 1-5. Other species such as *Ardisia sieboldii*, *Planchonella obovata*, *Ehretia macrophylla*, *Persea thunbergii*, *Erythrina orientalis*, and *Morus australis* were also found in the surveyed plots in the front forest belt.

The mean height of *Garcinia subelliptica* in every surveyed plot ranged from 642.1cm to 805.1cm. The mean DBH of *Garcinia subelliptica* ranged from 17.6cm to 27.6cm. Here we used the formula [Age of a tree (year) = DBH (cm) ÷ 2 × 8] by Hirata (2006) to estimate the age of surveyed *Garcinia subelliptica* trees. The mean ages of *Garcinia subelliptica* trees were estimated to be 70.4, 83.2, 79.6, 110.4, and 84 years old, respectively. The maximum DBH were 53cm, 58cm, 84.8cm, 60.4cm, and 34.2cm in the surveyed plots from 1-5, respectively. The biggest trees were estimated to be 212, 232, 339.2, 241.6, and 136.8 years old, respectively. The estimated age of all big trees was in line with the planting period (1742) of the forest belt except the tree in Plot 3. Its DBH was 84.8cm, and the estimated age was about 339, meaning that it was planted about 100 years earlier than the recorded planting year. It might be assumed that the trunks of two trees stood very closely and have grown to become one (see Photo 4-6). Such a feature of two trunks combining during growth can be frequently found in a *Garcinia subelliptica* forest.



Photo 4-5 Forest composition inside the forest belt in Tarama Island



Photo 4-6 The biggest Fukugi tree in Ho:go, in Tarama Island, which is assumed to have grown from two trunks into one.



Table 4-1 The Main Dominant Trees in Plots 1-5 in Tarama Island

Tree species	Number	%	Mean of height (cm)	Mean of DBH(cm)	Mean estimated age (year)
<i>Garcinia subelliptica</i>	119	63.6	691.1	20.5	82.1
<i>Calophyllum inophyllum</i>	38	20.3	667.8	25.4	
<i>Ardisia sieboldii</i>	12	6.4	631.2	15.3	

Table 4-2 Characteristics of Upper Storey Trees in the Surveyed Front Forest Belt in Tarama Island

Species name	No	%	Mean of	Mean of	Max of	Max of	Mini of	Mini of	
			Height(cm)	DBH(cm)	Height(cm)	DBH(cm)	Height(cm)	DBH(cm)	
<i>Garcinia subelliptica</i>	28	68.3	651.8	17.6	1152	53	311	4.5	
Plot 1 <i>Calophyllum inophyllum</i>	12	29.3	810.2	34.2	1048	55.3	622	17.5	
<i>Ardisia sieboldii</i>	1	2.4	414.0	10.0	–	–	–	–	
<b>Total</b>	<b>3 species</b>	<b>41</b>	<b>100.0</b>	<b>704.6</b>	<b>22.6</b>	<b>1152</b>	<b>55.3</b>	<b>311</b>	<b>4.5</b>
<i>Garcinia subelliptica</i>	31	73.8	642.8	20.8	1058	58	208	3.7	
<i>Persea thunbergii</i>	4	9.5	497.8	13.5	745	18.6	331	7.2	
Plot 2 <i>Calophyllum inophyllum</i>	3	7.1	680.3	32.5	892	38.9	420	29	
<i>Ardisia sieboldii</i>	2	4.8	391.0	5.6	432	5.7	350	5.5	
<i>Planchonella obovata</i>	1	2.4	426.0	5.1	–	–	–	–	
<i>Ehretia macrophylla</i>	1	2.4	534.0	11.9	–	–	–	–	
<b>Total</b>	<b>6 species</b>	<b>42</b>	<b>100.0</b>	<b>611.9</b>	<b>19.6</b>	<b>1058</b>	<b>58</b>	<b>208</b>	<b>3.7</b>
<i>Garcinia subelliptica</i>	37	71.2	729.3	19.9	1088	84.8	235	2.6	
<i>Melia azedarach</i>	4	7.7	683.8	20.4	819	27.4	373	5.7	
<i>Ardisia sieboldii</i>	3	5.8	452.0	6.2	582	7.4	317	4.4	
Plot 3 <i>Calophyllum inophyllum</i>	3	5.8	557.3	24.4	765	44.6	263	10.2	
<i>Ehretia macrophylla</i>	2	3.8	369.0	4.9	388	5.1	350	4.6	
<i>Persea thunbergii</i>	2	3.8	549.0	13.2	727	18.5	371	7.9	
<i>Erythrina orientalis</i>	1	1.9	934.0	53.8	–	–	–	–	
<b>Total</b>	<b>7 species</b>	<b>52</b>	<b>100.0</b>	<b>683.0</b>	<b>19.2</b>	<b>1088</b>	<b>84.8</b>	<b>235</b>	<b>2.6</b>
Plot 4 <i>Garcinia subelliptica</i>	13	52.0	801.5	27.6	1208	60.4	202	3.5	

	<i>Calophyllum inophyllum</i>	12	48.0	628.6	23.7	977	55.2	287	5.8
<b>Total</b>	<b>2 species</b>	<b>25</b>	<b>100.0</b>	<b>718.5</b>	<b>25.7</b>	<b>1208</b>	<b>60.4</b>	<b>202</b>	<b>3.5</b>
	<i>Garcinia subelliptica</i>	10	37.0	666.4	21.0	1171	34.2	328	5.2
	<i>Calophyllum inophyllum</i>	8	29.6	549.6	12.6	840	22.8	350	4.1
Plot 5	<i>Persea thunbergii</i>	6	22.2	747.5	17.2	971	24.1	590	6
	<i>Ardisia sieboldii</i>	2	7.4	474.0	7.1	503	9	445	5.2
	<i>Morus australis</i>	1	3.7	806.0	23.8	–	–	–	–
<b>Total</b>	<b>5 species</b>	<b>27</b>	<b>100.0</b>	<b>640.7</b>	<b>16.7</b>	<b>1171</b>	<b>34.2</b>	<b>202</b>	<b>3.5</b>

Table 4-3 A List of Undergrowth Vegetation Species in the Front Forest Belt

	Plots 1-5		
Species	<i>Alocasia odora</i>	<i>Diospyros maritima</i>	<i>Oplismenus compositus</i>
	<i>Alpinia zerumbet</i>	<i>Euonymus japonicus</i>	<i>Paederia scandens</i>
	<i>Ampelopsis brevipedunculata</i> var.	<i>Ficus microcarpa</i>	<i>Pandanus odoratissimus</i>
	<i>Antidesma pentandrum</i>	<i>Ficus superb</i> var. <i>japonica</i>	<i>Persea thunbergii</i>
	<i>Ardisia sieboldii</i>	<i>Garcinia subelliptica</i>	<i>Planchonella obovata</i>
	<i>Arenga tremula</i> var. <i>engleri</i>	<i>Gardenia jasminoides</i> <i>f. grandiflora</i>	<i>Podocarpus macrophyllus</i>
	<i>Bischofia javanica</i>	<i>Glochidion rubrum</i> Bl.	<i>Polygonum chinense</i>
	<i>Breynia vitis-idaea</i>	<i>Leucaena leucocephala</i>	<i>Premna corymbosa</i> var.
	<i>Callicarpa japonica</i> var.	<i>Lygodium japonicum</i> var.	<i>Psidium guajava</i>
	<i>Calophyllum inophyllum</i>	<i>Macaranga tanarius</i>	<i>Psychotria manillensis</i>
	<i>Clematis chinensis</i>	<i>Maytenus diversifolia</i>	<i>Rhaphiolepis indica</i>
	<i>Clematis grata</i> var. <i>ryukyuensis</i>	<i>Melia azedarach</i>	<i>Smilax sebeana</i>
	<i>Clerodendrum inerme</i>	<i>Miscanthus sinensis</i>	<i>Terminalia catappa</i>
	<i>Croton cascarilloides</i>	<i>Morus australis</i>	<i>Trichosanthes miyagii</i>
	<i>Cycas revoluta</i>	<i>Ophiopogon jaburan</i>	<i>Vitis ficifolia</i>
	<i>Diospyros egbert-walkeri</i>		
<b>Total</b>	46		

About 46 species of grass and seedlings were found in the undergrowth of all surveyed plots in the front forest belt (see table 4-3). The dominant species that were found in all surveyed plots are *Alocasia odora*, *Alpinia zerumbet*, *Diospyros maritima*, *Leucaena leucocephala*, *Ophiopogon jaburan*, *Persea thunbergii*, and *Psychotria manillensis*.

#### 4.5 Forest composition on the back hill

Plots 6-8 were surveyed on the northern hill at the back of the village. Table 4-4 shows the features of upper-storey trees. Table 4-4 shows that 108, 81, and 111 upper-storey trees, representing 8, 10, and 8 species, were found in Plots 6-8 respectively. The prominent species was *Ardisia sieboldii* in Plot 6, and accounted for about 61% of all upper-storey trees. The prominent species in Plot 7 was *Calophyllum inophyllum*, accounted for about 49%. The prominent species in Plot 8 was *Diospyros maritima*, which accounted for about 46%. *Calophyllum inophyllum* and *Garcinia subelliptica* were found to be the majority, and they accounted for about 46% of the total upper-storey trees in Plot 8.

About 23 species were found in the undergrowth storey of the three surveyed plots on the back hill. All species names are listed in table 4-5. The dominant species that were found in all surveyed plots were *Alocasia odora*, *Antidesma pentandrum*, *Diospyros maritima*, *Garcinia subelliptica*, *Podocarpus macrophyllus*, and *Psychotria manillensis*.

Plot 6 (see Photo 4-7) was located in the village cemetery on the slope facing the village. It is obvious that the cemetery has existed since the beginning of the village. In plot 6, five major species, *Ardisia sieboldii*, *Diospyros maritima*, *Bischofia javanica*, *Garcinia subelliptica*, and *Persea thunbergii* accounted for about 61.1%, 13%, 9.3%, 7.4%, and 5.6% (see table 4.4), respectively. According to Flora of the Ryukyus (Hatsusima, 1975), *Bischofia javanica* is commonly planted beside a graveyard. The mean height and the mean DBH of *Bischofia javanica* in Plot 6 were 829.3cm and 21.3cm, respectively. The mean height and the mean DBH of *Garcinia subelliptica* in Plot 6 were 737.4cm and 27.1cm, respectively. About 8 *Garcinia subelliptica* found in Plot 6 were estimated to be 85.2 years on average and

Table 4-4 Characteristics of Upper Storey Trees in the Surveyed Back Hill in Tarama Island

	Species name	Number	%	Mean of Height (cm)	Mean of DBH (cm)	Maximum of Height (cm)	Maximum of DBH (cm)	Minimum of Height (cm)	Minimum of DBH (cm)
Plot 6	<i>Ardisia sieboldii</i>	66	61.1	402.0	4.2	840	12.1	196	1.9
	<i>Diospyros maritima</i>	14	13.0	444.9	5.2	639	10	239	2.8
	<i>Bischofia javanica</i>	10	9.3	829.3	21.3	1134	42.8	434	7
	<i>Garcinia subelliptica</i>	8	7.4	737.4	27.1	1047	49.3	191	2
	<i>Persea thunbergii</i>	6	5.6	641.0	11.5	811	19.4	430	4
	<i>Planchonella obovata</i>	2	1.9	432.5	2.6	451	2.8	414	2.4
	<i>Ficus erecta</i>	1	0.9	414.0	2.1	–	–	–	–
	<i>Podocarpus macrophyllus</i>	1	0.9	783.0	19.3	–	–	–	–
<b>Total</b>	<b>8 species</b>	<b>108</b>	<b>100.0</b>	<b>489.4</b>	<b>8.1</b>	<b>1134</b>	<b>49.3</b>	<b>191</b>	<b>1.9</b>
Plot 7	<i>Calophyllum inophyllum</i>	40	49.4	982.4	21.4	1300	43	227	5.1
	<i>Podocarpus macrophyllus</i>	17	21.0	231.2	1.5	306	1.9	126	1
	<i>Planchonella obovata</i>	8	9.9	249.3	5.3	370	29	197	1.4
	<i>Diospyros maritima</i>	5	6.2	255.8	2.9	300	3.9	185	2.2
	<i>Allophylus timorensis</i>	4	4.9	215.3	1.6	250	2.2	185	1
	<i>Macaranga tanarius</i>	2	2.5	160.5	1.6	171	1.7	150	1.4
	<i>Terminalia catappa</i>	2	2.5	605.0	15.0	952	27.6	258	2.4
	<i>Breynia vitis-idaea</i>	1	1.2	230.0	1.0	–	–	–	–
	<i>Hernandia nymphaeaefolia</i>	1	1.2	299.0	3.5	–	–	–	–
	<i>Morus australis</i>	1	1.2	347.0	4.1	–	–	–	–
<b>Total</b>	<b>10 species</b>	<b>81</b>	<b>100.0</b>	<b>614.4</b>	<b>12.2</b>	<b>1300</b>	<b>43</b>	<b>126</b>	<b>1</b>
Plot 8	<i>Diospyros maritima</i>	51	45.9	261.6	2.7	484.0	5.4	121.0	1.3
	<i>Calophyllum inophyllum</i>	26	23.4	1111.5	24.4	1381.0	46.3	398.0	4.9
	<i>Garcinia subelliptica</i>	25	22.5	349.6	4.1	933.0	13.3	138.0	1.4
	<i>Ficus erecta</i>	3	2.7	326.0	3.3	389.0	6.6	252.0	1.6
	<i>Planchonella obovata</i>	2	1.8	247.5	1.1	252.0	1.1	243.0	1.1

<i>Terminalia catappa</i>	2	1.8	982.0	15.6	1074.0	19.8	890.0	15.6
<i>Breynia vitis-idaea</i>	1	0.9	415.0	4.8	–	–	–	–
<i>Hernandia nymphaeaefolia</i>	1	0.9	464.0	7.1	–	–	–	–
<b>Total 8 species</b>	<b>111</b>	<b>100.0</b>	<b>498.2</b>	<b>8.3</b>	<b>1381</b>	<b>46.3</b>	<b>121</b>	<b>1.1</b>

Table 4-5 A List of Undergrowth Vegetation Species in the Back Hill forest in Tarama Island

Plot 6-8		
<i>Allophylus timorensis</i>	<i>Diospyros egbert-walkeri</i>	<i>Oplismenus compositus</i>
<i>Alocasia odora</i>	<i>Diospyros maritima</i>	<i>Paederia scandens</i>
<i>Antidesma pentandrum</i>	<i>Garcinia subelliptica</i>	<i>Persea thunbergii</i>
<i>Bischofia javanica</i>	<i>Hernandia nymphaeaefolia</i>	<i>Pisonia aculeata</i>
<i>Breynia vitis-idaea</i>	<i>Ilex goshiensis</i>	<i>Planchonella obovata</i>
<i>Calophyllum inophyllum</i>	<i>Macaranga tanarius</i>	<i>Podocarpus macrophyllum</i>
<i>Cinnamomum camphora</i>	<i>Nephrolepis biserrata</i>	<i>Psychotria manillensis</i>
<i>Cycas revoluta</i>	<i>Ophiopogon jaburan</i>	
Total number	23	

171.2 years in the maximum. Thus, it may be assumed that *Bischofia javanica* and *Garcinia subelliptica* have been planted around the graveyard.

The undergrowth vegetation was very rare, only 8 species appearing, with a close upper storey. It is assumed that a regular clear cutting of the undergrowth grass and shrubs by the villagers has been conducted as a means of maintaining the graveyard.

Plot 7 (see Photo 4-8) was located on the slope facing the sea, about 110m away from the coast. The highest share of species was *Calophyllum inophyllum*, which accounted for 50% of all upper-storey trees. Other major species included *Podocarpus macrophyllum*, *Planchonella obovata*, and *Diospyros maritima*. Relatively more species appeared in the upper storey and undergrowth storey than in Plots 6 and 8.

The total number of upper-storey trees was only 81 in Plot 7, which was less than 80% of the number of the trees in Plots 6 and 8. The less number of upper-storey trees and the open canopy of the mature *Calophyllum inophyllum* trees resulted in a large number of *Nephrolepis*

*biserrata* and *Pisonia aculeata* in the undergrowth vegetation. *Calophyllum inophyllum* was the dominant species, which accounts for about 50% of upper storeyed trees. Plot 7 also indicates a mature *Calophyllum inophyllum* forest with the mean DBH of 21.4cm, and the mean height of about 10m. *Calophyllum inophyllum* is a moderate-sized evergreen tree, distributed on sandy seashores commonly in Miyako and Yaeyama Guntos. No *Garcinia subelliptica* trees were found in the upper storey in Plot 7.

Plot 8 (see Photo 4-9) was also located on the slope facing the sea, but a little farther from the sea than Plot 7. It may be treated as an intermediate place between Plots 6 and 7. The upper-storey trees were so close that undergrowth vegetation was under-developed. The highest shares of tree species in the upper storey were *Diospyros maritima*, *Calophyllum inophyllum*, and *Garcinia subelliptica*. However, it is worth noticing the different magnitudes of *Calophyllum inophyllum*, and *Garcinia subelliptica*. The mean DBH of *Calophyllum inophyllum* was 24.4cm, while that of *Garcinia subelliptica* was 4.1cm. The maximum DBH of *Calophyllum inophyllum* was 46.3cm, while that of *Garcinia subelliptica* was 13.3cm.



Photo 4-7 Forest composition in Plot 6 with little undergrowth vegetation because of a close upper storey.



Photo 4-8 Forest composition in Plot 7 with a lot of undergrowth vegetation of ferns and liana with an open upper storey.



Photo 4-9 Forest composition in Plot 8 with little undergrowth vegetation because of a close upper storey. The dominant species was *Diospyros maritima*.

The mean and maximum estimated age of *Garcinia subelliptica* was 16.4 and 53.2 years old, respectively. Although *Calophyllum inophyllum* grows faster than *Garcinia subelliptica*, it may be assumed that *Calophyllum inophyllum* originally grew in the natural forest, while *Garcinia subelliptica* started to grow in the forest recently.

#### **4.6 A Ryukyu Island Feng Shui village featuring forest planting**

A Ryukyu Feng Shui village features the use of tree planting to accumulate Qi. Hirae Village, located in the north of Ishigaki Island, is another typical Feng Shui village built in the Kingdom of Ryukyu (See Photo 4-10). From the photo, we could see a dark forest belt encircled the whole village, and dark squares of Fukugi tree lines embraced the houses. Unfortunately, all forest belts vanished after WWII.

Tree planting was highlighted to repair the defective topography in the Ryukyu Islands. A large area of forest has been preserved in the rear of the village. The forest belt, Ho:go, was planted to curve in the front and to extend to each side of the village to connect with the exuberant forest in the back. The high hill in the rear, the hills on the left and right, and the planted Ho:go in the front represent the four emblems, Black Tortoise, Azure Dragon, White Tiger, and Red Bird, respectively. In a Ryukyu ideal Feng Shui village, Ho:go functions as Red Bird instead of low hills. The intersecting point of four emblems is the location of the old village office. The village houses are scattered in the wide open space around the village office. Flourishing Fukugi trees enclose almost every house. The forest belt planted to embrace the houses and the village is a feature of a Ryukyu Feng Shui village and is different from the ideal Feng Shui model widely spread in East Asia.

Feng Shui trees also prevalently exist in mainland China and Hong Kong. Feuchtwang (1974) reports that Feng Shui trees are the most ubiquitous and sensitive focuses of interest in Feng Shui and are common Feng Shui symbols in practice. He (1990) illustrates the function of tree planting to enhance the vital energy and repair the imperfect landscape of a city or a village. A grove of natural forest in the rear of the village forms a charming and ecological



landscape in Hong Kong (Webb 1995). Compared to the symbolic use of trees in key Feng Shui spots in mainland China and Hong Kong, forest planting was used in a practical way in the Okinawa Islands.



Photo 4-10 An Aerial Photo of Hirae Village in the southern part of Ishigaki Island by American Army in 1945

Scale=1:6000

Note:

- ① A Forest belt of Ryukyu Pine trees (*Pinus luchuensis*) surrounded the village.
- ② The clustered village houses were embraced by Fukugi tree (*Garcinia subelliptica*) lines.
- ③ A large tree, named Ako Tree (*Ficus superba* Miq. var. *japonica* Miq.), standing in the entrance to the village.

As is well known, the Ryukyu Islands are constituted of lots of small islands, where the natural climate is somewhat inclement with frequent typhoon occurrence. The flat topography provides little protection from the strong northerly wind in winter. These Ho:gos and the forest in the rear hills have played an important role to protect the houses in the village.

Thus, the Ryukyu Island pattern of building a Feng Shui village is the perfect application of ideal Feng Shui principles to island topography. It is of small scale and are not blessed with hills to protect inhabitants from chilly winter winds and frequent violent typhoons in the long summer season. Thus, a Ryukyu Feng Shui village landscape, which embodies a symbiosis of the nature and man, is an ideal village landscape pattern in islands.

#### **4.7 The naturally regenerated Ho:go forest of rich biodiversity and the forest in the rear hills**

As mentioned above, *Garcinia subelliptica* and *Calophyllum inophyllum* were found to be the dominant species in the upper storey in Ho:go. There were altogether about 9 and 46 species found in the upper and under storeys in Ho:go, respectively. Both *Garcinia subelliptica* and *Calophyllum inophyllum* were resistant to typhoons. From the composition of the forest belt, it may be assumed that the forest belt was first planted with *Garcinia subelliptica*, and then replanted with *Calophyllum inophyllum*. During the long history of succession, more and more other natural species came to grow inside the forest belt.

*Ardisia sieboldii*, *Calophyllum inophyllum*, *Diospyros maritima*, and *Garcinia subelliptica* were the dominant species in the 3 surveyed plots on the rear hills. Compared to forest belt originally planted in the front, the forest in the back hills was a mix of natural forest and planted trees. Forest on the northern hill has regenerated with a long succession under little human disturbance.

Both the forests in the Ho:go and in the northern hills have naturally regenerated and are composed of plant species rich in diversity. A Village Ho:go is in nature a green corridor that connects the landscape patches. Planted corridors also provide excellent habitat for

insectivorous birds and predaceous insects, and they function as dispersal routes for small mammal species (Odum and Barret, 2005).

The forest in the Ho:go and in the rear hills has plays a significant role in a small island biotope. The forest may contribute to the sustainable development of biology in the small island.

#### 4.8 Summary

Feng Shui theory has been widely accepted as a landscape design model by many architects. According to Form School of Feng Shui, five major physical factors are basic for an ideal housing site. However, such a criterion is restricted to mountainous region. In fact, Feng Shui was first introduced to Ryukyu Kingdom in 14<sup>th</sup> Century and applied to village planning after 1730's. A Ryukyu Feng Shui village features the use of tree planting to accumulate Qi. A Forest belt was planted to curve in the front of the village and to extend to the east and the west to embrace the village along with the hill in the rear. The forest belt actually functions as Red Bird instead of low hills in a model Feng Shui landscape. One or more Fukugi tree lines were planted to embrace the houses. Compared to a symbolic existence of Feng Shui trees in China, tree planting was used in a much more practical means because of the natural situation in the islands. The Ryukyu Islands feature with the flat topography and frequent typhoon occurrence. We chose to survey on Tarama Island where Feng Shui forests are best preserved. We focus to study on the features of a Ryukyu Feng Shui village layout and the forest composition in the front forest belt and in the back hill. We found the trees in the back hill and forest belt were generally of a two-storey structure. *Garcinia subelliptica* and *Calophyllum inophyllum* were the predominant species in the upper storey in the forest belt. In contrast, tree species in the back hill were much more diverse with a majority of *Diospyros maritime*, *Calophyllum inophyllum*, *Ardisia sieboldii*, and *Podocarpus macrophyllus*. About 46 species were found in the under storey vegetation in the front forest belt, in contrast, only 23 species in the back hill. Thus, a Ryukyu Island pattern Feng Shui landscape is an ideal landscape that

embodies a pleasant habitat and agricultural production, as well as functions to conserve biodiversity and environment under a clement natural situation in island topography.

Notes:

- 1) Fukugi: It is the Japanese word “福木”. Its scientific name is *Garcinia subelliptica*.
- 2) Ho:go: The literal meaning of Ho:go (抱護) is to embrace and protect. In an ideal Feng Shui topography, surrounding hills are desired to embracing the living Qi. However, the Ryukyu Islands are mostly flat, with a few low hills, and with the strict natural situation, they suffer from frequent typhoons and strong winter winds. Ho:go has been highly emphasized to repair the defective topography with tree planting around the houses and the villages to achieve an ideal habitat environment.
- 3) Utaki (御嶽): It is a general Okinawan term for a sacred place. Utakis are usually located on the outskirts of villages. They are places where village people pray to the ancestors and gods for prosperity, happiness, a safe voyage and even psychological comfort. Forests around Utaki have been well preserved, since people believe that they will suffer misfortune if they touch the Utaki forest. Thick forests around Utaki have been well preserved

## CHAPTER V

### HOUSE-EMBRACING FUKUGI TREES IN TONAKI ISLAND

#### 5.1 Introduction

In Okinawa, *Garcinia subelliptica* (Fukugi) has been widely planted to encircle the houses and village to achieve a relative shelter on these small islands. This unique landscape came into being during the Ryukyu Kingdom and is still well preserved on some islands today. Feng Shui, first originated in mainland China, was applied to establish traditional Ryukyu villages and in tree planting surrounding the villages, habitats, and around some key points the villagers named “Feng Shui Spots.” Okinawa Prefecture are constituted of lots of small islands, where the natural climate is somewhat inclement with frequent typhoon occurrence. The flat topography provides little protection from the strong northerly wind in winter. It is obvious that the widely planted *Garcinia subelliptica* plays a vital role in shaping inhabitable shelter in Okinawa. At present, such house-embracing tree landscapes only exist in scattered distribution on the Okinawa islands. Only house-embracing trees in Bise village in the northern area of the main island of Okinawa and Tonaki Island are still in existence in a well preserved state. This chapter focuses on Tonaki Island as a case study area. House-embracing Fukugi trees in Bise village will be discussed in Chapter 6.

Previous studies (Nakamatsu 1977/1963; Machida & Tsuzuki 1993; Shinjo 1993) based on document reviews show that currently existing ancient villages were built during the 18th century under the guidance and policy of the Ryukyu Kingdom and the direct instruction of Feng Shui masters to achieve a sound habitat environment. Tree planting named house-embracing forests was highlighted as one of the important factors in shaping a good Feng Shui village (Tsuzuki 1997). Recent studies on Tonaki Island on the compass direction of houses and wind direction (Sakamoto 1989; Paku et al 1997) show that most houses building conform to the ecological principle, and face south to welcome cool summer wind and keep the cold winter wind out. The village roads run north-south and east-west, and seem to intersect approximately at right angles. But it was reported that no roads overlap with the

north-south or east-west axes in Bise village (Musha et al., 1988). The road intersection in Tonaki Island reported by Musha et al. was summarized as follows. The village were seperated to three parts, east part, west part, and south part. In east part, north-south running roads vary from 4° to 32° of declination angles from magnetic north to northwest. East-west running roads vary from 2° to 23° of declination angles from east to eastnortheast. In west and south part, north-south running roads vary from 9° to 29° of declination angles from magetic north to northeast. In west part, east-west running roads vary from 3° to 25° of declination angles from east to eastsoutheast. In south part, east-west running roads vary from 12° to 30° of declination angles from east to eastsoutheast. The curvous roads were assumed to be able to channel and reduce the damage of the strong winds in the island.

The purpose of this chapter is to present the actual layout of residences and habitat house-embracing trees in a Feng Shui village based on the case study in Tonaki Island. Tonaki Island is one of the best preserved sites of Fukugi tree landscape next to Bise village, and accounts for 60% of the village houses were encircled by the trees (Sakamoto 1989).

## **5.2 Methods and survey site**

In order to comprehend the actual stand structure of habitat-embracing trees, first every stand tree taller than 1m was numbered and then height and diameter at breast height (DBH) were measured and recorded. The numbers of sprouts and seedlings were also counted to analyze tree regeneration. Sprouts refer to those from the rootstock of trees taller than 1m and from stumps. Small trees less than 1m were counted as seedlings.

House No. 1877, 1952, 1943, 1944-1, 1816, 1837, and 1953 were surveyed in Tonaki Island. They were labeled from No. 1 to No. 7 (see Fig. 5-1). All seven selected houses are located inside the village except No. 5 which is located on the east coast.

The aerial photograph (see Photo 5-1) shows the general distribution of house-embracing trees. Figures drawn with CAD software (HO CAD Version 2.61) reproduce the actual structure and distribution and relative scale of stand trees of the sampling sites.

Tonaki Island is located at lat. 26°22'N. and long. 127°8'E., and is 58km northwest of Naha City. It has an area of 3.74km<sup>2</sup>. Tonaki Island was originally separated into two islands but the accumulation of sand between the two islands has joined the two islands making it one. There are two hills on the island that have an elevation of about 200m above sea level. They are located on the northern and southern sides of the island respectively. All residences extending from the east coast to the west port are clustered together in the small narrow plain between these two high hills. Tonaki Village is the second smallest village in Okinawa prefecture with a population of 502 in 2003. Since the 20th century, skipjack fishing has been the main industry and coastal fishing is also popular. While millet is the most common agricultural product grown on this small island, various vegetables are also planted for self-consumption.



Photo 5-1 an aerial photograph of Tonaki village

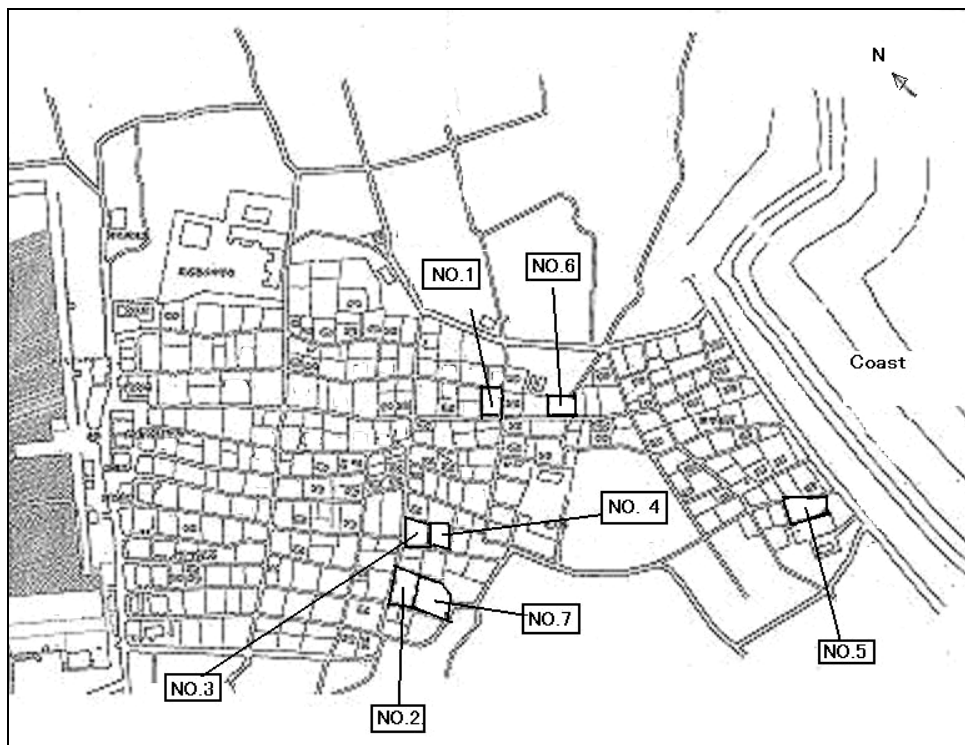


Fig. 5-1 the locations of the seven surveyed houses



Photo 5-2 A rebuilt traditional timber house embraced by Fukugi woods





Photo 5-3 House-embracing Fukugi trees line along the village road covered by white sand

As shown in Photo 5-1, the village houses are lined up in the center of the narrow plain with the roads traversing from east to west and north to south. Green *Garcinia subelliptica* forest belts surround the periphery of the village and encircle most of the houses inside the village to shape a unique village landscape.

All residences in the village were built about 70cm lower than the traverse roads. It has been discovered that first sandy soil was excavated when building the house in order to protect them from the frequent typhoons on this small island. The excavated sand was used to make fences around the residences and then *Garcinia subelliptica* were planted in the sand fences (A record of the history of Tonaki Island Village, 1983). The long years of cultivation of these trees has resulted in the present pleasant habitat embracing tree landscape.

The ancient village was first set up on the eastern side of the island and extended to the west as the population increased. It is easy to see that the houses are newer and some concrete houses are scattered about instead of the traditional timberwork houses. The trees around the houses in the west part of the village are younger and fewer than the east part of the village. Seven houses were selected in the east part of the village as our survey sites based on the

assumption that habitat embracing trees were planted in accordance to traditional Feng Shui belief many decades ago and have been cultivated and managed to achieve an ideal habitat environment harmonizing human existence and nature.

### **5.3 General layout of house-embracing trees**

From the aerial photograph (Photo 5-1), we can observe that forest belts in the peripheral borderline are much thicker than those inside the village, in particular for those adjacent to the wide open plain in the north or exposed to the eastern coast. Such a forest belt layout is greatly attributed to the strong cold northern wind in winter and the destructive eastern wind during typhoon season. Okinawa is dominated by typical monsoonal climate characterized with strong cold and dry northeasterly wind flows during winter and moist cool southwest winds during the summer. The period from June through to the end of November is known as the “typhoon season”. Westerly winds are weak. They typically convolve around the islands of Okinawa for several days whereby they normally re-curve into very strong winds of great destruction. As Fig. 5-2 show, forest belts in northern line are twofold, while the other three sides are single line and thinner. Fig. 5-5 shows the houses located next to the east coastline; thus, the eastern forest belt is very thick, while other sides are thinner due to the strong easterly winds that prevail during typhoon season.

### **5.4 General layout of residences**

In order to present the real layout of residences and the compass direction of houses, Figures (see Figs. 5-2, 5-3, 5-4, 5-5, and 5-6) were drawn based on the village map with HO CAD software. The locations and the size of DBH of all stand trees taller than 1m in the sand fence were measured and then plotted in a sketch map of every survey house to present a real picture of tree distribution and magnitude in the residence. The seven houses were selected here to present the typical patterns of layout of houses in the village. The usual pattern is that

two (see Figs. 5-3 and 5-4) or more adjacent houses form a residence unit. Thus, there are always tree lines on one to three sides that are common with the neighboring houses, while the tree line in the south is always open to the road. It is worthy noting that perhaps trees on all sides have been originally planted in a certain density, however, the remaining forest belt on common sides is usually deplete. On the western side of the residence in particular only a short tree line remains (i.e. No. 1 see Fig. 5-3) or the tree line totally disappears (i. e. No. 6) probably due to the change of lifestyle that has seen residents building wells, bathrooms and toilets on the western side of the houses.



Fig. 5-2 Layout of the structure of No. 1(1877) in Tonaki Island Scale=1:300

Note: Small circles refers to houe-embracing Fukugi trees. They were drawn on basis of the size of their DBHs.

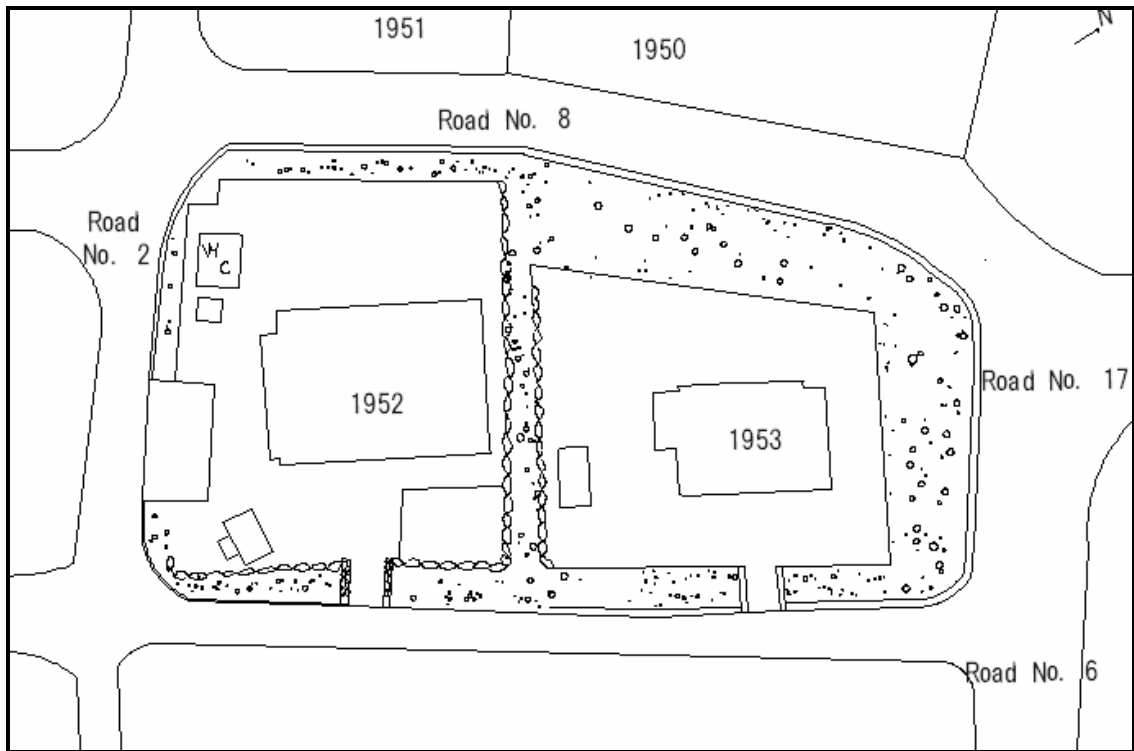


Fig. 5-3 Layout of the structure of Nos. 2 (1952) and 7 (1953) in Tonaki Island

Scale=1:400

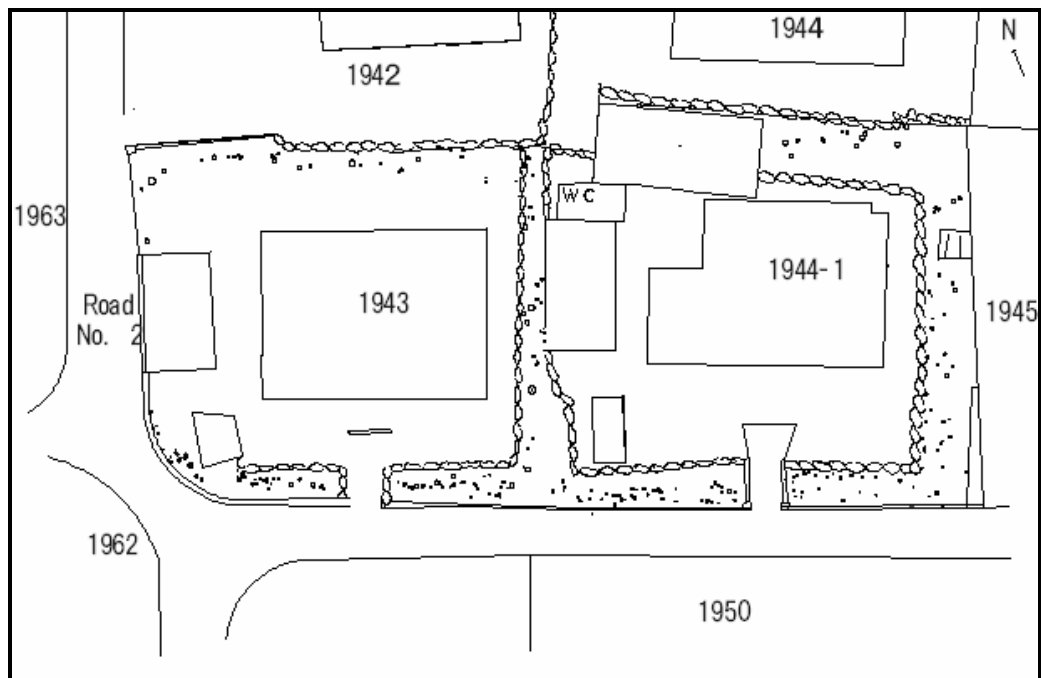


Fig. 5-4 Layout of the structure of Nos. 3 (1943) and 4 (1944-1) in Tonaki Island

Scale=1:400

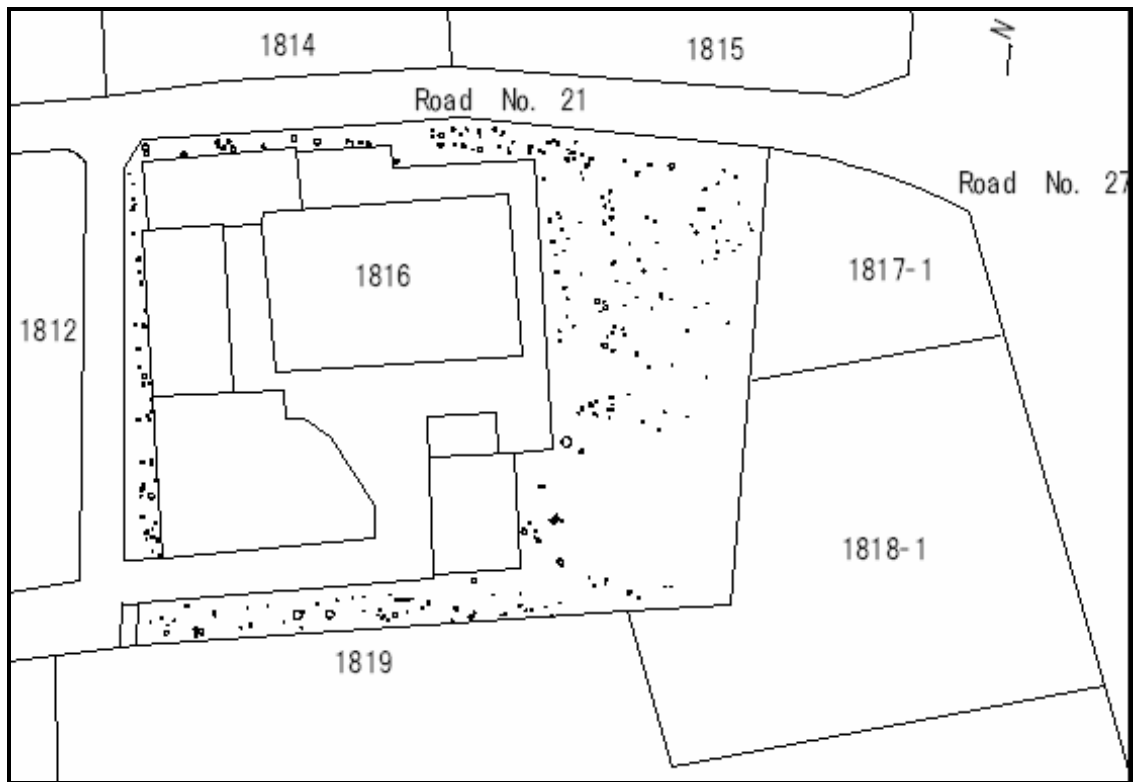


Fig.5-5 Layout of the structure of No. 5 (1816) in Tonaki Island

Scale=1:400

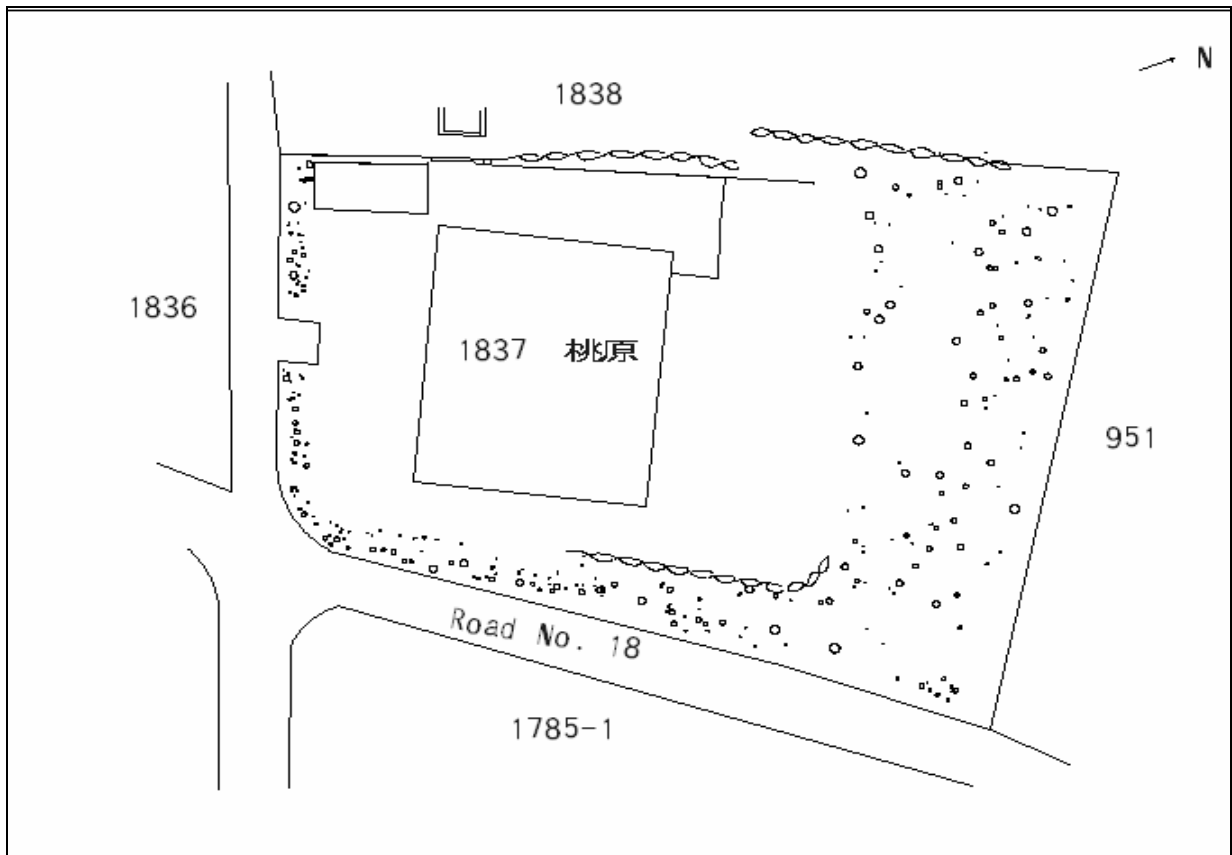


Fig. 5-6 Layout of the structure of No. 6 (1837) in Tonaki Island

Scale=1:300

Besides the above-mentioned elementary layout pattern of house trees that states that tree lines in the north are much thicker than the other sides, No. 5 (see Fig. 5-5) represents an exceptional case in that the forest belt in the east is especially thicker to protect the residence from the strong easterly winds during the typhoon season.

Instead of relative diverse distribution of house-embracing trees, most houses, 96 of the 103 (in 1987) are facing south and with their back to the north, which is consistent with an ideal compass direction for a good Feng Shui house (Sakamoto, 1989). Despite all the seven houses surveyed facing south, the entrances to the residences is not always in the south due to the layout of rock fences and the location of surrounding roads. For example, No. 5 (see Fig. 5-5) has the entrance in the west. But, the Fig.5-5 also shows that there is a big open space in the front of the house to welcome sunlight and warm wind from the south.

In a word, houses are always facing south with their backs to the north. On Tonaki Island, the *Garcinia subelliptica* house- embracing forest belts in the northern and eastern borderline of the village are much thicker. Such a layout in the compass direction of houses and the structure of house-embracing woods have been arranged to correspond to the natural conditions on Tonaki Island to block off the strong northern monsoonal wind, and formidable revolving easterly winds in typhoon season. Lighting in the grounds of the houses is also emphasized.

### 5.5 Features of house- embracing trees

Table 5-1 presents the height and DBH of house-embracing Fukugi trees in Tonaki Island. About 1,676 trees for 7 houses were surveyed in Tonaki Island. The mean height of house-embracing trees ranged from 346 to 438cm. The mean DBH ranged from 8 to 11.5cm. The mean estimated age of surveyed trees ranged from 32 to 46 years. The frequencies of height and DBH are presented in Figs. 5-7 and 5-8. The majority of surveyed Fukugi trees were under 7m, with a DBH smaller than 30cm.

Due to transportation inconvenience and inclement natural climate, small island inhabitants have immigrated to the mainland of Okinawa and some houses have been abandoned and the embracing woods left uncared for. It is not rare that owners of newly built concrete houses with embracing trees trim the embracing trees for the reasons such as difficulty in cleaning fallen leaves and the pungent smelling fruits that litter the grounds. Thus, how to manage the habitat woods becomes an urgent issue to maintain the typical Feng Shui village landscape. In order to understand the appropriate maintenance for *Garcinia subelliptica* habitat wood, data collected at each survey site was split into two types, which represent well-kept and abandoned forest belts respectively. It is supposed that well-kept house owners have planted the trees in accordance with Feng Shui tradition and maintained and kept an appropriate regeneration of the forest belts around the house to achieve a proper density and a pleasant living environment. While, abandoned houses refer to those deserted by the house owners

over the past years or those that embracing trees are still too young to have proper management including thinning or selective cutting. Our surveyed House Nos. 1, 2, 3, and 4 are included in the former, while Nos. 5, 6, and 7 in the latter type. Nos. 6 and 7 are houses totally deserted. While house- embracing trees in No. 5 were assumed to be planted about 40 years ago which make them relatively young and in particular the eastern side is predominantly small trees. Thus No. 5 is also concluded to be an abandoned house.

Table 5-1 Descriptive data of house-embracing *Garcinia subelliptica* Merr. trees

	Area of Each House (m <sup>3</sup> )	Height (cm)		DBH (cm)		Eastimated Age (year)	
		Mean	Maximum	Mean	Maximum	Mean	Maximum
No. 1	440.3	464.2	934	10.6	43.4	42.5	173.5
No. 2	481.1	419.5	1170	11.5	39.3	45.8	157.2
No. 3	407.8	396.2	821	10.1	39.8	40.5	159.2
No. 4	497.3	438.1	682	10.1	26.1	40.3	104.4
No. 5	722.6	347.6	1024	8	44.6	31.8	178.4
No. 6	610.4	437	1232	10.6	43.2	42.5	172.8
No. 7	523.4	346.4	1372	8.4	44.8	33.4	179.2
Average	526.1	<b>407</b>	-	<b>9.9</b>		39.6	

①Age of a *Garcinia subelliptica* tree (year) = DBH (cm) ÷ 2 × 8 (Hirata 2006)

Table 5-2 Descriptive data for trees

	total trees (cm)	Wk. Trees (cm)	Ab. Trees (cm)
Mean of Height	399.1	432.6	376.4
Std. Dev. of Height	234.6	193.7	256.7
Mean of DBH	9.9	10.6	8.9
Std. Dev. of DBH	8.2	7.3	8.7

Note: Wk. refers to Well-kept house- embracing trees.

Ab. refers to abandoned house- embracing trees.





Photo 5-4 Fukugi trees line orderly in the back of No. 1 (1877) house



Photo 5-5 Fukugi woodlands in the abandoned No. 7 (1953) house

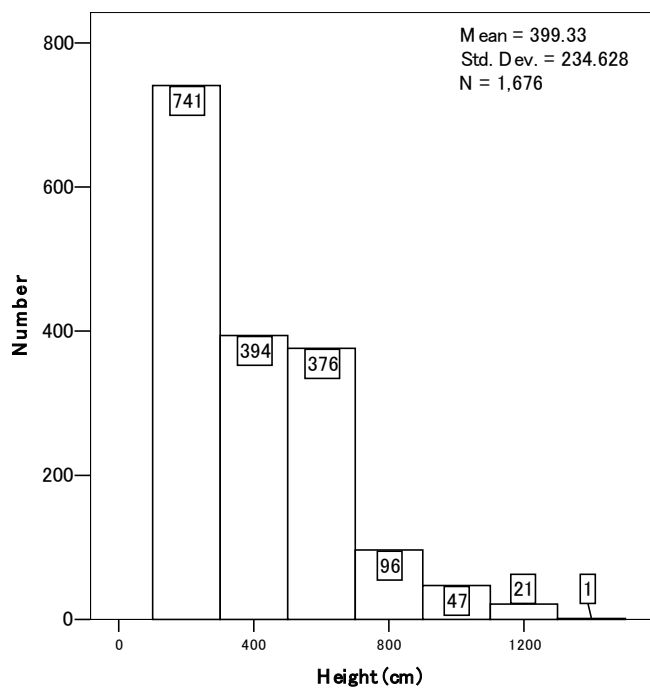


Fig.5-7 Frequency of the height of house-embracing Fukugi trees in Tonaki Island

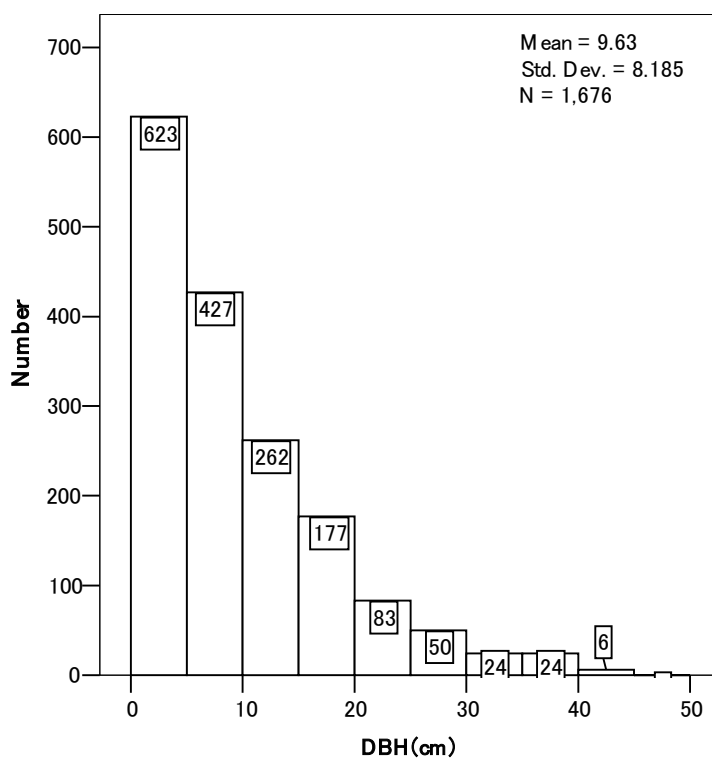


Fig.5-8 Frequency of DBH of house-embracing Fukugi trees in Tonaki Island

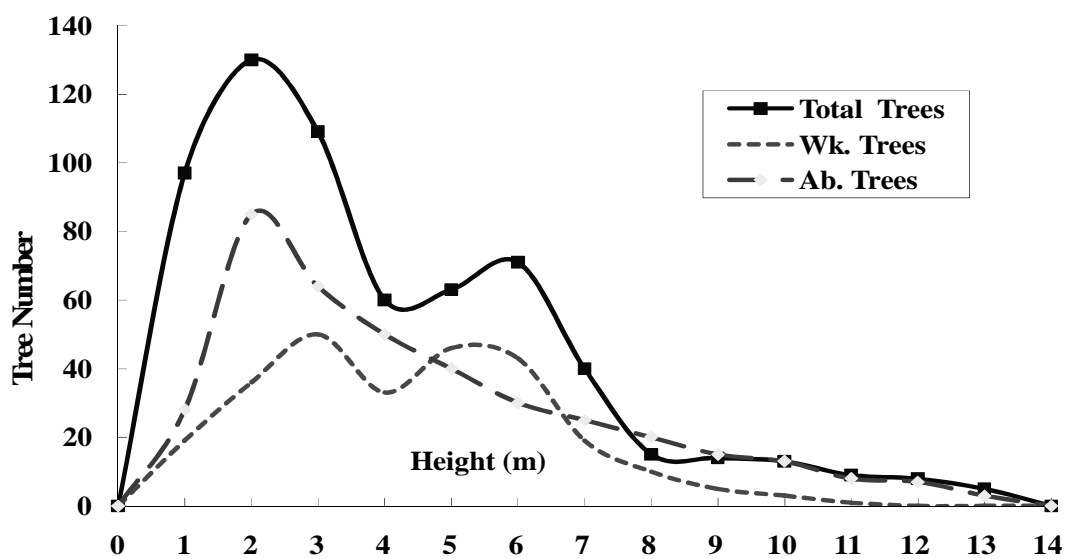


Fig. 5-9 A frequency distribution curve of the height of house- embracing trees

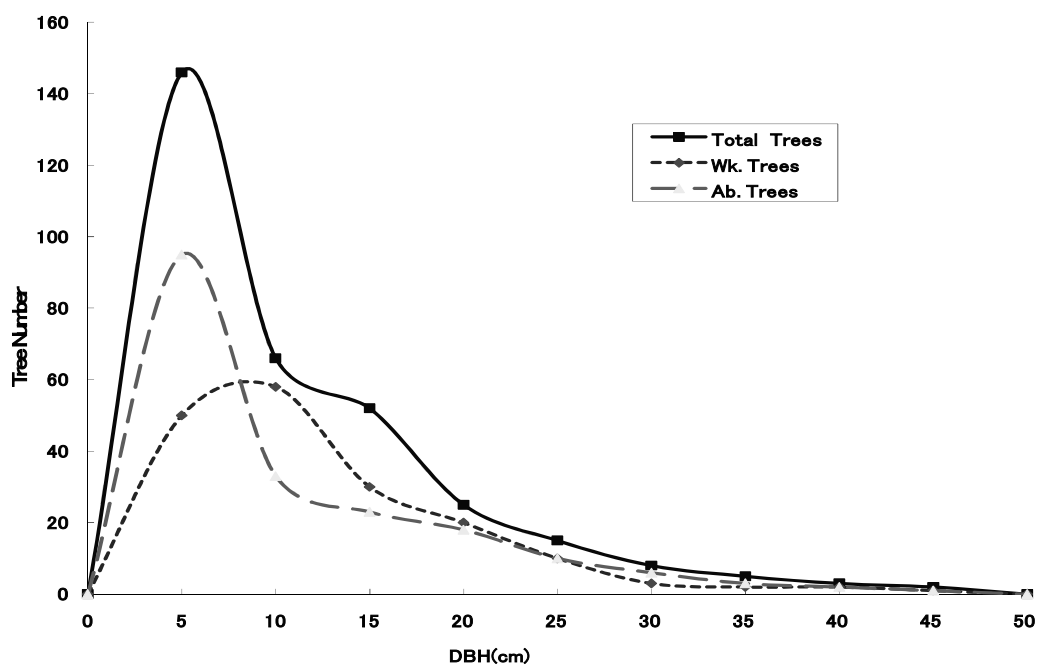


Fig. 5-10 A frequency distribution curve of DBH of house- embracing trees

Figures of frequency distribution curves for Height and DBH of trees taller than 1m (see Figs. 5-9, and 5-10) were created to observe the difference in the stand structure for well-kept and abandoned habitat trees. From table 5-2, we can see that mean value and standard deviation of Height for total samplings, well-kept house trees and abandoned house trees are 399.1cm, 234.6cm, 432.6cm and 193.7cm, 376.4cm and 256.7cm respectively. Mean value and standard deviation of DBH for 3 groups are 9.6cm, and 8.2cm, 10.6cm and 7.3cm, 8.9cm and 8.7cm respectively. From Fig.5-9, we can see that tree height of well-kept house trees mostly vary from 2m to 7m. While, trees around 2m for abandoned houses are an overwhelming majority. Fig. 5-9 show that the frequency distribution of the height of the total data has two peaks due to distribution of well-kept habitat trees. Well-kept habitat trees show two frequency peaks around 3m and 5.5m respectively. Based on the above mentioned supposition, we know that those well-kept house owners have cultivated the forest belts into two layers when the first planted trees have grown to a certain height, some mature trees were cut for various uses such as building houses, and at the same time saplings and new-born sprouts were kept to grow up into the lower storey of the forest belt. That the majority of trees in abandoned houses are around 2m shows that small trees occupy the deserted forest belt where no selective cutting or cleaning has been arranged and that seedlings have grown up and formed a clustered lower storey.

Accordingly, Fig. 5-10 shows that DBH of trees for well-kept and abandoned houses are concentrated around 10cm and 5cm respectively. For trees with a DBH greater than 15cm, the frequency is similar for both well-kept and abandoned houses. With selective cutting and periodic cleaning of the residence, trees of well-kept houses have reached a certain magnitude with a majority of DBH at 10cm. However, in the abandoned residences, clustered lower storey trees are found and without maintenance of the habitat for a long period the forest has nearly returned to its natural state. Fig. 5-11 shows the strong correlation between height and DBH for trees taller than 1m ( $R=0.703$ ).

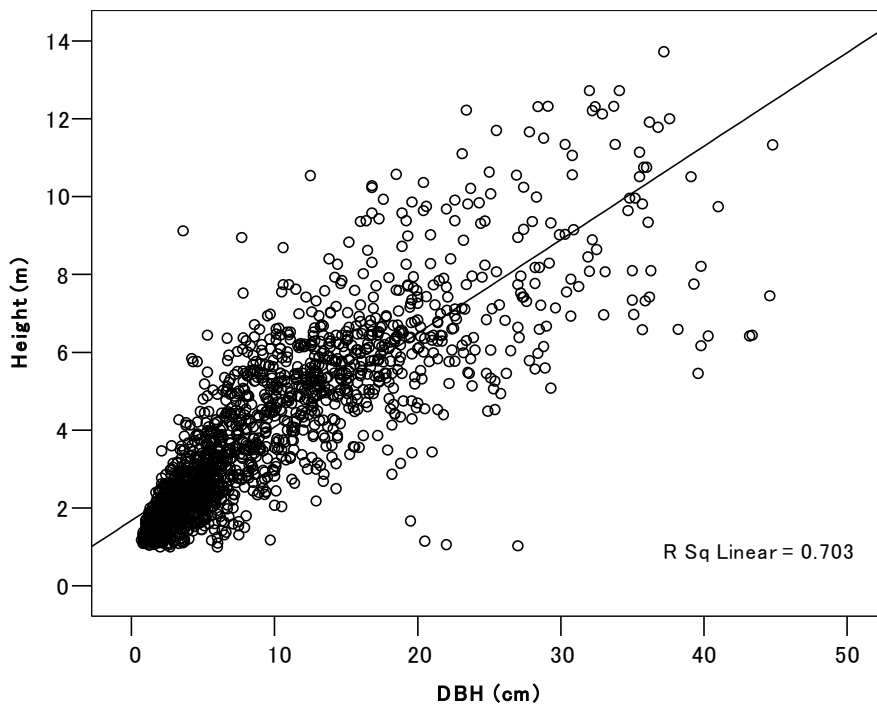


Fig. 5-11 Scatter plot of DBH vs. Height of all surveyed trees taller than 1m overlaid with the fitted line

I also calculated the total number of trees taller than 1m and the total area of sandy woodlands inside the rock wall fences for each survey house. Stand density was measured as 1.9, 1.8, 1.5, 1.3, 1.2, 1.2 and 1.5 trees per m<sup>2</sup> for houses from No. 1 to No. 7 (see fig. 5-12). We can read from the Figure that density ranges from 1.2 to 1.9 for all surveyed trees. As mentioned above, Nos.1 to 4 are defined as well-kept houses and Nos. 5 to Nos. 7 are abandoned houses. We found that density for abandoned houses is comparatively lower than well-kept houses due to the enlargement of the area of the sandy woodland (see Figs. 5-3, 5-5, and 5-6) caused by some parts of the rock walls collapsing and the trees sprouting in the grounds of deserted residences. For No. 1 and No. 2 (see figs. 5-2 and 5-3), trees are lined up in an orderly fashion inside the sandy woodlands and thus the woodland areas are relatively narrow and still leave a wide space surrounding the houses. But density of House No. 3 and No. 4 is exceptionally low, only accounting for 1.5 and 1.3 respectively. That is perhaps because No. 3 has two common tree lines including that in the rear and the west line is very short. Except for the

south tree line, No. 4 has three tree lines common with the adjacent houses. Density for common tree lines is relatively low due to the consideration of lighting and ventilation.

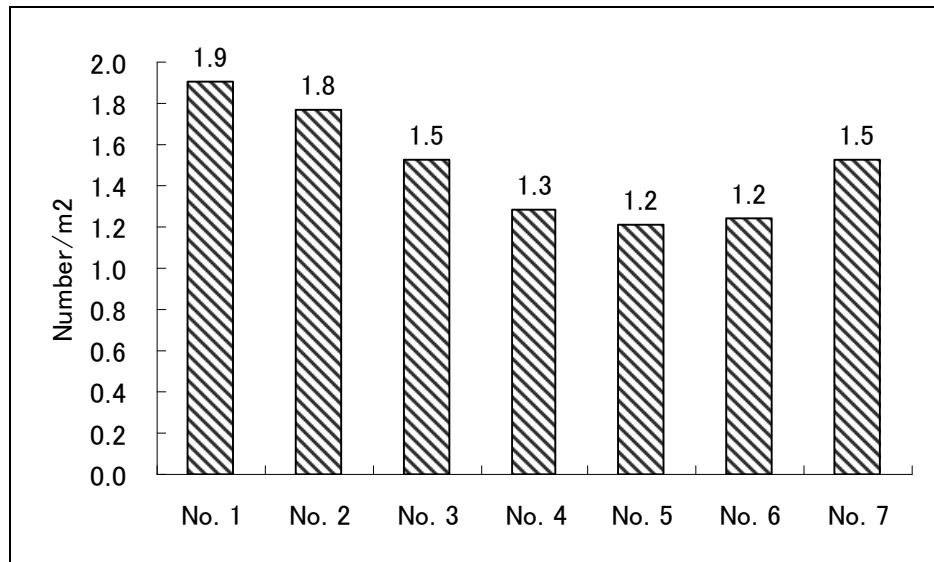


Fig. 5-12 Tree density by house

### 5.6 Regeneration of house-embracing trees

Tree sprouts and seedlings (see Table 5-3) were tallied in order to comprehend the regeneration management for house-embracing trees. Sprouts from the rootstock were counted as the total number of sprouting. Tree seedlings (<1m height) were also counted to record seedling abundance. Ratios of sprouting and seedlings are calculated here to index the comparative magnitude of sprout and seedling numbers. Ratio of sprouting and seedlings refer to the index value of total number of sprouting and seedlings divided by the total stand tree number ( $\geq 1\text{m}$  height) respectively. In this paper, I totaled the numbers of sprouts and seedlings in all surveyed well-kept and abandoned houses respectively. The measurement results are shown in Fig. 5-13. We can see that the number of seedlings in abandoned houses is much bigger than that of well-kept houses, accounting for 0.7 and 0.3 respectively. It is supposed that well-kept house owners have swept the house embracing woodlands from time to time to clean the fallen down fruits and unwanted small seedlings were also cleared to

Table 5-3 Density and regeneration of house-embracing *Garcinia subelliptica* trees

	Number ①	Density ②	Sprouting ③No.	Seedling ④ No.
No. 1	224	3.3	1034	52
No. 2	180	3	867	27
No. 3	149	3.1	69	59
No. 4	130	3	49	14
No. 5	405	3.1	216	39
No. 6	324	3.2	253	360
No. 7	264	2.8	176	280
Amount	1676	3.1	2664	831

① refers to the total number of *Garcinia subelliptica* trees taller than 1m

② = *Garcinia subelliptica* tree number/Length of *Garcinia subelliptica* tree Lines (m)

③refers to the sproutling grow from the rootstocks or from the cut stumps

④refers to the seedling lower than 1m.

maintain a ventilated lower storey. There are significantly more seedlings at the abandoned houses. This combined with the above-mentioned fact that stand trees lower around 1m-2m are the overwhelming majority, it is obvious that deserted woodlands have a thick lower storey in the absence of maintenance.

While, ratio of sprouts in well-kept house- embracing woods is higher than the abandoned residences accounting for 1.9 and 1.5 respectively (see Fig. 5-13), the difference is not so distinct. Sprouts can be divided into two types, one from the stumps and the other from the rootstock of stand trees taller than 1m. The former is connected strongly with regeneration, while it is difficult to tell any regeneration relationship for the latter. A higher sprout ratio for the well-kept houses shows that some mature trees have been selectively cut to build houses, which is why many sprouts are coming up from the stumps. It is suggested that well-kept residence woods have kept a good balance between the maintenance and utilization.



Photo 5-6 Sprouts from a stump left after the tree was cut and used to build a house.



Photo 5-7 Seedlings grown in the woods where fallen seeds were kept and planted



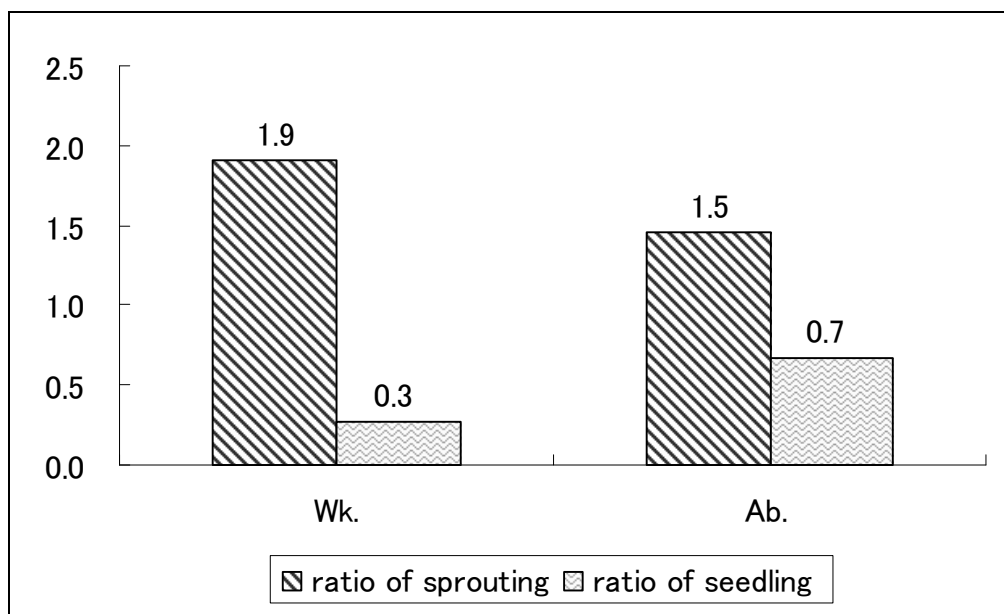


Fig. 5-13 Ratio of Sprouts and seedling of trees

### 5.7 The reasons of having selected Fukugi trees

Ryukyu Islands belong to a subtropical climate, and are endowed with a large number of tree species. But why people have chose Fukugi trees to plant around their houses in Ryukyu Islands. The historical record of formation of such a Fukugi village landscape is unclear. Thus, we can only assume that natural features may be the reason for their use as house-embracing woods. About 250 species belong to the *Garcinia* genus, and they are widely distributed in the tropics, in particular tropical Asia (Hatsushima, 1975). *Garcinia subelliptica* is only found naturally in the Philipines, Taiwan, and Yonaguni, Iriomote, and Ishigaki islands in Okinawa. Fukugi may have been introduced into the Ryukyus from Southeast Asia during the past 600 years (Walker, 1954: 226). The natural features of Fukugi are described in detail in *Important Trees of the Ryukyu Islands* by Walker Egbert H. (1954).

*Fukugi is a very distinctive small to medium-size slow-growing evergreen tree with dark gray to blackish, smooth, thick bark, numerous branches, and a narrow upright very dark green crown, the branchlets thick, stiff, 4-angled, green, glabrous. Leaves opposite, about*

12cm long, with a short thick petiole, the blade thick, leathery, glabrous, the lateral nerves about 15. Flowers in May to June, yellowish-white, unisexual, together or separate in fascicles on short thick clublike axillary braches, the pedicels about stamens 4 to 7 or perhaps more. Fruits in September to October, globose drupe about 2cm in diameter, smooth, firm-fleshy yellow when ripe, with 3 or 4 smooth brown seeds.

Yellowish-white, hard, close-grained, with numerous concentric white bands, which are slightly wavy and occasionally broken, with a beautiful silvery grain when cut radially.

People used to submerge the trunk in seawater near the beach for about one year as a mothproofing measure before it was used to build the traditional timber houses. A high-quality yellow dye may be obtained from the gum which exudes from the bark. The thick lubricous leaves were used as toilet paper. The fallen leaves were important for their use as fuel in an agricultural society with scarce resources. The various uses of *Garcinia subelliptica* trees can be given as the reason for their standing around the habitat. Recently, a new technology allows the development of wood yarn from *Garcinia subelliptica* to weave a handbag. It is expected that new products will be developed to meet new needs for natural products.

When the fruits of *Garcinia subelliptica* trees are ripening during July to September, thousands of bats come to the woodlands and feed on the ripe fruits. A *Garcinia subelliptica* tree is suitable for the sandy soil in the coastal area and impervious to sea water. Due to its natural features, it might be assumed that *Garcinia subelliptica* trees is one of the most suitable tree species for island landscape planning.

## 5.8 Summary

Houses encircled with *Garcinia subelliptica* house-embracing trees in the residence, are mostly south facing, which forms an ideal Feng Shui village structure on Tonaki Island. Forest belts in the northern and eastern borderline are much thicker were than those inside the village, which is greatly attributed to the strong cold northern wind in winter and the

destructive eastern wind during typhoon season. In general, two or more adjacent houses in transverse roads shape a habitat unit. Thus, usually there are one to three tree lines that are common with the neighboring house, with the exception of the southern line.

Seven houses with 1,676 trees were surveyed in Tonaki Island. The mean height of the surveyed house-embracing trees ranged from 346 to 438cm. The mean DBH ranged from 8 to 11.5cm. The mean estimated age of surveyed trees ranged from 32 to 46 years. The majority of surveyed Fukugi trees were under 7m, with a DBH smaller than 30cm.

Mean value and standard deviation of well-kept house trees and abandoned house trees are 432.6cm and 193.7cm, 376.4cm and 256.7cm respectively. Mean value and standard deviation of DBH for well-kept houses and abandoned houses are 10.6cm and 7.3cm, 8.9cm and 8.7cm respectively. Stand trees for well-kept houses appear as two storied structures with two frequency peaks around 3m and 5.5m, while trees around 2m in abandoned residences are an overwhelming majority. DBH for the majority of trees in well-kept and abandoned houses are 10cm and 5cm respectively. The difference in the distribution of trees in the two types suggests that trees have been selectively cut for several uses when the forests became mature and seedlings have been cultivated into a lower story in the well-kept house woodlands. It appears that there has been no thinning or cleaning arranged in the past decades in those abandoned house embracing trees.

It was found that tree density in well-kept houses is higher than that in abandoned houses. Because trees in well-kept houses are lined up in an orderly fashion inside the sandy woodlands, the woodland areas are relatively narrow and leave a wide space surrounding the houses. Abandoned residences have a relatively lower density due to an expanding woodland area with the desertion of the residence and collapse of some rock walls. Seedling ratio for abandoned houses is higher than that of well-kept houses, while it is opposite for sprout ratio. It is assumed that well-kept house-embracing woodlands have been cleaned from time to time to weed out fallen ripe fruits and unwanted seedlings, while trees in the abandoned houses have not been maintained for a long time and the forests have returned to a nearly natural state.

## **CHAPTER VI**

### **HOUSE-EMBRACING FUKUGI TREES IN BISE VILLAGE**

#### **6.1 Introduction**

The traditional village landscape of Fukugi house-embracing trees in Okinawa islands shapes the pleasant living environment in the subtropical monsoon regions which features frequent occurrences of typhoons. Houses scatter in well-ordered blocks that were separated by intersecting roads. Circled with Fukugi house-embracing trees on the property, houses in Bise village are mostly south facing, and usually have open places in the front, which forms an ideal Feng Shui village structure.

A lot of recent studies on the traditional village in Okinawa islands are from the perspective of architecture. Nakama and Koki (2002) studied on the inhabitants' consciousness of embracing Fukugi trees in Bise village. However, the layout of village houses and the actual structure of Fukugi trees enclosing the houses are little studied. We surveyed the house-embracing trees on Tonaki Island and summarized some features of the Fukugi layout in Chapter 5. Bise village in the northern part of Okinawa Island is the most typical case of the house-embracing trees. About 70% of the houses in Bise village were circled by Fukugi trees (Sakamoto 1989), comparing to 80% of the houses were circled by Fukugi trees in 1970. The house-embracing Fukugi trees in Bise village were surveyed in order to clarify the present structure (distribution, size, and density etc.) of the trees in the traditional planned Feng Shui village.

Bise village (See fig. 6-1) is located in the northern part of Okinawa Island at lat. 26°42' North and long. 127°53' East. Bise village (See Photos 6-1 and 6-2) is an arc-like protruding part in Motobu peninsula, facing the ocean in the west. Bise village has a long coastal line extending from southwest to northwest. The population of the village was 572 (October 2006). Among them, 180 were over 65 years old, accounted for about 1/3 of the total population.

Major industries were agriculture and fishery.

Bise village was built with blocks divided by a grid of roads. The roads are running north-south and east-west. The roads intersect approximately at right angles. Houses scatter in the blocks. Circled with Fukugi house-embracing trees on the property (see Photos 6-3 and 6-4), houses in Bise village are mostly south facing, and usually have an open place in the south. It is recorded that first the sandy soil was excavated to build a house. The excavated sand was piled surrounding the property and the stones were also laid to stop the sand. Then Fukugi trees were began to be planted. It was said that the sand fence enclosed by the stones were very helpful to the growth of Fukugi trees. Thus a view of a traditional house about 50cm lower than the roads came into being in Okinawa Islands. The traditional village landscape embodies the harmony of the nature and man.

However, a lot of the house-embracing trees lost during the World War II. Recently the habitants cut the trees with the change of life style. Some people built concrete houses and house-embracing trees are considered useless. A large number of young people left their homes in Okinawa islands to work in the big cities since the return of Okinawa to Japan in 1972. Difficulty of woodland maintenance is another major reason for these aged to cut trees.

Concerning the layout of village houses, it was found that one to four adjacent houses form a block inside interlacing village roads. I classify house layout into four types according to the number of parts separated by Fukugi tree line in a block. In order to clarify the actual stand structure of house-embracing trees, first every stand tree taller than 1m was numbered and then height and diameter at breast height (DBH) were measured and recorded. We also recorded the location of every tree in the woodland. We reproduced the actual layout and of trees with HO CAD software in the figures. The size of every tree was drawn in circles of different size on basis of their DBH. Five resident units of 3 types (see fig. 6-2), accounting for about 1,763 Fukugi trees were surveyed in Bise village.

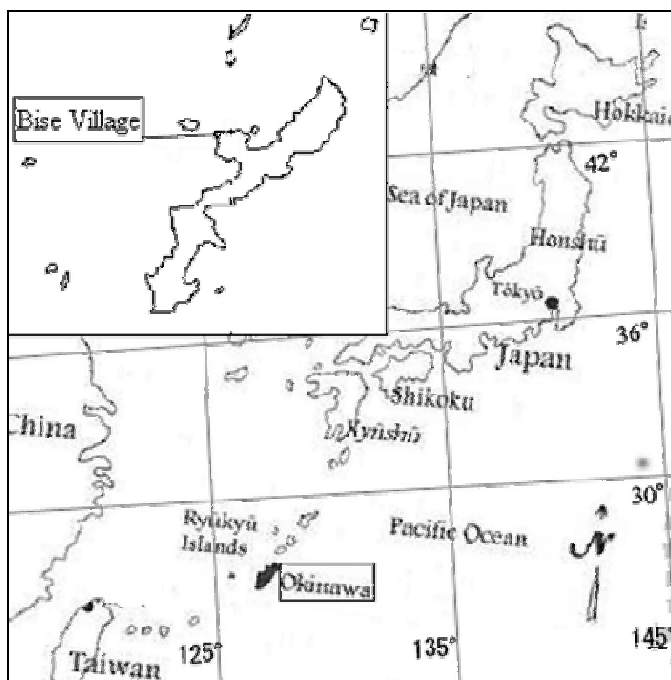


Fig. 6-1 Location of Bise village



Photo 6-1 An aerial photo of Bise Village

Source: Google earth

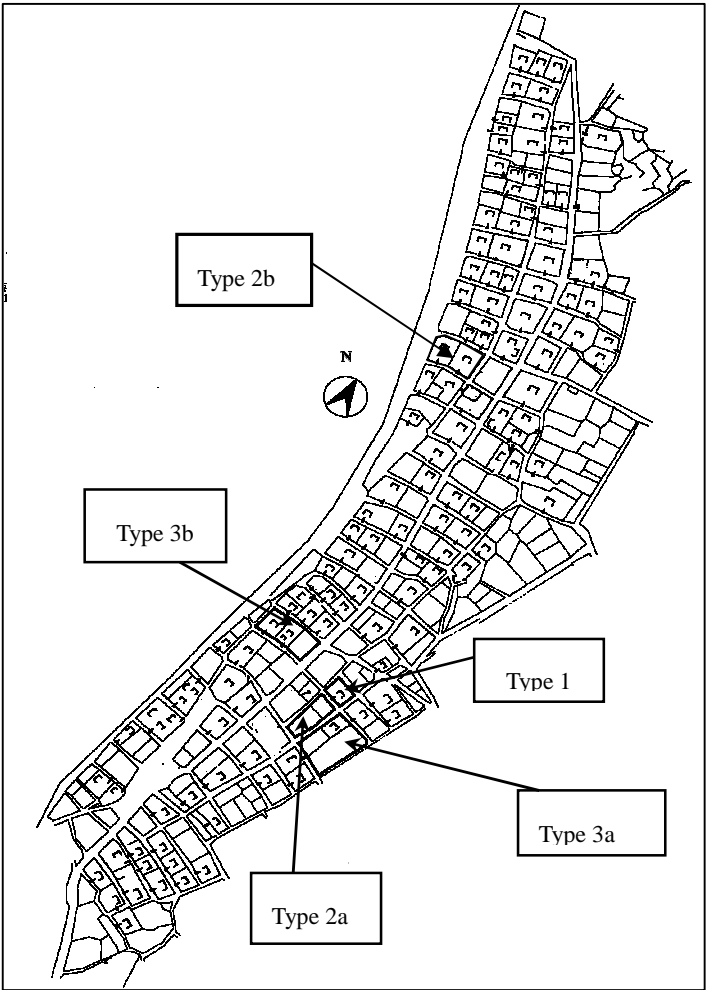


Fig. 6-2 Location of survey sites

Source: *Village landscape in Okinawa* (Sakamoto)



Photo 6-2 An overlook picture of Bise village



Photo 6-3 A well ordered tree line inside the village





Photo 6-4 The view of house-embracing Fukugi trees from the entrance to a house

## 6.2 The general layout

A grid of roads and house-embracing trees are the most distinct features in Bise village. It is assumed that such a grid planned village did not appear until 1737 (Nakamatsu, 1977). Some other researchers also argued that such a grid village might exist before 1737. Nakamatsu's assumption accepted in this research.

The breadths of habitat woodlands were different. Most habitat woodlands inside the village are in a well ordered line. In contrast, Fukugi woodlands near the coastal line or in the northern direction are usually laid out in two or more lines. It may be because the houses near the coast suffer from much stronger seasonal winds than those inside the village.

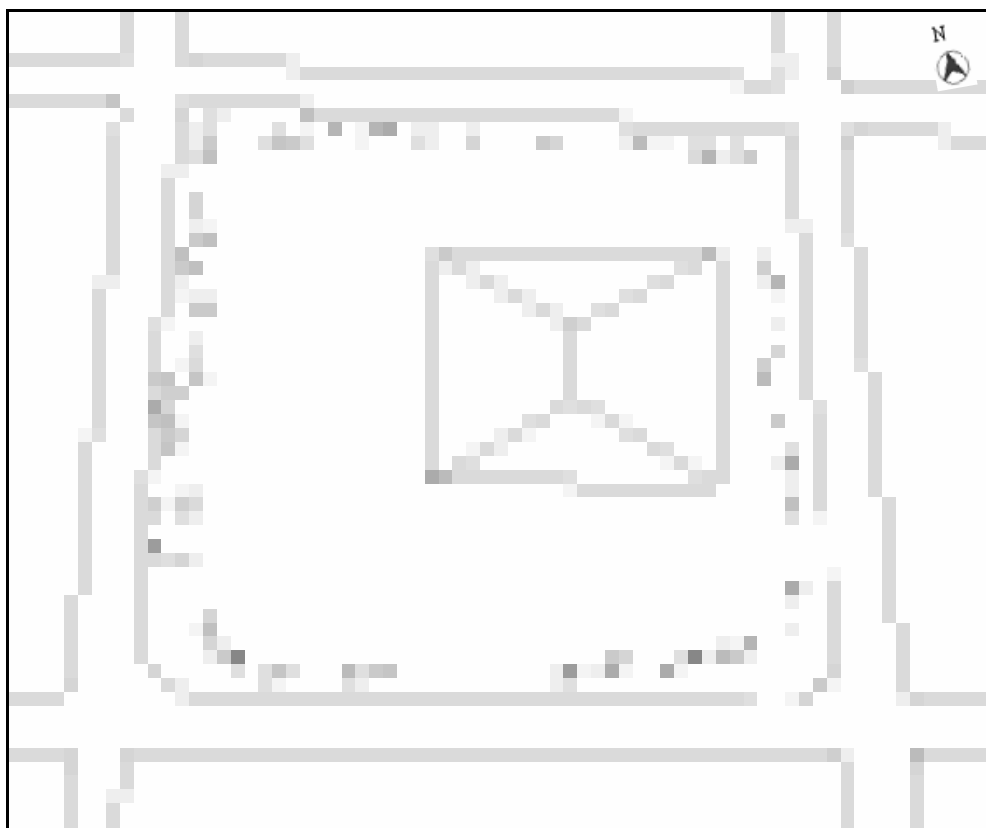


Fig. 6-3 House-embracing tree distribution in Type 1 in Bise Village

Scale=1:300

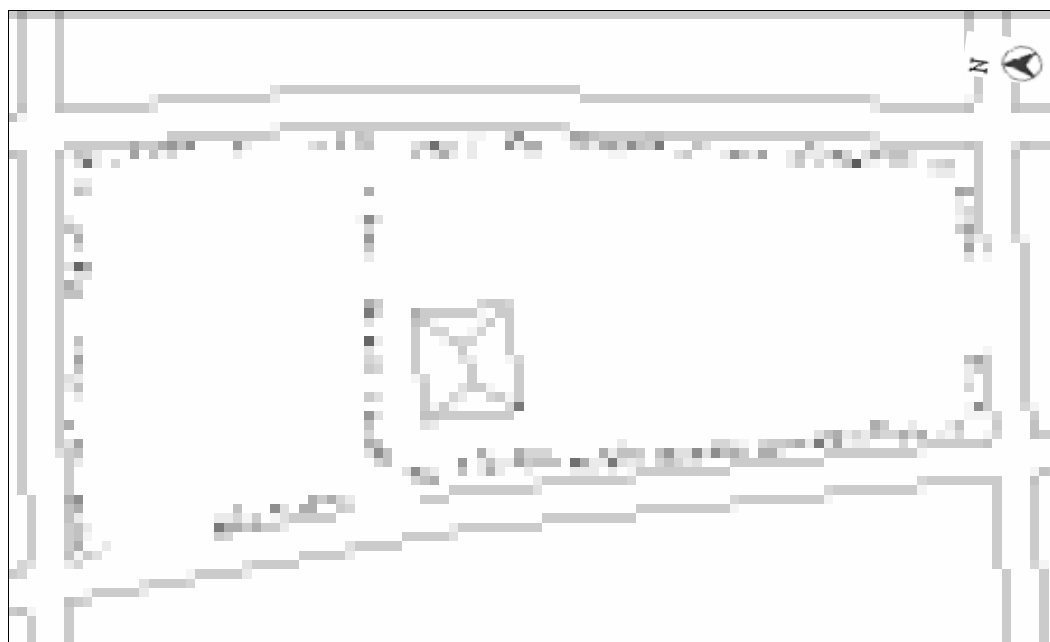


Fig. 6-4 House-embracing tree distribution in Type 2a in Bise Village

Scale=1:400

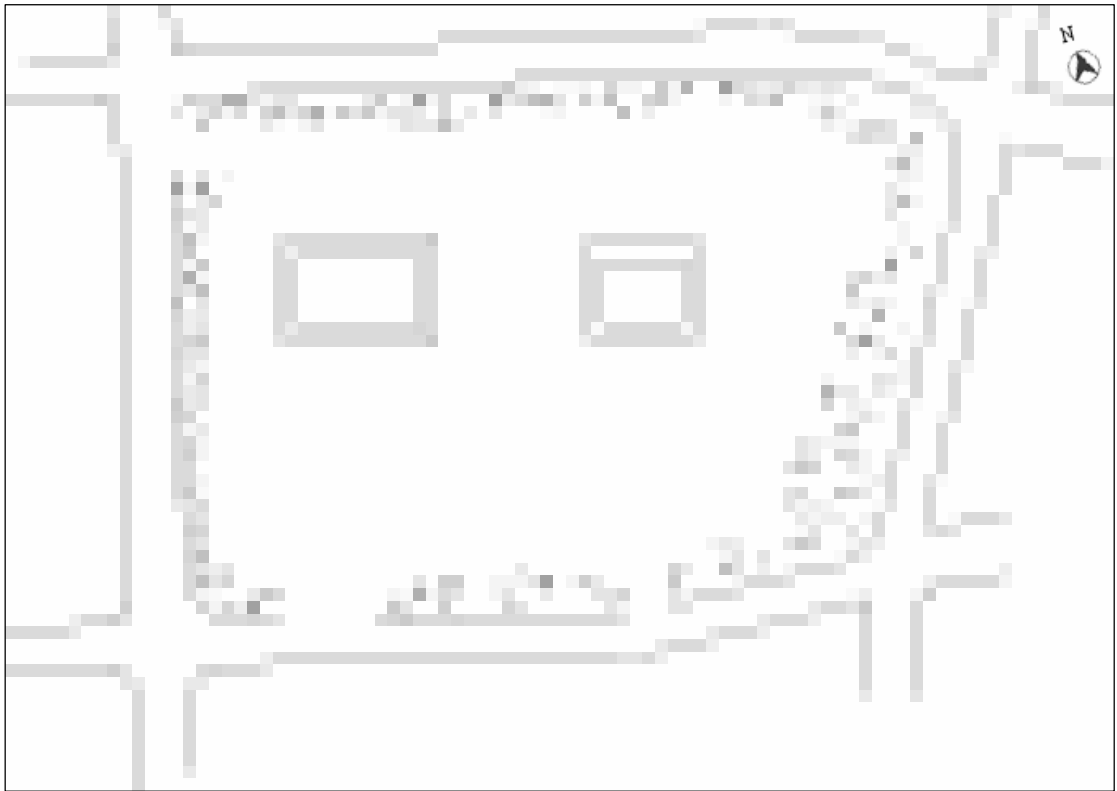


Fig. 6-5 House-embracing tree distribution in Type 2b in Bise Village

Scale: 1:400

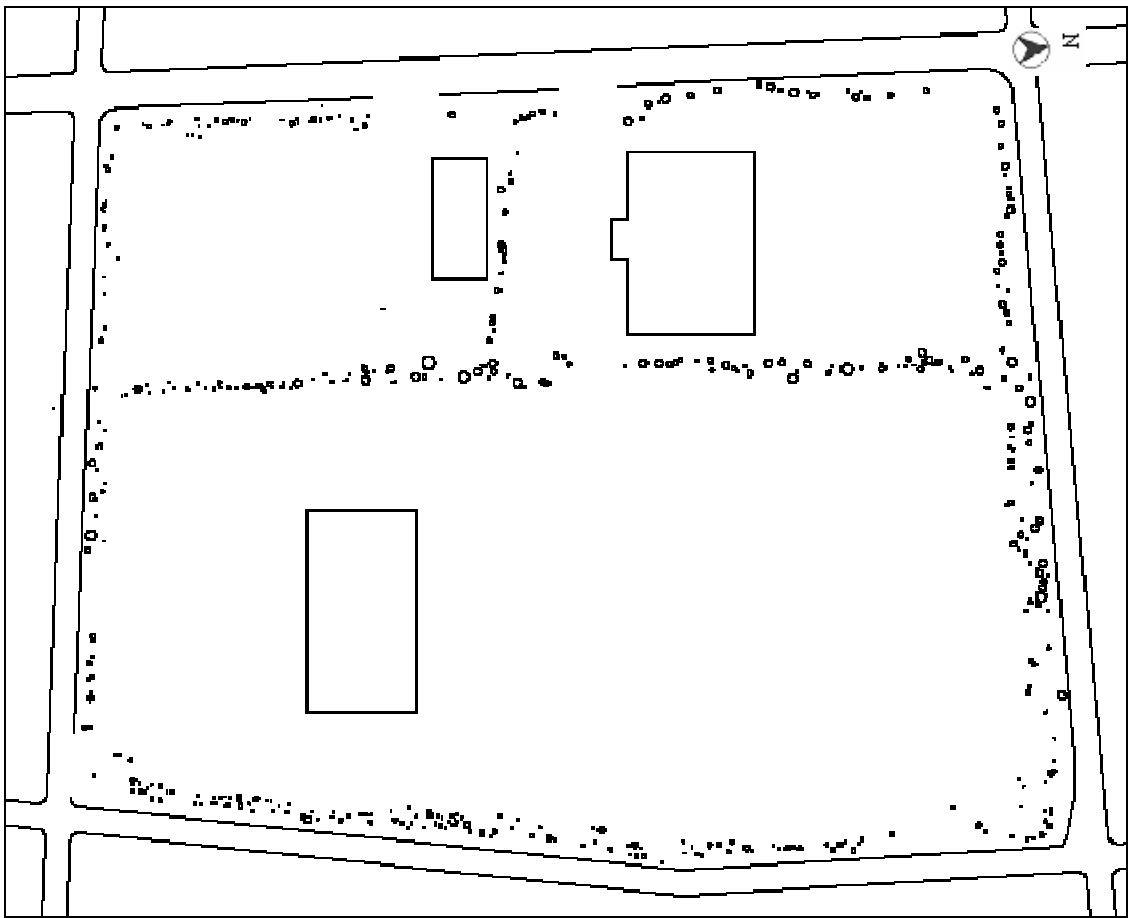


Fig. 6-6 House-embracing tree distribution in Type 3a in Bise Village

Scale=1:400

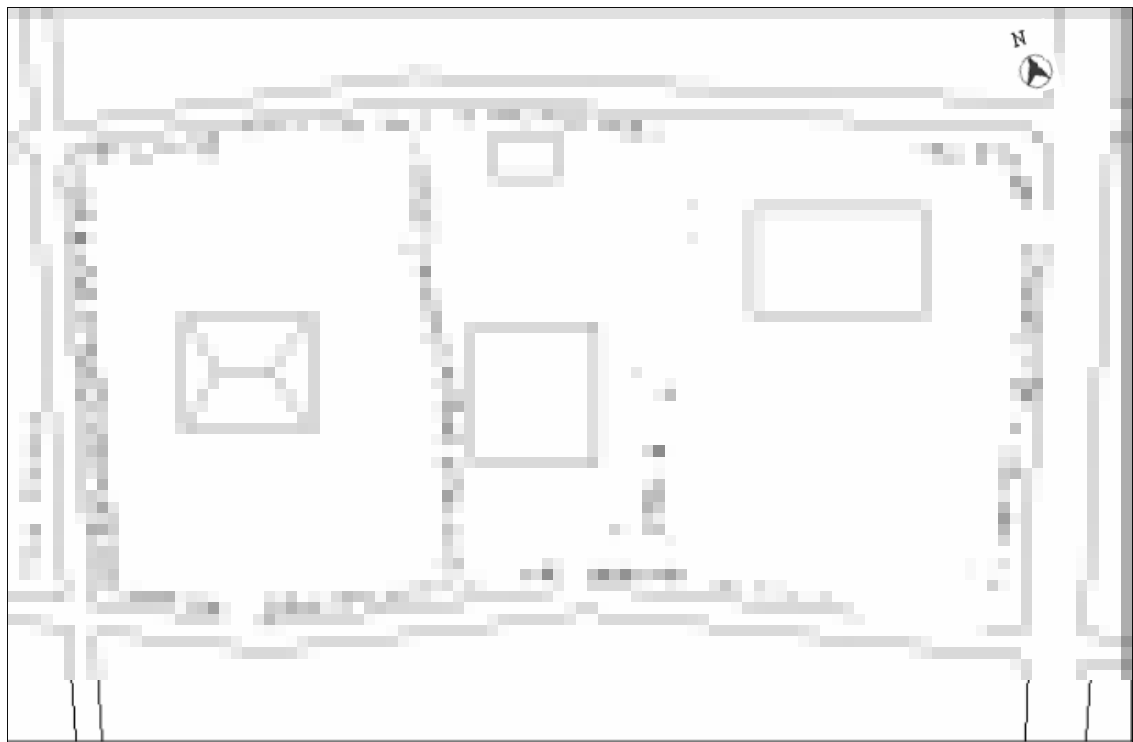


Fig. 6-7 House-embracing tree distribution in Type 3b in Bise Village

Scale=1:400

Table 6-1 Descriptive data by types

	Total amount	Height (cm)		DBH (cm)		Estimated age of the tree (year)	
		Mean	Maximum	Mean	Maximum	Mean	Maximum
Type 1	137	626.7	1470	16.5	53.1	66	212
Type 2a	300	560.8	1830	14.7	55.5	59	222
Type 2b	519	454.1	1605	9.8	63	39	252
Type 3a	547	587	1760	14	66.5	56	266
Type 3b	779	432.9	1280	8.9	60.3	36	241
Total	2282	503.1	1830	11.5	66.5	46	266

In order to clarify the actual layout of Fukugi trees, I considered the houses inside a block which is surrounded by the roads as a residence unit. Most residence units were shaped like a square or a trapezium. I must point out that all blocks in the so-called Go Board Pattern roads differ very much in size. In general, there were one to four parts inside a residence unit. Four types of residence units were summarized according to the numbers of the parts inside a residence unit. Type 1 (see fig. 6-3) refers to a residence unit which had only one part. Types 2 (see figs. 6-4 and 6-5), 3 (see figs. 6-6 and 6-7), and 4 refer to the residence units which had two, three, and four parts respectively. The number of the parts was only counted for those that were separated by currently existing Fukugi tree lines, or by the numbers of houses.

It was said that sometimes a branch family was established nearby when the son was married, but no trees were built as a separating line (see type 2a, in which the part in the south is much bigger than that in the north). It was found that Types 1, 2 and 3 were the most cases in Bise village. For example, I counted Type 3a as three parts that were separated by the existing tree lines. No matter how many branch parts there were before. In contrast, Type 4 was relatively rare. We chose to survey on Types 1, 2 and 3. I neglected Type 4 since Type 4 was very rare. It might be assumed that one to three parts were first planned in each block, and then new houses were built nearby because a block more than 3 parts were only found in the borderline of the village.

### **6.3 Analysis by type**

The general features of all five residence units surveyed are showed as Tables 1 and 2. We surveyed all 2282 stand trees in five residence units. Table 1 shows that the total number of Fukugi trees differs a lot because the size of the residence unit differs. Among all residence units we surveyed, Type 1 has the smallest area of 518.8m<sup>2</sup>. And Type 3a has the largest area of 2094.6 m<sup>2</sup>. Types 1, 2a, 2b, 3a, and 3b had the total tree number of 137, 300, 519, 547, and 779 respectively.

Table 1 also shows the size of trees in every surveyed residence unit. Mean heights for

Types 1, 2a, 2b, 3a, and 3b were 626.7cm, 560.8cm, 454cm, 587cm and 432.9cm respectively. The maximum height for all four survey units were 1470cm, 1830cm, 1605cm, 1760cm, and 1280cm respectively. The mean DBHs were 16.5cm, 14.7cm, 9.8cm, 14cm, and 8.9cm respectively. The maximum DBHs were 53.1cm, 55.5cm, 63cm, 66.5cm, and 60.3cm respectively. We know from table 1 that the size of trees in Types 1, 2a, and 3a were of no large difference. But the trees in Types 2b and 3b were relatively younger. Types 1, 2, and 3a are located in the center of the village, where the village was first established. But the eastern part of Types 2b and 3b are adjacent to the coast, where is newly developed. In a word, the trees were of different size not only among the woodlands in the same residence unit, but also from different residence unit.

It can be inferred that the origin of the village through the sizes of Fukugi trees. The area with existing oldest Fukugi trees in the centre could be assumed as the origin of the village. With the increase of the population, the village extended to the area nearby the coastal line. Our survey result on the height and DBH of the Fukugi trees could prove the above mentioned assumption.

#### **6.4 Density and Regeneration**

The tree number in every meter of the Fukugi woodland was calculated and shown as the density of trees in table 6-2. There were about 1.6, 2.1 3.6, 2.2, and 3.6 trees in every meter of the woodlands in Types 1, 2a, 2b, 3a and 3b respectively. The mean density for all four surveyed residence units was about 2.7. The density in Types 2b and 3b are about 1.5 time of the average value. It was because that the eastern side of Types 2b and 3b are nearby the coast and the trees were relatively young and the tree lines were thick.

Table 6-2 Density of Embracing trees

	Area (m <sup>2</sup> )①	Perimeter (m)②	Tree number ③	Density ④	Number of sprouts	Number of seedlings	Number of stumps	Number of sprouts from the stumps
Type 1	518.8	87	137	1.6	195	17	1	6
Type 2a	855.3	127.5	263	2.1	345	88	18	123
Type 2b	1387	144.5	519	3.6	1133	157	70	686
Type 3a	2094.6	177.2	392	2.2	260	169	25	163
Type 3b	1465.9	154.7	551	3.6	415	213	34	74
Total	-	546.4	1343	2.7	-	-	-	-

Note: ①is the area of each residence unit surveyed. ②is the perimeter of each residence unit.

③refers to the number of the trees taller than 1m. ④= Tree number③÷the perimeter(m)②

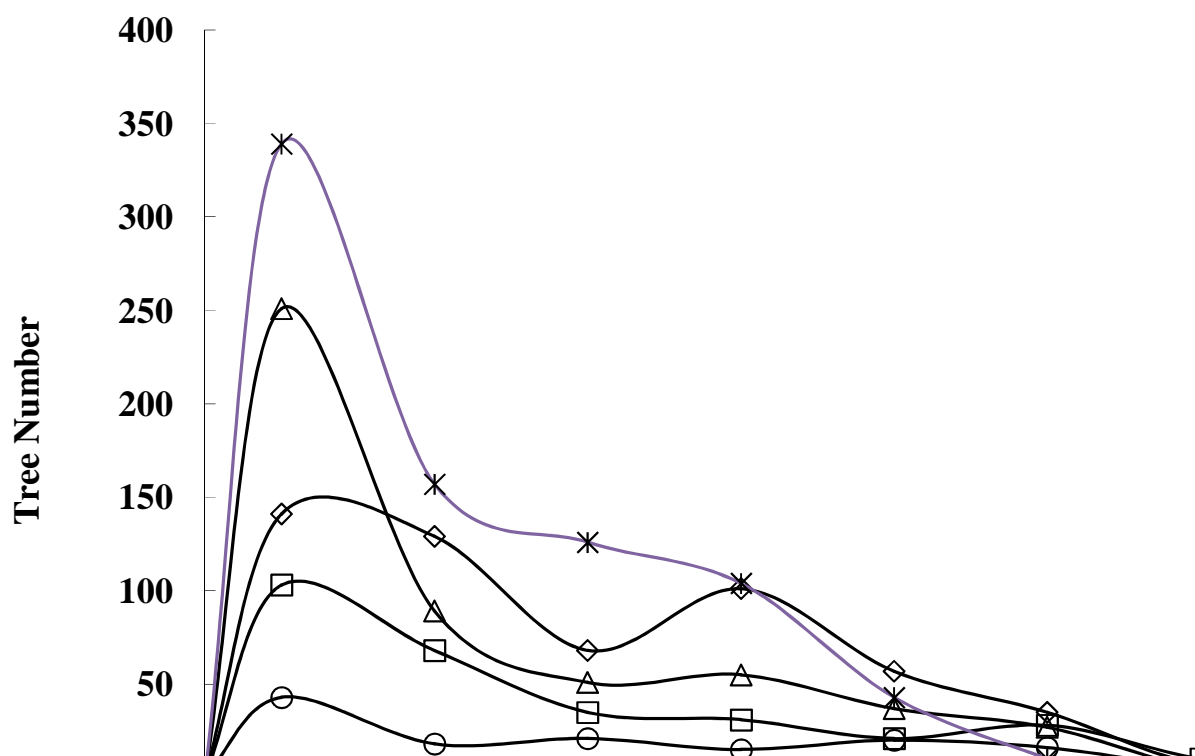


Fig. 6-8 A frequency distribution curve of height of house-embracing trees



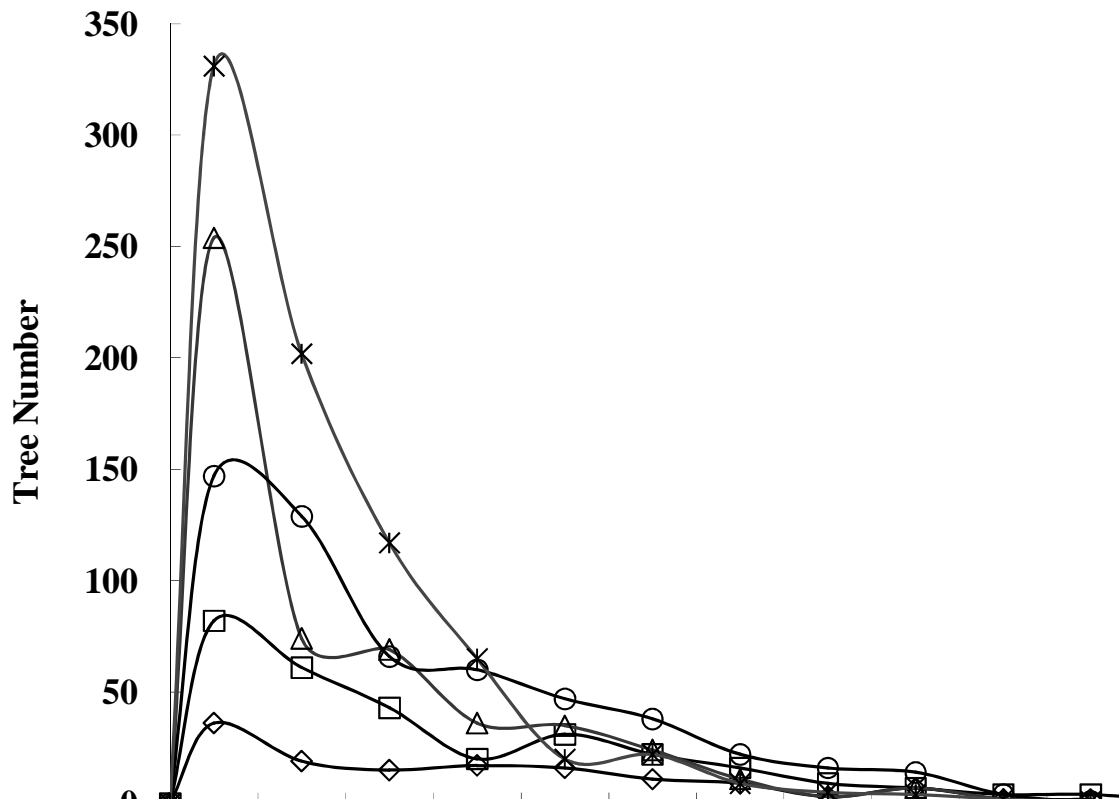


Fig. 6-9 A frequency distribution curve of DBH of house-embracing trees

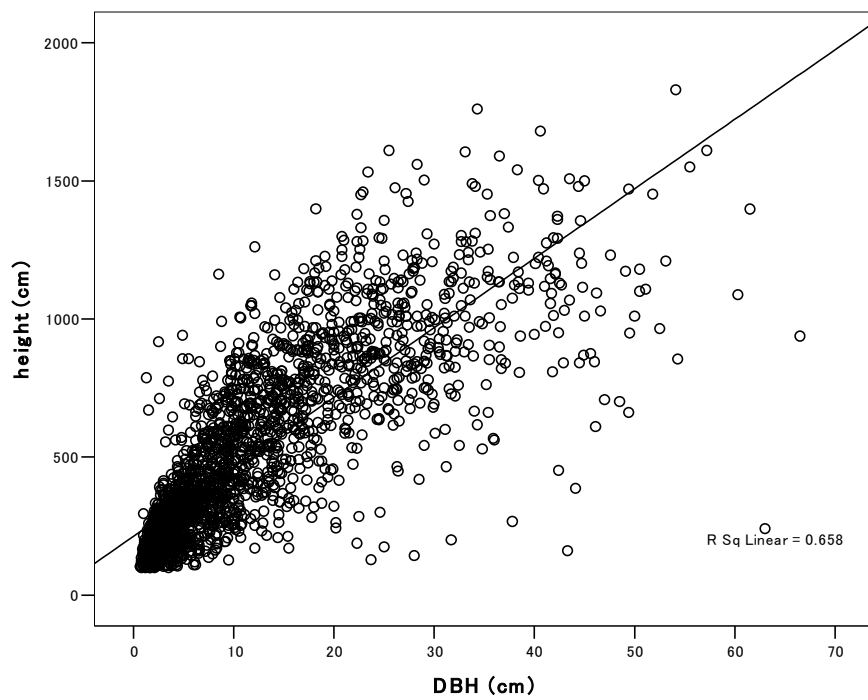


Fig. 6-10 Scatter plot of DBH vs. height of all survey trees taller than 1m overlaid with the fitted line

Figs. 6-8 and 6-9 show the distribution of height and DBH of house-embracing trees. The frequency distribution tendency of height is of no large difference with that of DBH. The majority of habitat Fukugi trees were under 9m of height, and 15cm of DBH. In fig. 6-8, we can see a peak of the height distribution curve of 1-3m. In fig. 6-9, there is a peak of the DBH distribution curve of 0-5cm. In a word, there are a large number of lower storey trees inside the habitat woods, while the house-embracing Fukugi trees have the appearance of 9m height since an overwhelming majority was less than 9m.

It was found out that the height and DBH distribution curves of Fukugi trees are smoother in Type 1, which means that trees were almost equally distributed. It maybe because that Type 1 is located in the center of the village and other neighboring Fukugi trees also provide Type 1 house with a good protection from typhoons and winter winds. A good maintenance of the woodlands attributes to the less under storey trees.

In contrast, house-embracing trees in Types 2b, 3a and 3b both have a frequency distribution peak of 1-3m of height and 0-5cm of DBH. The frequency peak suggests a dense distribution of lower storey in these three blocks. The locations of these three houses might be a good explanation of such a distribution peak. As is shown in Fig. 6-6, the north east side of Type 3a is in the borderline of the village and is exposed to the strong chilly winter. Our field survey also found very thick Fuguki woods, in particular in northeast side. As is above mentioned, the east side of Types 2b and 3b are facing the ocean, a thick woods of several lines seems necessary to protect the houses from strong typhoons.

As is shown in Figs, 6-8 and 6-9, Distribution curves of Type 2a are not as smooth as Type 1. But it is obvious that the share of the lower storey trees lower than 3m and smaller than 5cm of DBH are not as large as Types 2b, 3a and 3b. It may be because Type 2 is also in the center of the village and under the protection of neighboring woods. But being abandoned by the owners and being lack of routine maintenance may be attributed to the large number of

under storey trees. But the maintenance from time to time by visiting owners keeps Type 2a a better condition than Types 3a and 3b.

Fig. 6-10 shows the correlation between height and DBH for trees taller than 1m ( $R=0.658$ ). From Fig. 6-10, we can see a very large number of lower storey in all surveyed woodlands. The correlation is not so strong maybe because of thinning of planted Fukugi trees in the history.

The numbers of sprouts and seedlings (see table 6-2) were also counted to analyze tree regeneration. As mentioned in Chapter 5, sprouts refer to those from the rootstock of trees taller than 1m and from stumps (see photo 5-6). Sprouts from the rootstock and the stumps were counted respectively. Small trees less than 1m were counted as seedlings (see photo 5-7).

We found a lot of seedlings in the Fukugi woodlands in Types 2a, 2b, 3a and 3b. There were only 17 seedlings in Type 1; but there were 88, 157, 169, 213 seedlings in Type 2a, 2b, 3a, and 3b respectively. A family still lives in Type 1, and the housewife cleans the grounds almost every day. The frequent cleaning might explain the reason of few seedlings. In most parts of Types 2a, 2b, 3a and 3b, the grounds were seldom cleaned due to the following reasons: the houses did not exist; the houses were abandoned; the houses were leased or visited only a few days in a year. Quite a few of stumps were also found. The number of stumps found in Type 1, 2a, 2b, 3a and 3b were 1, 18, 70, 25 and 34 respectively. The sprouts from the stumps for the four surveyed residence units were 6, 123, 686, 163 and 74 respectively. It might be because the stumps in Types 2a, 2b, and 3a were generally bigger. It could be assumed that the mature trees were cut in the woodlands of Type 2 and 3a. In contrast, the stumps in Type 3b were small. It could be assumed that selective cutting was done when the woods were young. People practiced thinning and cut some mature trees and some seedlings were kept to grow up.

## **6.5 Estimated Age of Trees**

It is obvious that the ages of Fukugi trees relate strongly to the history of the village. The annual ring of a Fukugi tree is very hard to count. But the oral and literature records lacks of precision. Here we used the formula [Age of a tree (year) = DBH (cm)  $\div$  2  $\times$  8] by Hirata (2006) to estimate the age of surveyed trees. According to the formula by Hirata, the mean ages of Types 1, 2a, 2b, 3a, and 3b were estimated to be 66, 59, 39, 56, and 36 respectively; the maximum ages were 212, 222, 252, 266, and 241 respectively. The estimated ages of the Fukugi trees also prove that trees were not of the same size as assumed, but of difference in tree age. Such a structure of different size of trees has formed as a result of continuous uses and regeneration in the history.

## 6.6 Summary

Well-ordered intersecting roads and Fukugi embracing trees are the most distinct features in Bise village. Circled with *Garcinia subelliptica* house-embracing trees on the property, houses in Bise village are mostly south facing, which forms an ideal Feng Shui village structure.

It was found out that most habitat woodlands inside the village are in a well ordered line. In contrast, *Garcinia subelliptica* woodlands near the coastal line are usually laid out in two or more lines. It may be because the houses near the coast suffered from much stronger seasonal winds than those inside the village.

Four types of residence units were summarized according to the numbers of the parts inside a residence unit. Type 2 and Type 3 were the most cases in Bise village. In contrast, Type 4 was relatively rare. It might be assumed that one to three parts were first planned and then new houses were built nearby since a block which has more than 3 parts was only found in the borderline of the village.

The total numbers of *Garcinia subelliptica* trees range from 137 to 779 because the size of the residence unit differs. There were about 1.6, 2.1, 2.7, 2.2, and 3.6 trees in every meter of the woodlands in Types 1, 2a, 2b, 3a and 3b respectively. The mean density for all four surveyed residence units was about 2.7.

DBH of all surveyed trees ranged from 1cm to 66.5cm with the mean value of 11.5cm. The mean DBHs in Type 1, 2a, 2b, 3a and 3b were 16.5cm, 14.7cm, 9.8cm, 14cm, and 8.9cm respectively. The maximum DBHs were 53.1cm, 55.5cm, 63cm, 66.5cm, and 60.3cm respectively. DBH of the oldest tree survey was 66.5cm, which was estimated as 266 years old. The mean ages of Types 1, 2a, 2b, 3a, and 3b were estimated to be 66, 59, 39, 56, and 36 respectively. The size of Fukugi trees which were taller than 1m was very diverse. We also found a lot of seedlings that were less than 1m and quite a few of stumps in the Fukugi tree lines.

Thus, it might be assumed that people practiced thinning and cut some mature trees, and some seedlings were kept to grow up. The area with existing oldest Fukugi trees in the centre could be assumed as the origin of the village. With the increase of the population, the village extended to the area nearby the coastal line.

Concerning the maintenance, the Association of the Youth in the village was in charge of regular pruning before World War II. It was the customary for the pupils to clean the roads before school. At present, the local group of women cleans in the village twice a year. The cleaning inside a habitat is in the charge of the owner. In a word, Fukugi house-embracing trees have been under a collective maintenance. However, such a collective maintenance system collapsed with the advent of an ageing society, the increase of abandoned houses. Thus, it is our future issue to discuss further on the proper maintenance of Fukugi house-embracing trees in the traditional village.

## **CHAPTER VII**

### **CONCLUSION**

Human activities have transformed the environment and landscape dramatically. The Rio Declaration on Environment and Development in Earth Summit 1992 indicates a global concern for the symbiosis of the environment and man. Feng Shui, undoubtedly, is one of the most common research foci recently, because few ideas in the world are more closely related to the natural environment-humanity relationship than Chinese geomancy (Yoon, 2003; 2006)

Feng Shui is a traditional art related to landscape management. Feng Shui originated in mainland China and then expanded to other regions in East Asia. It has been applied to build capital cities, village landscape, and graveyards. The Form school concerns the physical form of the site under consideration and its surrounding environment. An ideal Feng Shui landscape must have the true Dragon Vein covered with lush greenery, surrounding Sha hills, namely Black Tortoise in the back, Azure Dragon in the left, White Tiger in the right and Red Bird in the front, and a meandering water flow into the site.

Feng Shui practice is based on empirical observations of the surrounding landform. Its ultimate goal is to achieve the harmony between man and the nature. Feng Shui offers a principled but highly flexible code (Michell, 1973). It has been applied to different topographies in mountainous areas, in the plain, and even in small islands. A Feng Shui village landscape embodies a biological significance and the harmonious coexistence between the environment and man. A Feng Shui village might be re-evaluated as an ideal and sustainable landscape model in East Asia.

Feng Shui was first introduced to Ryukyu Kingdom in 14<sup>th</sup> Century and applied to village planning after 1730's. During the period from 17<sup>th</sup> to 18<sup>th</sup> Century, Feng Shui was employed as a national policy, and was applied to guide capital building, city planning, village building, graveyard site choosing, and even forest management.

Majority of researches on Feng Shui in Okinawa were from the perspectives of history,

architecture, anthropology, and folklore. Most of these studies concern the historical study, or analyzes village layout. However, a comparative study of Feng Shui in Okinawa with that in mainland topography is little reported. This study compares with Feng Shui practice in East Asia to clarify the features of a Ryukyu village with foci on Feng Shui trees and Feng Shui village landscape, based on the case study in Ryukyu and Sakishima Islands.

One purpose of this research is to clarify the current existing Feng Shui village landscape structure on islands in Okinawa Prefecture. Another purpose, not less important, is to explore the actual composition of Feng Shui trees used in the Feng Shui villages. In order to probe into the particular practice of Feng Shui in Okinawa, a comparative study among East Asia regions are conducted, since Feng Shui was originated in mainland China and prevalently practiced in other regions in East Asia. An ideal Feng Shui village landscape structure in mainland China and Hong Kong is generalized based on literature review. Feng Shui tree species are also discussed based on literature review and my own field trips to some southeast provinces in mainland China and Hong Kong. Three of the best preserved Feng Shui villages of Tarama Island, Tonaki Island and Bise village in the northern part of mainland Okinawa were surveyed to explore the village landscape layout and Feng Shui forest composition.

### **7.1 Features of island Feng Shui village landscapes**

The Form school of Feng Shui practice concerns the physical form of the site under consideration and its surrounding environment. Five major physical factors of Dragon, Sand, Water, Cave and Direction are basic for an ideal housing site. The Form School first observes land formation and terrain, and then determines location and orientation. Surrounding hills are desired to accumulate Qi (living energy) for a favorable living site.

Emphasizing the topographical observation in mainland China, Feng Shui practice primarily applies the repairing principle (Bu in China, Bi-bo in Korea, Ho:go in Okinawa). In mainland China, artificial buildings such as a bridge, a pagoda, or a pavilion, and a few trees were built in lowest site of Water Gate to retain the leaving fortune with water. Bi-bo (裨補)

in Korean means a supplementary measure to repair the defected Feng Shui landscape. Forests were used to repair the defective Feng Shui landscape for some vital sites such as Water Gate (K. Su-gu), or Dragon Mountain.

Ho:go is an essential word in Okinawa Feng Shui concept. Ho:go literally means to embrace and protect. In Okinawa, another meaning of Ho:go is a forest belt being preserved or planted. Village Ho:go was planted to curve in front of the village and to extend to the east and the west to embrace the village along with Kusatimui in the rear. Ho:go also refers to a forest belt that encircles a house, a village, several vicinal villages, or the coastline, and is called House Ho:go (house-embracing forest), Village Ho:go, District Ho:go, and Coastline Ho:go, respectively.

Tamara Island was surveyed to clarify a typical Feng Shui village landscape. It was found that the forest belt of Village Ho:go actually functions as Red Bird instead of low hills in a model Feng Shui landscape. Tree planting was highlighted to repair the defective topography. The high hill in the rear, the hills on the left and right, and the planted Ho:go in the front represent the four emblems, Black Tortoise, Azure Dragon, White Tiger, and Red Bird, respectively. The intersecting point of four emblems, the best site, is the location of the old village office. The village houses are scattered in the wide open space around the village office.

In summary, the Ryukyu Feng Shui village is laid out centering the village houses comparing with emphasizing landform in mainland China. Village houses are encircled by multilayer forest belts of house-embracing trees, *Kusatimui* in the rear hill and forest belt in the front together to embrace the village, and coastline forest belt. Such a layout, designed to protect the village from the winter wind and typhoons, is attributed to the environmental difference between mainland and island topographies.

## 7.2 Feng Shui forests in the rear hill and the front Ho:go

Village Ho:go were mainly planted with Ryukyu pine trees (*Pinus luchuensis* Mayr) or



Fukugi trees, varying between different regions. Coastline Ho:go are mostly Ryukyu pine trees and *Pandanus odoratissimus* L.f. (Adan in Japanese), *Hibiscus tiliaceus* L. (Japanese name: Ouhamabo) and *Pongamia pinnata* L. Pierre (Japanese name: Kuroyona). *Pinus luchuensis* was desired in Ho:go because it is an evergreen species. One or more Fukugi tree lines were usually planted to embrace the houses.

Tarama Island, where Feng Shui forests are best preserved, was surveyed to clarify the features of a Ryukyu Feng Shui village layout and the forest composition in the front forest belt and in the back hill. It was found the trees in the back hill and forest belt were generally of a two-storey structure. *Garcinia subelliptica* and *Calophyllum inophyllum* were the predominant species in the upper storey in the forest belt. In contrast, tree specimens in the back hill were much more diverse with a majority of *Diospyros maritime*, *Calophyllum inophyllum*, *Ardisia sieboldii*, and *Podocarpus macrophyllum*. About 46 species were found in the under storey vegetation in the front forest belt, in contrast, only 23 species in the back hill.

Compared to forest belt originally planted in the front, the forest in the back hills was a mix of natural forest and planted trees. Forest on the northern hill has regenerated with a long succession under little human disturbance.

Both the forests in the Ho:go and in the northern hills have naturally regenerated and are composed of plant species rich in diversity. Thus, a Ryukyu Island pattern Feng Shui landscape is an ideal landscape that embodies a pleasant habitat and agricultural production, as well as functions to conserve biodiversity and environment under a clement natural situation in island topography. The forest in the Ho:go and in the rear hills has plays a significant role in a small island biotope. The forest may contribute to the sustainable development of biology in the small island.

A Village Ho:go is in nature a green corridor that connects the landscape patches. It is a future issue to explore to Feng Shui forest's significance of biodiversity based on further survey on insectivorous birds and predaceous insects.

### 7.3 The practical use of tree planting in an island Feng Shui village

Greenery on the Dragon mountain and tree planting in Shui Kou (Water Gate) of the village was highlighted in Chinese Feng Shui. Dragon mountain, also called Dragon vein, refers to a mountain ridge. It is the first priority in locating a good Feng Shui landscape. Luxurious greenery is considered to be the origin of the flow of good energy. Water was considered as to connote wealth. Water Gate is a vital concept in Chinese Feng Shui. It refers to the site where the surrounding water leaves the village. It is always the lowest site in the village. Feng Shui forests, in particular, in Dragon Mountains and in Water Gate are symbolic of good fortune to village people.

Some early researchers report the actual practice of tree worship in rural China. D.C. Graham (1961) reports several single trees which are the foci of Feng Shui in Szechwan (C. Si Chuan province). Freuchtwang (1974) states that Feng Shui trees are the most ubiquitous and sensitive foci of interest in Feng Shui and are common Feng Shui symbols in practice. Illustrations on the function of tree planting to enhance the vital energy and repair the imperfect landscape of a city or a village emerged during the 1990s by some Chinese researchers such as He (1990), and Wang (1992). With the global trend in concern for the living environment, Coggins (2003) reports Feng Shui forests around villages are well preserved in the mountainous north of Fujian Province.

A similar use of Feng Shui trees has been reported in other countries and regions in East Asia besides mainland China. The preserved forests form a charming and ecological landscape in the highly urbanized region of Hong Kong (Webb, 1995). Two functions of Feng Shui trees in South Korea, repairing a defective landscape and enhancing the vital energy, are reported by Shibuya (2003) and Whang et.al. (2006).

Comparing with a symbolic use of Feng Shui trees in mainland China, Hong Kong, and Korea, a Ryukyu Feng Shui village landscape features practical use of tree planting. *Garcinia subelliptica* trees were planted surrounding village houses to protect them from seasonal monsoons and frequent typhoons. Village Ho:go was planted to curve in the front to enclose

all village houses. Natural forest in the rear hills has been well preserved to protect from chilly winter winds. Ho:go was also planted to surround several neighboring villages. Ryukyu pine (*Pinus luchuensis*) trees and Adan (*Pandanus odoratissimus*) trees were usually planted along the coastline. In brief, multiple layers of forest belt were planted in a traditional Feng Shui village. Such a village landscape was planned to apply to the local topography and natural environment such as the local climate.

In mainland China, Hong Kong, and Korea, Feng Shui trees are commonly a few separated patches standing as a symbol in the village. Evergreen species is favored to bring the fortune. In Okinawa, forest belts are used functionally to embrace the house, the village, and the coastline to contain the strong wind. Feng Shui trees include Fukugi, *Calophyllum inophyllum*, *Pinus luchuensis*, *Pandanus odoratissimus*, and *Hibiscus tiliaceus*.

#### **7.4 Prevalent Fukugi (*Garcinia subelliptica* Merr.) trees**

A Feng Shui tree is always defined as an evergreen species, but no special limitation to the species. In general, a camphor tree (*Cinnamomum camphora* Presl), a banyan tree (*Ficus microcarpa* L. f.), and bamboo are very commonly planted in the village landscape in southeastern China. Such trees always grow very fast and lush with a big crown. Red pine (*Pinus densiflora* Siebold & Zucc.) is common Feng Shui tree species in Korea.

Comparing with no special limitation of Feng Shui tree species in mainland China, Feng Shui trees include Fukugi, *Calophyllum inophyllum*, *Pinus luchuensis*, *Pandanus odoratissimus*, and *Hibiscus tiliaceus* in Okinawa. Among them, Fukugi was found prevalent as house-embracing trees and village Ho:go.

The natural features and usefulness on Fukugi trees may be assumed as the reasons of its prevalent existence. Fukugi is evergreen tree with a narrow upright very dark green crown. It has green, thick and glabrous leaves. Thus, Fukugi is very useful as the windbreak and tide damage protection trees in the small island topography.

Local people used almost all parts of Fukugi. Timber was used to build a house, leaves as green fertilizer, and bark for yellow dye. It is also important as shade tree for local people in a long summer. A *Garcinia subelliptica* tree is suitable for the sandy soil in the coastal area and impervious to sea water. Due to its natural features, it might be assumed that *Garcinia subelliptica* trees is one of the most suitable tree species for island landscape planning.

### 7.5 Layout of house-embracing Fukugi trees

House Ho:go is one of practical uses of Feng Shui trees in Okinawa, which is particular among Feng Shui practice in East Asia Utilization of Feng Shui trees to embrace all the sides of the house has not been found in China, or in Korea. Two villages of Tonaki and Bise, which have the best preserved house-embracing Fukugi trees, were surveyed to clarify the actual layout and composition.

The actual locations of every tree in the woodland were recorded to reproduce the actual layout of the trees with HO CAD software in the figures. On the basis of their DBH, the size of every tree was drawn in circles of proportional size. The survey results in the two villages of Bise and Tonaki found that houses encircled with *Garcinia subelliptica* house-embracing trees in the residence, are mostly south facing, which forms an ideal Feng Shui village structure. Forest belts in the northern and eastern borderline are much thicker than those inside the village, which is greatly attributed to the strong cold northern wind in winter and the destructive eastern wind during typhoon season. In general, one to four adjacent houses form a habitat unit inside transverse roads. Thus, usually there are one to three tree lines with the exception of the southern line that are common with the neighboring house.

It was found that most habitat woodlands inside the village are in a well ordered line. In contrast, *Garcinia subelliptica* woodlands in the north, east, or near the coastal line are usually laid out in two or more lines. It may be because the houses near the coast suffered from much stronger seasonal winds than those inside the village.

In a word, house-embracing trees and interlaced road network are the features of a Ryukyu

Feng Shui village. There are always one to four houses embraced by Fukugi laid out inside the blocks separated by roads. Along with houses mostly backing north and facing south, forest belts in the north, east, and along the coastline are thick. One ordered line is common other than above-mentioned directions. Such layout of Fukugi is assumed as countermeasure to winter wind and typhoons.

It was found that, in Okinawa, most houses building conform to the ecological principle, and face south to welcome cool summer wind and keep the cold winter wind out (Sakamoto 1989; Paku et al 1997). The village roads run north-south and east-west, and seem to intersect approximately at right angles.

All village roads are not straight, but courteous in Okinawa. As a result, no intersections are perfect right angle. Fukugi tree lines are laid out along the roads which decline from the north-south or east-west axes. Such a layout has been planned to conform with Feng Shui principle of “to contain the wind and to accumulate the water”. The curvous roads are able to channel and reduce the damage of the strong winds coming to the village.

### **7.6 Features of house-embracing Fukugi trees**

The features of house-embracing Fukugi trees were surveyed and listed as follows.

The mean height of the surveyed house-embracing trees in Tonaki Island was 407cm. The mean and maximum DBH were 9.6cm and 44.8cm. The mean and oldest estimated ages of surveyed trees were 39.6 and 179.2. The majority of surveyed Fukugi trees were under 7m, with a DBH smaller than 30cm.

During the past decades, small island inhabitants have immigrated to mainland Japan, or mainland Okinawa. Some houses were abandoned with the embracing woods left uncared for. In order to understand the appropriate maintenance for *Garcinia subelliptica* habitat wood, data collected at each survey site was split into two types, which represent well-kept and abandoned forest belts respectively. Mean value and standard deviation of tree height of well-kept house trees and abandoned house trees were 432.6cm and 193.7cm, 376.4cm and

256.7cm respectively. Mean value and standard deviation of DBH for well-kept houses and abandoned houses were 10.6cm and 7.3cm, 8.9cm and 8.7cm respectively. Stand trees for well-kept houses appear as two storied structures with two frequency peaks around 3m and 5.5m, while trees around 2m in abandoned residences are an overwhelming majority. DBH for the majority of trees in well-kept and abandoned houses are 10cm and 5cm respectively. The difference in the distribution of trees in the two types suggests that trees have been selectively cut for several uses when the forests became mature and seedlings have been cultivated into a lower story in the well-kept house woodlands. It appears that there has been no thinning or cleaning arranged in the past decades in those abandoned house-embracing trees.

It was found that tree density in well-kept houses is higher than that in abandoned houses. Because trees in well-kept houses are lined up in an orderly fashion inside the sandy woodlands, the woodland areas are relatively narrow and leave a wide space surrounding the houses. Abandoned residences have a relatively lower density due to an expanding woodland area with the desertion of the residence and collapse of some rock walls. Seedling ratio for abandoned houses is higher than that of well-kept houses, while it is opposite for sprout ratio. It is assumed that well-kept house-embracing woodlands have been cleaned from time to time to weed out fallen ripe fruits and unwanted seedlings, while trees in the abandoned houses have not been maintained for a long time and the forests have returned to a nearly natural state.

Survey data in Bise village were classified into four types. Four types of residence units were summarized according to the numbers of the parts inside a residence unit. It was found that Type 2 and Type 3 were the most cases in Bise village. In contrast, Type 4 was relatively rare. It might be assumed that one to three parts were first planned and then new houses were built nearby since a block which has more than 3 parts was only found in the borderline of the village.

DBH of all surveyed trees ranged from 1cm to 66.5cm with the mean value of 11.5cm. The mean DBHs in Type 1, 2a, 2b, 3a and 3b were 16.5cm, 14.7cm, 9.8cm, 14cm, and 8.9cm respectively. The maximum DBHs were 53.1cm, 55.5cm, 63cm, 66.5cm, and 60.3cm

respectively. DBH of the oldest tree survey was 66.5cm, which was estimated as 266 years old. The mean ages of Types 1, 2a, 2b, 3a, and 3b were estimated to be 66, 59, 39, 56, and 36 respectively. The size of Fukugi trees which were taller than 1m was very diverse. It was found that a lot of seedlings that were less than 1m and quite a few of stumps in the Fukugi tree lines.

Thus, it might be assumed that people practiced thinning and cut some mature trees, and some seedlings were kept to grow up. The area with existing oldest Fukugi trees in the centre could be assumed as the origin of the village. With the increase of the population, the village extended to the area nearby the coastal line.

### 7.7 Management of house-embracing Fuguki trees

As above-mentioned, house-embracing Fukugi trees have been planted to surround the houses. House-embracing Fukugi trees are under routine care and management to maintain Feng Shui's function. Thus, proper management in the planted Fukugi trees were also surveyed in this study.

Tree number in every meter of the woodlands ranged from 2.8-3.3 in Tonaki Island, and 1.6 to 3.6 in Bise village, respectively.

It was found that the average area of each house in Tonaki Island was the same as that in Bise village. The surveyed premises are 526m<sup>2</sup> in Tonaki Island, and 529 m<sup>2</sup> in Bise village on the average. The mean heights of house-embracing *Garcinia subelliptica* trees were 407cm and 552cm on Tonaki Island and Bise village, respectively. A distance between the tree line to the house, which is about 3-5 times that of the tree height, is favorable to minimize strong wind (AJFT, 1971). It might be assumed that there is a strong correlation between the house area and the tree height.

The surveyed *Garcinia subelliptica* trees in Tonaki Island were much shorter than those in Bise Village. It may be assumed that Bise village, located in mainland Okinawa was built a few decades earlier than Tonaki Island. The estimated year of the oldest tree in Bise village

almost conform to the assumed period of building Feng Shui village, also called Goban village by Nakamastu (1977) in 1730s.

## 7.8 Summary

Research results are summarized as follows:

(1) On the use of Feng Shui trees. In mainland China, Hong Kong, and Korea, Feng Shui trees are commonly a patch standing as a symbol in the village. Evergreen species is favored to bring the fortune. Some major Feng Shui tree species include camphor (*Cinnamomum camphora*), banyan (*Ficus microcarpa*), and red pine (*Pinus densiflora*). In Okinawa, forest belts are used functionally to embrace the house, the village, and the coastline to contain the strong wind. Feng Shui trees include Fukugi, *Calophyllum inophyllum*, *Pinus luchuensis*, *Pandanus odoratissimus*, and *Hibiscus tiliaceus* in Okinawa.

(2) Village landscape centering the village house. A Feng Shui village landscape highlights the surrounding landform to “contain the wind” and “accumulate the water” in China and Korea. In contrast, in Okinawa, village houses are encircled by multilayer forest belts of house-embracing trees, *Kusatimui* in the rear hill and forest belt in the front together to embrace the village, and coastline forest belt. Such a layout, designed to protect the village from the winter wind and typhoons, is attributed to the environmental difference between mainland and island topographies.

(3) House-embracing Fukugi trees. Fukugi trees that embrace all sides of the house are not found in Korea, or China. House-embracing trees and interlaced road network are the features of a Ryukyu Feng Shui village. In Okinawa, there are always one to four houses embraced by Fukugi laid out inside the blocks separated by roads.

(4) Fukugi laid out to deal with the wind direction. Along with houses mostly backing north and facing south, forest belts in the north, east, and along the coastline are thick. One ordered line is common other than above-mentioned directions. Such layout of Fukugi of Okinawa is assumed as countermeasure to winter wind and typhoons.



(5) House-embracing Fukugi trees are under routine care and management to maintain Feng Shui's function. The mean heights and DBHs of house-embracing Fukugi were 407cm and 9.6cm in Tonaki, and 552cm and 11.5cm in Bise, respectively. The mean and the biggest DBHs were 9.6cm and 44.8cm, and 11.5cm and 66.5cm in Tonaki and Bise, respectively. Tree number in every meter of the woodlands ranged from 2.8-3.3 in Tonaki Island, and 1.6 to 3.6 in Bise village, respectively. The estimated mean and oldest tree ages were 39.6 and 179.2 in Tonaki, and 46 and 226 in Bise. The distribution of diverse tree ages, and proper density might be assumed as the result of proper management.

(6) All village roads are not straight, but curvous in Okinawa. As a result, no intersections are perfect right angle. Fukugi tree lines are laid out along the roads which decline from the north-south or east-west axes. Such a layout has been planned to contain the wind according to Feng Shui principle of "to contain the wind and to accumulate the water". The curvous roads are able to channel and reduce the damage of the strong winds coming to the village.

In summary, Feng Shui practice, adapted to the severe nature of winter wind and typhoons in summer in Okinawa, utilizes tree planting to achieve an ideal Feng Shui environment. Comparing with mountainous Feng Shui practice in China and Korea which highlights the landform and use Feng Shui trees symbolically, Feng Shui in Okinawa is functionally practiced, thus, an "Island Ryukyu model of Feng Shui" is argued in this study.

## REFERENCES

- Ahern, Emily M., 1973. *The Cult of the Dead in a Chinese Village*. Stanford University Press, Stanford, California.
- AJFT (Association of Japanese Forestry Technology), 1971. *Forest Encyclopedia*. Maruzen Press, Tokyo. (in Japanese)
- Anderson, E.N. and Anderson, M.L., 1973. *Mountains and Water*. Orient Cultural Service, Taipei.
- Anderson E. N., 1996. *Ecologies of the Heart: Emotion, Belief, and the Environment*. Oxford University Press, New York.
- Bruun, Ole, 2003. *Fengshui in China, Geomantic Divination Between State Orthodoxy and Popular Religion*. University of Hawaii Press, Honolulu.
- Chen, J. D., 2002. *Life-Friendly or Death-Friendly-on Feng-shui & the Social Cultural Transformation in Fujian Province*, pp270, unpublished doctoral dissertation, Xiamen University, Fujian, China. (in Chinese)
- Coggins, Chris, 2003. *The Tiger and the Pangolin-Nature, Culture, and Conservation in China*, University of Hawaii Press, Honolulu.
- Corner, J., 1992. Most important questions. *Landscape Journal*. Vol. 11(2):163-164.
- De Groot, J. J. M., 1962. *The Religious System of China [Leyden, 1892-1910]*. Vol. 3, Literature House, Taipei: 934-1056. (First published by E.D. Brill, Leyden in 1892)
- Dukes, E. J., 1914. Feng-shui. In: Hasting (ed.), *Encyclopedia of religion and ethics*, New York, Vol. 5, p833-835.
- Eitel, Ernest. J., 1993. *Feng-shui, or, The Rudiments of Natural Science in China [1873]*. Synergetic Press, Bonsall, ca.
- Feuchtwang, Stephan D. R., 1974. *An Anthropological Analysis of Chinese Geomancy*. Southern Materials Center, INC., Taiwan, pp 261.
- Freedman, Maurice, 1966. *Chinese Lineage and Society: Fukien and Kwangtung*, the Athlone Press University of London, pp206.

- Gao, Y. Q., 1994. Feng-shui in China, Chinese Huaqiao Press, Beijing, pp271. (in Chinese)
- Glacken, Clarence J., 1960. The Great Loochoo : a study of Okinawan village life. Rutland, Vt. ,Tokyo.
- Graham, D. C., 1961. Folk Religion in Southwest China, The Smithsonian Indiyuyion, Washington.
- Guan, Chuanyou , 2002. Feng Shui's influence on ancient forest planting and preservation, Journal of Wanxi University, Vol. 18(1):65-68. (in Chinese)
- Guo, S. L., 1994. Monthly Journal of Historical Study, No.3, 43-51. (in Chinese)
- Hatsushima, S., 1975. Flora of the Ryukyus. Okinawa Biological Education and Research Society, Naha (in Japanese).
- He, X. X., 1990. A Probe into Feng-shui, pp 158, Southeast University Press, Najing.
- He, X. X. and Luo, Qi, 1995. History of Feng-shui, Shanghai , Shanghai Wenyi Press, Shanghai. pp257. (in Chinese)
- Hirata, E., 2006. On the estimation of the age of an old *Garcinia subelliptica* tree. In: NPO Body Corporate of Yamabiko (Eds.) On the *Garcinia subelliptica* Trees in Okinawa. Okinawa Green Promotion Committee, Naha pp. 41-46 (in Japanese).
- Huang, Y., 1999. Feng-shui Concept and Modern Environment Protection, <http://nknucc.nknu.edu.tw/~t1313/frame1.htm>.
- Japanese Colonial Government, Forest Experiment Station, 1938. Chosen No Rinso.
- Jia, B. S.,1998. Living Legacy: Hong Kong's Housing Heritage Gives Advice to Eco-Housing Development for the Future, <http://arch.hku.hk/~jia/jia/phk.html>.
- Joseph, K.L., Yip, Y.N., Ngar, Jackie Y., Yip, Eric K. Y., Liu &Patrick C.C. Lai, (Plant Working Group, Agriculture, Fisheries and Conservation Department) 2004. Venturing Fung Shui Woods, Cosmos Books Ltd., Hong Kong.
- Leonard P. J., 1994. The Political Landscape of a Sichuan Village, Unpublished Ph. D. dissertation, University of Cambridge.
- Liu, Peilin, 1995. Feng Shui—Environmental Concept of Chinese, Shanghai Sanlian Bookstore, Shanghai, pp423. ( in Chinese)

- Lovelace, George W., 1985. Man, Land, and Mind in Early Historic Hong Kong. In: Becker, Alton., Hutterer, Karl L., Musgrave, John K., Hook, Peter E. (Eds) Cultural Values and Human Ecology in Southeast Asia. Center for South and Southeast Asian Studies, the University of Michigan, USA.
- Machida, M. and Tsuzuki, A., 1993. An introduction to feng shui village—studies on Kitaki Mountain feng shui. Ryukyu University Law Faculty Bulletin (History and Geography) 36 pp.99~213 (in Japanese) .
- Mak, Michael Y. and Ng, Thomas S., 2005. The art and science of Feng Shui- a study on architects' perception. Building and Environment. 40.
- March, A. L., 1968. Journal of Asian Studies, Vol. XXVI( 2): 253-267.
- McHarg, I. L., 1969. Design with Nature, Natural History Press, New York.
- Michell, J., 1973. Foreword to the second edition of Feng-shui. In: Eitel, E.J. Feng-shui. Kingston Press.
- Mizukami, Shizuo, 1977. A Study of the Botany in Ancient China, Kadogawa Bookstore, Tokyo. (in Japanese)
- Murayama, Chijun, 1971. Korean Feng Shui. Japanese Colonial Government in Korea.
- Musha, Eiji et al., 1988. Memory of Roads Part 5 Characteristic of the Intersection. Summaries of Technical Papers of Annual Meeting Architectural Institute of Japan. October in Kanto. 1-2. (in Japanese)
- Nakama, Yuei, 1984. Sai On and Forest Policy, in Kinsei no Shomondai Shirizu 1: Sai On to Sono Jidai, Ryukyu Shimoshy, Naha. (in Japanese)
- Nakama, Yuei, 2002. The significance of Fung-Shui as a System of Administration for Village Environments – The case of a Modern Ryukyuan village and forest landscape. Journal of Japanese Society of Plant and Person Relationship 2 (1), 39-46.
- Nakama, Yuei, 2003. The Present and Past of Miyako Islands, in Committee of Thinking the Nature and Culture of Miyako(eds) *The Nature and Culture in Miyako Islands*. Shinnsei Press. Naha, Okinawa. (in Japanese)

- Nakama, Yuei, 2006. Fukugi in Okinawa and Village Landscape. In: NPO Body Corporate of Yamabiko (Eds.) On the *Garcinia subelliptica* Trees in Okinawa. Okinawa Green Promotion Committee, Naha pp. 1-10 (in Japanese).
- Nakama, Yuei and Koki, Zenfuku, 2002. The significance of housing shelter forest and regional inhabitants' consciousness in island regions. Journal of the Japanese Society of Coastal Forest Vol. 2 No.1 pp5-11.
- Nakamatsu, Yasyu, 1977. The ancient village: a folklorist study of Okinawa. Naka, Japan: Okinawa Times Press. (in Japanese)
- Needham, J., 1956. Science and Civilization in China, Vol. 2, History of Scientific Thought. Cambridge University Press, pp 359-363.
- Noritada, Kubo (eds), 1990. Feng Shui in Okinawa. Hirakawa Press, Tokyo. [in Japanese]
- Odum, Eugene P. and Barrett, Gary W., 2005. Fundamentals of Ecology. P374-459
- Paku, C., Yamada, M., and Furukawa, N., 1999. Studies on the Topography, Space Composition of Axis and Wind in the Villages of Izena Island and Tonaki Island, Folklore Architecture, 115, p 89-96.
- Pearson, Richard Joseph, 1967. Temporal and Spatial Variation in the Culture History of the Ryukyu Islands, PhD. Dissertation. Yale University, University Microfilm, Inc..
- Pedesen, Poul, 1995. Nature, Religion and Cultural Identity: The Religious Environmentalist Paradigm. In Ole Bruun and Arne Kalland, Asian Perceptions of Nature: A Critical Approach. Curzon Press Ltd, Surrey Tw.
- Ponting, Clive, 1991. A green history of the world-the environment and the collapse of great civilization, the Penguin Group, U.S.A.
- Sakamoto, I., 1989. Village landscape in Okinawa, Kyusyu University Press, Fukuoka.
- Shibuya, S., 2003. Forest and Bi-bo in rural Korea - an explanation from Feng Shui and woodland management. In: Ishihara, H. (Eds), Rural Space Research, G: Rural Culture and Space Recognition. Publisher Daimeido, Tokyo. 413-425. (in Japanese)
- Shinjo, T. 1993. Yaeyama Village Feng Shui, Historical Materials Editorial Office Bulletin, No. 18 p1-20.

- Shimajiri, K., 1990. Feng Shui Concept in Okinawa. In: Noritada, K.(Eds), Feng Shui in *Okinawa. Hirakawa Publishing, Tokyo. 3-14. (in Japanese).*
- Skinner, S., 1982. The living Earth Manual of Feng-shui. Routledge & Kegan Paul, London.
- Si, T., 1998. Feng Shui Art and Environmental Selection, Jinan Press, Shan Dong. pp129. (in Chinese)
- Smil, Vaclav, 1993.China's Environmental Crisis. An Inquiry into the Limits of National Development, M.E. Sharpe, London.
- Smits, Gregory, 1999. Visions of Ryukyu: Identity and Ideology in Early-Modern Thought and Politics. University of Hawaii Press.
- Tamaki, Masakiko, 1990. "Historical Feng Shui Records in Northern Okinawa Island" in Noritada, Kubo (eds). *Feng Shui in Okinawa*. Hirakawa Press, Tokyo. [in Japanese]
- Tarama Village Office, 2005. An outline of Tarama village. Tarama Village Office, Tarama (in Japanese).
- Tasato, Yutetsu, 1983. A research on Villages in Okinawa, San Press, Naha, Japan. (in Japanese)
- Tonaki Village Office, 1983. A Record of the History of Tonaki Island Village, Vol. 1. Tonaki Village Office, Tonaki (in Japanese).
- Tsuzuki, Akiko. 1990. "The Introduction and Expansion of Feng Shui in Pre-modern Okinawa". in Noritada, Kubo (eds). *Feng Shui in Okinawa*. Hirakawa Press, Tokyo. [in Japanese]
- Tsuzuki, Akiko, 1997. Studies on the Saion's afforestation – Feng Shui and technology. Toyoshien, No. 48-49.
- United States Civil Administration of the Ryukyu Islands, 1953. Ryukyu Islands: Forest Situation Specil Bulletin.
- Walker, Egbert H., 1954. Important trees of the Ryukyu islands. United States Civil Administration of the Ryukyu Islands, Naha, Japan.
- Wang, QiHeng (ed.), 1992. Research of Feng Shui thoery. Tianjing University Press, Tianjing. (in Chinese)

- Wang, Yude, 1994. *Civil Dwelling Planning in China*. China Opera Press, Beijing, pp193. (in Chinese).
- Watanabe, Y.,1994.*Landscape Geography of Qi*. Jinbunshoyin Book Ltd. (in Japanese)
- Webb, Richard, 1995. *The Village Landscape*. In: Hase, P.H., Sinn, E. (Eds.), *Beyond the Metropolis: Villages in Hong Kong*. Joint Publishing, Hong Kong.37-47.
- Whang, B.-C., Lee, M.-W., 2006. *Landscape ecology planning principles in Korea Feng Shui, Bi-bo woodlands and ponds*. *Landscape Ecology Engineering*, Vol. 2 No.2, 147-162.
- Xu, Ping, 1990. *Feng-shui: A Model for Landscape Analysis*. Unpublished Ph. D. dissertation, Harvard University, Massachusetts.
- Yang, W. H. and Zhang, P., 1993. *Feng-shui of China*. International Culture Press, Beijing. pp134. (in Chinese)
- Yoon, Hong-Key,1976. *Geomantic Relations between Culture and Nature in Korea*. The Orient Cultural Service, Taipei.
- Yoon, Hong-Key, 1980. *The Image of Nature in Geomancy*, *Geojournal* Vol. 4 No.4, P341-348.
- Yoon, Hong-Key, 1982. *Environmental determinism and geomancy: Two cultures, two concepts*, *Geojournal*. Vol. 6 No. 1,p77-80.
- Yong, Hong-Key, 1985. *An Early Chinese Idea of a Dynamic Environmental Cycle*, *Geojournal*, Vol. 10 No. 2, P211-212.
- Yoon, Hong-Key, 2003. *A Priliminary Attempt to Give a Birdseye View on the Nature of Traditional East (Asian) and Western (European) Environmental Ideas*. In: Ehlers, E. And Gethmann, Carl F.(Eds) *Environment Across Cultures*. Springer.
- Yoon, Hong-key, 2006. *The Culture of Fengshui in Korea- An Exploration of East Asian Geomancy*. Lexington Books, U.S.A.
- Yu, Kongjian, 1994. *Landscape into Places: Feng-shui model of Place Making and Some Cross-cultural Comparisons*. In: Clark, J. E. (Ed), *Proceedings of 94'c CELA Conference, History and Culture*, Mississippi State University, pp320-340, USA

Yu, Kongjian, 1998. *The Source of Ideal Landscape: the Cultural Meaning of Feng Shui*.  
Beijing: Commercial Press. (in Chinese)





## APPENDIX Vegetation Composition in Survey Plots in Tarama Island

A list of undergrowth seedling and grass found in the surveyed plots

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
Species	<i>Alocasia odora</i>	<i>Alocasia odora</i>	<i>Alocasia odora</i>	<i>Alocasia odora</i>	<i>Alocasia odora</i>	<i>Alocasia odora</i>	<i>Allophylus timorensis</i>	<i>Allophylus timorensis</i>
	<i>Alpinia zerumbet</i>	<i>Alpinia zerumbet</i>	<i>Alpinia zerumbet</i>	<i>Alpinia zerumbet</i>	<i>Alpinia zerumbet</i>	<i>Antidesma pentandrum</i>	<i>Alocasia odora</i>	<i>Alocasia odora</i>
	<i>Antidesma pentandrum</i>	<i>Antidesma pentandrum</i>	<i>Antidesma pentandrum</i>	<i>Ampelopsis brevipedunculata</i> var. <i>hancei</i> (Planch.) Rehd.	<i>Breynia vitis-idaea</i>	<i>Diospyro egbert-walkeri</i>	<i>Antidesma pentandrum</i>	<i>Antidesma pentandrum</i>
	<i>Bischofia javanica</i>	<i>Ardisia sieboldii</i>	<i>Ardisia sieboldii</i>	<i>Ardisia sieboldii</i>	<i>Callicarpa japonica</i>	<i>Diospyros maritima</i>	<i>Bischofia javanica</i>	<i>Cinnamomum camphora</i>
	<i>Callicarpa japonica</i>	<i>Bischofia javanica</i>	<i>Arenga tremula</i> (Blanco) Becc. Var. <i>engleri</i>	<i>Calophyllum inophyllum</i>	<i>Calophyllum inophyllum</i>	<i>Garcinia subelliptica</i>	<i>Breynia vitis-idaea</i>	<i>Diospyros maritima</i>
	<i>Calophyllum inophyllum</i>	<i>Breynia vitis-idaea</i>	<i>Calophyllum inophyllum</i>	<i>Clematis chinensis</i>	<i>Clematis chinensis</i>	<i>Persea thunbergii</i>	<i>Calophyllum inophyllum</i>	<i>Garcinia subelliptica</i>
	<i>Clematis grata</i>	<i>Clematis chinensis</i>	<i>Diospyro egbert-walkeri</i>	<i>Clerodendrum inerme</i>	<i>Clematis grata</i>	<i>Podocarpus macrophyllus</i>	<i>Cinnamomum camphora</i>	<i>Ilex goshiensis</i>
	<i>Clerodendrum inerme</i>	<i>Clematis grata</i>	<i>Diospyros maritima</i>	<i>Diospyro egbert-walkeri</i>	<i>Cycas revoluta</i>	<i>Psychotria manillensis</i>	<i>Cycas revoluta</i>	<i>Podocarpus macrophyllus</i>
	<i>Croton cascarilloides</i>	<i>Diospyro egbert-walkeri</i>	<i>Gardenia jasminoides</i>	<i>Diospyros maritima</i>	<i>Diospyro egbert-walkeri</i>		<i>Diospyros maritima</i>	<i>Psychotria manillensis</i>
	<i>Diospyros maritima</i>	<i>Diospyros maritima</i>	<i>Leucaena leucocephala</i>	<i>Euonymus japonicus</i>	<i>Diospyros maritima</i>		<i>Garcinia subelliptica</i>	
	<i>Garcinia subelliptica</i>	<i>Ficus microcarpa</i>	<i>Macaranga tanarius</i>	<i>Ficus microcarpa</i>	<i>Gardenia jasminoides</i>		<i>Hernandia nymphaeaeifolia</i>	
	<i>Leucaena leucocephala</i>	<i>Gardenia jasminoides</i>	<i>Melia azedarach</i>	<i>Ficus superba</i>	<i>Glochidion rubrum</i> Bl.		<i>Macaranga tanarius</i>	
	<i>Morus australis</i>	<i>Glochidion obovatum</i>	<i>Morus australis</i>	<i>Leucaena leucocephala</i>	<i>Leucaena leucocephala</i>		<i>Nephrolepis biserrata</i>	
	<i>Ophiopogon jaburan</i>	<i>Leucaena leucocephala</i>	<i>Ophiopogon jaburan</i>	<i>Lygodium japonicum</i>	<i>Lygodium japonicum</i>		<i>Ophiopogon jaburan</i>	
	<i>Oplismenus compositus</i>	<i>Macaranga tanarius</i>	<i>Oplismenus compositus</i>	<i>Macaranga tanarius</i>	<i>Macaranga tanarius</i>		<i>Oplismenus compositus</i>	

	<i>Persea thunbergii</i>	<i>Melia azedarach</i>	<i>Paederia scandens</i>	<i>Maytenus diversifolia</i>	<i>Maytenus diversifolia</i>		<i>Paederia scandens</i>	
	<i>Podocarpus macrophyllus</i>	<i>Morus australis</i>	<i>Persea thunbergii</i>	<i>Miscanthus sinensis</i>	<i>Miscanthus sinensis</i>		<i>Pisonia aculeata</i>	
	<i>Polygonum chinense</i>	<i>Ophiopogon jaburan</i>	<i>Persea thunbergii</i>	<i>Morus australis</i>	<i>Ophiopogon jaburan</i>		<i>Planchonella obovata</i>	
	<i>Psychotria manillensis</i>	<i>Oplismenus compositus</i>	<i>Psychotria manillensis</i>	<i>Morus australis</i>	<i>Oplismenus compositus</i>		<i>Podocarpus macrophyllus</i>	
		<i>Paederia scandens</i>	<i>Psychotria manillensis</i>	<i>Ophiopogon jaburan</i> ( <i>Ophiopogon jaburan</i> )	<i>Paederia scandens</i>		<i>Psychotria manillensis</i>	
		<i>Persea thunbergii</i>	<i>Rhaphiolepis indica</i>	<i>Pandanus odoratissimus</i>	<i>Persea thunbergii</i>			
		<i>Planchonella obovata</i>	<i>Smilax sebeana</i>	<i>Persea thunbergii</i>	<i>Planchonella obovata</i>			
		<i>Psychotria manillensis</i>		<i>Planchonella obovata</i>	<i>Psidium guajava</i>			
		<i>Smilax sebeana</i>		<i>Podocarpus macrophyllus</i>	<i>Psychotria manillensis</i>			
		<i>Arenga tremula</i> (Blanco) Becc. Var. <i>engleri</i>		<i>Premna corymbosa</i>	<i>Smilax sebeana</i>			
				<i>Psychotria manillensis</i>	<i>Terminalia catappa</i>			
				<i>Smilax sebeana</i>	<i>Trichosanthes miyagii</i>			
					<i>Vitis ficifolia</i>			
Total amount	19	25	22	27	28	8	20	9