

GREENERY CONCERNS OF GREEN BUILDING DESIGN AND FENG SHUI

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Abstract

For a sustainable environment, the green building issue has become more and more important in architectural design recently. Green planting is one of the important strategies of green building design. In fact, the site greenery ratio and quantity are stipulated in the building regulations in newly constructed buildings for CO₂ reduction in Taiwan. On the other hand, in traditional Chinese societies, the concept of Feng Shui for dwellings still affects people's concepts of building design and garden planning. So, green planting is one of the important elements to be considered in Feng Shui. While green building incorporates plantings for energy savings and sustainable environment, the greenery concept of Feng Shui for dwellings emphasizes harmony between people and the natural environment. Although, both green building and Feng Shui clearly place emphasis on some of the same issues, in some situations they are in conflict. This study focuses the green planting issue, and tries to expose disputed points and to discover common principles to satisfy both schools of thought. Following a literature review, an experts' investigation method was applied in this study. In the final results, four main green planting principles have been arrived at. Green plantings for green building design and Feng Shui concepts need not conflict, rather can mutually progress. Thus, green building design can be promoted more, and traditional Feng Shui concepts can be preserved in the modern age. If we can consider the relevant concepts of Feng Shui for dwellings during the process of green building design, it would greatly benefit the propagation and promotion of green building design in Chinese society.

Keywords: green building, feng shui, traditional culture, green planting

1. INTRODUCTION

As we known, excessive CO₂ emissions result in the greenhouse effect around the earth, leading to significant changes in the global climate. Therefore, how to reduce carbon dioxide emissions is a big challenge leading to the emergence of green building designs. In Taiwan, the concept of green building, emphasizing ecology, energy savings, waste reduction, and health, is called EEWH system. In 2004, to promote green building, Taiwan government departments established a green building accreditation systems based on EEWH and included nine major indicators to evaluate performance of a green building (Architecture and Building Research Institute, Ministry of the Interior, 2010). The nine indicators include: biodiversity, greenery, site water conservation, energy savings, CO₂ emissions reduction, waste reduction, water resources, sewage and garbage improvements, and indoor environmental quality. Taiwan government departments and scholars are actively promoting green buildings by developing green building policies and techniques; they also have published green building technique manuals for designers to apply in their design projects. Among the nine indicators, green planting is one of the important design techniques for green building design. In fact, the government manuals provide many useful greenery strategies and methods for practical application. The purpose of greenery is to incorporate as many green plantings as possible on the site, not only for absorbing CO₂ emissions, but also for facilitating water infiltration into the site soil for increasing water content of the soil, which can improve the serious heat island situation in the cities (Architecture and Building Research Institute, Ministry of the Interior, 2010). There are many strategies and methods for incorporating greenery, which includes ecological vegetation wall, roof and artificial planting hole, diverse plant types, etc. Through these strategies, the government not only hopes more green space can be set inside each site plan, but also that vertical greenery spaces can expand by developing planting on the walls, roofs or balconies. No matter how they are laid out, greenery considerations help carbon dioxide reduction and the increase of green plants in a city improves the

micro weather of urban areas.

On the other hand, the ancient Chinese building concept *Feng Shui* for dwellings still influences many Chinese people regarding house planning and arrangement of residential space in Taiwan. Recent research pointed out that almost 73% of the general public has positive views towards the impact of *Feng Shui*, and about 87% of northern Taiwan residents will actively deal with *Feng Shui* issues when their dwellings face *Feng Shui* problems (Chen, 2011). As some studies have shown, the concept of *Feng Shui* emphasizes harmony between people and the natural environment and is concerned with not only the architectural physical environment, but also the all-round dwelling site environment, such as wind, light, watering, landscape, building direction, location, soil, mountains, rivers, etc., and it was considered to be the scientific rule for building residential structures in ancient times (Wu, 2005; Yu C. T. and Yu Y., 2006). *Feng Shui* concepts cover not only the relatively small environment of the house, but also the larger ecological and geological environments around it. From the *Feng Shui* point of view, greenery is one important concern for dwellings; *Feng Shui* concepts take into consideration the issues of greenery planting location, form, plant varieties and significance of plants selected.

Based on the above discussion, it is clear that the greenery of dwellings is an important issue for both schools of thought: green building design and *Feng Shui* in Chinese society. The greenery of green building design places emphasis on the ideas of CO₂ emissions reduction, water retention and ecology, whereas green planting of *Feng Shui* for dwellings focuses on the influence of planting for the dwelling and the fortunes of people who dwell in those living environments. As both schools of thought are concerned with the same topic but focused on different aspects, some conflicts may exist under some circumstances. To expose the differences and similarities of greenery in these two concepts is the main motive of this study. In fact, both systems contain the concepts of ecological environmental protection and sustainability. This paper breaks new ground in the cross-disciplinary discussion between architecture and traditional Chinese *Feng Shui*. To clarify the relationship between green building and *Feng Shui* for dwellings can not only promote green building policies, but also prevent *Feng Shui* issues from being ignored in modern times. The study results can lead to common planting design principles for the future that fulfill both schools of thought.

1.1 Research objectives

As discussed above, the greenery within green building design is concerned with increasing the performance of CO₂ absorption by plantings and promoting water infiltration into site soil. On the other hand, green planting in *Feng Shui* is a geomantic art that focuses on the effect of plantings to make residents more comfortable and to lead to better fortune in their lives. They are concerned with the same plants issue, but stress different content and influences. So, whether these two approaches can interact well with each other is worthy of further discussion. Therefore, this study attempts to explore the connections and differences between the planting concepts in both schools of thought. The objectives of this study, thus, include:

1. collating the greenery design of green building techniques and planting contents of *Feng Shui* for dwellings;
2. analyzing and comparing the similarities and differences between these two schools of thought;
3. providing green planting design references to concurrently satisfy green building design objective and *Feng Shui* for dwellings concepts.

1.2 Scope and limitations of study

Regarding greenery strategies of green building design, this study will focus only on the planting strategies and methods provided by the Architecture and Building Research Institute of Taiwan in its manuals. Other plantings will not be discussed in this study. As for *Feng Shui*, the development of its theories has complexity that is difficult to track. Moreover, the authenticity of ancient data is also difficult to validate (Han, 1998). We have, therefore, employed data collated by modern scholars and

information from modern *Feng Shui* books. There are two main factions, Form School and Compass School, in *Feng Shui* and the difference between them will be discussed in a later chapter. As this research is focused on green planting concepts, it will employ the Form School of *Feng Shui* for dwellings because it contains more complete and systematic discussions about the living environment, and also comprises more integrated information. In fact, as the contents established by the Compass School are more complex and mysterious, even metaphysical, they will not be discussed in this study. Furthermore, the *Feng Shui* references are focused on recent, easy-to-understand modern publications; the ancient classical Chinese content is not included in the discussion.

2. LITERATURE REVIEW

In Taiwan, a government department, Architecture and Building Research Institute of the Ministry of the Interior, is the main unit promoting and developing green building policies. A number of green building design manuals have also been published for reference in practical design. In fact, the Architecture and Building Research Institute has been developing green building techniques and evaluation methods, and published the *Evaluation Manual for Green Buildings in Taiwan*, which contains different green design strategies of buildings and the evaluation system for green buildings. For green planting, this manual provides detailed calculation processes to account for CO₂ reduction amount related to planting techniques (Architecture and Building Research Institute, Ministry of the Interior, 2009). The Graduate School of Architecture at National Cheng Kung University, another important green building research unit in Taiwan, has also completed some research in the field of green buildings, largely under the leadership of Professor Hsien-Te Lin. His *Technology Guides for Green Building Design* was published to provide practical techniques and strategies for green building design, and detailed descriptions of the green building accreditation system. Regarding green planting techniques, his book provides four main approaches to improve site area plantings (Lin, 2010). In 2006, Professor Lin collated his earlier research and published *Green Architecture* to discuss the green building design concept for the subtropical zone, in which he provides different opinions on ventilating, watering, biodiversity, energy saving, construction concepts for different areas (Lin, 2006).

As for *Feng Shui*, this subject is not very prominent in academic research in Taiwan, and no mention of planting topics is found in academic journals because this school of thought encompasses multiple professional fields. Only a few research papers concerning *Feng Shui* for dwelling issues have appeared in academic journals. In general, practical *Feng Shui* content is more commonly presented in *Feng Shui* trade books. In 2003, Chiang considered ancient *Feng Shui* to be an art of setting a house in the correct position to keep your family prosperous and healthy. In the past, *Feng Shui* has had much superstition and mystery attached to it; excessive focus on the mysterious side of some *Feng Shui* techniques has unfortunately led to some negative comments and judgment and neglect of *Feng Shui*'s effect on the harmonious relationship of people with the ecological environment and nature.

In recent years, after some western scholars acknowledged the importance of Chinese *Feng Shui*, which emphasizes harmony between man and nature and integration with the environment; it received more positive regard as a type of universal ecology (Chiang, 2003). According to historical data on the *Feng Shui* Form School, *Feng Shui* considers influences closely related to disciplines such as astrology, ecology, geology, psychology, astronomy, geography, structural science, and meteorology (Wu, 2005; Shen, 2006). Wu has the opinion that *Feng Shui* is a positioning concept that influences architectural layout, design, and construction, and integrates many environmental factors such as the geological environment, water environment, soil conditions, planting, lighting, and ventilation. *Feng Shui* for dwellings thus seeks a harmonious coordination between human residences and the natural environment (Wu, 2005). Wu emphasizes study of the historical development of *Feng Shui* and provides many green planting taboos in the *Feng Shui* school of thought. He also points out that much faulty *Feng Shui* knowledge caused people to become confused about its original intention; he recommends that people find out the real concept from tracing its historical development (Wu, 2006).

Han (1998) examines the connections between *Feng Shui* and the environment. He also considers *Feng Shui* concepts to be a part of the daily lives of people in Chinese society, such that they cannot be seen as a superstitious belief. Han also collated some *Feng Shui* planting and watering taboos for dwellings from ancient books. In Shen's (2006) book, *Feng Shui: Harmonizing your inner & outer space*, the history of *Feng Shui* development is described in detail, and some *Feng Shui* strategies and concepts based on different spaces are provided, such as for living space and working area. Some sections focus on issues of trees and plantings in dwelling gardens. *The Practical Encyclopedia of Feng Shui* (Hale, 2004) analyzes *Feng Shui* requirements based on different space demands, and also includes some discussion on planting. In Okinawa, some villages were developed and arranged by taking *Feng Shui* into consideration. Dense forests were required to be planted on the *Feng Shui* sites with consideration for wind flow, that effectively protected the village houses and paddy fields (Chen and Nakama, 2011). *Feng Shui* guidelines are considered in many building designs, but no scientific basis has been established as to the effect on people.

From the environmental psychology point of view, *Feng Shui* influence can be determined psychologically (Bonaiuto *et al*, 2010). *Feng Shui* is ancient Chinese wisdom, and it deeply influences Chinese society in many practical aspects even for modern people (Chen, 2007).

It is obvious that, due to the active promotion and integrated policies of green building design by government departments, there is a significant amount of complete information available on the topic. In contrast, literature concerning *Feng Shui* for dwellings is more complex but less systematically collated. The latter, therefore, requires more time to arrange and analyze. Although, after thousands of years of development and variation, *Feng Shui* has become complicated, mysterious, and difficult to understand, its concepts still affect architectural design and garden planning of residential spaces among Chinese people today. This study endeavors to investigate planting issues from both the green building design and *Feng Shui* perspectives, and attempts to expose any inherent conflicts and discover appropriate solutions that can satisfy both schools of thought.

2.1 Sects of *Feng Shui*

As historical records show, *Feng Shui* has had two main sects: Form School and Compass School, from the Song Dynasty (960-1279, AD). Before this, no formal records show that Compass had any relationship with *Feng Shui* issues. The Form School was regarded as the original and classical *Feng Shui* concept. When the Compass appeared in Song Dynasty, it was applied to *Feng Shui* in that period. Therefore, the Compass School had strong relations with the scholars who believed in the Confucian School of idealist philosophy of the Song and Ming Dynasties (Wu, 2006; Wang 1994).

Form School emphasizes the harmonious living and natural environment of people's dwelling, such as mountain forms, water environment and topography around the site. In fact Form School has been developed from ancient times in China, and has a completed and systematized theory and statement. However, experts in the Form School are not easy to find in modern times as they must have many kinds of knowledge such as: astronomy, geography, environment, architecture, structures, psychology, etc. In this specialization, such all-around experts are hard to find and train.

On the other school, the Compass School, based on directions and popular concepts in Song and Ming Dynasty. These concepts are related to Yin and Yang, Five elements philosophic theory which affect the direction of dual cosmic forces, and the effects of numerology on directions. It is more complex and mysterious, and very hard to understand; thus, from Song Dynasty many scholars gave negative commentary (Kao, 2004). In fact, many factions have also derived from the Compass School. When compared with Form School, it is obvious that the Compass School has less integrated system and fewer consistent theory statements, and is really hard to authenticate (Wang, 1994). Therefore this study focuses on the Form School of *Feng Shui* for dwellings because it contains more complete and systematic discussions.

3. METHODOLOGY AND PROCEDURE

As Bonaiuto's study points out, *Feng Shui* has little scientific evidence to support its influence; till today it is still hard to apply quantified logical analysis to *Feng Shui* study. This study seeks some possible solutions to improve this situation. Two phases of in-depth interviews and investigations with experts were processed for this study. Due to fewer and fewer people understanding the Form School, there are very few such *Feng Shui* experts in Taiwan now. For this study, six Form School experts, with average professional experience of about 12.5 years, were invited to participate in the first-stage interviews for exploring relationships between green building design and *Feng Shui*.

In the second stage, another expert investigation was carried out among 12 *Feng Shui* experts to confirm that the planting strategies and principles inferred from the first stage matched an independent panel of *Feng Shui* experts' viewpoints. The green planting strategies which are referred to in the design manuals are specific and straightforward. Therefore, during this study, only *Feng Shui* experts were interviewed to confirm the inferred results from their perspective.

4. ANALYSIS AND DISCUSSION

For explicating the connection between green building designs and *Feng Shui* issues regarding green planting, expert interviews were undertaken. The first round was to confirm what green building indicators and the important factors for green plantings are concerned with *Feng Shui* opinions. The second stage checked how greenery contents in green building design are related to *Feng Shui* from experts' views. The final round sought to confirm the principles that meet both requirements of sides of thought.

4.1 Connection between green buildings indicators and *Feng Shui*

This study carried out an interview investigation among six Form School *Feng Shui* experts. To avoid misunderstanding about green building design contents and the purpose, the interviewer clearly explained the purpose and indicators of green building design as plainly as possible during the interview to make sure *Feng Shui* experts comprehend what green building design comprises and practices. Table 1 presents the views of these experts on which of the green building indicators are connected to *Feng Shui*. It is obvious that experts have believed many indicators of green design related to *Feng Shui* issues. Some results can be observed of the investigation as:

1. In the nine indicators of green buildings, there are six indicators that all experts completely considered those have connection with *Feng Shui* concepts.
2. All experts agree that biodiversity, green planting, water retention, energy savings, water resource, and garbage and sewage are related to *Feng Shui*.
3. From the experts' view, it is no doubt that the topics green planting which we concerned in this study has strong relation with *Feng Shui*.

Table 1. Experts' views on connections of *Feng Shui* with green building indicators

Experts Indicator	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6
1. Biodiversity environment	⊙	⊙	⊙	⊙	⊙	⊙
2. Green planting	⊙	⊙	⊙	⊙	⊙	⊙
3. Water retention	⊙	⊙	⊙	⊙	⊙	⊙
4. Energy savings	⊙	⊙	⊙	⊙	⊙	⊙
5. CO ₂ emissions reduction	⊙	⊙				
6. Waste reduction	⊙					
7. Indoor environmental quality	⊙	⊙				⊙
8. Water resources	⊙	⊙	⊙	⊙	⊙	⊙
9. Garbage and sewage	⊙	⊙	⊙	⊙	⊙	⊙

⊙ indicates that expert views this indicator as significantly (Source: collated by author)

4.2 The green planting concerns of *Feng Shui*

When checking the expert investigation results and data collected on green planting of *Feng Shui*, it is clear that green planting is an important element in *Feng Shui*. Checking the information provided by Wu and Wang, the greenery issue can be discussed as follows:

1. Implications of trees

Some Chinese people believe that some particular tree species have positive meaning for them, such as pine trees meaning long life, cypress trees meaning a man with great ability and loquat trees meaning many children and grandchildren, etc (Wang, 1994). On the other hand, some trees or plantings have native meanings. Vine plantings symbolize disputes and lawsuits; thus they are not suitable to plant in dwellings.

2. Location of plantings

On *Feng Shui* concepts, it is not suitable to plant high and dense trees on the front side of dwellings because trees block the front scene symbolizing obstruction of life prospects. Trees with sharp-pointed forms also do not fit at the front and back sides of houses since point shapes mean a sharp knife or bayonet on your front or back, and these are not a good situation in life (Wu, 2005).

3. Shape of plantings

In *Feng Shui* view, some plant shapes are not welcomed around dwellings due to being ominous in people's vision. It prefers the plant form neat and clear without any obstructions. Particularly, a plant with a monster or queer shape facing the house has an ominous meaning; people do not like that situation.

When further checked the detail contents of the greenery issue in the green planting indicator and *Feng Shui* concept, they show that the concern subject matters related to locations, types and implications of plants issues. Table 2 presents the comparisons of greenery in the green building and *Feng Shui*. In fact, both concern subject matters are very close and related. On the other word, the result is directly responded to the experts' investigation.

Table 2. Comparisons of greenery concern in the green building and Feng Shui

	Green planting indicator concern	Feng Shui concern
Greenery contents	• Ecological vegetation wall • Roof and artificial planting • Plant types and amount • Greenery rate	• Implications of trees (Tree species) • Tree shapes • Location of vegetations

4.3 Green planting designs related to *Feng Shui*

In the Taiwan green design regulations, the plant types and quantities are critical elements to match the building regulation requirements. As discussed above, the greenery issue of *Feng Shui* is concerned with implication, location, and form of plants. Thus, improper plantings will result in some bad omen situations for people who live in the houses. When we inquired of experts for more details on green plantings for green building techniques related to *Feng Shui* issues, the six experts presented the same viewpoints on the green planting contents. The green planting contents such as ecological vegetation wall, artificial roof planting, and plant species have strong connection to *Feng Shui* greenery issues. Table 3 shows the investigation results of experts' views on the connection of green planting designs and *Feng Shui*. There is obviously much consistency among the experts' views.

Table 3. Summary of green planting designs related to *Feng Shui* issues

Experts Green planting techniques	Expert A	Expert B	Expert C	Expert D	Expert E	Expert F
1. Ecological vegetation wall	▲	▲	▲	▲	▲	▲
2. Artificial roof planting	▲	▲	▲	▲	▲	▲
3. Wind-blocking and aeration for plants						
4. Plant species	▲	▲	▲	▲	▲	▲

▲ indicates that expert views this technique as significantly related to *Feng Shui*

5. PLANTING PRINCIPLES CONCERNING *FENG SHUI*

From the previous discussion, the planting concern of *Feng Shui* is clearly important and the literature does show that there are many planting taboos and rules. Analyzing information from various sources, the researcher summarized several planting principles which are commonly considered *Feng Shui* concepts of greenery.

❑ **Types or significances of green plantings to avoid negative meanings**

Some plants have negative meanings or omens in the *Feng Shui* concept. People prefer to have positive and auspicious plantings around the dwelling. Some trees such as pines, cypress and camphor have the meaning of long life and spirit of being firm and persistent; thus people like them to be planted around houses. Contrarily, some trees are not suitable to plant near houses due to easily provoking mishaps and ominous events, such as willow and banyan trees. In fact, this is the view of some Chinese people on plantings, but perhaps not appropriated by western people.

❑ **No high and dense plants to block the front of houses**

In *Feng Shui* view, the area in the front of houses signifies the future prospects for families. It should not be blocked with high and dense plants or obstructions. *Feng Shui* believes that the high obstructions will cause unanticipated events. In fact, they believe if someone wants to grow plants on the front side, the plants should not be higher than someone's shoulders, and allow one to see through the front (Wu, 2005).

❑ **Plant shapes should not be queer or dried-up forms**

In the *Feng Shui* concept, plant vitalities symbolize the health of people. Withering plants will cause health problems or mishaps to people, so a dying plant should be removed as quickly as possible (Shen, 2001). Trees that are not maintained well and grow into queer shapes are not proper to have in gardens. In the *Feng Shui* greenery concept, the plant shape should be neat, tidy and avoid weird and offensive visual appearances.

❑ **Avoid twining plants scrambling directly on exposed walls and roofs**

In *Feng Shui* opinion, twining plants symbolize muddled lawsuits and disputed affairs. When a house is covered with twining plants, the family will incur some unfortunate matters. Some people also believe that a house covered with twining plants will experience increased indoor humidity. High humidity will lead to mould growth, which influences people's health; thus twining plants around the house are not welcomed.

5.1 Confirmation of the principles for green building and *Feng Shui*

The main purpose of the final stage of this study was to confirm the principles presented in the previous discussion. In addition to the six experts consulted in the first-stage interviews, another seven experts were invited to participate in this investigation; these *Feng Shui* experts ensured that the proposed green planting principles are indeed suitable. Table 4 shows the mean and the standard deviation calculated from the expert investigation results on green planting principles. The measure for this instrument employed a 5-point Likert scale, with 5 meaning completely agree and 1 meaning no connection. It is worth mentioning that the means of responses to all questions are above 4 points. The investigation results indicate that the experts agreed strongly about the green design planting principles which are matched to the *Feng Shui* concept of greenery.

Table 4. The mean and standard deviation results of experts' views on principles green building designs should consider in regard to *Feng Shui* concepts

Question	Mean	Std. Deviation
Q 1: How important is it for species or significances of green plantings to avoid negative meanings?	4.33	0.651
Q 2: How important is it that high and dense plantings should not be in the front of houses?	4.42	0.669
Q 3: How important is it that planting shapes should be not queer and dried forms in <i>Feng Shui</i> ?	4.25	0.622
Q 4: How important is it to prevent twining plants from scrambling directly on exposed walls and roofs of houses?	4.58	0.669

6. CONCLUSIONS AND SUGGESTIONS

The objective of the green plantings in green building design is to increase the vegetation area on the building site. However, green plantings in *Feng Shui* emphasize the species of the plants, the implications of location, and the shapes of the trees or bushes. For future environment sustainability, green building and *Feng Shui* should not to be obstacles to each other, rather should mutually support each other as long as we can sufficiently satisfy the requirements of both. As shown through results of an experts' investigation, the green building designs of greenery are directly and closely associated with the garden vegetation concept in *Feng Shui*. As green building is an important trend that must be adhered to in current building design, and *Feng Shui* contains pearls of wisdom handed down from the ancient Chinese, both systems contain aspects of ecological environmental protection. This study shows that the concepts need not conflict, but that they can complement each other. In planting issues of *Feng Shui* for dwellings, species and implication of trees and planting locations affect fortune and health of families; thus, green building designs should be careful to deal with these appropriately. This study was not conducted with the objective of encouraging people to believe in *Feng Shui*, but with the hope that moderate respect may be given to this traditional school of thought when designing green plantings for green building. Furthermore, we hope that more interdisciplinary studies will be carried out to derive solutions that fulfill both systems, so that traditional building concepts and modern design thought can be concurrently promoted. Thus, the promotion of green building will not be hindered by *Feng Shui* factors, but greater progress can be achieved through mutual consideration.

This study is only the beginning of interdisciplinary research on green building and *Feng Shui*. Future studies can investigate other topics through in-depth investigations on water and environment issues, and also investigate some scientific statistics on *Feng Shui* influence on people's situations. The researcher hopes that this will greatly benefit the further development of green building, and allow for incorporation of the concepts of *Feng Shui* for dwellings into modern architectural developments and traditional residences.

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