Sustainable Cities and Korean Ecological Traditions

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Abstract

There is a growing feeling that, while Western rational, scientific and technological approaches have contributed greatly to the urbanization of Korea, the undesirable consequences of this pattern of development necessitate a new, more ecologically sound approach reflecting the cultural values of Korean society.

The principal aims of this paper are to improve the understanding of the relationships between environmental knowledge, awareness, and action connected with growth and development from a Korea perspective, and to suggest prospects for a new relationship between sustainability and the Korean ecological tradition.

To explore this new relationship, this paper begins with a discussion of sustainability and a comparison of Western and Eastern approaches to nature and environment. Then it reviews research on the eco-city which contributed to the inclusion of environmental dimensions into urban land use planning and development.

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From these broad bases, it examines paradigms and movements that had an impact on the development of the eco-city concept, with particular emphasis on "sustainable development" - the most recent paradigm. It moves on to address the growing interest in the Korean ecological tradition that lies in the same context with sustainability, sustainable development, and the principles of sustainable development. This chapter also provides the reader with how the tradition has been applied at the house layout, eco-techniques and urban planning level.

Finally, a brief conclusion is drawn in the final chapter.

I. Introduction

Preparations for the new millennium has been in full swing in various fields. This includes a lot of predictions of environmentalism for the twenty-first century. L.P. Thiele describes the fourth wave of environmentalism for the twenty-first century as coevolution.[1] The idea of coevolution and its action is based on the interdependency between humans and nature in the global context. It is significant that the prosperity of human beings depends on their ability to preserve the life sustainability of the entire biosphere. With sustainable development in mind, human life should be incorporated within the ecological network.

Evolution generates many levels of wholeness simultaneously, from the metabolic dance of the cell to the vast cycles maintaining the biosphere. The biosphere pulses with the interconnection of all life. Each level—cell, organism, ecosystem, bioregion, biosphere—should be respected as we coexist with natural world around us. With this current trend in mind, exploring a Korean viewpoint of nature and society will be very relevant.

In the past several decades, Korea's aspirations for development have mirrored the life-styles and economic achievements of developed countries. Very recently, however, Korean people have begun to realize that these life-styles and economic achievements lead rapidly to environmental degradation. It is now perceived that developed countries are far away from sustainability in the sense as it is defined within Korean tradition. Many people in Korea argue that it is urgent from an environmental standpoint to make our development model more sustainable. There is a growing feeling that, while Western scientific and technological approaches have contributed greatly to the urbanization of Korea, the

1) Thiele argues, genetically non-related organs experience simultaneous evolution in an interrelated manner resembling that of culture and nature. He also suggests that the first wave is conservation; the second, containment; the third, co-optation (pp. 3-29).

undesirable consequences of this pattern of development necessitate a new, more ecologically sound approach reflecting the cultural values of Korean society.

It is often said that we should consider a way to adapt Korean views of nature, society, and life-style to urban development in terms of economic, social and ecological aspects. It is believed that if our approach to "sustainable cities" in Korea takes on the appearance of Western ecological thought but remains indifferent to Korea's own commendable and practical traditions, the result will be only the further westernization of Korea.

II. Environmental Values, Knowledge and Action

The principal aim of this paper is to improve the understanding of the relationships between environmental knowledge, awareness, and action connected with growth and development from a Korean perspective, and to suggest prospects for a new relationship between sustainability and the Korean ecological tradition. To explore this new relationship, this paper begins with a discussion of sustainability and a comparison of Western and Eastern approaches to nature and environment.

First, it is desirable to investigate the current Western concept of sustainbility and the eco-city. The eco-city presupposes sustainability. Environmental scholar David W. Orr separates technological sustainability from ecological sustainability.[2] Technological sustainability in urban planning derives from applying technological thinking to all areas of life. This mechanistic era is ending in most areas of human endeavor. The idea of technological sustainability includes ideas that all human beings are the same and can be programmed into life-styles just as machines can be driven or programmed, and that nature is not important in itself and can be modified to suit our needs.

On the other hand, ecological sustainability takes a more creative and environmental approach. This approach can be attained by a better understanding of the local ecology and its interaction with the human ecology of the city. Sustainability is not a single movement or approach. It is as varied as the communities and interests currently grappling with the issues it raises.

Sustainability means that the environment should be protected in such a condition and to such a degree that environmental capacities (the ability of the environment to perform its various functions) are maintained over time: at the least at levels sufficient to avoid future catastrophe, and at the most at levels which give future generations the opportunity to enjoy an equal measure of environmental consumption.

2) Ryn & Cowan (1996, 6-7) emphasize that ecological sustainablility embraces assumptions very different from the optimism of the U.S.-sponsored report on sustainable development titled, *Our Common Future*. It requires limits to technology, limits to material wants, and limits to the stress placed on the biosphere.

Environmentally Sound and Sustainable Development (ESSD) has become a challenge for Korea as well as for other countries in the world. Nevertheless, sustainability is not a well-defined concept. A judgement about "environmental sustainability" cannot be made before there is clarification of the nature of the environmental information being considered and the context in which it is being used. The set of elements that require definition is not the same for all environmental systems. In addition, judgements about sustainability must always be made in relation to particular values. Questions such as "for whom" and "for what" are integral to the concept of sustainability, since its meaning varies considerably between, as well as within, different cultural groups. People who hold different sets of values may choose different actions when faced with the same evidence. Therefore, societal perceptions, attitudes, and values must be considered along with knowledge of environmental systems, as part of the study of transferability of possible courses of action from one culture or subculture to another. Figure 1 shows the relationship between environmental knowledge, values, and action.

Faludi argues that there are three paradigms of planning theory and practice. (Here paradigm is defined as a distinctive perspective from which problems and solutions are being approached.) According to Faludi, these three paradigms are characterized by the way they conceive of planning. They can be seen as object-centered and control-centered as well as decision-centered. The underlying perspectives on knowledge and action are reflected in these three paradigms.

The object-centered view of planning lays overwhelming emphasis on the object of planning. No attention is paid to the steps and learning from understanding to action. Action simply follows from knowledge (see Figure 1). The underlying message concerning knowledge and action is loud and clear. Knowledge is objective and certain: knowledge can be obtained through study and research and is thus

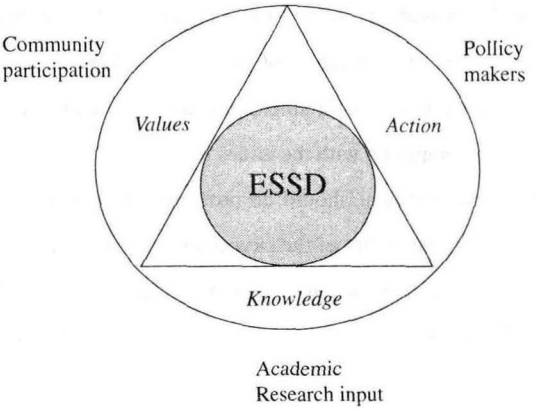

Figure 1. Conceptual relationship between environmental knowledge, values and action, and Environmentally Sound and Sustainable Development.

only possessed by experts (especially by experts with a special skill in synthesizing disparate facts).

Control-centered planners see planning as state intervention. They are concerned with the nature and effects of powers of control exercised by the state. An underlying assumption is that control powers ultimately serve to maintain the capitalist powers of production. Marxists, housing reformers, and welfare economists alike hold a control-centered view of planning.

By contrast, the perspective on knowledge and action underlying the decision-centered view of planning is in tune with more current theories. Existing knowledge forms a tentative framework that has emerged from past negotiations, negotiations in which the researcher committed to searching for truth is but one of the parties to the game. Every argument can come up for renewed discussion. The formation of new knowledge certainly requires fresh arguments. This applies even more to action. There, the relationships between the views held and the goals one pursues are even more overt, and the subjective nature of proposals even more evident.

Rendering the relation between knowledge and action explicit can only make the need for debate and agreement of all participants all the clear. Therefore, the underlying perspective of the decision-centered view is also a democratic one. Experts have a definite role in bringing in the evidence. They are full partners in thrashing out the relationship between facts and values, but they can never have the final say. They are not the only players in the game.

A decision-centered view of planning has important implications for the way we approach ESSD. In Korea it suggests that we need to treat traditional Korean approaches to nature and environment, as well as grassroots naturalistic philosophies, as important sources of knowledge, ideas and beliefs which should be drawn upon and taken into account in the urban planning and decision-making process.

III. Research on the Eco-city

The most pressing global environmental, economic and social issues that we will face in the next century will be in the cities. The inclusion of environmental dimensions into urban land use planning and development can be seen in terms of the development of an eco-city which provides an integrated solution to the global and ecological crisis.

It has been argued that a focus on urban ecosystems may suggest the start of a constructive approach to planning. There is a difference between traditional and emerging methods in the inclusion of a broader range of environmental variables and environmental effects and the greater sophistication with which they are modelled. This has resulted in a wealth of definitions of the eco-city (Register 1987; Urban Ecology Australia 1993; Platt et al. 1995).

In Korea, the eco-city received increased interest in the early 1990s, mostly initiated by the Ministry of the Environment; Kim Kwi-Gon executed two case studies on the eco-city in Taej n Metropolitan City and Tonghae City. In his reports, Kim analysed ecosystems and suggested strategic issues and eco-city plans for those cities.

One can argue that the need for the integration of environmental considerations into urban planning and development is self-evident. However, the realization of Environmentally Sound and Sustainable Development (ESSD) principles using eco-city concepts and methods is not that simple. An eco-city can be defined as a city shaped in accordance with ecological principles. According to Urban Ecology 1996, ecological cities should meet the following ten principles (Roseland 1977, 3).

(1) revise land use priorities to create compact, diverse, green, safe, pleasant, and vital mixed-use communities near transit nodes and other facilities;
(2) revise transportation priorities to favor foot, bicycle, cart, and public transit over automobiles, and to emphasize "access by proximity";
(3) restore damaged urban environments, especially creeks, shore lines, ridgelines, and wetlands;
(4) create decent, affordable, safe, convenient, and racially and economically mixed housing;
(5) nurture social justice and create improved opportunities for women, people of color and the disabled;
(6) support local agriculture, urban greening projects, and community gardening;
(7) promote recycling, innovative and appropriate technology, and resource conservation while reducing pollution and hazardous waste;
(8) work with businesses to support ecologically sound economic activity while discouraging pollution and hazardous wastes;
(9) promote voluntary simplicity and discourage excessive consumption of material goods;
(10) increase awareness of the local environmental bioregion through activist and educational projects that increase public awareness of ecological sustainability issues.

Based on these principles, the author chaired the UNDP eco-city project concerning the development of eco-city planning guidelines to help local governments establish eco-city planning. Tasks to initiate eco-city planning and a full outline of its procedures are contained in the final report.

In supporting eco-city planning, the right type of development at the right time should be promoted in the right place. The eco-city plans proposed in the case studies provide for a more ecologically sustainable urban development than is possible under conventional urban planning and design methodologies. Further research is needed on environmental budgeting for evaluation of extra

expenditure which is to be argued for on environmental grounds. Another important question is how the proposed eco-city plan contributes to the sustainability of Taejŏn and Tonghae. Therefore, research is also required on environmental performance, performance indicators, and criteria by using a sustainability evaluation matrix.

According to the eco-city planning methodology, when a city is developed or re-developed, the results should be compared with those obtained through traditional planning methods and analysed in terms of environmental loads, as well as socioeconomic or psychological aspects.

IV. Paradigms or Movements that Had an Impact on the Development of the Eco-city Concept

The eco-city concept that was discussed in the previous section originates from the West. Many paradigms and movements had an impact on the development of the eco-city concept. In his book *Eco-city Dimensions: Healthy Communities, Healthy Planet*, Roseland lists "Healthy Communities," "Appropriate Technology," "Community Economic Development," "Social Ecology," "the Green Movement," "Bioregionalism," "Native World Views," and "Sustainable Development" as paradigms or movements that affected the development of the eco-city concept. Although somewhat simplified, I believe these paradigms or movements will be helpful in understanding the evolutionary process of the eco-city. The following is a review of "sustainable development"—the most recent paradigm.

1. Healthy Communities

The notion of "healthy communities" aims to improve public health by local government intervention focusing on medical care. The *Ottawa Charter for Health Promotion* (WHO 1986) expresses well the paradigms of the healthy community. It recognizes that the fundamental conditions and resources for health are peace, shelter, education, food, income, a stable eco-system, sustainable resources, social justice, and equity.

The Healthy Cities Project[3)] conducted by the WHO in Europe and the healthy community projects in Canada conducted by the local government show how we can improve public hygiene, food handling and other public health regulations, recreational facilities, education, transportation, economic development, and land use planning.

3) The World Health Organization has directed the successful creation of a 30-city network known as the Healthy Cities Project in Europe.

2. Appropriate Technology

Schumacher (1973) has proposed the notion of "Appropriate Technology"(AT), whose main goal is to enhance the self-reliance of people on a local level. Examples of current projects which are generally classified as AT include passive or active solar collectors for heating and cooling; small windmills to provide electricity; roof-top gardens and hydroponic greenhouses; permaculture; and worker-managed craft industries.

To achieve self-reliant communities, AT promotes strategies such as low resource usage coupled with extensive recycling, preference for renewable over nonrenewable resources, emphasis on environmental harmony, emphasis on small-scale industries, and a high degree of social cohesion and sense of community.

3. Community Economic Development

The Community Economic Development Centre at Simon Fraser University defines Community Economic Development (CED) as a process by which communities can initiate and generate their own solutions to shared economic problems and thereby build long-term community capacity and foster the intergration of economic, social and environmental objectives. Examples of CED range from small business counseling and "buy local" programs to worker operatives, community development corporations, and community land trusts.

4. Social Ecology

Social ecology is part of the struggle against social domination and hierarchy that include the liberation of women, of workers, of blacks, of native peoples, of gays and lesbians, and of nature. Social ecology is the study of human and natural eco-systems as well as the social relations that affect the relation of society as a whole with nature. The primary social unit of a proposed ecological society is the eco-community, a human-scale, sustainable settlement based on ecological balance, community self-reliance, and participatory democracy.

5. The Green Movement

The Green Movement has four pillars: ecology, social responsibility, grassroots democracy and nonviolence. It also endorses the principles of community self-reliance, the improvement of the quality of life, harmony with nature, decentralization and diversity (Capra and Spretnak 1984).

The Green Movement takes different forms in different countries. For most North Americans, being

Green signifies being pro-environment, but for Germans, it signifies being pro-feminists who support civil liberties, working for solidarity with Third World peoples, and standing for an end to the arms race (Swift 1987). Starting in the mid-1970s, this movement formed a political party called the Value Party in New Zealand; Les Vertes in France; and Die Gru n in West Germany. The Green Movement spread to many other developed countries in Europe and North America.

6. Bioregionalism

The central idea of bioregionalism is place,[4] but a bioregion represents the right size for human-scale organization with a natural framework for economic and political decentralization and self-determination. Bioregionalism considers people as part of a life-place, and just as dependent on natural systems as the native plants or animals.

Bioregional practice is oriented toward resistance against the continuing destruction of natural systems, such as forests and rivers, and toward the renewal of natural systems based on a thorough knowledge of how natural systems work and the development of techniques appropriate to specific sites (Dodge 1981)

7. Native World View

The idea of a "native world view" finds sustainable patterns of resource use and management in the belief and behaviour systems of indigeous cultures. Its basic idea is that humans cannot be separated from their environment. The Native World View paradigm is easily seen in the following comparison of the Western and American Indian traditions:

> The Western tradition pictures nature as material, mechanical, and devoid of spirit. ... while the American Indian tradition pictures nature throughout as an extended family or society of living, ensouled beings. The former picture invites unrestrained exploitation of nonhuman nature, while the latter provides the foundations for ethical restraint in relation to nonhuman nature (Callicot 1982).

8. Sustainable Development

As we have mentioned at the beginning of this section, the spirit of "sustainable development" is well defined in the World Commission on Environment and Development Report (1987): Sustainable

4) In this context, "the spirit of place is expressed by something unique to a particular place. Enclosed valleys, or prominent hills; indication of great antiquity, such as old trees and rocks; earthworks; places where the lighting is dramatic, especially where associated with water; all these contribute to a powerful sense of place, particularly where there is a feeling of wilderness.

development is the development that meets the needs of the present without compromising the ability of future generation to meet their own needs. Agenda 21 is founded on this definition and was adopted as the action plan for the twenty-first century in the Earth Summit held in Brazil in 1992.

8.1. Background and Definition of Sustainable Development

Sustainable development emerged in December 1983 amidst growing concern over declining ecological trends and the seeming incompatibility of economic and environmental perspectives. The UN Secretary-General responded to a United Nations General Assembly resolution by appointing Gro Harlem Brundtland of Norway as chairman of an independent World Commission on Environment and Development. For the next few years the Brundtland Commission studied the issues and listened to people at public hearings on five continents, gathering over 10,000 pages of transcripts and written submissions from hundreds of organizations and individuals. In April 1987 the commission released its reports: *Our Common Future*. At the core of the report is the principle of "Sustainable Development." The commission's embrace of sustainable development as an underlying principle gave political credibility to concepts many others had worked on over the previous decade. The commission defined sustainable development as meeting "the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987). This simple, vague definition was also the foundation for Agenda 21, the document that emerged from the United Nations Conference on Environment and Development (the "Earth Summit" held in 1992 in Brazil) as a sustainable development action plan for the twenty-first century.

8.2. Principles of Eco-city Planning Related to Sustainable Development

According to Gibson et. al. (1997) others ten principles of eco-city planning are as follows:

Principle 1: Base planning units on natural boundaries

Principle 2: Design with Nature

Principle 3: Consider global and cumulative effects

Principle 4: Encourage interjurisdictional decision making

Principle 5: Ensure consultation and facilitative cooperation and partnering

Principle 6: Initiate long-term monitoring, feedback, and adaptation of plans

Principle 7: Adopt an interdisciplinary approach to information

Principle 8: Adopt a precautionary but positive approach to development that aims not just to avoid further damage but also to reduce stresses and enhance the integrity of ecosystem and communities

Principle 9: Ensure that land use planning integrates (rather than merely "balances") environmental, social, and economic objectives

Principle 10: Link ecosystem planning with other aspects of democratic change, social learning, community building, and environmental enlightenment

The summarized features of above-mentioned principles are as follows.

1) Eco-city planning is founded on humankind's dependency on nature. Therefore, ecology allows many insights in the review of urbanization. Ecology helps ecologists or urban planners/controllers to generate environment or green ideas. It also encourages urban planners/controllers to pay attention to non-humans and stresses.

2) In planning a city, eco-city planning is helpful in resolving environmental issues. It is believed that it would contribute to ecology in explaining environmentalism and environment-society relations. It may also offer something for ecology through initiatives for environment-friendly urban planning philosophy, theory, and techniques. Such initiatives can be divided into two categories. The first is applying an approach similar to studying industries in analyzing urban ecosystem. The second, more recent initiative, is applying the principles of the ecosystem—diversity, stability, circularity, and independence—in understanding, planning, and managing urban structures and functions.

According to the former approach, as the elements of a biological system interact, the elements of an urban ecosystem also interact. In both systems, important elements are the flows of energy and substances.

The flows of energy and substances are related to urban metabolism. This perspective helps to provide a clear explanation of inputs such as water, power, and fuel coming from the outside world and how substances like water waste and trash are eliminated.

Under such a concept, inter-dependency between the natural region and man-made region must be considered. This concept also provides a conceptual foundation that is required in developing a number of topics on how to minimize the imbalance in the urban environment caused by human actions.

It is believed that the latter initiatives became active with the application of the principle of sustainable development to cities. When the concept of sustainable development is applied to a city, it begins to be called an eco-city.

An eco-city is viewed as an organism. It becomes a city where the various activities and city structure are planned and designed in a way similar to the principles of diversity, independence, circularity, and stability, characteristic of the natural ecosystem. This allows the co-existence and co-evolution of humankind and the environment.

3) Eco-city planning principles have been defined based on sustainable development principles.

Here "sustainability" means that the environment should be protected in such a condition and to such a degree that environmental capacities (the ability of the environment to perform its various functions) are maintained over time : at least at levels sufficient to avoid future catastrophe, and at most at levels which give future generations the opportunity to enjoy an equal measure of environmental consumption. On the other hand, according to Our common Future, sustainable development means "ensuring that the needs of the present are met without compromising the ability of future generations to meet their needs," as discussed in IV.8.1 of this paper.

There are many proposals on how to achieve such sustainable development, Graham Haughton aligns sustainability principles with ecological, social, economic and management issues:

1) Human activity must ultimately be limited by environmental considerations;
2) Future generations should not have to pay the price of our carelessness with the environment;
3) It is better to take precautions now to prevent damage to the environment than to have to repair such damage later on (the "precautionary" principle);
4) Resources should be conserved by using renewable and recycled materials, and by minimising waste-by reusing and recycling materials and making products that last;
5) The poor must not be asked to bear the environmental damage caused by the life-styles of the rich;
6) Efforts to reduce demands on the Earth's natural resources should be given priority over attempts to meet such demands;
7) New ways of measuring prosperity need to be devised, accountable to environmental well-being as well as economic wealth;
8) Environmental costs should be fully borne by those who degrade the environment (the "polluter pays" principle);
9) It is important to ensure that everyone understands and accepts the need for environmental policies;
10) Implementation and management responsibilities for programmes and policies should be placed at the lowest practical level of government (the "subsidiarity" principle).

V. Korean Ecological Tradition

Today, environmental ecologists as well as urban planners have a great interest in the Korean

ecological tradition that lies in the same context with sustainability, sustainable development, and the principles of sustainable development. The Korean traditional view of ecology will be reviewed below in terms of principles of co-existence and co-evolution between humankind and nature, bioregionalism, substance and energy circulation, and regional community.

1. Naturalistic Philosophies in Korea

A number of underlying factors, including local cultural, religious, historical, and political factors, have affected environmental research, awareness and action in the environmental field in Korea. Because of its location at the far eastern end of the Asian continent bordering on China, Korea has traditionally been exposed to Chinese influences in most cultural fields. Also, Buddhism, which has been a main inspiration for many magnificent cultural achievements, Zen Buddhism, Taoism and Confucianism, including the Chinese philosophies of Yin and Yang & Five Elements Theory as well as Geomancy (*p'ungsu*), have been evident in Korean society. Believing in the harmony of life with nature, Koreans have readily accepted these naturalistic philosophies.

1) Taoism

Taoism has long been cherished in East Asian societies. Its point of view about nature today attracts people who cherish nature itself. Within the framework of Taoism, nature is heaven who has volition and supervise human beings[5] Because it stands aloof from humankind, one cannot make investigations into it with only human knowledge. Humans have deep wisdom as well as perception, with such deep wisdom we can recognize the transcendental heaven.[6] As heaven is a transcendental being, so are people transcendent. Furthermore, Taoism insists that even animals, mountains, and streams have their own spirit (Choi J.S. 1990).

According to Laozi, *dao* is the source of life in all the universe and also a mother who created all living beings. Thus, *tao* is the absolute god. If *tao* and humans join together, then humans can also become an absolute god. In this regard, human beings are the lord of all creation. Taoism is different from Western mysticism in that it adapts itself to nature, unifying itself with the laws of nature. On the contrary, Western mysticism tends to dominate nature.

Joseph Needham's discussion of the ancient debate between Confucian and Taoist water engineers exemplifies the Taoist view of nature (Ryn & Cowan 1996, 116-117). The Taoist believed that water

5) Nature has the power to punish of reward for the deeds by human-beings.

6) Humans and nature can become a single entity through ceaseless self-enlightment, for human and nature are regarded as beings absolutely equal.

should meander over the landscape, following its inherent tendencies, whereas the Confucian favored strict control of water flow. Then, as now, there is a struggle between the desire to make more land available for homes and agriculture and the desire to respect the integrity of existing hydrological cycles. The result of the struggle is that the narrow channels of the Confucians were often buttressed with retention basins for occasional floods. On the other hand, the very wide dikes of the Taoists were augumented with additional channels to allow farming during nonflood conditions.

The Taoists saw the land as an active landscape providing ecological functions that simultaneously meet the needs of both people and wider living communities. They valued the intrinsic integrity of the landscape and found both meaning and sustenance by participating in its processes.

An active landscape is neither completely wild nor excessively controlled in the manner of conventional water projects and agricultural systems. The idea of an active landscape reminds us of ecological flood-control system, providing a strong case for preserving the ecological integrity of the land. In it there is a kind of self-design or self-organization at work. Each microcosm spontaneously develops new levels of coherence and resilience that arise only from the rich interactions of the whole system.

In this respect, Taoism is similar to the Gaia Theory suggested by James Lovelock (1992). Gaia Theory sees the Earth as an active self-regulating system. Life regulates the climate and the chemical composition of the atmosphere at an optimum level for itself. It is a holistic process. In this view, the Earth is a super-organism or physiological system. This raises the level of the study of the Earth from geography to physiology, resulting in geophysiology, since the regulations of the climate and the chemical composition of the Earth require a physiological approach.

The Gaian view of carbon dioxide levels explains the need to include life organisms in the study of the environment. The geochemical weathering of rock was, by itself and in the absence of life, insufficient to account for the low contemporary level of carbon dioxide. In 1989 the American scientists Volk and Schwartzman confirmed part of this prediction by showing that the rate of rock weathering is increased by a factor of 1000 when organisms are present. This is much more than is needed to enable a powerful physiological regulation of climate and carbon dioxide.

Although Gaian Theory and Taoism started from completely different premises, their ecological viewpoint of self-regulation of nature is similar. In Taoism, humans and nature can become a single unit in which humans conform to the principle of nature. But the consequence of our conforming to nature brings about the exploitation of nature itself. In consequence, human should live up to the will of nature who has self-regulating function.

2) Zen Buddhism

In the real world humans live under in a frameless network in which they mingle and circulate. Because there is no original beginning, there is no God or creator in the universe. The root of Buddhism lies not in God or a creator but in the Buddahood and its operation through Buddhists. Buddhism focuses on not the external world, but on the internal attitude of people towards the world. The aim of Buddhism is the completion of Buddahood through ceaseless efforts against vice and other temptations, and the practice of mercy towards others—including nature, with a view to attaining the highest goodness.

Circulation of life enables human to reincarnate in a different form after death on the basis of karma. Therefore, one can be reincarnated as a human or animal or part of nature itself. This notion of circulation provides the idea of the law of cause and effect in Buddhist thinking and forces one live up to the ethical way of life. In this way believers come nearer to the completion of Buddahood (Yi 1990, 24).

The outstanding characteristics of Hwa m philosophy lies in its thorough approach to totality. There is nothing without change in the universe. Everything will repeat a ceaseless cycle of appearance and disappearance. The same thing or phenomenon seems different according to who, where, when, and how one sees it. The moon looks like a small ball from Earth, but it becomes a big world when one is on the moon itself.

Voidness or Emptiness (*sunyata*) is manifestation or phenomenon (*rupa*). Voidness is neither nothingness nor annihilation. All things are instantaneous beings changing from instant to instant, existing in an instant (*ksana*). This momentarilism supports the idea that nothing exists in the real form, but very little things can appear or exist in the universe as remaining substance.

All entities are born in various forms such as egg, vapor and the umbilical cord and the placenta[7] Some live on the earth, others live on water, fire, wind, tree, and flower in the same universe. Buddhism teaches that all living or non-living beings in the universe are equally valuable, and should be respected without discrimination. All entities should seek harmony and respect amongst themselves.

This spirit expresses Buddhism's point of view on nature. The ecological significance of Buddhism can be summarized as follows: We are in nature, and nature is in us. The great exists in the small and hence every act has not only global, but cosmic implications. Humble local acts, each respecting the whole web of life, add up to a sustainable culture. People are finite and fallible. The human ability to comprehend and manage scale and complexity has its limits. We need to change the way we think about

7) It refers to the initial state of birth by nature.

knowledge and design. We need to scale our designs both to the limits of ecosystems and to the limits of human understanding. This has the immediate advantage of bringing sophisticated forms of local knowledge into play. In turn, this local knowledge can inform the design process, providing it a high level of ecological sensitivity and appropriateness.

The co-existence of humankind and nature and the notion of regional community are developed in the Buddhist scripture *Hwaŏmgyŏng*. Buddhism stresses the restoration of life order. Venerable Dobup expresses it thus:

> "Life functions in harmony with the whole while keeping its own uniqueness. This applies to the world in the same way. It exists by getting along as equal partners and creating value for each other. Therefore, there is no such thing as a road for only myself. If there is a road, it would be a road that is large enough for everybody to live together. It is not relations of taking but of give-and-take. These foster the significance of each other's existence and create an order of co-existence. Therefore, the Buddha said that self-completion and the way to the completion of Buddha's Land would be possible only by restoring an order of co-existence where everybody lives side by side. Buddha said that when one fully participates in momentary relations with a wholistic view and becomes a part of it (the practice of "no-mind"), the reason of existence will be revealed and its value will be captured in the present life. In the scripture, specific practices of such actions are often stressed as the importance of life having mercy. They are described as actions which get rid of confrontational views, life-styles of taking and being taken from, instead shifting to relations of give-and-take and a life of harmony."

Buddhist philosophy re-highlights the human/non-human relations. The stress on individual activities within the harmony of the whole has much significance to land usage planning. When such significance is aligned with eco-city planning principles 5, 9, and 10 mentioned above, it would be able to improve "conventional" planning practices.

3) Confucianism

(1) Principle of *Yin-Yang* & Five Elements

Confucianism and the Principle of *Yin-Yang* & Five Elements have long prevailed in East Asian societies.

Confucianism sees all things in the cosmos as generated by the harmony of *yin* and *yang*, which develops and changes due to the five elements: wood, fire, earth, metal and water.

The cosmic dual forces of *yin-yang* divide all the entities in the world into *yin* and *yang* and represent

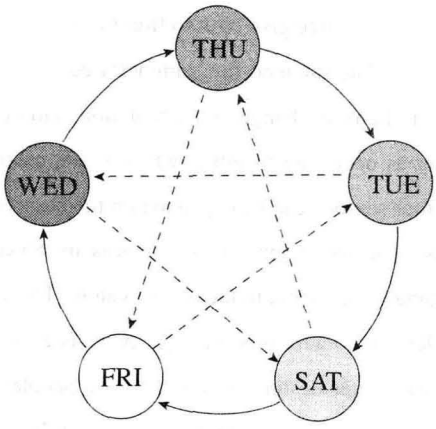

Figure 2. The system of co-development (solid line) and co-decay (dotted line)

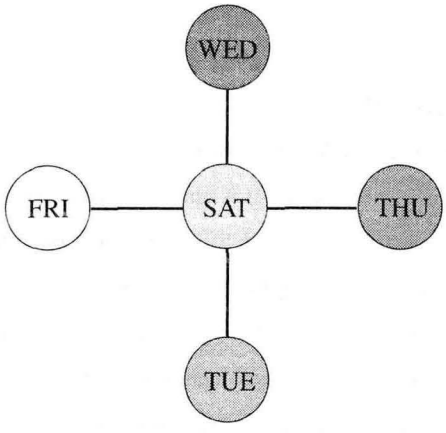

Figure 3. The relationships between the Five-Elements and the directions

various opposing concepts such as: positive and negative, active and passive, male and female, sun and moon, etc. The dualism of yin and yang is different from the Western dualism in that the former is complementary, but the latter is strictly contradictory.

The Principle of *Yin-Yang* & Five Elements includes the concept of change. The totality which it represents is like the change of nature itself, the constant tendency of nature through observance, some will of nature, the law of nature, the life power of nature, the virtue of nature by ceaseless generation and binary opposites of morality, etc.

Change in this Principle does not take the form of a straight line or a spiral but a circle as in the following diagram.

Yin-yang & Five Elements tells us that tree give birth to fire; fire, soil; soil, metal; metal, water. Water becomes winter; metal, autumn; soil, late summer; fire, summer; tree, spring (Kim H.K. 1993, 331).

Circular movement is the paradigm of change and circulation. This principle also sees heavenly phenomenon and human affairs as occurring together, which is the central idea of *yin-yang* & Five Elements.[8] The change of the four seasons can be explained on the basis of this principle. The creation and extinction of Five Elements causes the change of the four seasons. Since this principle is technically, repeatedly ordered, it allows human to conform to the will of nature. Those who believe in Yin-Yang & Five-Elements can submit to destiny because this principle prevails all over the cosmos. People have believed that this principle determines the destiny of the country, of people and agriculture.

With this theory people can predict the future and interpret the past. It is also a key to all the questions of geography, history. music, medicine, language, music, design, system, the way of life for survival.

Within this theory people seek harmony within family and perseverance. Its shadow side is fatalism, conservatism and a lack of adventurousness.

4) Theory and Techniques of *P'ungsu*

Among Korea's naturalistic philosophies, *p'ungsu* (Korean geomancy) is regarded as a method of land suitability analysis in a modern sense and it is also a socially rooted determinant of land use in Korea. *P'ungsu* is an aesthetic science dealing with the positive management of land in accordance with the hidden forces within the earth. According to *p'ungsu*, buildings were placed facing south with a mountain at their back. Ideally, the mountain had to have "wings" at both sides so that it could embrace the structure which, in keeping with *yin-yang* considerations, had to have a stream flowing in the front. Efforts were made to avoid having man-made constructions disrupt the natural contour of the terrain, which would destroy the harmony of nature.

Yun (1995) describes ancient Chinese castle town planning, including streets, commercial and resident district zones and burial site of royal family, etc in detail. Japan and Korea modeled their towns after the Chinese traditional castle town plan. An example is shown in Figure 4 of a Japanese interpretation of this Chinese naturalistic philosophy in the placement of the city of Kyoto. The city was set on a slightly inclined plane surrounded on three sides by low, rolling mountains. The choice of the site was determined in the eighth century in accordance with the principles of Chinese geomancy. Kyoto's grid plan was a smaller model of the Chinese capital of Changan, and originally measured 5.5 kilometers north to south and 4 kilometers east to west. The north-south axis split the town into

8) This principle is a kind of materialism in this respect.

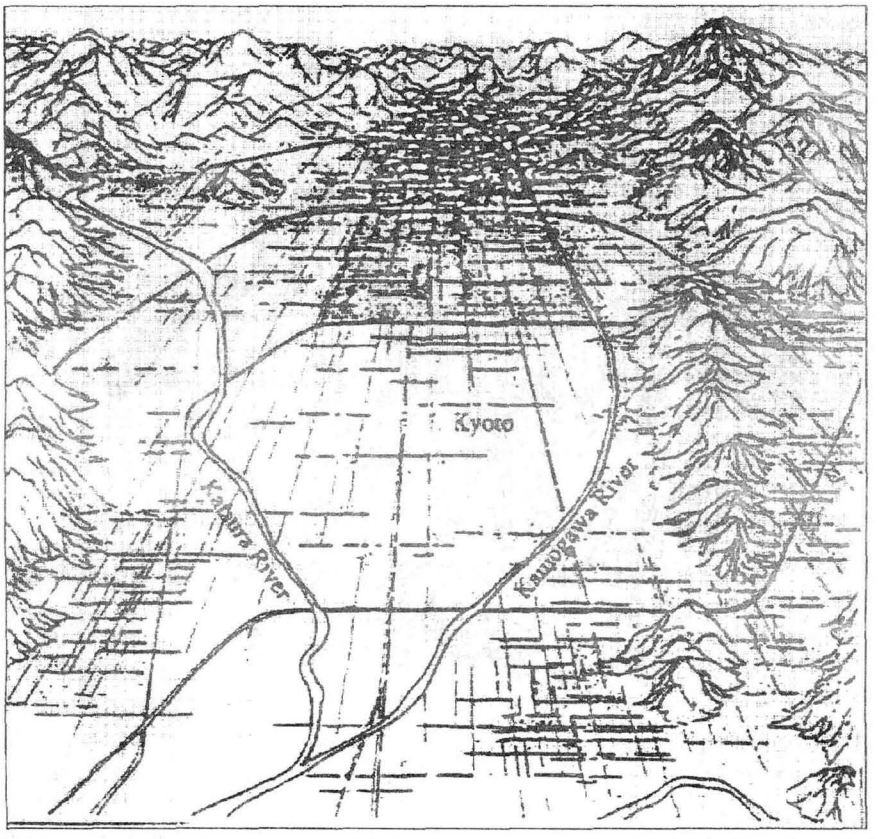

Figure 4. Aerial perspective of Kyoto, Japan

symmetrical halves. At the northern terminas lay the imperial compound with its vyildings arranged according to the gerarchiacal offices of government. These buildings, and the entire city, all faced southward, the direction the Emperor always faced, toward light and warmth.

An example of a Korean interpretation of Chinese theory of geomancy is shown in Figure 5. Seoul is almost perfectly endowed with auspicious geomantic elements.

The guardian animals are the black tortoise to the north, the vermilion bird to the south, the blue dragon to the east, and the white tiger to the west. Proper balance among the four mountains and well-shaped form, associated with the imaginary animals, ensure a harmony mirroring that of the cosmos and guarantee prosperity for those who occupy the place encircled by mountains.

P'ungsu regards land as an organism with a system symbolizing hidden forces and natural phenomena. Such a system is circulatory. Geomantic traditions influenced beliefs and practices related to the environment. Over time the awareness and practices of *p'ungsu* have undergone changes according to differing needs of different eras.

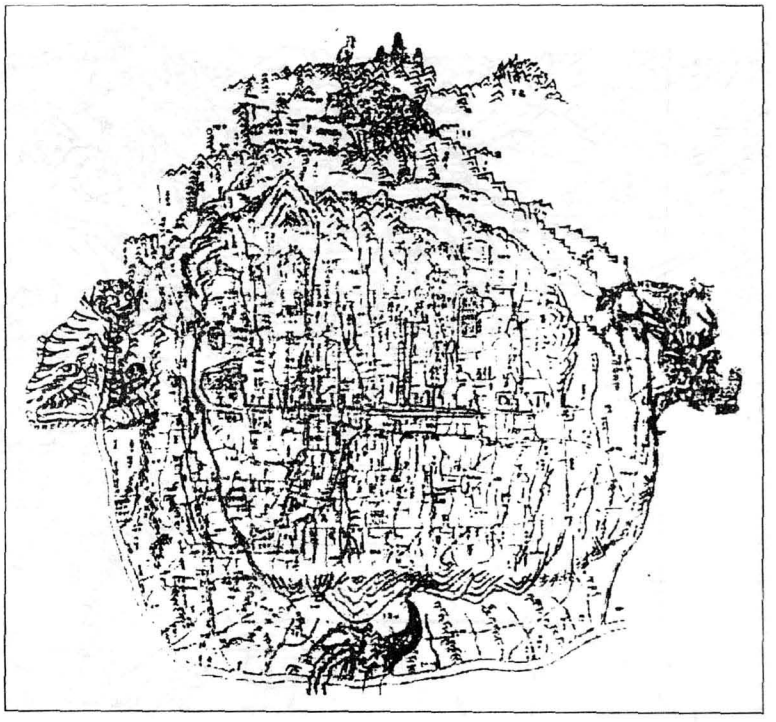

Figure 5. The town planning scheme of Seoul on the principle of *p'ungsu*

The awareness and practices of *p'ungsu* have particular implications for analytical functions of planning. A comparison of anthropocentric perspecitve and theory of *p'ungsu* is shown in Table 1.

The principles of *p'ungsu* can be seen to have many parallels with new paradigms in science, which now emphasize a holistic and systemic approach. As knowledge and methodology improve, it might therefore be expected that it will become more and more feasible to integrate the anthropocentric perspective and *p'ungsu*. Information on hidden forces within the earth may be used to determine the capacity of the natural system to carry a certain size and spatial organization of activities we call urbanization. Presumably such information would suggest areas where attention should be placed in alerting planning activist, raising public consciousness, and focusing environmental and land-use controls.

Not only can understanding and applying the principles of *p'ungsu* help to improve environmental understanding and decision making, *p'ungsu* could also be influential in changing the value system of the general public and interest groups.

2. An Analysis of Korean Examples.

As reviewed earlier, Korean ecological tradition had affected mostly in selecting a location for a city or a house. Its impact is also found in layout of a city or a house and in eco-technique aspects. Therefore, a house layout and eco-techniques will be reviewed in this section. Then, Taejon eco-city master plan developed by Seoul National University study team, which is headed by the author, will be described.

Table 1. Comparison of anthropocentric perspective and theory of *p'ungsu*

Analytical functions	Anthropocentric perspective	*p'ungsu* theory
Tenets	The concern for the natural environment is ultimately based on the welfare of people.	The concern for the natural environment is based ultimately on religious and naturalistic philosophic beliefs.
Decision making	• An anthropocentric basis for decision making cannot reflect the value of maintaining stable ecological systems of preserving rare species. • The decrease of natural capital due to economic growth and development is not taken into account. • One criterion that is commonly used is an adaptation of utilitarian philosophy known as the benefit-cost criterion	• *P'ungsu* based decision making can reflect ideas of modern ecology and environmentalism • The essential message of geomancy is a life of harmony with nature, in particular with land.
Planning implications	Concern for the natural environment has been translated into government policies that guide the way decisions affecting the environment are made.	Concern for the natural environment has been translated into ethical norms, but not into government policies that guide the decisions affecting the environment are made.
Planning techniques	• Land suitability analysis • Capacity analysis • Plan evaluation and project-impact assessment.	• Cause-effect sequences are not adequately explained by *p'ungsu*. • The choice of the site is determined according to the organicism, concept of land and theory of circulation • According to this organicist concept of land, heaven, earth, and humanity are regarded as one entity. • The basis of *tao* is the theory of circulation. The change of day and night, seasonal change the and operation of planets are based on the theory of circulation

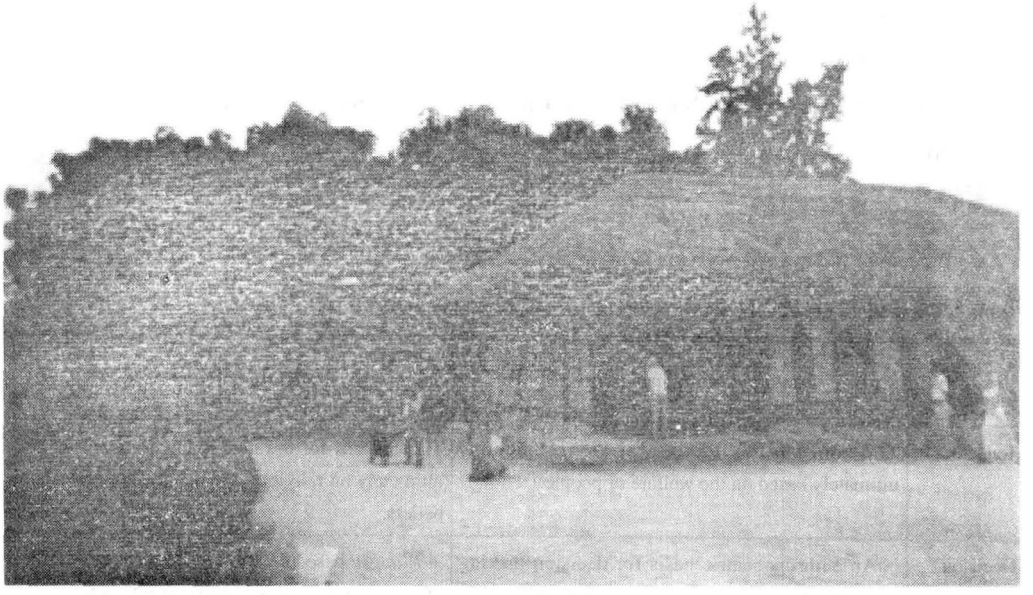

Figure 6. Wolmae's House (Namwon, north Cholla)

2.1 Korean ecological tradition observed through the reproduction of Korean traditional house layout

Korean lifestyle pattern including house layout was greatly affected by philosophy and religion that Korean people had from the old days. One typical philosophy would be geomancy that does not go against the flow of the nature. Philosophy and religion inherent in Taoism that stresses to worship the nature and to accord with the nature's reason were latent in the public, in particular in common people and reflected in their daily life.

Its outcome is shown well in location of a city or a house, in particular, a commoner's house and in layout of a house. Ecological tradition found in a Korean traditional house layout will be reviewed by studying Wolmae's house, which is located in Namwon, north Cholla province and has been reproduced in traditional style.

1) Location

① From old times, Korea followed the reason and providence of the nature in selecting a site for a

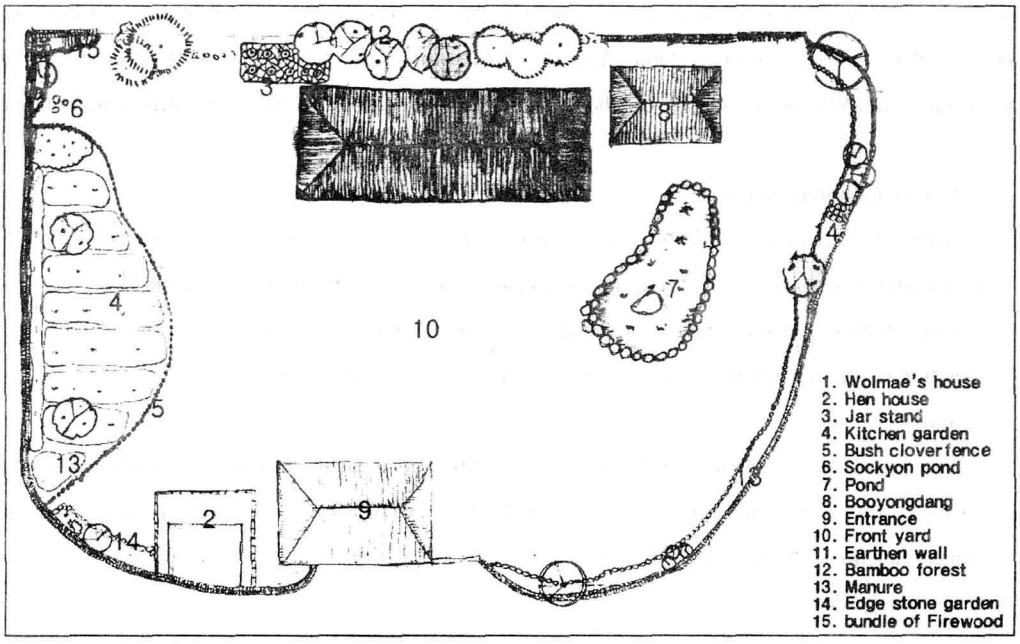

Figure 7. Layout of Wolmae's House (Namwon, north Cholla)

house. One typical example would be to have a mountain behind and a river in front. This is to have a mountain behind so that it can serve as a windshield against cold seasonal wind, to have water pass through or flow along a house site or village from the back to front to have an easy access to water, which is key to life, and to have open front landscape.

② Facing the south

This is a traditional ecological feature that is also relatively common in foreign examples. In laying out a house, it was preferred to have the house face the south or the southeast. This is a layout stressing the energy conservation and saving aspects. Through more solar energy and sunshine, energy saved in a house may be increased.

2) Features of layout structure

Pictured below is the layout of Wolmae's house in Namwon (Figure 7). Korean ecological tradition would be reviewed through the features of layout structure shown here.

① Fence/Wall

In foreign countries, it is common to have fences. In Korea, a western-style house usually has brick walls, while a traditional house uses natural materials such as earthen walls or stone walls as found in

Wolmae's house. As they are multi-pored materials, they function as habitats for insects and have an ecological feature of being recyclable materials. Furthermore, the height of a wall is set at a level allowing open landscape from inside of a house but, at the same time, preventing outsiders to peek into a house.

② Korean traditional house

As nature-friendly material such as wood is used in foreign eco-houses, rice-straws are used in roof of Korean traditional houses. As for flooring techniques, a stone base is laid on the ground and wooden pillars are set up on top of it. Then, a knee-high floor is built with woods. This has an effect of lowering temperature in summer and raising it in winter, functioning to save and preserve energy.

③ Yard

In foreign nations, it is often created with grasses and flowers in a garden concept. In traditional style, this is called yard and secures a large space covered with soil. This serves as a workspace and performs ecological functions creating micro climate.

④ Kitchen garden

In case of foreign countries, it is usually developed at outside of a house or in small scale. However, Korean traditional style features efficiency by maximizing a kitchen garden space while securing a yard space along fences. In particular, as a kitchen garden is located within a residential unit, it allows self-sufficient lifestyle in ecological aspect and highly increases independence.

2.2. Korean ecological tradition observed through eco-techniques

As described earlier, in Korean ecological tradition, the features of land use found in a city or a house structure were reviewed through the layout of traditional houses. Through eco-techniques applied in each residential unit, more specific features based on traditional ecological views from the old days will be reviewed.

Following is a table showing eco-techniques found in facilities of Wolmae's house in Kwanghanroo, Namwon, north Cholla province and the impact of eco-techniques on four ecological principles – stability, independence, circularity, and diversity.

2.3 Taejon Eco-city Planning

An UNDP ecopolis research project has been undertaken by the research team, directed by the author. The result reported here needs to be seen in its context; the Taejon metropolitan city was selected because it is the first city to prepare a comprehensive eco-city plan in Korea.

Table 2. Eco-techniques found in facilities of Wolmae's house

Facility	Eco-techniques	Ecological effect based on ecological principles
pond	Increase underground water content by storing rainfall. Habitats for creatures.	circularity (circular use of water), diversity (bio-diversity)
henhouse	Produce food (eggs). Compost manure.	independence (food and economic independence), circularity (circular use of nutrients)
jar stand	Efficient natural storage of food. Use local materials. (plate stone)	circularity
kitchen garden	Self-sufficiency through food production. Supply nutrients. Expanded function of green area.	increase independence (reduced entropy)
bush clover fence	Function to separate spaces. Use natural materials.	independence (use of natural materials produced within the area)
millstone	Produce food using natural materials.	independence (produce food within a household)
house	Key living area; multi-pored straw roof functions as habitats.	diversity (increased habitats), independence (independence in building materials with the use of local materials)
Booyongdang	A separate unit; multi-pored materials function as habitats for creatures.	diversity (increased habitats), independence (independence in building materials with the use of local materials)
entrance	A multi-pored straw roof function as habitats for creatures.	diversity (increased habitats),
front yard	Fine sand pavement stores rainfall; habitats; work space.	circularity (circular use of water)
backyard	A practical space connected to bamboo forest.	independence (household secures food on its own)
Sokyon pond	Store rainfall; function as habitats for lotus flowers and insects	circularity (circular use of water)
earthen wall	Environment-friendly natural materials; diverse habitats for insects and plants	diversity (increased bio-diversity), independence (secure materials locally)
bamboo forest	Created due to geographical features of southern part; function as habitats and attract birds and insects.; pear tree, persimmon tree (attract magpie), zelkova tree (attract cicada)	diversity (increased bio-diversity), stability (provide habitats)
manure	Habitats for various insects;	diversity (increased bio-diversity), circularity (circular use of substances)
edge stone garden	Habitats for grasses and plants; functions to increase green area.	stability (air purification with increase green area ratio)

2.3.1 Study area

The study area, Taejon, is located in the cintre of Korea, within a regio called Cungchung (the city of Taejon 1995).

2.3.2 Eco-city Plan

The eco-city plan for Taejon was prepared in 1996 by the Seoul National University research team supposed by UNDP, Ministry of Science and Technology of the Republic of Korea, and DAEWOO company. Generally known as the eco-city plan, it sought to anticipate the forces which create cities and facilitate their ecologically sound and sustainable development. It recognized the closed connection between biotope systems and the arrangement of land uses and the need to consider these two basic elements together.

5 goals were defined which have been the guiding principles for the eco-development of Taejon:

- Creation of the urban structure in harmony with the environment.
- Self-reliant, circulatory, stable and diverse functions of the city.
- Easy movement and access, not only for man, but also for plants and animals.
- Efficient and ecological use of resources.
- Environmental awareness and participation, with particular emphasis on the promotion of lifestyle for the co-existence of man and nature.

It is necessary to control the expansion of urbanized areas to maintain a balance between the conservation of pleasant surroundings and development. The best eco-techniques available were carefully taken into account during the preparation of the eoc-city plan.

2.3.3 City Structure

The eco-city plan identified a number of key structuring principles which would meet its goals and define the character of the city, as well as provide the framework for the city's sustainable development. The plan was prepared the enable the idea of a compact city to be realised.

2.3.4. Green Network system and Ecosystem Strategy

A green circle and green stations are connected to create a green network through grenn pathways of ecological corridors. Individual areas vary widely in character and function within the continuous structure of the biotopes according to their location, accessibility, specific features and the nature of the surrounding development.

2.3.5 Eco-city Services and Facilities.

The provision of eco-city services and facilities such as eco-bridges, district heating systems and allotments has been fundamental to the development of the Taejon eco-city. The main feature of the 'Sewage Treatment Plan' is to install small-scale sewage treatment plants along the streams. Treated water will be discharged into dry streams.

2.3.6 Residential Areas

A new eco town-in-town has been proposed as part of the Taejon eco-city Plan. It was intended that it should become a strong ecological focus point. The original planning philosophy encouraged a biotope system through the area, subject to the constraints from buildings, access and parking. The main features of the plan include:

- connection of 2 separate mountain by an ecological corridor which passes through the town ;
- utilization of a stream as another ecological corridor;
- creation of a circulatory water system throughout the town;
- making maximum use of solar energy;
- proposal for a wildlife park;
- facing of housing sites to the south to obtain maximum light.

It can be said that the Eco-city Plan proposed in this study provides for a more ecologically sound and sustainable urban development than is possible under conventional urban planning and design methodologies.

VI. Conclusion

According to Mann(1991), many observers consider that the achievement of a sustainable society in developing nations is possible only in a system of radical decentralization. It is suggested that, instead of relying on centralized, hierarchical and highly capitalized development, those concerned with development should emphasize relatively small-scale resource use based on community and local experience. In this sense, the grassroots naturalistic beliefs, norms, and values at the local level of Korean society must be considered, along with the knowledge of environmental systems, as part of the study of possible courses of action. This new approach assumes a decision-centered approach to

planning. It also requires a dynamic dialectic between the scientific, rational and technological approaches of the West, and the organic and circulatory approaches of the East.

If we are to achieve organic, circulatory, and environmentally sound decisions leading to the coexistence of people, nature, and environment, the concept of environmental sustainability emphasized in this chapter may be considered to be more useful than the conventional model.

As we have seen through this paper, Korea had so much good principles and technologies with environment-friendly spiritual base as those of western modern eco-city.

However, we can hardly find such a ecological tradition in our modern cities. Thus it is desirable that our future modern eco-city planning should be based on such a ecological tradition.

Since 1992 Rio Eearh Summit, the principles of sustainable development have been applied to eco-city planning, there appear some difficulties of problems in formalizing korean ecological tradition in the concept of modern eco-city. In addition, the implementation of korean ecological tradition in restricted only in old capital town planning. As these our ancient castle towns haven't been fully restored up to now, it is difficult to find realistic evidence except a few examples.

Therefore, this paper also cannot overcome such a limit in that most of its sources are dependent on the literary materials or logical assumptions.

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