

Phytosociological Studies in the Field of Landscape Planning in Japan

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Introduction

This paper deals with the problems involved the application of phytosociology into landscape planning, noting the research tendency of these fifteen years and providing some topics for further discussion.

First the situation before the World War II is discussed, when the application of phytosociology to city planning was tried. Secondly through the period of enlightenment on the necessity of phytosociological study, some ideas and approaches for landscape planning, land evaluation, planting design and nature conservation from ecological aspect have appeared and developed. As for these problems, the paper sums up some case studies in various fields and in the end notes the expectation to applied phytosociology in Japan.

I. Application of phytosociology into landscape planning

In 1974 June 5/7, a symposium by the International Society for Plant Geography and Ecology was held in Tokyo, under the title of "Contribution of Vegetation Science to Environmental Protection for Human Survival". At the opening speech, Prof. R. Tüxen, secretary-general of the International Society for Plant Geography and Ecology, said, "Japan will be an advanced country in the study of applied phytosociology and in the field of its contribution to environmental conservation". He also noted the significance of vegetation maps and its application to solve the environmental problems. It goes without saying that many other sciences should cooperate to cope with the environmental problems. Still, ecology could be regarded as the most important science among them. Consequently, the advancement of applied ecology has become an urgent and serious task.

Needless to say the study of applied phytosociology cannot make progress until the study of phytosociology develops to a considerable extent. As the start of the study of applied phytosociology, there appeared biological engineering (Biotechnik, Lebendbau) in the thirties in West Germany, which dealt with roadside planting and protection of forest, and riverside conservation.

In Japan an interest in application of phytosociology was taken in relation to national and regional planning before the World War II. At first Heinrich Dörr's article ("Landschaftsgestaltung und Raumordnung", *Gartenkunst* 1939)²⁾ was translated and introduced in the Japanese journal "Parks and Open Spaces" in 1941. This article argues that the sociological principles in the plant community can be applied to the social order of human beings. It says that the principles of regional planning can be induced from the laws of growth of natural

beings, which are explained as follows:

1. law of outer organization (Gesetz der äußeren Gliederung)
2. law of the inner structure (Gesetz der inneren Struktur)
3. law of the development (Gesetz der Entwicklung)
4. law of the form (Gesetz der Form).

This shows that at that time people tried to adopt the biological principles directly and analogically to the human society as the bases for the regional planning. It is remarkable that in Japan much interest was taken in the phytosociology which might be available for the city and regional planning theory. Ecological way of thinking was much appreciated more than the technological treatment such as planting and environmental assessment. In the same way, the availability of ecological theory and method were appreciated among other fields of science such as geography, sociology, etc.. It might be quite natural that landscape architects paid more attention to ecological theory and thinking, because they had little knowledge of the technique of phytosociological vegetation survey, and there existed very few results of the phytosociological field study.

II. Developing phytosociological studies

Ecology is a rather new science. Ecological study in Japan grew popular during and after the World War II. People were fascinated by it because it was new and it required little money; as is well known, the research funds were cut down at the time. It was during this period when the basis of the later development was formed, which, in turn, made it possible to cope with arising environmental problems.

A systematic work of these basic studies in ecology was put forward around the early nineteen-sixties,⁴⁷⁾⁷³⁾ The first book in the field of applied ecology was published in 1963⁷⁴⁾⁸⁷⁾. However, it mostly dealt with food production, biological control of weeds and insects, preservation and use of natural resources, and general ecological problems for the field of agriculture, forestry and fishery. Little attention was given to environmental conservation or land-use planning.

Since 1955 people had begun to notice environmental problems. Many laws related to environmental pollution were enacted one after another. Urban development and regional development were under way, while the legislation in these fields was being discussed. On the other hand, ecological science had not had enough experience to respond immediately to such a situation. The only thing the specialists were able to do was advocate the need for ecological studies⁴⁾⁵⁾⁴⁹⁾⁵³⁾. Since the beginning of 1965 environmental problems had spread all over the country, deteriorating both in quantity and in quality. There arose a strong need for comprehensive planning including precautionary measures and regulations against polluters. Some guidelines were drawn for desirable environmental standard and regional plans were made for pollution control. At the same time phytoecological field survey was rapidly put forward, which provided data to grasp the natural conditions in the region. It was the beginning of technological approach from ecological aspect.

At first natural park areas were chosen as study field, in which it would be easy

to make a vegetation survey. The first phytosociological vegetation map (actual vegetation map) in Japan was completed at Tanzawa (Kanagawa Pref.) in 1964⁴⁸⁾. The survey was intended to serve as the base for the designation of protection areas in a quasi-national park. From this time most of the vegetation surveys in natural park areas were carried out by means of phytosociological method^{10)51)52)54)59)~66)69)78)}. But it was not until 1970 that the result of a survey was used for natural park planning^{22)24)~26)80)}. Through the survey, the suitability of the area as a natural park was assessed and the bases for zoning plan and landscape planting were provided.

Secondly vegetation surveys were made for landscape analysis and diagnosis in the city planning area, where a large housing estate and new towns were to be constructed. The first survey was made in the area planned for the Tsukuba Research Campus City from 1965, and in this time the first potential natural vegetation map in Japan was made⁸⁸⁾⁸⁹⁾. Since then these surveys have been conducted and recommendations have been submitted concerning the protection areas, desirable plant species and planting design^{6)9)16)38)45)55)~57)68)70)91)}.

In parallel with such a development, the Basic Law for Agriculture and Forestry was established in 1961 and the enterprises for the structural improvement in agricultural land started in 1962. Ministry of Agriculture and Forestry took interest in redevelopment planning of existing rural villages about 1966. The first model villages were Kito in Shizuoka Prefecture and Tamari in Ibaragi Prefecture. Vegetation surveys started as one of the basic investigations for rural planning⁹⁰⁾ and suggestions were made as to how to establish ecological land use plan, making most use of natural conditions⁹⁾. It was the first approach in this country from phytosociological standpoint to land use planning.

At the same time we can notice the changes in urban areas. Many laws were enacted such as the Law concerning Landscape Conservation of Old Capital Region (1966), the Law concerning Conservation of Suburban Green Space in the National Capital Region (1966) and the New City Planning Law (1968). The need for open spaces in cities has increased, and people required the protection and reservation of forests or cultivated fields destroyed by urban sprawl. The vegetation survey in National Park for Nature Study was originated in an impact assessment for the construction of Capital Expressway crossing this Park⁷⁷⁾. The result of this survey has turned out to supply an important base to judge the condition and succession of vegetation in a city. This survey contributed a great deal to the development of urban ecology⁷²⁾⁷⁵⁾⁷⁶⁾.

As for parks and open spaces in a city, field surveys have begun to make clear the actual state of existing public and private forests¹⁷⁾⁷⁹⁾, site conditions for parks and open spaces¹⁸⁾²³⁾³⁴⁾⁶⁷⁾ and to suggest guidelines for the maintenance of vegetation¹¹⁾²⁷⁾.

Since the most of flat land was covered by structures because of urbanization, reclamation of coastal area was put forward actively, and constructions of open spaces and planting became important tasks for housing and industrial area on reclaimed land. According to the amendment of the Factory Location Law in 1973 which made it obligatory to secure certain open spaces in a factorysite, the planting method and design under extreme conditions has become a major subject of study³⁾²³⁾⁴¹⁾.

1970 is the turning point of environmental policy. In this year 14 laws relating to environmental pollution control including the Basic Law for Environmental Pollution Control were amended or enacted in the Diet called "Pollution Diet", and standards and regulations for environmental protection were intensified as a whole. In the following year, 1971, Japan Environment Agency started. There arose movement against the destruction of the vegetation in natural park areas. The main target of criticism was the great damage of natural landscape caused by the construction of roads (driveway) in natural park areas. Phytosociological surveys began to grasp the actual damage in landscape by the construction of roads, and then recommendations were made concerning the location of a road, the conservation of surrounding vegetation and landscape planting of the roadside from the phytosociological point of view^{13)15)21)29)30)32)35)~37)39)}. It was in connection with the road construction that the first phytosociological approach to so-called environmental impact assessment was made. Besides monitoring, the study of plant succession was made to re-examine roadside slopes after construction, and to develop techniques to stabilize them³¹⁾⁴⁰⁾⁴³⁾.

In addition to the above problems large scale studies were carried out to indicate how land use planning should be from the ecological point of view. First, land type classification was made geomorphologically and vegetationally in Kanto districts. The region was divided into natural land types, each of which is evaluated in terms of land use capability. Finally the zoning plan for land use was proposed¹⁾¹⁴⁾⁸¹⁾⁸³⁾⁸⁴⁾. This approach presupposes that we should conserve natural factors as much as possible²⁰⁾. Today this work, which is called Ecodevelopment (ecological planning), has become a great task for landscape architects.

III. Expectation to applied phytosociology

It has been only about ten years since the study of technological application of phytosociology to landscape planning started. Although investigators and research institutes are small in number, the necessity of applied phytosociology is increasing. Let me discuss here what the application should be.

First we can note the applicability of phytosociological thinking to physical planning. For example, we should try to maintain the biological diversity of the land, to assure and continuously promote biological productivity, and we could apply principles of plant communities to ecological land use planning. In the socio-economic circumstances of today, this ecological planning will function as a unique physical planning developed in the field of biological science.

Secondly we need an appropriate method of vegetation survey to know the actual state of biological environment and to diagnose the land through vegetation. Phytosociological survey seems to be one of the best methods today. Environmental diagnosis is an important task in ecological planning. Above all, in order to utilize the result of survey for physical planning, we require such cartography as vegetation map and "Standort" map. Here is the advantage of phytosociological method with regard to land use planning. Land type classification and land use capability classification, which constitute the basic part of land use planning, can be replaced by phytosociological land type classification (actual vegetation map, potential natural vegetation map) and phytosociological

land evaluation ("Standort" map). Furthermore, we shall have to develop a comprehensive method for natural land type classification and land evaluation including abiotic (geomorphological) land type classification and land evaluation.

Thirdly phytosociological surveys have served theoretically to choose the plant species for landscape planting. It has been scientifically proved that we should choose native species of the land for afforestation and planting of avenues, windbreaks, hedges, and other green elements. The past experience also tells us that local species do best in case of planting. In order to promote the realization of the plant select theory, we must make a lot of experiments on germination, transplanting, pruning, environmental tolerance, etc.. Therefore there is a need for research in a new field, experimental applied phytosociology so to speak.

The aims of applied phytosociology are continuously to conserve biological natural resources for human life and to construct an orderly biological environment. In our living space there are various space levels such as house-, community-, city-, region-, country-, and earth-levels. Based on the understanding of the problems peculiar to each level, we must develop the study of applied phytosociology to solve those problems¹²⁾.

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