

TOWARD AN ECOLOGICAL APPROACH TO THE
ENVIRONMENTAL PLANNING OF COASTAL CITIES IN JAPAN

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SUMMARY

Cities that are safe, pleasant/beautiful and healthy environments to live in are a common objective of urban man worldwide. However, planning them so that these three goals are simultaneously achieved is no easy task. In this paper, a "human ecological approach" to the planning of cities in an Asian island ecosystem, Japan, is suggested, and research aimed at applying the proposed approach is referred to.

INTRODUCTION

Japan is an archipelago in the East Asian monsoon region and is located on the western edge of the circum-Pacific orogenic zone. Its nearly 4,000 mountainous islands extend from 24°N to beyond 45°N latitude. This convergence of geographical circumstances is the main reason why Japan is subjected to almost every kind of known natural hazard. The majority of its 117 million people live at very high densities in the nation's 151 urban centers (of over 100,000 population) 58% of which are coastal (Ref. 1).

With almost no exceptions, cities in modern Japan, particularly coastal ones, have been thought of almost entirely as places for increasing, supporting and continuing economic growth and development aimed at the national goal of "catching up with and surpassing the West" and not as spaces for safe and healthy human living (Ref. 2). To achieve its economic goals, the nation's industrial facilities, everything from petro-chemical complexes to steel plants, have been and continue to be located by or under the guidance of the central government in the cities on the Pacific coast, often referred to as the Tokaido Megalopolis. People naturally gravitated there in large numbers and still do today. A minimum of thought was given by government planners to the safety, amenity needs and health of those people because the diversion of capital for such purposes might detract from industrial investment and its related increased industrial output, G.N.P. It was only when it began to appear that the diseconomies of overcrowding, lack of sewer systems, shortage of adequate housing and urban open space, as well as pollution etc. might negatively influence the economies of industrial agglomeration, and due to the outcome of several major pollution court suits in favor of the victims, that begrudgingly attention began to be paid, if piecemeal and sectorally, to some of these issues. However, the continuation of almost all of these diseconomies today can be seen as proof of the failure of the Japanese

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government to truly tackle these problems in a planned and holistic way. The predominance of structural solutions, if any, reflects the engineering-orientation of the government since the nation's emergence from isolation over 115 years ago, the only approach considered effective in its quest to "catch up with the West". The need for greater flexibility and holistic comprehensiveness in the solution/avoidance of urban problems and the achievement of a safer, more beautiful and healthier urban environment is the one the approach suggested here tries to answer.

HUMAN ECOLOGICAL PLANNING

Briefly, human ecological planning is the comprehensive, holistic and interdisciplinary approach to land, air and water use planning developed over the last 25 years at the University of Pennsylvania (where the author was educated). It is an approach which seeks to reveal regions as interacting and dynamic natural and socio-cultural systems having intrinsic opportunities and constraints for all human uses. Its goal is environmental planning for health (natural and human) and well-being (safety and amenity etc.) at all scales. To do this kind of planning, the physical, biological and social sciences are interdisciplinarily coordinated by the ecological planner speaking for/with the people of the region under study. The emphasis on locality, i.e. each region as unique, is said to distinguish this approach from orthodox city planning (Ref. 3,4,5).

The method generally begins with the development of an ecological model of the study area based on a thorough scientific analysis of its bio-physical phenomena operating as natural processes, ex. geology, soil, surface hydrology, vegetation and topography interacting to reveal areas where the erosion-sedimentation process is operating. Next, the region's inhabitants, their history, beliefs, values and the characteristics of their socio-cultural relations etc. are studied as they interact ethnographically, anthropologically and epidemiologically in social processes which have developed over time as the people have adapted to the changing environment. Both the physical manifestations of human adaptation, such as land use patterns, and non-physical instruments, such as laws, mores, institutions and perceptions etc. are systematically considered and organized into planning goals and objectives defined in terms of health and well-being. The search for the places in the environment containing the greatest number of desired and necessary natural and human health and well-being factors, i.e. land use suitability evaluation, forms the basis for planning decisions and alternate planning proposals (goal-achieving strategies).

PLANNING GOALS AND KEY ELEMENTS

Each of the three goals, safety, amenity and health, is next defined in terms of mappable areas of relative danger, value and healthiness respectively. A listing of goal areas follows:

- Safety Goals:
1. Earthquake/seismic danger areas
 2. Landslide/mudflow danger areas
 3. Flood danger areas
 4. Fire/explosion danger areas
 5. Traffic accident danger areas

6. Crime danger areas, etc.

- Amenity Goals:
1. Aesthetically valuable areas
 2. Culturally-historically important areas
 3. Educationally/Scientifically valuable areas
 4. Recreationally valuable areas, etc.

- Health Goals:
1. Areas of physical healthiness
 2. Areas of social healthiness
 3. Areas of mental healthiness
 4. Areas of natural ecosystem healthness, etc.

Depending on the locality, factors such as vulcanism and lava flow danger areas, among other, might also be included.

A study of safety, amenity and health protection land use planning measures used in Japan and elsewhere, as well as of the bio-physical and socio-cultural characteristics of the study area was undertaken. Then a matrix was developed in which both the factors used to define each goal area and the planning measures considered effective in the region were crossed with the list of goal areas. This exercise revealed the dominance of vegetated open space and the chonaikai (local neighborhood organization)/community relations as the natural and social process factors, respectively, considered to be of primary importance in the human ecological planning of Japanese cities so as to simultaneously achieve safety, health and amenity objectives.

Places that should be left in or converted/returned to vegetated open space are defined first by a study of the natural processes operating in the region in which the city is a part (Ref. 6). As a rule, lands for open space which perform important work in their natural condition for both natural and urban ecosystems tend to be relatively unsuitable for urban development, ex. floodplains, steep slopes, aquifer recharge areas, coastal ecosystems etc. Adjacent areas serve a buffer function requiring restrictions on intensive development, while what remains is likely to be relatively suitable for most kinds of urban uses.

A study of population distribution, densities and building types etc. is likely to reveal areas where open space is important/necessary from the viewpoint of social processes, especially hazard evacuation, recreation and the relief of mental stress etc. The coincidence of both natural and social process open space is the ideal to be sought, but one seldom seen or even considered in Japan. Interconnecting disconnected open spaces into a network weaving through the urban fabric is considered to be a major objective of human ecological planning in the urban environment.

A review of the anthropological and sociological literature on Japanese culture (ex. Ref. 7,8,9) reveals the key importance of community relations in general, and human relations in particular in Japan. This fact makes this social process a central one in the planning of any city or town to increase the degree of urban safety, amenity and healthiness there. For instance, the role of the chonaikai in local fire-fighting, in

neighborhood block rescue operations and in the administration of first aid are but a few safety functions that it can fulfill (Ref. 10). Regular community educational activities and traditional and new cultural festivals etc. aimed at strengthening and preserving community cohesiveness, even in the face of increasing mobility, can help increase awareness among residents of the educational and cultural amenities of their community as well as promote pride in their neighborhood and city.

Good community relations and strong sense of unity and mutual concern, formerly common under the homogeneous ethnic and socio-cultural conditions of Japan, can help reduce crime and delinquency as residents watch out for each other (Ref. 11). Regular hazard prevention practice can both prepare the people to protect their physical health as well as promote safety in an emergency. The support and encouragement of friends and neighbors still found in traditional Japanese communities can lead to growing peace-of-mind and thus better mental health. Instilling the Japanese traditional sense of nature along with a modern scientific understanding of its importance in a healthy and beautiful state in Japanese young and old alike can lead to actions which protect and restore nature in the urban environment.

It must be remembered that it is not natural and social processes seen as separate but their convergence that gives urban planning its ecological character. Assuming the necessity of this kind of planning, it is proposed that the development of a vegetated open space network based primarily on this convergence be carried out from a long range and river basin-wide viewpoint. The long range view will require developing a strategy by which present vegetated open space is protected and future needed spaces are obtained and interconnected in a systematic and orderly manner under administrative guidance and with citizen cooperation and participation. The location of evacuation areas and routes within this network serving recreational, socio-cultural and health needs of the city's people on a daily basis, is to be sought. Present moves in Japan to urbanize agricultural open space remaining in the urban fabric by weakening present open space use regulations (Ref. 12) should be resisted. Instead, consideration should be given to converting areas designated as "urbanized" into "urban-restriction areas" and requiring expansion and the interconnection of the vegetated open space therein. Water, electricity, gas and telephone lifelines should be located in the open space network underground in strong flexible piping. This will protect them during seismicity, make them more easily accessible for repair and emergency use, not allow them to disrupt the daily use and amenities of the space above and keep them out of the reach of vandals. Both public and private facilities, such as schools, hospitals and clinics, fire stations, assembly halls and community centers, disaster prevention/control centers and food markets etc. should be located facing onto or adjacent to the open space network. This will obviously add to their beauty (amenity), increase the opportunity for external, healthy, community social and cultural interaction, as well as make them readily accessible in times of emergency. Strong quake and fire-resistant construction will help make them safe places to gather at in times of hazard, and as part of the vegetated open space system protect evacuation areas located there from large fires. By centering open space on water bodies, such as rivers, streams, ponds etc., the amenity value of those spaces will be

increased while increasing the safety value of those spaces. It has been suggested that a park or open space be at least 6,600m² in area to insure fire safety (Ref. 13), an indication perhaps that small scale solutions may be no real solution at all. In addition, the removal of block walls around private homes and buildings and replacement with low hedges will reduce the danger of structural collapse during a quake (safety), beautify the environment (amenity), help purify the air (physical health), and enable mutual surveillance to protect against crime (social health) etc.

CASE STUDY

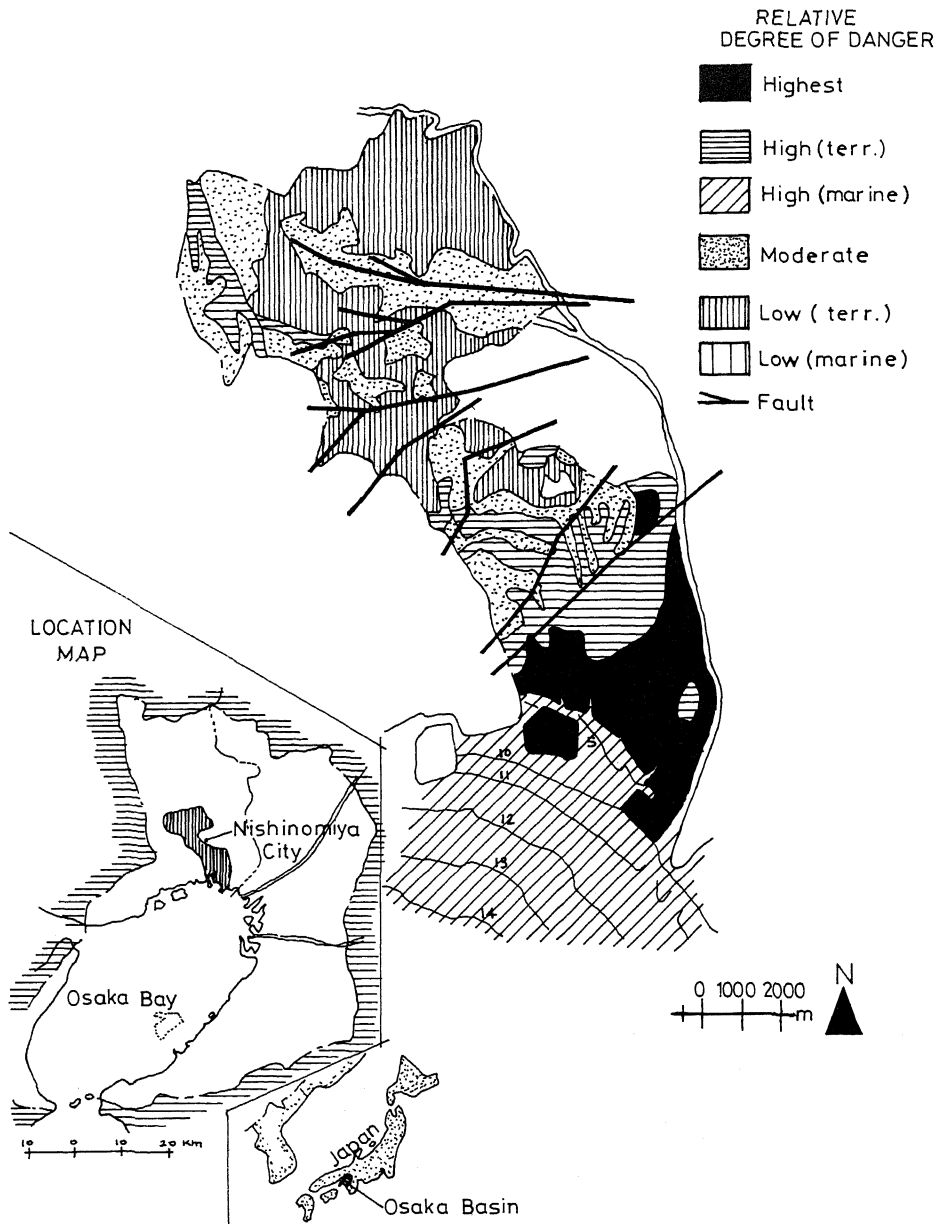
The area to which the method described in this paper is to be applied is the City of Nishinomiya, located in the Hanshin (Osaka-Kobe) conurbation on the northern coast of Osaka Bay in Western Japan. The total area of the city is 97.82 km², and it has a population of 413,000 people most of whom live on the narrow coastal plain located between the over 500m high granite massif of Mt. Rokko on the north and the highly urbanized, elliptical shaped, coastal estuary that is Osaka Bay on the south.

From the viewpoint of natural processes, this combination of natural conditions has resulted in a long history of hazards of which severe flooding and coastal inundation, landslides and mudflow predominate (Ref. 14). Also, the city is cut by no less than seven faults, some of which remain active (moving 0.1mm/yr). Recent inland dam and erosion-control works have severely restricted sand supplies to the coast resulting in coastal erosion, a more recent threat to the coastal environment along with extensive landfills being planned or already completed in the same area (Ref. 15).

Research to date has focused primarily on the natural process danger areas of the city, an example of which is shown in Fig.1. At the present time, the analysis of amenity and health-related goal areas is continuing in accordance with the methodology introduced earlier. Both natural and social process factors for each goal area are to be investigated. As a coastal city, its definition as a "coastal zone" both landward and waterward will be undertaken. The development of safety, amenity and health preserving/restoring specifications for all possible land, air and water uses that are foreseen in the city's future is also planned.

The result of this research will eventually be used to re-evaluate the content of the present city plan and the city's hazard prevention program with the aim of making recommendations that might lead to the simultaneous achievement of safety, amenity and health goals. Success of this experiment could lead to a model case worthy of study by other densely populated coastal areas in Japan, Asia and perhaps in other countries as well.

Fig.1. EARTHQUAKE DANGER AREAS



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