JAPANESE URBAN ARTIFICIAL ISLANDS: AN OVERVIEW OF PROJECTS AND SCHEMES FOR MARINE CITIES DURING 1960S-1990S

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The aim of this paper is to provide a short but comprehensive overview of the historical evolution of the concepts of the “artificial urban island” and “marine city” devised and developed in the context of Japanese architecture and urban planning during the second-half of the twentieth century. These concepts were a consequence of the severe shortage of buildable land for new industrial and freight complexes, as well as for housing and public facilities. From the futuristic urban morphologies of Metabolism and Kenzo Tange’s plans, which developed as polemic rejection of late modernist architectural principles, to the engineering approach of official government planning schemes, based on the provision of massive-scale public infrastructures, this study is a chronological survey of the main marine city projects conceived in Japan during the last 4 decades. This paper further analyzes and highlights the connection between the urban forms and planning paradigms of the artificial islands and briefly investigates the needs and ambitions behind these urban marine prototypes.

Keywords: Artificial Islands, Marine City, Metabolism, Kenzo Tange, Waterfront, Megafloat

人工島, 海上都市, メタボリズム, 丹下健三, ウォーターフロント, メガフロート

Preface

In contemporary Japan the spread of interest in highly innovative and advanced urban prototypes such as the marine cities dates back to the late 1950s and lasted for more than a decade, during which several schemes of landfill islands and artificial marine environments were developed. Most of those schemes were to be located in the shallow waters of Tokyo Bay, the economic, political and cultural center of Japan, which became a privileged area for many utopic urban projects. A combination of factors simultaneously present at the end of the 1950s and early 1960s (economic growth, urban expansion, technological innovation, the dawn of a consumerist society) set the “cultural milieu”, in Japan and other industrialized countries, which led to a growing interest and progressive acceptance for the theme of marine cities as an alternative urban environment. This new spirit fostered and inspired bold and ambitious architectural proposals and urban plans over the succeeding years. In particular, many coastal Japanese cities experienced a serious shortage of suitable areas for new construction in their central districts as well as the need to renew or improve their existing infrastructure.

The years of rapid economic growth from 1955 to 1973 were characterized by a progressive increase in the capital accumulation derived from unprecedented expanding exports, and to keep pace with this economic prosperity the Japanese metropolises required more room both for industrial and residential use. New networks for energy supply and mass transportation were designed and built to support the economic expansion at expense of residential and public use areas in the city centers. This in turn contributed to further urban sprawl and pollution.

Especially the awareness of the growing strategic importance of the waterfronts of large metropolitan areas due to the fast development of container vessel transportation fostered the improvement of obsolete port infrastructure and the construction of new harbour facilities to host larger cargo ships. This prompted the execution of massive reclamation works to create artificially new sites for larger industrial areas, petrochemical complexes and energy plants as close as possible to trade and shipping routes.

As an important and long lasting consequence of the economic miracle of the 1960s, large areas of Japanese coastline near big cities witnessed a progressive process of radical topographic transformation. Many port cities, such as Tokyo, Osaka, Nagoya, and Kobe, were abruptly altered and the natural shape of their urban waterfronts and shorelines were totally changed especially after 1960 due to vast programs of landfill activity lasted for more than two decades. The massive scale of waterfront transformation and extension, along with the spread of the artificial land into the sea and the development of new warehouse and factory complexes supported by a system of new railways networks boosted a rapid growth of port areas throughout the
country. These new ports were equipped with larger docks, wharfs, and deeper berths to deal with the growing freight traffic. This dynamic of fast development of the ports and the necessity to create more land for housing and public services to serve them cast a heavy burden on local governments. These municipal areas strove to control the severe urban congestion caused by rapid immigration from the rural areas. They were also forced to develop fast and effective measures to balance the need to sustain economic growth of its production facilities and the need to house people on less and less space within the city.¹

**Megastructures and Marine Cities in the early 1960s**

In April 1958, the Japan Housing Corporation (hereafter JHC) proposed an extreme solution for the land shortage problem within the administrative boundaries of Tokyo Metropolis. Their plan, following an already strong tendency to implement massive engineering works to reclaim land along the coastline of the major Japanese industrial port towns, was to fill and polder (following a method already successfully used for centuries in Holland) the entire east side of Tokyo Bay, from the central Tsukiji District to the Boso peninsula, with the intent to create a total of 42,500 km² of new land. Known as the “Kuro Kano Proposal”, after the JHC president who first presented the plan, this project was conceived as the ultimate solution for Tokyo’s exceptional urban growth during the post-war economic recovery. From the very beginning the plan seemed technologically and financially feasible, because of the sufficient technique expertise for such massive engineering works to be executed in the shallow waters of the bay, which averages only 20m depth, and because of the supposed largely available capitals to support the project; however the lengthy time required to complete the reclamation works and the inevitable radical changes of the natural coastline became a major deterrent for such an epic undertaking. But especially harsh was the reaction of many architects and planners, who criticized the plan because it certainty would cause the total destruction of the natural environment of the harbour and eventually do little to limit congestion and prevent Tokyo from further sprawling across the new reclaimed lands. Indeed it was in this context that new radical habitat and architectural proposals for marine cites started to draw attention towards new alternative urban prototypes built on artificial land.⁴

The first to propose using offshore artificial islands as a total new suburban development complexes built outside the fringes of metropolitan centers, and, coherently with a general trend of the time, investigated new ways to connect the single architecture with the total urban system. Searching for recreating the total image of the city as a coherent, modern and functional composition of parts and whole, the two architects conceived housing, public services, industrial facilities and urban infrastructure as a comprehensive and integrated urban structure, and focused especially on the design of multi-dwelling housing prototypes and other mixed-use residential models. Both plans also became important precedents that boosted further reflection and investigation about the nature of attempted to modernize the new urban settlements and modern housing design in the following years, as they characters of the Japanese urban landscape, which at the time was largely composed of a fragmented and chaotic urban fabric of traditional low roofs, low density wooden dwellings, with poor public services, limited private spaces, and scanty green areas.

Otaka’s scheme for Tokyo’s development on the sea was an upgraded version of the linear city concept, which owed much to N. A. Miljutin’s 1920s plans for Stalingrad.⁵ Otaka proposed an urban form consisting of two parallel broad strips of functionally differentiated areas set over the water by means of reclaimed land and artificial decks, running around the entire edge of Tokyo Bay. The elemental zoning of Otaka’s horseshoe-shaped master plan with its extensive traffic network of expressways and high density housing complexes was an exemplary application of modernist approach expressed in the 1933 Athens Charter. In his plan, Otaka stressed the importance and placed an evident emphasis upon the general movement network and the development of modern high-rise dwellings. These ones were designed as clusters of tall slabs built directly over the sea on strips of reclaimed land that in turn supported a system of artificial platforms as “urban podiums”, a concept he further developed in later urban projects.⁶

Even bolder was Kikutake’s “Marine City Project”, which had first published in 1958 as “Marine City” and then revised as a key Metabolism project of in 1960 as “Sea City Unahara”. This project was a model of floating industrial city on an unprecedented scale, which Kikutake labelled as a “unit-space of production”, and was meant to offer a comprehensive alternative to both the modernist urban design approach and to the traditional residential-industrial complexes (kominatos) developed by engineers and official planners in Japan for sites mostly on waterfront landfill.

Kikutake designed his model of city as an integrated system of multi-functional urban elements. He also strove to match the aesthetic quality of the architectural structures with the functionality of the overall plan that would offer a new urban environment on the sea and separate from the congested and polluted cities based on the land.⁷ His marine city showed an organic form shaped as two concentric rings, the inner for residential use and the outer for industrial purposes, both constructed as floating reinforced concrete and steel structures anchored but not fixed to the sea bottom. The whole urban lay-out resembled a huge artificial movable floating atoll, filled with high density buildings...
Kikutake developed and further refined several different versions of marine cities in later years and published his research and new “Ocean City” models between 1962-1963 and then in 1968. As a founder and one of the main participants of the Metabolist group, Kikutake’s projects diffused the new design and architectural principles of the Japanese avant-garde to a worldwide audience. Representing an important part of the new urban ideas proposed by Metabolism and enunciated in the original manifesto, and meant as a design solution to land shortage and urban disaster prevention, Kikutake’s models of marine cities and floating structures had a deep and long lasting impact on other designers and architects in Japan and abroad, in a period when planners concentrated especially of a few basic but fundamental urban issues, such as traffic circulation flow, infrastructure development, new mass housing schemes and the search for a monumental scale of new highly representative architectures and civic buildings. His ideas also fostered a search for innovative forms for the future city and architecture that would break free of the influence of historical forms and the traditional cityscape. It was in 1961, however, that the most famous model for a Japanese marine city appeared: Kenzo Tange’s “Tokyo Plan 1960”. Tange conceived of this plan as a collection of integrated megastructures, and almost immediately after its unveiling it became an icon of the total urban design concept for marine urban habitats. The plan’s iconic status owed in many ways to its echoing of many of the features already present in the Metabolist approach to urban design, that in this plan were revised and presented in far greater detail through the several models and drawings. Aiming to revolutionise the formal appearance of the contemporary city with a new sense of monumentality and “symbolization”, Tange based his plan on a structuralist vision of the urban design, which gave prominence to the development of an extensive web of movement and integrated it with a system of mega-infrastructures and urban blocks.

With “Tokyo Plan 1960” Tange emphasized the possibility of the city’s future expansion occurring on the bay. In doing so, he separated a new area built atop the bay from the old urban core which was already suffering from congestion. His general idea for the development on the
bay was likely influenced by a condition of combined factors. First, the Tokyo government had progressively promoted a planning policy for land reclamation into the bay for industry and shipping since the period of post-war economic recovery. Second, many other architects, such as Otaka and Kikutake, as well as construction companies had made similar proposals with projects which were largely published and promoted lively discussions. Third, it was generally assumed that the use of reclaimed land in the bay avoided the constant problem of land speculation, because the price of the artificial land was far cheaper and the legal restrictions which prevented comprehensive large urban design within existing neighbourhoods in the mainland (such as, the time-consuming negotiations required to building due to the need to deal with many individual landlords and the difficulties in property expropriation) were virtually nonexistent.

In terms of building technologies, Tange proposed a scheme that employed land reclamation, suspended bridges and artificial platforms set on pilots to create a design for a multi-levels, mass transport-based city. This mixture of technologies shows the influence of previous suggestions, from Le Corbusier's to Kikutake's projects, to adapt new urban structures to a marine environment. The result was a city plan that stressed the importance of the system of circulation and a clear and ordered separation of functional districts and proposed a new urban image reminiscent of some exotic elements of the East-Asian villages, as can been seen into the clusters of housing blocks shaped as gigantic pile-dwellings.

Kisho Kurokawa's 1961 “Kasumigaura Floating City” was similar in conception to Tange’s plan, with its vertical zoning and architecture of motion, and an emphasis on vehicular movement set atop of the urban block designed as a container frame (basically a sort of gigantic lattice) supporting smaller plug-in dwelling elements. Designed according to the fundamental concepts of progressive growth and change that were put forward by the Metabolists, this Kurokawa’s project conceived the basic elemental unit of the city as a self-contained floating urban district. This single district or urban block was characterized by vertical zoning, the use of multiple elevators to ensure communication between its different levels, and was shaped and designed as a floating buoy which could interconnect to other urban units to form groups of clusters in an ever growing urban body. The organic and unpredictable development of the city thanks to the random connection of different floating structures was intended as a proof of flexibility and effectiveness of the open system design approach, which at the time Metabolism shared with Structuralism in architectural design.

This design approach was implemented without hesitation for the creation of a total urban artificial environment over the water, searching for a balanced coexistence between the natural habitat and the modern infrastructures in behalf of the population of a modern city and in response to the needs of modern society in the Atomic Age. Many design features of this floating city were influenced by Kurokawa’s own research into shipping containers technologies and transport infrastructures, a research that subsequently evolved into his well-known “capsule architecture” and “street architecture” in the following years. In many ways, though, Kasumigaura project was representative of the attitude manifested by many others architects and their approaches to the design of marine cities during all the 1960s. An approach which saw the marine cities designed as functional, compact and apparently innovative and complex urban structure with a science-fiction appeal, capable of instant growth and change because fundamentally were conceived as an assemblage of modular and standard components produced with concepts borrowed from shipbuilding and other industrial technologies, and aimed to support the basic “Athens Charter” functions of the inhabitants in terms of housing, leisure, movement and work.

Outline of Major Artificial Islands as “Marine New Towns” from the late 1960s to 1986

Apart from these architects’ view of the marine city as a technologically advanced and futuristic-oriented living environments, the Japanese government also sponsored and addressed researches on similar marine projects and other urban settlements on artificial land along the main cities’ waterfronts. These government-sponsored (both local and national bodies) plans were characterized by their use of less sophisticated but safer land reclamation techniques and their virtually lack of any social and aesthetic consideration in their design and construction, and achieved some noteworthy results especially in the planning of new coastal industrial areas and the development of new sites for modern port facilities. Furthermore the land produced through these reclamation projects became an important asset of local, prefectural and national governments because they created an additional source of further capitals through their being leased to industry, private corporations and other investors.

After the end of Second World War and with the recovery of the economic situation starting from the middle of the 1950s, new projects to expand and modernize ports and harbours and increase the amount of land for industrial and shipping use were widely promoted throughout Japan. This followed a practice deeply rooted into urban history of many port cities (such as Edo-Tokyo, Hiroshima, Osaka), where when feasible coastal land had been reclaimed as a means to cope with the process of urban expansion. In the context of the progressive post-war economic growth, plans to develop new and important distribution facilities for the export of commercial goods became a top priority for main port cities, which saw a steady increase of shipping trade carried on by larger and larger container ships.

Governmental authorities also realized the need to increase the protection of the industrial zones developed along the waterfront and other urban coastlines from any sort of natural disasters like typhoons, earthquakes and tsunamis, which proved to be major threats to vulnerable and unprotected port cites. The reality of this threat was shown when Nagoya, one of Japan’s largest industrial city set in Ise Bay, was heavily damaged by a large and destructive typhoon in 1959. Following the disaster in Nagoya, many coastal engineering works (such as the construction of new offshore breakwaters and protected artificial
harbours) were implemented along urban waterfront areas by the local municipalities, and finally a comprehensive policy for a coordinated redevelopment and planning of the country’s ports was initiated by central government under the “The First Five-Year Port Development Plan” (1961-1965).17

Under the auspices of this plan, the city of Kobe was a forerunner in enhancing its port as a fundamental commercial gateway for western Japan at both a domestic and international levels. The urban development of Kobe during the previous 100 years well represented the astonishing pace of growth experienced by many others Japanese port cities. With a population of 30,000 people in 1868, Kobe had a population of more than 1,5 million inhabitants by the late 1950s, and most of this urban expansion had been driven by industry and shipping, as at the time the city ranked first among the Japanese port for trade quantity. With the fast evolution of the transportation technologies and the progressive containerization of the export, Kobe re-engineered its port facilities and set plans to build new container piers and port terminals for larger ships.18

Due to the critical topographic site of Kobe, as the nearby chain of Rokko Mountains prevented the city’s expansion inland, a series of large landfill projects were carried on along the coasts to locate new industrial factories, port facilities and garbage collection plants.

In 1966 the plan to build a multi functional city on an offshore artificial island was set up. The land reclamation works necessary to complete the construction of the first marine new town of Japan named “Port Island” took almost twenty years, and it was the outcome of a comprehensive plan involving many architects, engineers, experts, and governmental and private enterprises. In the long run all their combined efforts resulted in the creation of an integrated urban system of marine new towns located in the sea and new industrial districts bed towns located on the land, with the latter ones set on most of the sites that had been levelled to provide the soil for the reclamation of the artificial island.

Largely claimed as a success, the execution of the first Port Island led to further plans to build another large marine new town 1972 (Rokko Island), and then to a second-stage expansion of “Port Island” itself in the 1980s.19

These offshore artificial islands were conceived of as small self contained marine cities, and their construction profoundly altered the pre-existing harbour-scape and the functional lay-out of Kobe City.

Whereas the former city’s structure was characterized by the concentration of specialized infrastructural complexes within its boundaries aimed to satisfy the requirements of the industrial production, the new urban structure, derived directly from the presence of these new separated multiuse parts conceived and designed not just like utilitarian territorial appendices, had developed to enhance the dynamic movements of goods, ships and peoples. In this sense the new urban structure showed an urban pattern quite different form the design of conventional old port cities, whose waterfront and port areas drawn almost all the functions of the harbour and its infrastructures, and are often virtually separated from the residential and other commercial areas of the city.

With their sense of enclosed community surrounded by an outer empty open space and a clear boundary between the two areas, the urban lay-out of both Port Island and Rokko Island somewhat recall the general scheme and the urban morphology of the earlier Ebenezer Howard’s “Garden City” concept, an urban model that in Japan was revisited as “Den-en toshi” in early Twentieth century.20 Port Island, for instance, employs a simple zoning concept: it has a central core for residential and urban services that is characterized by an ordered distribution of rationalist architectural volumes that are separated from the outer harbour and piers areas by the tracks of the monorail network that acts as a buffer zone. Thus the final townscape is that of “an island inside an island” or even a much diminished version of Manhattan. 21

On the other hand Rokko Island’s monorail, which is also its main transport connection with mainland city, does not enclose the urban core but instead runs along its main urban axis of residential towers, hotels, public and commercial facilities, squares and other open spaces. This effectively creates a blend of different functional uses, with spaces left for either green areas or for future expansion and the development of new architectures and urban facilities.
Urban Mega-projects on the Waterfronts in the 1980s and the New Studies on Mega-float

After the second oil shock in 1979-1980 a progressive shift in economic factors set the foundation for a new fast period of economic growth in Japan, which eventually led to the so called economic “Bubble” in the late 1980s. A new awareness of the importance of modern and more efficient public facilities and infrastructures for industrial cities, aimed at strengthening their competitiveness into a more globalized and interconnected world system of cities, resulted into the development of an impressive amount of new mega urban projects, like during the early 1960s, especially along the waterfronts. Indeed these areas became a priority in the attempt to raises the city functions (in terms of provisions of new buildings, advanced mass transit networks and other basic infrastructures) to an international level.21

In the particular case of Tokyo Bay, the port districts of Tokyo became the object of a major attention for the metropolitan government and several private enterprises, whose ambition envisioned new projects that would link Tokyo’s economic expansion to the urban restructuring of the vast metropolitan region of the capital. In the 1986 the Tokyo Metropolitan Government proposed the creation of a “multi-polar metropolis plan” in order to limit the further spread of the city central business district, and in doing so to control its urban congestion and the excessive population density, balancing the business and residential functions in the metropolitan territory. The main features of the proposed scheme, known as the “Amano Proposal” after the name of the governor of the city council, was the development of a decentralized system of urban sub-centers. The main core of this urban restructuring of Tokyo was to be located in the waterfront area of Tokyo, between the Tsukushima and Daiba reclaimed lands, and was named “Tokyo Teleport Town” (or “Tokyo Rainbow Town”). According to the bureaucrats and entrepreneurs who supported the proposal, this new urban core would enhance Tokyo potentials as an attractive and modern international financial center.22 Based on a pragmatic and economic oriented approach to planning, and reflecting the interests of powerful Japanese private companies, developers and local politicians, this project called for a new urban center to be built on extensive areas of landfill and destined most of Tokyo bay especially for commercial, retail and service activities, virtually transforming that area into a huge showroom of the new economic prosperity of post-war Japan.23 In contrast to this evident and questionable market-led urban scheme other designers and planners proposed different projects that rejected the speculative character of the proposed waterfront sub-center scheme, which emphasized a cityscape made of redundant high-rise office towers, multi-level commercial and shopping spaces with underground service facilities, and instead favoured more investments into housing complexes, recreational green areas and other public spaces.

Among the several alternative projects there was Kenzo Tange’s 1986 project for a “Tokyo Bay City Plan”, which proposed the creation of a system of large mixed use artificial islands, following his comprehensive and social oriented approach to planning and suggesting again an open-ended and linear pattern of urban growth. Basically the urban lay-out of the project was a softer and more up-to-date version of the monumental and strictly hierarchical structuralist order of spaces and movement networks that he had already put forward in his first earlier 1961 “Tokyo Plan”, but with minor visual impact and reduced concern for mass-housing issues. In 1987 Kisho Kurokawa’s “Neo Tokyo Plan 2025”, with a purely poetic but sterile vision of architect, simply translated on a grander scale many of his earlier metabolist urban architectures, that were arranged as clusters of floating structures around and atop a doughnut-shaped area of reclaimed land built in the center of Tokyo bay. 25 Other projects showed a growing concern for environmental issues such as in “Oshino Proposal”, which proposed turning Tokyo Bay into a natural preserved or “harbour park”, whereas other plans expressed the interests of independent corporations and private research groups, who saw the artificial islands just as a “good business” for the immediate future and proposed prototypes of marine structures based on sophisticated technological marine structures but simplistic economic and marketing considerations. Despite some of the good ideas expressed in some of these alternative projects, the construction of the new Tokyo Waterfront Sub-center was carried on in the following years (moreover similar large scale schemes of waterfront urban renewal were also proposed in Osaka Bay as “Techno Port Osaka – Nanko Island”, Yokohama’s “Minato Mirai 21”, Fukuoka’s “Island City”, and Nagoya Port’s “Harbour Garden Wharf”). This project resulted in what many critics decried as an anachronistic and unfitted late-modernist urban layout: it was filled with groups of large neo rationalist architectures scattered about vast empty spaces of reclaimed land and connected by long boulevard-like paths that lacked any formal relation to Tokyo’s traditional urban streetscape and pattern of mixed land use.26 Furthermore especially problematic for Tokyo Teleport Town (as well as in other projects of new marine towns) was the connection with the mainland and other main urban district of the city in terms of transportation and working activities, which resulted in higher costs for islands’ residents and workers. 27 In fact, among the other things, it was the revenue from services like transportation, housing and office rents and retails that had been the main incentive behind the massive investments of capitals into these large scale redevelopment projects along the waterfronts and other land reclamation projects. Especially from the middle of the 1980s, many public corporations and private companies believed that the construction of artificial islands and marine cities would eventually stimulate an increase of domestic demand and thereby reduce the national trade imbalance.28 Many new projects were designed for leisure facilities and resort complexes on small offshore artificial islands. In addition numerous studies on the technical and financial feasibility of such marine projects, and on their potential economic outcomes, were carried out and consequently fostered broader researches in the fields of coastal ocean space utilization and marine engineering. In this process, new offshore floating platforms were developed that would be able to resist the harsh environmental conditions in the sea and other natural disasters, and that
could relieve the chronically shortage of buildable land of Japan’s urban areas. Among these projects were platforms for a functionally specific use for large metropolitan areas such as floating airports or floating wharves.29

With the economic downturn of the early 1990s which halted the large-scale urban projects, investigations in new and compact marine structures were largely promoted. In 1995 the Technological Research Association of Mega-float or “TRAM” was set up with governmental support in order to develop very large floating structures (VLFS or Mega-floats), a sort of multiuse floating mat that was conceived as an efficient alternative to the too costly, time consuming, and environmentally destructive technique of land reclamation. Researches on these structures mainly focused on the possibility of their multi purpose use, the advantages derived from the possibility to design and built them according to specific needs, their resistance to earthquakes and natural disasters, and above all their flexibility in finding a location for them. This in turn fostered further study into advanced engineering construction techniques and the design of new floating platforms that could be used as floating terminal containers, offshore wind power plants, storage facilities, rescue bases, floating hotels and offshore floating airports (the first of which was successfully tested in Tokyo Bay in 1999).30

A scheme which blended Asian traditional geomancy prescriptions (Feng-shui) and modern construction technologies and planning strategies was implemented by architect Arata Isozaki in his plan for “Mirage City” (1995), an artificial island to be built near Macau.31 Rejecting the too rigid, “useless” and obsolete functionalist approach based on a master plan designed by a single architect, Isozaki sought for a different approach and involved others designers in the development of this artificial island. Together they proposed what appeared to be a metaphoric representation of the typical Asian urbanism, with the city seen as a collage of many different and complex functions, forms and architectures all in perpetual flow. Isozaki also searched for a different meaning in the evolution of new forms of urban planning as consequence of contemporary massive urban growth processes. In general terms the design approach of this island underscores a scheme full of sophisticated and interesting symbolic insights and innovative architectures. However the formal layout and the general scheme, with a particular stress on the movement system and the overall shape of the artificial land, appear to be an ingenious evolution of built example of previous models of artificial islands. Notably it can be the similarity with the marine artificial islands built in Kobe thirty years earlier, evident especially in the linear development of the service axis of business and commercial zone, which stretches longitudinally as the symbolic and functional urban core of the entire community.

Conclusions

Developed during the post-war period of rapid economic growth by architects such as Tange and the Metabolists, the influence of the early marine cities projects has proved to be long lasting in Japan. Fundamentally these mega-projects have been rooted in an engineering approach to urban design that has been dominant in Japan during the last four decades as a means of resolving some of the basics issues related to continuous urban growth- namely, chronic land shortage for both industrial and residential use, coastal barriers for the protection from natural disaster, and the improvement of port facilities. Basically these projects derived from studies into the industrialized prefabrication and mass production of modern housing and infrastructures. Eventually these studies led to innovative and bold city forms and solutions to urban problems, but they were also, as with the Metabolists, seen as a solution to the contradictions and shortcomings of governmental planning practices and policies in Japan.

Indeed the historical evolution of the schemes for these marine cities presents some sort of analogies and differences. The projects developed in the early 1960s and late 1980s were all conceived in a period of strong economic expansion, and they aimed to promote a form of decentralization of some of the main urban functions of the big metropolises, as well as to provide the city with a new cityscape and improved spaces for people life and productive activities. Major differences derive from the technological, economic and social context in which they originated. During the 1960s the emphasis was on the post-war reconstruction, and the city was seen as the natural center of industrial activities and infrastructural terminals, which in turn caused urban sprawl and pollution. In the 1980s, the shift of the economic base from industry to the service sector, and the importance of leisure and financial activities in a global economy, prompted the cities to rely on private capitals to develop new service facilities and offices spaces to expand their urban functions. Most of these marine city projects can be classified as either reclamation schemes or floating type, with this last one built in steel or reinforced concrete, such as in some of the most innovative schemes of experimental urban architectures of earlier Kikutake’s proposals, and seen as a possible alternative to the brutal but effective coastal filling techniques implemented throughout Japan since the late 1950s. Concerning the urban layout of marine cites and the aesthetics of their architectures, emphasis shifted from a search for a total image composed of large and complexes megastructural
architectures in the 1960s, to a more functionalist design approach based on simple and pragmatic zoning 2 decades later. This approach was especially evident in the projects of the so called “artificial marine new towns” planned by governmental and local authorities in the last 30 years. Since the late 1990s, new researches on multi-functional floating platforms and community developments offshore are progressing thanks to the combined efforts of private corporations and governmental initiatives and founding. Interest in this area is especially evident in the study of flexible-use floating structures, which are mainly intended to offer a secondary functional role to mainland services and infrastructures. In this regard, these structures do not offer yet a real practical alternative to more traditional mode of land expansion, and their residential prototypes have failed to become an integral part of the pre-existing city. This last issue however may become potentially a future area of further research in Japan, if the extensive experimental use of a new generation of larger floating structures, namely the Megafloat (VLFS), can prove to be a valid alternative, in terms of their technological feasibility and cost-effectiveness, in creating artificial land.

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References and Notes


2) To give an idea of the astonishing development of cargo trade during the time, the Port of Nagoya, for instance, saw an increase in total shipments from 529,000 tons in 1951 to 7,000,000 tons in 1971 (data from Nagoya Port Maritime Museum; see also the website of Port of Nagoya: www.port-of-nagoya.jp).


5) Miljutin’s plan for Stalingrad developed as one of the first proposal for a linear city in Soviet Russia between 1928 and 1930. This model of socialist city was designed as an attempt to associate industrial and rural activities by means of parallel ribbons of functional separated areas for industry, residences and collective facilities integrated side by side along a linear transportation network of railways and streets.


7) Kikutake’s Marine City project was presented by Tange at CIAM meeting in Otterloo in 1959. Most of main Kikutake’s marine schemes and basic ideas are found in the following essay: “Floating Cities as Marine Architecture”, in: Marina City 1958-1971. Material List for Floating City Project 1971 at Hawaii University, 1971.

8) Kikutake adopted as model for his Marine City the “Veleda” jellyfish, which can float on the surface of the sea, and then proposed 5 key concepts as basic reference for a marine structure, namely: the floating shaft, the floating grid, the floating mat, the floating foundation and the floating unit. Subsequently, he patented a steel floating structure in 1977 based on his studies in ocean engineering for the Ocean Expo 1975. His research led to a method of building a floating structure for a marine city assembling a plurality of individual cells rigidly interconnected, and having a single, rigid, monolithic deck formed thereon. This and other projects anticipated many of the research achievements in Japan during the next 30 years. For a comprehensive view of Kikutake’s works and research, see: Tsume, K. 1997, “Kikutake Ken”, in: Kiyonori Kikutake, Concepts and Planning, Bijutsu Shuppan-Sha, Tokyo, 1978.

9) For instance, in 1961 “Koto Distric Project” Kikutake devised in the south area of Tokyo (Shintamachi) a system of urban floating platforms and high rise towers able to float in case of flood or other natural disaster.

10) As many architects of the time, Kikutake drew most of his inspiration from the application of various technologies used in different fields, such as oceanic engineering techniques, shipbuilding industry procedures and studies on prefabricated modular system design. The project for “Ocean City” (1962) merged the concept of a marine platform with his idea of a ‘Tower Shaped Community’ (1958). The idea of a floating vertical shaft into the sea came to him after he visited the FLIP (Floating Instrument Platform) marine research vessel of San Diego Oceanographic Institute in 1962. Furthermore the forms used in some of his marine architectures projects anticipated the models of offshore oil rigs used to produce oil in deep waters. As a matter of the fact, Kikutake’s model of marine tower city as (vertical floating) shaft seems to show a striking resemblance, in shape and structure, with the current SPRAR oil installations.

11) See, for instance, the MAR Group’s ‘Plan for London’ (1938); the plan for Paris metropolitan region (1959), and Amsterdam’s ‘Pampus Plan’ (1965).

12) Other schemes were proposed mostly just as diagrams, such as the plan proposed by Industrial Planning Conference in 1959.

13) See for instance Helix City (1961) and Kurokawa’s studies on ship containers installations.

14) Other schemes were proposed mostly just as diagrams, such as the plan proposed by Industrial Planning Conference in 1959.

15) For instance, the MARS Group’s ‘Plan for London’ (1938); the plan for Paris metropolitan region (1959), and Amsterdam’s ‘Pampus Plan’ (1965).

16) Other schemes were proposed mostly just as diagrams, such as the plan proposed by Industrial Planning Conference in 1959.

17) As many architects of the time, Kikutake drew most of his inspiration from the application of various technologies used in different fields, such as oceanic engineering techniques, shipbuilding industry procedures and studies on prefabricated modular system design. The project for “Ocean City” (1962) merged the concept of a marine platform with his idea of a ‘Tower Shaped Community’ (1958). The idea of a floating vertical shaft into the sea came to him after he visited the FLIP (Floating Instrument Platform) marine research vessel of San Diego Oceanographic Institute in 1962. Furthermore the forms used in some of his marine architectures projects anticipated the models of offshore oil rigs used to produce oil in deep waters. As a matter of the fact, Kikutake’s model of marine tower city as (vertical floating) shaft seems to show a striking resemblance, in shape and structure, with the current SPRAR oil installations.


19) In 1958, for instance, construction was completed on the piers and wharfs of the new Tokyo International Trade Fair on the reclaimed land of Harumi, and the berths for the new Kobe International Terminal.

20) Early examples of marine structures and “man made” lands can be seen in the XII century floating pavilion of Itsukushima (Hiroshima) and others artificial islands built during Edo period, notably Daishima (Nagasaki). For a comprehensive study on the role of reclamation as an important tool in the process of urban expansion of the cities in Japan and overseas, see: Brian J. Hudson, Cities on the Shore. The Urban Littoral Frontier, Pinter Publisher, London, 1996.

21) The First Five-Year Port Development Plan was conceived as an instrument to deal with the progressive shortage of port and harbour capacity of the Japanese cities, and was linked to the famous Prime Minister Ikeda Hayato’s national economic plan to “Double the People’s Income” (1962). It was also simultaneously related to the “Law on Emergency Measures for Port Development” (1961) and the “Law to Promote the Construction of New Industrial Cities” (1962). The combined effect of these fundamental legal measures was to boost the construction of multiple systems of modern infrastructures, new ports and industrial facilities on the waterfronts and the reclaimed lands to cope with the immediate consequences of the period of high economic growth. For more detailed information and various general data on this issue, see the website of the Japanese Ministry of Land, Infrastructure,

12) By the time of the outbreak of the Asia Pacific War (1931-1945), Kobe had become a fully developed commercial city and the main port of Japan in terms of volume of cargo. In the last years of the Second World War, during which the cities of Japan were regularly and heavily bombed, Kobe suffered a great loss of life and most of its urban areas were destroyed. Following the war, reconstruction proceeded slowly until the mid-1950s, after which Japan’s economic growth skyrocketed. As well known, with the Japanese economy being essentially based on the import of raw materials and the export of finished goods, the country’s port cities became important nodes in an international economic network. Large scale land reclamation projects, which altered the natural shoreline of many urban waterfronts, were initiated by the national government’s regional development policies and implemented under the motto “growth-through-planning”. Kobe became a leading city in this kind of development with massive projects to reclaim parts of the sea aiming to improve port facilities and thereby transform the city into one main commercial port in the Pacific Ocean. In Kobe, as well as in many other Japanese port cities, it was especially important to build new piers and wharfs with an adequate depth (of up to 20m) to host the large container-ships which were unable to load/unload their cargo in the low waters of the old ports. From early 1960s until late 1990s the process of urban population growth and port congestion had been the main reason behind Kobe’s rapid expansion into the sea.

13) Port Island and Rokko Island have a total extension of 443 ha and 595 ha, and a population estimated in 20000 and 30000 people respectively. In both of the islands the ratio of the land used for port facilities and berths is more than 50%. See: Kobe City Official Website: www.city.kobe.jp/kigyo-yuchiku. Kobe Port and Harbours Office: www.pa.kkr.mlit.go.jp/kohou/kohepp. Besides in the early 1980s new redevelopment projects aimed also at the regeneration of old port areas (Harborland, Meriken Park).

14) Den-en toshi or “Garden City” indicated in Japan a suburban settlement that was developed from the early 1920s as a sort of suburban railway development pivoting around a central railway station. Departing from the original English concept intended that the garden city as a self-sufficient middle-size city connected to a major central city, den’en toshi developments were designed as simple and exclusive garden residential suburb for the new wealthy middle class. The general lay-out of Port Island and Rokko Island, that are a sort of suburban developments with integrated urban functions, indeed follow in some ways the model of original Garden City. For instance, they are settlements linked to the central city by the railway, and have a radial and concentric urban form, with the commercial facilities and other fundamental town functions located in the center. Furthermore the ratio of population of Garden City (32,000) is similar to that of the artificial islands, and all of them are seen as decentralized urban sectors of the main city, from which they are separated by natural barriers to limit their expansion (a green belt for Garden City and the water of the sea for Port Island and Rokko Island).

15) A similar urban layout was proposed by architect Fumihiko Maki in an early project for the urban district of Dojima in Kinki in 1962, so just a few years before the start of reclamation for Port Island. So it could be said that this project had a degree of influence in the final design of the urban core of Port Island. See: Fumihiko Maki, “Dojima District Plan”, in: the Japan Architect (JA), Vol.38, 6/1962, pp. 10-54.


25) See: Arata Isozaki (directed by), Opening Exhibition “The Mirage City – Another Utopia”, organized by NTT-InterCommunication Center, Tokyo, from April to July 1997.

Source for Photographs (Edited by the Author) Fig. 1-3. Kin’do Kenchiku, Vol.14, No.5, May 1960, Fig. 2-4. Kisho Kurokawa, Metabolism in Architecture, 1977, Fig. 5. Jiyu Chen, Doekke Eisima, Kenji Hotta and Jesse Walker (edited by), Engineered Coasts, 2002, Fig. 6-7. Process Architecture, No. 73, June 1987, Fig. 8. Arata Isozaki, Pamphlet of the exhibition “The Mirage City – Another Utopia”, NTT-InterCommunication Center, Tokyo, April 1997.

和文要約
本稿は1960年代から1990年代まで日本の都市計画として最も重要なプロジェクトの歴史的発展についての包括的な観察を試みることを目的とする。これらのプロジェクトは、新たに産業や物流送達の地域生産複合体、住宅、公共施設を造るための土地の深刻な不足が故に考案された。本研究は、後期のCIAMの建築原理に対する批判を含むビルマガジンと丹下健三によって構想された未来都市から政府が計画的に新たな都市インフラを提供するに当たって考案された大規模プロジェクトに至るまでの40年間、日本で開発された都市計画を年度順に調べたものです。