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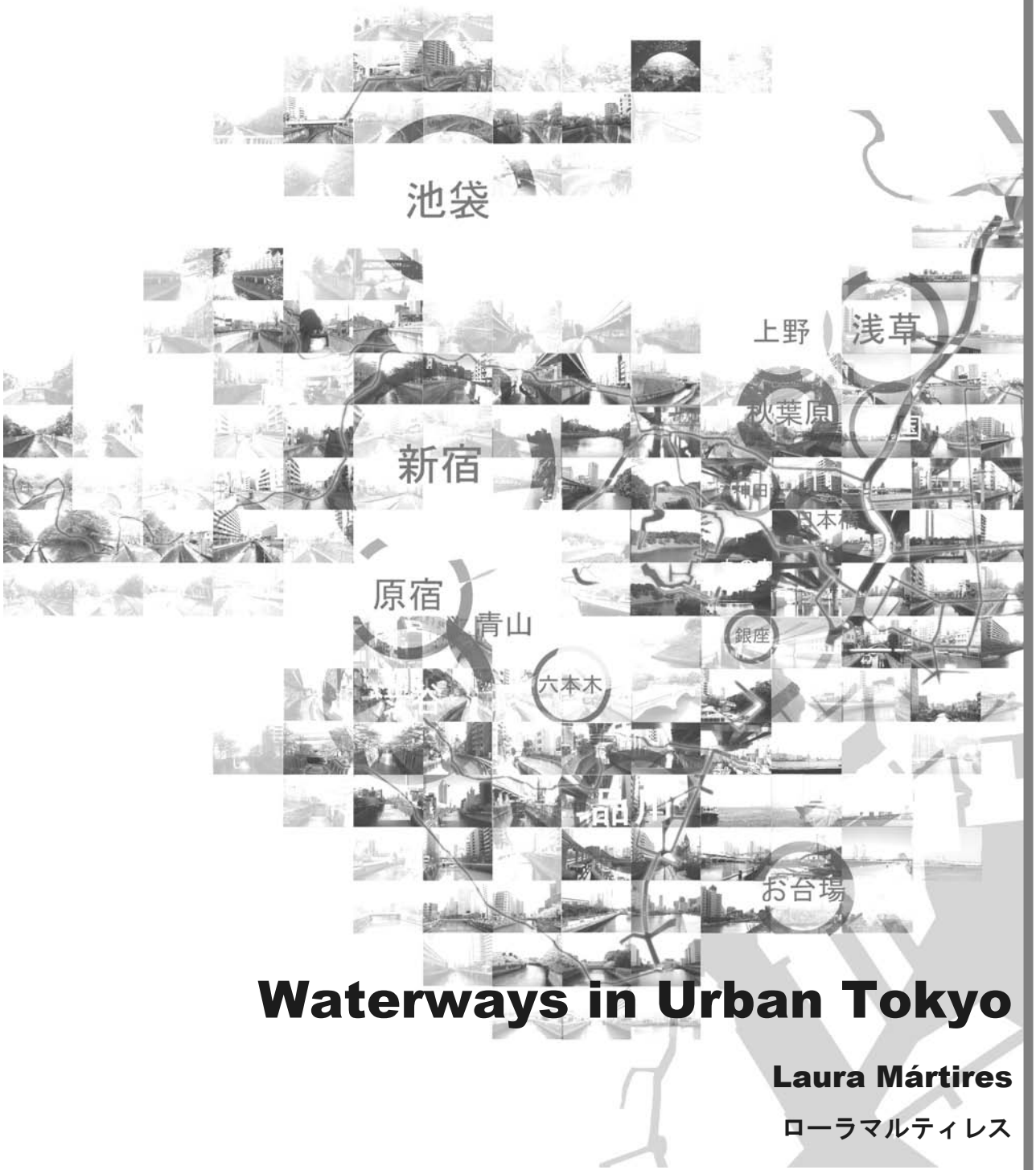

Waterways in Urban Tokyo

Laura Mártires

ローラマルティレス

東京大学大学院新領域創成科学研究科

社会文化環境学専攻

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Introduction

Water is sometimes sharp and sometimes strong, sometimes acid and sometimes bitter, sometimes sweet and sometimes thick or thin, sometimes it is seen bringing hurt or pestilence, sometime health-giving, sometimes poisonous. It suffers change into as many natures as are the different places through which it passes. And as the mirror changes with the color of its subject, so it alters with the nature of the place, becoming noisome, laxative, astringent, sulfurous, salty, incarnadined, mournful, raging, angry, red, yellow, green, black, blue, greasy, fat or slim. Sometimes it starts a conflagration, sometimes it extinguishes one; is warm and is cold, carries away or sets down, hollows out or builds up, tears or establishes, fills or empties, raises itself or burrows down, speeds or is still; is the cause at times of life or death, or increase or privation, nourishes at times and at others does the contrary; at times has a tang, at times is without savor, sometimes submerging the valleys with great floods. In time and with water, everything changes.

Leonardo Da Vinci (1452-1519)

Waterfront redevelopment has been to urban planning in the recent decades a field in which important issues have been raised. The first projects were basically concerned in releasing the waterfront's adjacent industrial lands and to plan these areas as new parts of the city. For a long time the waterfront served as a distribution channel in which goods were transported and then carried and distributed into the city. With the development of locomotives and trains, these places became a priority in which to allocate merchandise distributing terminals and for a long time, the edge spaces in which water and city came together were trapped with factories, warehouses and train tracks.

The 20th century saw a huge boost in new transportation devices and water based traffic started to reduce which in turn make many industrial areas near the waterfront obsolete. This change in character was the start of a new era for the urban waterfront and many cities started to look at these spaces, which by then were pretty polluted and lacking basic urban infrastructures, with new eyes: the waterfront could make part of the city life again and the regeneration of these spaces started to pick up. The decades of the 60's and 70's saw the increasing interest in projects related to the waterfront and the United States were probably the biggest conductors of this new trend of urban redevelopment with large scale projects in major American cities, such as Boston, Seattle or New York.

This trend continues until today although slight differences can be seen. Basic waterfront redevelopment is seen as a major cosmetic production in the city and a way to expose it to a world economy in which cities are constantly competing. But recently, waterfront redevelopment has shifted from this trend to a more individual, sustainable approach in which cities recognize the waterfront spaces as important for their global and local economy, and for their local and foreign visitors. Finally, projects are taking a more local approach and putting aside the "playground" character much associated with major waterfront projects.

This study started from the recognition that Tokyo, as a port city, was extremely behind its world counterparts in projects involving the waterfront. This simple assumption provoke curiosity in knowing more about waterfront spaces in the city and suddenly the subject of Tokyo's Waterways came into surface. Why were these spaces hidden in the shadowy depths of the city? Were there any plans for them or any concern at all? How did the city looked when rivers and waterways flourished? Is it possible to return these spaces to the city daily life?, These questions allied to some fascination with water posed the beginning of this research.

Hidenobu Jinnai, a reknown Japanese scholar, is involved actively in the research of Tokyo's waterfront from a perspective of the city viewed from the water. He studied several other Japanese cities as well as Italian ones and his knowledge about Tokyo and Tokyo's waterways history is immense. In the 60s, Tokyo bay was an emergent topic and several proposals were created for the construction, extension or redevelopment of Tokyo Bay. The most famous proposal is from the architect Kenzo Tangue, but others, like Kiyonori Kikutake or Kisho Kurokawa are also relevant. None of these proposals were carried on, but they left a vision and a desire pending for some intervention in the waterfront. Recently, projects concerning Tokyo's waterfront are not only increasing, but the fact that water spaces have been improving in quality and environmental aspects are bringing a new wave of concern and active intervention in order to include these spaces in the city.

For this study, the focus goes, not to Tokyo Bay and the seaside waterfront, but to other water spaces: rivers, waterways and canals. Waterways in Tokyo are not very well known, they are not spaces in which cosmetic redevelopment projects can be done, and they are not spaces in which the city can easily intervene or create strong proposals to show to the world.

But Tokyo's waterways are immense, although unknown for most of Tokyo's dwellers. They constitute a form of water "gapspaces" in the city and their urban potential is enormous. Their history in the city extends to its primitive formation and because of rivers and waterways, as usual in many other cities, the city prospered, extended and became the metropolis we know today.

In this research, the focus goes to these spaces: Where are they? What are their characteristics, their problems, their potentials? What is their importance in the urban realm and how can they be included in the city? How should these spaces look like and how should urban planners deal with these spaces? These are the fundamental questions this research aims to answer.

In order to answer these questions the study is structured as follows:

A first chapter "Cities and Water" establishes an introduction in which water spaces and its role the urban realm are discussed. Topics include water and city history, water and mankind relationship and meanings, water and urban sustainability and urban regeneration issues allied to the redevelopment of the waterfront.

The second chapter "Waterfront General Topics" deals with issues directly concerned with typical waterfront development projects: its importance for the city, design and management issues and several case study examples- its application and results.

The third chapter "Tokyo: A Lost City of Water?" focuses on the specificities of Tokyo and its waterways: The metropolis, its history and urban visions, the history, background and evolution of waterways, waterfront planning and existing government plans and regulations and finally a short conclusion describing the importance of waterways for the city.

The fourth chapter "Tokyo's Waterways" presents an extensive description and analysis of Tokyo's studied waterways: photography, network maps, individual mapping and individual characterization ending with a conclusion about the actual state of waterways: its problems and potentialities.

The fifth chapter "Waterway Agenda" constitutes the most important part of this study and it contains the main discussion of how these spaces can be approached in their design, from top to bottom: it is presented a general waterway vision for the city, followed by strategies concerning the waterway network and river scale interventions. Next are formulated design conceptual guidelines based on Japanese architecture, cities and traditional landscaping and these conceptual guidelines are applied to each waterway in an individual SWOT analysis, rule application and exemplification project. Finally are included six representative projects which serve as illustrations for future real projects in Tokyo's waterways.

The final chapter presents the conclusion of this work focusing on the belief that Tokyo contains an immense potential for its complete urban regeneration. The inclusion of waterways in the city once again can transform the way Tokyo presents itself to the world and to its citizens. The important conclusion of this work is that no good project can be done in waterways without carefully understanding local and global realities within the city. No project can be successful by focusing only on its plot's limits: an urban vision and specific strategies are needed to improve these spaces and this study can become a starting point for the way Waterway Urban Planning in central Tokyo is made.

Methodology

First, "to accept nothing as true which I did not clearly recognize to be so." Second, "to divide up each of the difficulties which I examined into as many parts as possible." Third, "to carry on my reflections in due order, commencing with objects that were the most simple and easy to udnerstand." And finally, "to make enumerations so complete and reviews so general that I should be certain of having omitted nothing."

In, "The Seekers", Daniel Boorstin about Descartes, p.168

The present study was formulated based on two types of data: field work observations and specific readings.

The field work data collection was realized between January 2007 and May 2007 with the approximate duration of five months. To support field work visits, digital maps and hard copy maps were used and during this period visits to the following rivers and waterways were effectuated on a daily basis including: Shibuya, Furukawa, Kanda, Kitajukken, Komatsu, Meguro, Myoshoji, Nihombashi, Onagi, Ooyoko, Shakujii, Sumida, Yokojukken rivers, Kiba canals, Sendaihori moat, the Imperial and Outer moats and canals in the Shinagawa Area. These visits were recorded by taking photographs from every bridge with a pedestrian access the length of each waterway studied section along with several sketches and notes.

Adding to these observations, punctual visits to specific rivers were done in the course of this research in order to observe prompt realities and record them. The waterways were chosen according to its proximity to Central Tokyo and its urban character.

The second type of data was collected during the period as a research student and a master course student, from April 2005 to current date, January of 2008.

This period was marked by the research and reading of several bibliography concerning waterfront issues in English, Portuguese and Japanese both hard and soft copies. These readings concerned waterfront design and management in its general aspects, urban history and urban sustainability issues in a world perspective as well as in the specific case of Tokyo, novels and essays which contents were relevant for the subject in question and several case study examples of projects attached to the waterfront.

Both data were collected and analyzed carefully, forming the foundation for the drawings, projects, discussion and theoretical formulations presented in the course of this paper.

We came from the water; our bodies are largely water; and water plays a fundamental role in our psychology. We need constant access to water, all around us; and we cannot have it without reverence for water in all its forms. But everywhere in cities water is out of reach.

In "A Pattern Language" Christopher Alexander, p.323

1.1. Cities and Water: The Beginning

Cities are the birth of civilization and its historic nature must be understood in order to set the foundation for what they meant through time and what they mean today.

As a special creation of Man, cities originated in a couple of great river valleys: the Nile, the Tigris-Euphrates, the Indus, the Hwang Ho. In these places, land was fertile and rudimentary forms of agriculture and cattle raising were possible for survival. When water was not directly at hand, mechanisms of water storage were produced in order to be able to survive. This is an important aspect: survival. Without water, cities couldn't flourish, agriculture and farming were impossible, and humans couldn't survive. Water and cities have had then an intricate relationship of survival and prosperity. Some cities thrived and created major civilization outcomes and others simply couldn't survive by lack of resources, especially water.

In the course of times rivers, the sea, lakes of bays were places in which to settle and start something, places of birth. Rivers themselves were the first highroads, after boats were invented commercial transactions and city expansion were possible. In the Indus valley, Egypt or Mesopotamia, rivers formed a spinal transportation system which served as a model for the irrigation ditch and the canal. People had to work together with themselves, the river and with nature since natural flooding was necessary to agricultural field irrigation, necessarily "it was along the riverbanks that population thickened."[1]

This interdependent relationship with water grew stronger and the acquisition of water from rivers, lakes, wells or springs has been a daily task for mankind. With cities and villages came the need for constant water supply and water networks and the Romans developed an organized and centralized system of aqueducts, siphons and collection of used water. In the Middle Ages water was distributed largely by human intervention and only in the 19th century, the first modern societies with regard to water supply were born.

Throughout the world and throughout history, great urban waterfronts are found: port cities such as Alexandria, Istanbul, Amsterdam, Shanghai or Venice have captivated the imaginations of urban dwellers. Water cities as often many are called, offer a sort of spiritual character in which a distant past when water offered routes of transportation and shaped the city's identity, importance and economic prosperity was real.

Harbors, bays and the sea shore were in ancient times places of spiritual character and even worship for mankind. Some of these places were the stage for the greatest public works in history – the Pharos in Alexandria or the Colossus of Rhodes. This edge between the land and the sea set the stage for a magical door into the unknown for centuries and nowadays it is still said that there is no comparable feeling to the one of being at the edge of the sea. In the collective unconscious of mankind, mythical submerged cities like Atlantis or marooned harbors such as Ostia recall the glories of past civilizations long lost to the modern world.

This human attraction with water has long been a topic of reflection and conjecture: in a philosophical, mundane, architectural or urban level. Water contains a complex range of associations to life, birth, mystery, death, purifying or regeneration. It has had a spiritual dimension throughout times and still today it is believed that contact with big surfaces of water has a soothing effect and sometimes even therapeutic.

In a psychoanalytic theory, water is symbolic of the unconscious and of unformed potentiality of the human spirit.

For Deleuze and Guattari, water is "one of the models used to describe the opposition between the "smooth space of becoming as contrasting with the static striated spaces of stabilized identity"[2] and the urban waterfront can also be described as this edge between a static, controlled space which is the city and the fluid, dynamic space which is the sea or the water. The waterfront is a boundary, an edge in which two different identities come together. These edges represent a space in which a series of dialectic oppositions come together: "order/chaos, being/becoming, place/space, culture/nature, closed/open, striated/smooth, solid/void"[3] Probably is this dualistic character that provides with the magic and mystery of the waterfront.

American anthropologist Loren Eiseley assumes that "If there is magic on this planet, it is contained in water." and in fact water is a fundamental attraction in all cultures among all classes of people. Water is often the location of celebrations and ceremonies, religious rites, boat races, new year offerings, and so on. Being it for ritual ceremonies or personal recreation, people are attracted to the water's edge. Just like in ancient times, man was attracted to the water edge for survival reasons, nowadays, this basic necessity reflects itself in the search of a more spiritual place in which festivities, rites or simple daily recreation activities take place.

Coming from a country with a long history of navigators and living in the proximity of a river or of the sea all my life, this proximity becomes an unconscious factor in the way people live their lives and in their options when moving house, city or where to spend their vacations or some free time.

In Portugal, beach areas constitute major contributors for the country's GDP. People are attracted to these areas from national and foreign places, mainly Europe. The proximity of the sea influences the urban development, public and private investment and the allocation of urban and natural activities in close relation to the waterfront.

Coming from this type of environment, the first contact with Tokyo was shocking in the sense that as a sea port city, the waterfront was so underdeveloped. The great potential that lays in front of the city is always blocked from our view or clear access. When the focus changed from the Tokyo Bay to Tokyo's inner waterways, this shock was even more overwhelming. How could a city waste such a great potential, and how could these places be forgotten and put aside? Following what has been said about urban history and water issues, it is fascinating the hidden potential of a city like this. And this confirms what experts affirm: that "Waterfront sites with the greatest potential are often among the most ignored sections of our cities. Not only are these sites simply dirty; they are abused, derelict, and plagued by environmental issues."[4]

Nevertheless these areas have come gradually into focus starting in the USA and expanding to many countries around the world. The regeneration of water spaces has become an area of interest for urban dwellers and developers and once again the possibility of great waterfronts is a within our grasp. The 20th century saw expansion and the destruction of many waterfront spaces, some with extreme historical importance and value, but the 21st century, marked by global environment issues and resource control, will probably be marked by a century in which the recover, maintenance and good usage of these spaces becomes a reality. In that sense, Tokyo is a major candidate for the recovering and editing of its water spaces.

1.2. Urban Sustainability

In 2007, the rural Chongming Island in the Yangtze River near Shanghai, started to transform itself and preparing for a new development: the creation of a new city, Dongtan.

Fig01. Photorealistic Images of Dongtan's Urban Plan

Dongtan's is proudly called the "world's first sustainable city" by its planners firm. The planning describes a city of 50 000 inhabitants by 2010 hoping it to reach the 500 000 by 2040. The development will cover 4600 hectares, less than a fifth of the entire island and windmills will dominate the city skyline where turf, greenery and solar panels will cover the buildings roofs. It is estimated that around 80 percent of all solid waste will be recycled, while organic waste is supposedly destined to be composted or burned in order to supply heat and power. Motorized vehicles are restrained to the ones powered by electricity or fuel cells and if this description can be realized, the city will be self sufficient in energy, food, and water, with close to zero carbon emissions from transportation.

Urban sustainability is an issue that gains more and more visibility each year and projects that started with few modifications in architectural design range now to major master planning as described above. Architecture and Urban Design in the 20th century were a reflection and celebration of the Age of Industry and Technology, but there was a shift in response to a new Age of Information and Ecology.

Why is this issue so important and why do cities seem to be in the spot light concerning the big question of sustainable development? First of all, the most well know definition of sustainable development recorded in the 1987 Bruntland report tells us that "Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs." which means that the consumption of natural resources should be controlled and managed in order not to leave our future generations with less then what we had.

But in a world mesmerized by economical consumption and waste of resources how do cities contribute for this tendency:

- It is estimated that the building of shelter consumes one-sixth of the world's fresh water supply, one quarter of its woods harvest and two fifths of its fossil fuels and manufactured materials;
- The 21st century will see for the first time in the history of humankind that the world's six billion people will live in cities. UN projections estimate that between 2000 and 2025 the world's urban population doubles from 2.4 billion in 1995 to 5 billion.
- Cities are connected to nature through markets and technology and virtually all cities rely on food, fuels and materials from elsewhere: this reality provides with other milestone for this new millennium, the fact that all cities and all city dwellers form a part of a single networked globe.

Like Lewis Mumford wisely affirms in his book The City in History, *This book opens with a city that was, symbolically, a world: it closes with a world that has become, in many practical aspects, a city*, cities constitute nowadays one of the major factors contributing to the world's environmental problems. Calls for urban sustainable development are for these reasons urgent and important to be tackled.

Cities seem to be at first sight the problem rather than the solution: the number of people living in slums has increased, industrial pollution is rapidly growing fouling water and air. However the flow of people toward cities didn't decrease, by the contrary.

From this perspective, cities and urbanization provide a rather crucial opportunity to rethink the way we live in our urban habitat and they provide the chance to take a radical reappraisal of the way our cities related to the natural environment. City planning is then critical to regulate and create urban environments that are eco-friendly.

An up-down perspective is needed in the first place in order to set the mood and goals of cities, but this have to then be conjugated with a down-up viewpoint in order to fill the voids that general city planning cannot undertake. A holistic approach together with different scale approaches to the way we design our cities and our buildings is fundamental to reach a more balanced city design. Thus, sustainable doesn't mean only to create self-sufficient "mechanisms". Cities moving towards sustainability improve their public health, the citizens well-being, lower their environmental impacts, recycles its materials and uses energy efficiently.

Some defend the return to the compact city model in which densities are raised, brownfields are recycled and living and working spaces come together decreasing daily travels. Juxtaposition of functions and networks in the city seem to be one of the crucial factors for a more interconnected, well functioning city in which people live, work and entertain themselves in the same area.

Architecture design is also called to focus and the current practices in which architects and constructors are autistic to the nature of a place are severely condemning not only our environment but our urban cultures. "Ego-architects" should give place to "Eco-architects", people that are ecologically aware of the place they are designing: its life, its natural and cultural resources, its availability in sunlight, shadow, water or its vernacular architecture, its fauna and flora, and so on. An eco-architect designs a building to create aesthetic, economic, social and ecological value.

As shown above, cities have the power of severely destroy or recover its surrounding and global environment and for that careful planning is necessary in order to improve these places, because these are the places we live in.

Tokyo is one of the world's largest cities and it succumbed in its urban planning to reasons selfish to economic purposes. The prefecture held 12 790 000 inhabitants in October 2007 and although it contains one of, if not the best, rail transportation system in the world providing with less automobiles and less carbon dioxide emissions, its large population, daily travels and needed resources to keep the city alive consume vast amounts of energy. The apparently not ruled urbanism of the 20th century provided the city with cramped spaces, private and public, the destruction of many of its natural features, including topography, green areas and the waterways and a city in which the citizen is expected to consume until exhaustion. Tokyo is the perfect city for a world obsessed with consumption and only recently architects, citizens and politicians started to look for another kind of public environment: one in which the city provides with a varied range of spaces in which people can chose from sports to culture, from shopping to volunteering.

In this sense, the city is already one step further in the fact that it is willing to become better, it is willing to provide its citizens and visitors with a city in which people feel comfortable to live in. Tokyo's urban regeneration has already started in punctual projects, here and there, and in this study, it is proposed that waterways can function as a major asset for the city in the view of sustainable urban regeneration. The recovery, design and restoration of these places can provide not only with natural wind corridors in which water, greenery and city come together to offer new habitats for people, animals and greenery, but also they present a chance to recover a part of the city's history and culture: to leave to further generations spaces in which they can live and feel their city's history and natural spaces as well as participate in their own city building.

1.3. Urban Regeneration: The Role of The Waterfront

The previous subchapters focused on the relation between cities and water and the urgent need of city sustainable development. But it is not possible to just start building new cities from a *tabula rasa*[5] and claiming the need for sustainable urban environments: editing urban spaces and improving them towards a more sustainable urban environment is the main trend nowadays and urban regeneration projects thrive through metropolis and cities around the world.

Urban regeneration tasks focus on existing urban scenarios with certain problems and potentialities trying to revive them into a more complete urban scenario. Common projects can include brownfield land regeneration, old neighborhood revival or improvement of central city public spaces. At times urban regeneration projects include small editing in existing urban areas and at others they can incorporate the inclusion of completely new urban areas into an existing scenario.

The waterfront played and plays an important role to urban regeneration developments throughout the world and it contains a special interest for investors, being usually a priority space for this type of intervention. As urban areas around waterfronts develop, the competition for the usage of these edge spaces becomes more intense and the demand for space grows. This competition is often more eager between the trade and tourism industry sectors.

In an increasingly global economy, international trade and the transport of oceangoing goods boom demanding more space at seaports to handle cargo. At the same time, this kind of trade produces economic growth which often provokes a rise in tourism. As tourism increases cities neet attractive, appealing spaces and the waterfront is a major factor of development in order to tackle these trends.

The waterfront becomes the setting in which major investments can be made transforming at times the whole image of a city. An example of that is Dubai: it projected itself in the world's economic and architectural scenery due to its waterfront project.

The Dubai waterfront, led by Nakheel – Dubai's first development company – is the largest waterfront development in the world's fastest growing city, bigger than Manhattan and Beirut offering to investors over 250 master-planned communities.

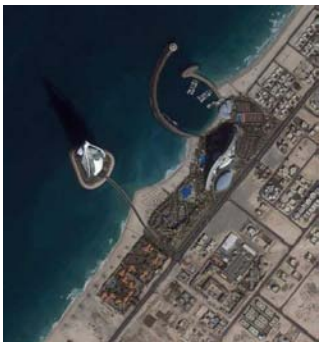


Fig02. Sattelite Photograph Burj Al Arab

Fig03. Palm Jebel-Ali

Fig04. Palm Deira

Fig05. Palm Jebel-Ali

Fig06. Palm Deira

Fig07. The Palm Jumeirah

The vision behind this project is to create a "world-class destination for residents, visitors and businesses in the world's fastest growing city[6] and even before the project is complete, Dubai's waterfront has already become a symbol of Arab Emirates and its world projection is enormous. It will inaugurate soon (expected in 2008) the world's tallest skyscraper , it possesses already the world's tallest and most expensive hotel, the Burj Al Arab and the islands being constructed in the waterfront can be seen from the space.

Not discussing the quality of the project and its imperial character, the fact is that waterfront spaces can become major issues of economic development for a city and at the same time boost the tourism, trade and even image of the same city.

Allied to economic and tourism development, waterfront spaces are also a major factor contributing to city dweller's quality of life. Cities want their waterfront to become places of public enjoyment in which visual and physical access to the water and the land are ample all day, and all year. When a waterfront becomes a dynamic space serving more than one specific purpose they grow to be spaces loved by its citizens. In this sense, waterfront represent major opportunities for urban regeneration in cities and they should be places to live, work and play contributing to the quality of life in its economic, social and cultural aspects.

Finally, and together with the previous subchapter discussion, waterfront spaces have also the power of becoming symbols of the city's ecological awareness and prosperity. Waterfront urban regeneration projects should include an environment sensitive development and projects should be encouraged and even regulated in order to be eco-friendly.

Concerning this subject, it is lucid to finish with the conclusion that waterfronts can provide for great sources regarding urban regeneration: they can serve as economic boosts when developed with industrial trade facilities in mind or when given opportunities for real estate investment, they can enhance social and cultural aspects by reconnecting the city and its water edge, as well as citizens and its natural assets, and they can serve at times as major cosmetic operations, changing the image of the city among its dwellers and among its economic world competitors.

Tokyo, as a seaport city, contains these potentialities, although they are still concealed by major blockage between the city and the sea. As a river networked city, it contains another kind of potential in which linear water spaces can contribute for different typologies of urban regeneration: typologies more concerned to the environment, to local citizens and improvement of life quality. It can be said that Tokyo and its water spaces provide with major assets for the definition of the city in its local and global environment, but these are trapped among the city's development policies waiting for inspired minds to regenerate them into the city once again.

Water unsettles the principle of horizontality, especially at night, when its surface resembles pavement. (...) on water you are somewhat more alert than ashore, your faculties are more poised.

In "Watermark" Joseph Brodsky, Nobel Prize of Literature

2.1. Urban Waterfront Development

Urban Waterfront developments started around the decade of 60s when waterfront areas became spots of intense redevelopment activities. The United States were pioneers in this new urban redevelopment typology and Boston or San Francisco bays were transformed in commercial and recreational areas. Fifteen years later waterfront redevelopment projects had been undertaken across North America and the redevelopment of both old seaports and inland waterfronts had become a major industry. European cities have also started transforming their sea or river port areas and more recently the Asian urban boom is beginning to show major activity in waterfront areas.

In the case of North America, all early settlements were founded in or near a protective harbor which provided security, accessibility and a starting place from which European discoverers could explore and settle. As economic activities augmented, safe harbors evolved into effusive seaports stimulating growth in the surrounding regions. With time these seaports became increasingly sophisticated adding docking, cargo-handling and storage facilities. Not only in North America, but in major world cities the waterfront represented the focal point of activity in some region. Its importance was economic, but also as major terminals of commercial and intellectual trade. They were central to the social activity of a city and for the exchange of ideas.

This trend continued until the mid-19th century in which the introduction of railroads revolutionized transportation methods. This not only contributed for major changes in inland trade, but it contributed for a slow fade-out in the importance of water routes and water trade. Most waterfront areas were connected to rail tracks and the water edge's natural setting was gradually transformed and blocked by the mechanisms of civilization. Needless to say that allied to inland transportation methods came the expansion of cities into the continent and its alienation from the waterfront was obvious until the second half of the twentieth century when the first major waterfront redevelopments started. This trend is common to cities among the world and even nowadays it is possible to go to cities in which the edge area between the water and the land is still occupied by obsolete rail tracks, storage warehouses or old industrial sites: Lisbon, a familiar city to me only now is starting to rethink its relation to the Tagus River, Tokyo still didn't release most of its sea and river edge areas. American cities have long started the process of waterfront revitalization and most European cities have recently tackled specific waterfront areas in order to improve city life and to regain a relation lost for centuries. Barcelona is probably the most celebrated case of waterfront projects in Europe, but northern Europe cities started recently to incorporate innovative redevelopments to include their waterfronts in the city once again, such as Hamburg, Rotterdam or Zurich. In America Boston, San Francisco, New York or Pittsburg are well know for their waterfront and Asian cities started also to apply waterfront regeneration processes or the complete construction of waterfront cities. Needless to say, that all over the world, the waterfront is a subject dear to citizens and developers. As waterfront blockage history is similar in cities around the world, the factors that contributed for its resurgence are also common to many cities.

The main factor for the re-intervention in these areas is the existence of available land. As cargo handling facilities moved to inland, waterfront land became ready for development. Cheap prices also contributed as a stimulus for investors and entrepreneurs and allied to the local government interested in revitalize urban areas, the waterfront became a priority place for urban projects.

The transformation of these industrial land allied to environmental regulations starting in the decades of the 70s and 80s also led to significant improvements in water quality, which turned waterfronts more attractive to developers and consumers. Many browfield areas were turned into parks and aesthetically pleasant spaces, transforming the appeal of the waterfront.

In North America, the historic preservation movement starting in the decade of 60s was also a major factor for the maintenance of historically relevant architecture, and the preservationists were the first to recognize the importance of the historic preservation of waterfronts, its natural beauty and picturesque architecture.

Gradually, citizen activism played an important role in the sense that it reflects a commitment to the city and to improving its quality of life. This input from citizens gave to waterfronts the legitimacy and civic cooperation needed for the financing and development of these areas.

The decades of the 80s and 90s saw a resurgence in city development and urban revitalization after decades dedicated to pure economic expansion in which cities became neglected. At the time, downtown business districts came back to life and cities were seen again as places for entertainment. The waterfront development usually accompanied this trend in building new residential areas, such as Battery park in New York City, adjacent to the waterfront. The allocation of residential neighborhoods in the waterfront brought with itself more activities to support dwellers creating more diversified spaces in which to live, work and play.

Finally, the rediscovery of certain water uses help to revitalize these areas. Ferries and other water transportation attracted users and provide some character to the area. Small craft recreation as well as small craft marinas helped to improve the "personality" of many waterfronts making of them places that attract people.

Urban waterfronts have always been intimately tied to their surrounding environment and they usually reflect the changes in social, economic or industrial usages. Its importance being stated it is recognizable the value of good planning and design of these spaces.

According to the Urban Land Institute researchers, ten principles of Waterfront Development must be considered in order to take advantage of the opportunities afforded at the water's edge:

1. *The transformation along the urban waterfront is a recurring event in the life of the city, and tends to occur when a major economic or cultural shifts lead to conflicting visions of contemporary urban life*: e.g. the industrial revolution and the blockage of the waterfront and recently the ecological revolution and the recovery of water habitats in the city;

2. *The aura of a city largely resides and endures along its waterfront, allowing substantial changes to occur without inevitably harming its enduring qualities of place*: e.g. the transformation of Pittsburgh's "Rivers of Steel" into natural spaces belonging to the city;

3. *Despite periodic and sometimes rapid change, a waterfront preserves for its bordering city some inherent and unalterable stability*: waterfront landscapes give character to their cities and preserve natural features that no matter how they change will continue to provide some continuity in the way people see these spaces;

4. *As valuable and often contested realms, urban waterfronts bring forth the opposing, though reconcilable, human desires to preserve and to reinvent*: waterfront spaces represent the edge between the natural and artificial world representing for that spaces in which preservation needs come together with the incontestable need for creativity present in humankind;

5. *Even though a waterfront serves as a natural boundary between land and water, it must not be conceptualized of planned as a thin line*: As a dynamic space of opposing realities coming together, this edge must be designed to reflect these oppositions- the treatment of the edge spaces as a monotonous linear space is dangerous and can undermine the attractiveness of the waterfront;

6. *Waterfront redevelopments are long-term endeavors with the potential to produce long-term value. Endangering this for short-term riches rarely produces the most desirable results*;

7. *Underused or obsolete urban waterfronts come alive when they become desirable places to live, not just to visit*: typical

theme park urban design is to be avoided, as well as mono-functional creation of urban waterfronts;

8. *The public increasingly desires and expects access to the water's edge. This usually requires overcoming historic barriers – physical, proprietary, and psychological – while persuading new investors that there is merit in maintaining that valuable edge within the public domain*: Privatization of waterfront land should be controlled and a balance between private and public investment should be reached in order to keep important accesses to water public, avoiding the creation of "islands" only accessible to some;

9. *The success and appeal of waterfront development is intrinsically tied to the interrelationship between landside and adjacent waterside uses – and to the environmental quality of both the water and the shore*;

10. *Distinctive environments, typically found at waterfronts, provide significant advantages for a city's competitiveness in its region or in relation to its rival cities*;

These principles can be applied as pre conditions to practically all waterfront spaces but although this kind of studies is common nowadays, many mistakes are still made and they can undermine the complete success of the waterfront redevelopment. Common mistakes can be resumed in:

- Focus on single-use developments or not multi-purpose destinations;
- Continue the automobile domination: waterfronts should not be places in which to pass by car!
- Create too much passive space or too much recreation;
- Privatize the adjacent waterfront land and not creating public access;
- Not providing destinations: activities and destination points in the waterfront must exist in order to attract people there- no destinations, no people.
- Developing the waterfront by private will solely and not including the community;
- Making design statements: the Bilbao phenomenon created the "landmark in the waterfront" kind of project. Waterfront developments that base their design in this kind of statement are threatened with being overcomed by other design statement waterfronts loosing its long-term value character;

So in summary waterfront projects should make public goals its primary objective with optimized and safe public access, they should create a community vision and citizens should actively participate in the process of decision. They should incorporate multiple destinations and activities carefully connected between each other and activities should encourage a 24-hour activity service. Parks and green spaces should not be used solely as destinations but as connectors between other activities. Buildings should be designed to enhance public access to the water and to represent the cultural and historical community visions in the waterfront. Multiple modes of transportation should be encouraged avoiding or limiting vehicular access in the edge areas between water and land. Seasonal activities and cultural festivals should be integrated and iconic buildings should serve multiple functions. Finally, these spaces should be carefully designed and continuosly managed in order to keep their diversity and variety of activities.

In the following section are presented design and management strategies common in waterfront redevelopment projects that serve as common ground to future projects in Tokyo or other cities.

2.2 Design and Management Issues

In this subchapter, specific issues related to the waterfront design, implementation and management are introduced. Together with these, premises concerning environmental concerns are also discussed in order to provide a more complete image of the typical topics that form the basis of urban waterfronts redevelopments.

Design Strategies

According to the Urban Land Institute researchers, any waterfront redevelopment should take its design very seriously and they provide with eleven topics that should be taken in consideration.

1. Identity
2. Extending the City Towards the Water
3. Pushing the Water Towards Inland
4. Waterfront Buildings
5. Water Scale and Spatial Dimension
6. Water Transportation
7. Dynamics and Movement
8. The Sensory Experience
9. Heightening the Awareness of the Waterfront
10. The Line of Force
11. The Encounter of Opposite Dualities

Creating Identity is a fundamental premise for any waterfront project and is is not an easy task. Projects that were successful in adding meaning to one waterfront do not necessarily offer the same results in another waterfront. In the process of design it is important to research the local history, the local market, and to understand through civic participation what is expected from the citizens and developers of the waterfront spaces.

Extending the city towards the water as well as pushing the water towards inland is crucial for the successful symbiosis between these two elements. Autistic urban design in which “self contained islands” are planned should be completely avoided and a more fluid relation between city and water should be expected. At times the city can extend to the water edge and communicate through its buildings and public spaces and at other times water can penetrate the city “calling” and attracting people to experience its spaces.

Buildings in the waterfront should be designed to reflect the fact that the waterfront is a gateway, seen and approached from all directions. Because these buildings will have a unique visibility their facades should be balanced with each other turning to the water and the city, volumes should be decided according to public spaces and water scales. Some creativity is also expected since the area requires, however too much creativity and strong design statements should be carefully controlled as already mentioned in order to not turn the waterfront area into a temporary theme park.

The water spatial dimension should be used to provide with activities and landscapes according to its scale and formal aspects. At times waterfronts are lucky enough to have perfect alcove shapes or bays, and at other times this kind of space is not possible. Artificial islands, peers or promontories are an option, but as long as the water area remains open enough, a variety of activities and skylines are possible.

Waterborne transportation is an important fact to attract people to the waterfront. Transportation can include daily ferries for citizens and workers, water taxis working 24 hours shift providing with another type of urban transportation and creating terminals connected to pedestrian, train or bicycle paths, cruise boats for recreation or the simple rowing boat when possible are other typologies

that can and should be added when possible to the waterfront.

Transportation is very important, being it waterborne or not and transportation terminals should be integrated to each other and to the city in order to create continuous flow of people in the city and the waterfront. These terminals should be designed to be functional but also to serve as landmarks in the area helping to reinforce the identity of the waterfront.

The sensory experience of the waterfront is one of the most attractive factors concerning water spaces and a variety of experiences should be provided in order to attract a bigger range of people: social or individual activities, active and quiet. These experiences can come from the simple odor of the water, from the feel of water spray against the skin, from the breadth of humid air or from the sensation of being on a boat at sea when walking on a pier or breakwater. The well designed waterfront is sensible to these and other sensations provided by the space and creates activities passive of being experience in diverse ways.

Enhancing the awareness of the waterfront is in many cases the fundamental change to be done. Designing should take in thought the fact that many times the presence of the waterfront is not immediately felt from the inner city and this can be enhanced in many ways. The waterfront itself can incorporate illumination, art or reflections in the water that better show its glory during the day or night.

The line that the water draws when it encounters the earth/ city should be a factor for the waterfront design. Waterfronts are linear spaces per excellence and its linear character attracts people to its edge. Many times waterfront designs destroy these lines trying to create more dynamics or happenings along a simple line, but an extreme exaggeration of this can turn the waterfront into a helpless circus place. Sometimes the simple edge line is the best way of demarcating the edge and design should take these natural lines into question.

The edge spaces between land and water should be carefully designed. It is a boundary space, the ultimate demarcation between city and water. It is a transitional space that suggests adventure, embarking or arriving. It is a juxtaposition of dualities and its contrast characterizes and defines the waterfront. For that its design should not be taken lightly and these two “worlds” should be embraced to form a dramatic heightening of both.

Basically the design of the waterfront should respond to three major issues:

First, to release the water surface, second to create continuity between the city and the waterfront, and third, to harmonize natural spaces in the city.

1. Releasing the Water Surface

The transformations that occur in the water surface along the day or along the seasons are one of the magical factors of the waterfront. Water reflects the sky, the buildings, the light and the surface of the water changes in color and movement. It provokes at times feelings of quietness or restlessness and it reflects the climate and the environment.

The design of the waterfront should then consider the possibility of glimpsing the water surface from within the city. This can be done by designing buildings in setbacks providing with lower volumes near the water and taller ones behind: this can increase sunlight in the waterfront as well as providing views from the inner buildings in the city into the water surface. Buildings should be placed along the waterfront in intervals and people should be allowed to see the water surface from within inner streets. Framing these views should also be thought of and the usage of natural topography is encouraged. Public spaces along the water should include stand or stagelike spaces, observatories or terraces and balconies providing spaces in which functions can be reduced to watching the water surface itself.

Design should improve the connectivity between water and people and provide with spaces in which water is close: by designing promenades and pedestrian surfaces almost at the same level as the water, by adding stairs, ramps to sea walls or by

creating hanging terraces or decks.

Waterfront design should provide with spaces to “play” such as artificial sand beaches, splashing piazzas, pedal boats, fishing spots or beaches and spaces to rest, like waterside squares, pergolas, urban furniture (benches, lanterns, illumination) or events piazzas.

Considering its linear character, waterfront are especially prone to walking spaces and these should be included along the waterfront and connected to pedestrian transversal streets, important parks or culture facilities. They should include board walks, protection elements, design of pavements, trees and greenery, stone sea walls or pedestrians-only bridges.

Allied to resting and playing spaces, spaces in which to enjoy a meal or to have a morning coffee should be planned and designed nearby the waterfront: outside restaurants and esplanades, pier restaurants, fish and food markets of boat restaurants are some of the possibilities.

2. Create Continuity Between the City and the Waterfront

The city inner spaces and the urban waterfront should be carefully designed in order to be directly connected in its public realm. The waterfront and the inner neighborhoods should be considered as one and designed as one: street design should make the water surface visible, building layouts should not obstruct the vision towards the water, regulations for building heights and its relation to topography should be used, accesses should be direct and safe guiding people to the waterfront, materials should be somehow controlled and designed in harmony with each other and the place, signs and marks should be included in the design to increase the place’s identity and originality.

When having two margins they should be designed as one: rivers, bays, and so on. The skyline should be designed in order to create some sort of unification, greenery should be allocated along the waterfront but controlled in order not to become a visual obstruction, the night scenery should be planned to create appropriate illumination, landmarks should exist or be designed in order to improve the place’s character, marinas can at times be planned and public spaces can provide some sort of inscenation stage in which connections with other activities and transportation nodes are designed.

The historic and cultural character of the place should be enhanced and when possible traditional environments of historical buildings should be restored or revived. Cultural heritage activities and exhibition spaces can be planned and designed to increase the sense of roots and historical character.

3. Harmonize Natural Spaces in the City

The design of waterfronts should be especially careful not to disturb existing habitats, flora or fauna. When possible, integrated design and planning should reinforce these or recover them into its natural state.

Water cleaning and purification is fundamental for the success of a waterfront and processes of cleaning, water and waste treatment should be planned and integrated in strategic places. Stone sea walls can be designed, cleaning boats and drainage treatment facilities allocated and well planned.

Flood control measures should also be accommodated: artificial landfills, pilotis buildings, banks and fills, embankments, dikes and levees carefully designed or water gates.

Finally the waterfront should be designed according to specific climate conditions: carefully chose building layout in order to get sunshine and shade in specific places, to control strong winds, to create atriums or design buildings with closable screens, to use eco-friendly sunshade protection and chose greenery according to native species and allocate it in strategic places.

Implementing and Managing the Waterfront Redevelopment

Knowing already that waterfront projects are long term affairs, implementation processes together with the management of these spaces through time is of major importance. Many waterfront sites are completely isolated and its image is not good, so to turn the place's image around implementation practices require waterfront redevelopment agencies to manage three areas: politics, finance and urban design.

To start a waterfront development project takes money, available land, power and a vision of the urban future of these spaces. The starting phase is usually characterized by for the control of the site and by debating its future usage. The control of a project generally goes to the government that will focus political will and money on it. Since local politics will dominate the startup processes, a sponsoring government will require local based control, including the establishment of a local implementation organization and a local planning process. The goals in this starting phase are to establish an implementation agency and to obtain regulatory approval for a workable plan. Political change overtime can undermine or delay the waterfront development. For long term stability, the implementation agency must manage the relationships with the level of government that appoints its board and has ultimate financial responsibility for its survival. It also has to manage the relationship with local governments which own or control the infrastructure needed for redevelopment.

Finding the startup capital for waterfront redevelopment usually takes a long time. Early expensive expenditures are needed for land assembly, site clearance, environmental remediation and new infrastructure. Funding is usually done by governments since the long term profit and the risks are not so attractive for the private investors. Delays in approving the project can also contribute for major frustration and loss of private investors which means that the process of funding becomes even more difficult when local governments capacity of response to projects of this size are not direct and decisive. The plan should start by small scale project realization to create recognition and some stability and since recessions are an usual part of the economic cycle, plans for parks, infrastructure, and social housing should be in hand so that agencies can respond quickly, with the usual public works programs, to create employment in a recession. Finally developers want flexible plans for long-term projects. Best urban design plans should provide for changing uses within the same building types and envelopes.

Planning and design implementation and managing processes should take in account policies that develop small increments in tight phasing plans. Infrastructures should be simple, phased and when possible existing infrastructures and buildings should be adopted to other uses.

Environmental Issues

Typical environmental issues that arise at waterfronts can be considered in terms of their physical, cultural and ecological impact on the site and are as follows:

Soils: sediment deposits from upstream may contain debris and can limit water depth, constrain navigation or convey pollutants. The soil may be contaminated with toxins;

Water: groundwater levels may fluctuate of be contamined. Surface water may be polluted by bacteries or boat discharges. Stormwater can be polluted and its flow may be disrupted. Floodwaters may limit habitable building elevations and setbacks;

Structures: Foundations may be unstable or corroded from chemicals or aeration. Buildings may contain contaminated materials or asbestos. Bulkheads, piers and piles may be damaged by weather, moisture or salts.

Sensitive Materials: Gas or landfill soil may be present. Waste or spills from energy sources may be present. Historic artifacts may be present.

Flora and Fauna: Loss of habitat from clearing and filling, weed invasion, remnant wetlands, species loss of sea grass.

Invasive animals may be present. Protected or rare species or habitats may be present or at risk.

Uses: harmful impacts may be present from infrastructure and navigation structure. The site can be affected by vessel speeds, wakes or pollution.

In the environmental perspective the waterfront is a part of a large context in which a complicated network of ecosystems interact. Because ecosystems are immensely complex, environmental issues are the most difficult to deal with in the waterfront redevelopment. This requires a systems approach: through the awareness of the operating principles of systems it is possible to become multifaceted, interdisciplinary and integrative in design and treatment of these spaces.

To reclaim waterfront sites and plan them according to environmental friendly laws and practices there are three choices:
1. To go back and ecologically restore the site to a previous pre-industrial condition, 2. to stay still and maintain by conservation practices aspects of an existing condition or 3. to move forward, which requires a scenario in which adaptation is the key: a proactive approach to waterfront environmental issues involving remediation, monitoring and management of a hybrid cultural and natural environment.

Design, management and environmental practices in the waterfront are fundamental in order to reach a more complete urban environment, in which things actually work. The following subchapter presents examples of waterfront redevelopment around the world: good and bad, as well as cases of riverfront redevelopment which will serve as an introduction for the next chapters, focusing not on seaside waterfronts but on linear water spaces such as rivers, canals and streams.

2.3 Waterfront Redevelopment Examples

This subchapter introduces examples of waterfront redevelopment projects around the world, starting with an overview of the best and the worst places, a specific waterfront redevelopment project in Europe, two riverfront redevelopment case studies and finally projects in Japan.

2.3.1. The Best and the Worst: General Examples

To decide this subject is not only a very hard task, since it requires a person to know all the waterfronts around the world, but also since it is a subjective matter that can differ from personality to personality it makes this practically impossible. Fortunately the "Project for Public Spaces" (PPS), a nonprofit organization dedicated to helping people create and sustain public places that build communities, already did this evaluation and this section provides their opinion concerning the best and the worst waterfront cities in the world. As mentioned, although it is a work done by an organization it is no less than a subjective matter and for that this section is to be seen as a general example section in which good and not so good waterfront cities are introduced.

The following six waterfront cities offer a flavor of what can be possible: these cities incorporate the waterfront into the broader life of the community and by exploring their water edge we can get a sense of the whole city:

Stockholm, Sweden:

In this city of islands the waterfront constitutes the real heart of the town and it has adapted over time to the evolution of the city. There are few heavy traffic roads along the water and walking or bicycling become great pleasures. Its promenades and esplanades attract people to the water and this pedestrian network continues to the inner city creating a well connected waterfront.

Fig08. Stockholm Waterfront

Venice, Italy

Venice continues to represent THE Waterfront city, its famous canals and streetscape along with its seascape turns it into a real water city. The lack of automobile transportation turn the city into a place where it is actually fun to walk around and even get lost.

Fig09. Venice Waterfront

Helsinki, Finland

Helsinki's compact downtown is almost entirely on the waterfront. It serves as a gathering spot with markets, parks, and an esplanade. Its safe and quiet paths connects the pedestrian to the several neighborhoods centered around small public spaces and these intimate communities are connected to main destinations of a larger scale.

Fig10. Helsinki Waterfront

San Sebastian, Spain

San Sebastian's waterfront, with its beautiful promenades and contemporary architecture, along with its bay of Biscay follows the arcing coast from one end of the city to the other. Its lively public spaces connected to the ancient city are very well suited for pedestrian use and the waterfront feels like the center of the city.

Fig10. San Sebastian Waterfront

Sidney, Australia

One of the most famous bays in the world the Sidney harbor and waterfront is a great place to stroll, take a boat ride or just sit down and relax.

Fig11. Sidney Waterfront

Hamburg, Germany

One of Europe's largest ports, home to an industrial waterfront located on an estuary where the Elbe flows into the North Sea, Hamburg's waterfront is accessible to people through a scenic promenade linking the shore to the downtown.

Fig12. Hamburg Waterfront

Other great waterfront cities include Baltimore (Maryland), Chicago, Montreal (Canada), Nice (France), Porto (Portugal), Rio de Janeiro (Brazil) or San Francisco, California.

Following are introduced the opposite examples: Waterfront cities in which the inclusion to its inner city was not successful or its planning left much to desire:

New York, New York

One of the most extensive waterfront in the world that has been largely inaccessible to the public for decades. Replacing the working waterfront by a driving waterfront was a mistake but nowadays waterfront plans are once again on the spot. The threat its that once again, single use plans may be applied, repeating history and isolating the waterfront once more.

Fig13. New York Waterfront

Copenhagen, Denmark

Copenhagen's waterfront is being raped by lifeless architecture. The new buildings contribute little or nothing to the public realities including the recently built Opera House. Although Copenhagen contains other examples of good waterfront, the new redevelopments contrast sharply to the old ones in a bad way.

Fig14. Copenhagen Waterfront

Hong Kong, China

Hong Kong is usually identified with its waterfront setting, unfortunately the city keeps expanding to the water by landfill and the construction of new towers. Public spaces are scarce and there are no places to stroll or enjoy the vistas, eat or even shop. To enjoy the scenery visitors have to take a boat to Lantau Island, where they can experience a real connection with the water.

Fig15. Hong Kong Waterfront

Boston, Massachusetts

Most developments in the waterfront search for an iconic, sculptural look, rather than seizing the potential on their sites to enhance the quality of public spaces.

Fig16. Boston Waterfront

Tokyo, Japan

Although Tokyo's inner districts possess a lively, distinct charm and character, its waterfront is contrasting and visibly neglected. The amazing commercial harbor doesn't present a people-friendly waterfront and it is still waiting for the careful attention to public spaces that the rest of the city enjoys.

Fig17. Tokyo Waterfront

Seattle, Washington

Seattle city and the waterfront are separated from a viaduct which is now urging an intense debate.

Fig17. Seattle Waterfront

Paris, France

Roads running parallel along the Seine block the city and the river connection and trap promenades between two major realities: the water and the highways which turn the space along the river unattractive and unsafe.

Fig19. Paris Waterfront

These examples are followed by other destinations considered bad in terms of their waterfront characteristics, but as already mentioned, considerations about waterfront redevelopment can be either good or bad depending on the person, researcher or entity analyzing them.

2.3.2. Hafencity, Hamburg

Fig20. Hafencity Project

Fig21. Master Plan

Hafencity is one of the most prominent city centre development projects in Europe and is situated directly between the historic Speicherstadt warehouse district and the River Elbe. The development is estimated to increase the city centre by 40% and it is expected to be a new city with a cosmopolitan mix of apartments, services, culture, recreation, tourism and retail uses. The development is expected to continue until the years 2020-25.

The Masterplan outlines the urban redevelopment fro the extension and enlargement of Hamburg's city centre by means of transformation of nearby former harbor areas. One of the main purposes is to enable Hafencity to become an energizing influence in Hamburg's economic, ecological, social and cultural development. The area is located between the flood protection line of the city centre and the North arm of the River Elbe, placing it in a river flood area. The plans aim for sections to be raised in order to provide effective protection against flooding.

Open urban spaces hope to be the center cores of the plan and to take advantage of this interplay between land and water, high and low tide. The Barcelona partnership EMBT Arquitectes Associats, Enric Miralles and Benedetta Tagliabue won the competition to design the open spaces in the west of Hafencity and its Mediterranean style, successfully incorporated the ever-changing water levels. The Sandtorhafen harbor, dating from 1866 will become a tall ship harbor in 2008, filled with historic ships, accessed by pontoons, bridges and gateways. Adding to this a modern marina is being created in Grasbrookhafen.

Fig22. Magellan Terraces

Fig23. Dalmannkai Steps

The Hafencity redevelopment is divided and phased in 10 sections, five of them are presented next:.

1. The Sandtorkai Quarter: approx. 30 000 m^2 of gross floor spaces and the first Hafencity quarter to be completed.

Fig24. Sandorkai Quarter Plan

Fig25. Sandorkai Quarter Photo

2. The Dalmannkai Quarter: under construction, 115000 m^2, 650 apartments, services, hospitality outlets, adjacent to dock for historic sailing vessels, marina, pontoon bridges. Scheduled for completion in 2007/2008

Fig26. Dalmannkai Quarter Plan

Fig27. Dalmannkai Quarter Photo

3. The Strandkai Quarter: approx. 190 000 m^2 gross space for service-sector companies, hospitality outlets, leisure infrastructure and residential housing.

Fig28. Strandkai Quarter Plan

Fig29. Strandkai Quarter Perspective View

4. The Uberseequartier: 275 000 m^2 of gross floor space, culture, leisure, cruise ship terminal, retail, hospitality, hotels, services, residential housing- Scheduled for completion in 2011.

Fig30. Uberseequartier Plan

Fig31. Uberseequartier Model

5. The Brooktorkai: 52 000 m^2 of planned floor space services, cultural facilities and trade. Completion in 2010.

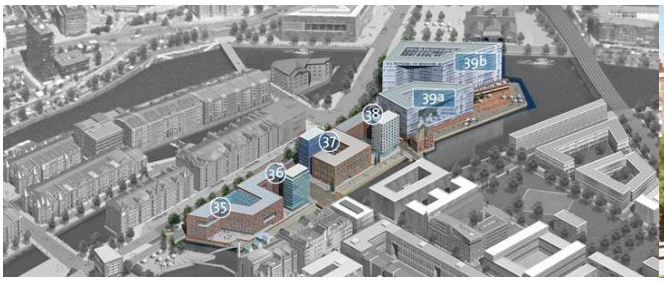


Fig32. Brooktorkai Quarter Plan


Fig33.Brooktorkai Perspectve View

Other areas include the East Magdeb harbor, the Lohsepark, the Baakenhafen, the Oberhafen and the Elbruckenzentrum. The Hamburg waterfront redevelopment project is important to be mentioned because of its process and city vision: to create a new city center the waterfront was the place of choice and the process of planning is visible organized, phased and well though to include both the city and the water spaces in an interconnected relation between each other.

Of course results of the whole plan implementation are not visible yet, but the constructed areas seem to be a success. The urban planning of the area included a wide variety of urban uses, it didn't set itself in a single use plan and it took advantage of the historical and cultural character of both the city and the waterfront port areas. The focus on public spaces is very strong and visible in the way these places are decided by architectural competitions in which only the best wins.

Hamburg represents a new stage in waterfront redevelopment in Europe and contrary to Dubai's waterfront as an example, it doesn't contain such a media visibility, but that is because it is being planned for Hamburg's citizens and not to show Hamburg's power to the world. In several years probably Hamburg's waterfront will have much more success as an good urban and waterfront integration project since from the beginning its goal was to create a new city center, representative of the city's culture and pride and in which citizens are the main priority.

2.3.3. Two Rivers: LA and Cheonggyecheon

1. Los Angeles River Revitalization Master Plan

The key words for the Los Angeles River Revitalization Master Plan can be resumed to :

1.History

2.Vision

3.Simplicity


Fig34. LA River Photorealistic View

The history of the river was a crucial factor for the plan's conceptual vision and based on this the goals were to restore the river and its cultural and historical importance once again into the city.

To understand the river's evolution in the course of time was important to define its future.


Fig35. LA River Historical Evolution

With a clear background in mind it was possible to establish a vision and a concept for the river: to restore its natural banks, attract the city and the citizens to the river once again and to restore natural habitats.

Finally, the plan is based in very simple premises:

- The River can become the living green spine that connects nature and communities, providing space for active and passive recreation;
- It can grow in the minds of current and future generations by engaging children in the beauty and wonders of nature, inspiring interest in the environment and the sciences;
- It can again become the heart and soul of the city as a great place to live, grow and prosper;

With these concepts in mind the Master Plan formulated four major goals:

1. To Revitalize the River by: Enhance Flood Storage, Enhance Water Quality, Enable Safe Public Access and Restore a Functional Ecosystem;

2. To Green the Neighborhoods by: Creating a Continuous River Greenway, Connecting Neighborhoods to the River, Extending Open Space, Recreation and Water Quality Features into the Neighborhoods, Enhancing the River Identity and Incorporating Public Art Along the River;

3. To Capture Community Opportunities by: Making the River the Focus of Activity, Fostering Civic Pride, Engaging the Residents in the Community Planning Process and Consensus Building, Celebrating the Cultural Heritage of the River;

4. To Create Value by: Improving the Quality of Life, Increasing Employment, Housing and Retail Space Opportunities, Creating Environmental Sensitive Urban Design and Land Use Opportunity Guidelines, Focusing Attention on Underused Areas and Disadvantaged Communities;

Issues concerning the plan focused on studies about the physical conditions of the River channel, Hydraulical Considerations (Channel Capacity and Velocity), Water Quality, Ecological Function and Habitat Value, Recreation and Public Access to the River, Transportation Considerations, The larger Watershed and Policy contexts and Engaging the Community in the Planning Process.

It is not possible yet to see the results of the Master Plan since it is still engaging in workshop activities within the community, and as a long term project we still have to wait to actually see if the expectations are acheived. In the meantime it is only possible to show the images and visions for the several phases expected to follow the present state.

Fig36. Existing Situation and Expected Phasing of the Project1

Fig37. Existing Situation and Expected Phasing of the Project2

2. Seoul, Restoration of Cheonggyecheon

Cheonggyecheon river was characterized by its 6km long and 50-80 meters long road structure covering it. Per day, more than 168 000 cars were running Cheonggye Street and Cheonggye elevated highway.

In the year 2000, a study by the Korean Society of Civil Engineering discovered that serious repair works should be done for three years to adress deficiencies of the road and the elevated structures.

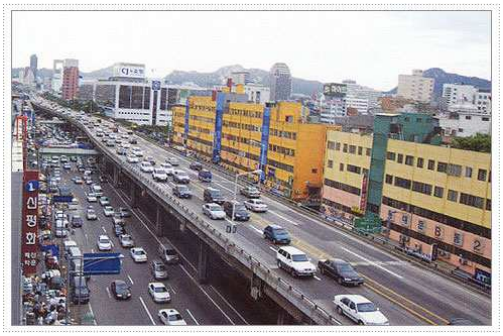


Fig38. Cheonggyecheon River Before Restoration

Instead of repairing the elevated highway structure, the politicians at the time decided to restore the historical river underneath the structure and the development became the largest urban renewal project undertaken in Korean history. Works began in July, 2003.

The project seeked to restore the environmental health of the stream by removing the highway structures and elevated expressway breathing new life into the area economically.

Fig39. Cheonggyecheon Project Images

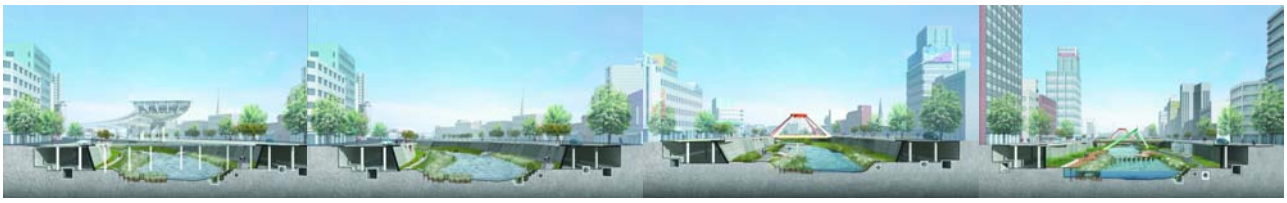


Fig40. Cheonggyecheon Phasing Process

The project was integrated in a downtown revitalization scheme and its four goals were as follows:

1. Restoring History and Culture
2. Strengthening Residential Development
3. Revitalizing Downtown Industries
4. Establishing Environmentally Friendly Transport System

The bridges that span the restored waterway have been designed to reflect the character of their neighborhoods and to downform building patterns that are distinctively Korean. The importance of green spaces in urban areas as places of retreat, relaxation, and reflection informs the landscape architecture.

The lighting scheme has been designed to give the stream and its neighborhood a distinctive character at night and landscape revetments will provide the stream some curves and irregularities on the stream bed which would provide for a better fish habitat.

For commemorative purposes, a few piers from the elevated expressway remained in place in order to remember fragments of its historical and economical importance for the city.

The results of the restoration project are there for everyone to see and the story tells that the new stream that flows through Seoul brought a new life to its citizens.

The inclusion of a water space in the city in replacement of a structure that marked the industrial age brought a new image for the city in an age in which environmental issues are at stake.

Fig41. Cheonggyecheon River AfterRestoration

The inclusion or restoration of natural elements in the city brings a new kind of urban regeneration and in the case of Seoul it projected its image in the world as an eco-friendly city. Not only the environmental problem was tackled but also economical regeneration in the area was improved and the overall quality of life in the city center was enhanced to another level.

The focus on public spaces was one of the keys for the success of this project and the alliance to urban history and culture was another. People can once again identify themselves with the river and by using its spaces they can learn about their history and pass it on to future generations. The concern in keeping elements typical of Korean culture and to reinforce their character by promoting public activities, festivals or commemorations is yet another smart way of not only enhancing the character of these spaces, but keeping them alive and maganing them in the long term. For its vision, implementation and proximity with Tokyo's case, Cheonggyecheon can provide with a major example but also with a competitiveness factor that will emerge from now on in the Asian realm.

Tokyo's waterways, rivers and canals are just waiting for projects such as these and if Tokyo's rulers and citizens are shown with these examples and provided with a river vision for their own they become major candidates for this kind of project.

Fig42. Cheonggyecheon: Art Installation

Fig43. Cheonggyecheon: Flower Installation

Fig44. Cheonggyecheon: Marathon

Fig45. Cheonggyecheon: Public Spaces

2.3.4 Water Spaces in Japan: Projects and Successful Cases

1. Tokyo Canal Project

Tokyo's waterways were neglected for a great part of the 20th century but that situation started to reverse with the appearance of topics such as Urban Regeneration or Urban Revitalization.

As cities grow old and reach to a certain level of economic equilibrium the physical growth of the city lessens to be the priority issue, and the concern shifts to the regeneration of existing urban fabrics. This is true in many cities around the world that have reached a mature condition and Tokyo is one of them.

In the last two decades this kind of approach to the city is increasingly visible and in what concerns the waterfront the shift has been quite evident, not so much in concrete projects but in the way architects and planners started to think about the waterfront. The documentation concerning the waterfront increased, as well as visions, architectural designs, environmental concerns, and so on.

In the design area this phenomenon is noticeable through symposiums, workshops, magazine focus, and the like. One of the examples of this phenomenon was the workshop called "Tokyo Canal" started in 2003 and still in progress going to a third phase.

Tokyo Canal's Workshop was organized by several members and the main theme was to see "Tokyo, as a City of Water".

In their introduction they claim that Tokyo's canals had a great importance in the formation of the city through history, and now, in the 21st century, with the resurgence of the thematic of the Revival of Cities, Tokyo's canals come back into focus as an important discussion topic. In this sense, the main goal was to realize concrete proposals for the city's waterways in order to improve lifestyles, cityscapes and the environment in relation to the water. These proposals should be realistic, but imaginative, keeping in mind the background of the waterways and its relation to the history of the city and its prosperous Edo period.

The projects should create visions for the future of Tokyo in five or ten years from then (2003), they should interchange knowledge with other fields and concern about social proximity issues and finally the workshop members would interact closely with members from The Netherlands, a country with deep connections to waterways: its design and management.

The workshop elaborated three themes:

1. Waterscape: aiming at the usage of infrastructures in an aesthetic manner, to think about waterways as a network, and to improve the relations between citizens and water.

2. Urban Design: from a city that had always had a deep relation to its canals to a city destroyed by war and that completely transformed itself into a giant capitalist symbol , it is difficult to affirm that the landscape that arose from those changes is attractive. With this background in mind, this topic's goal was to look at the city with new eyes and to rethink its environment and correspondent lifestyles in connection to the waterfront spaces.

3. Environment: Some of the problems Tokyo faces in relation to the waterfront can be resumed to Water Shortage, Water Pollution, River Vegetation Pollution, Flood, Loss of Canal Function, etc. With this in mind, it is necessary to think about new technologies for water purification, plans to re-approach citizens and water spaces (public space design) and to re-connect waterways with the city.

With these three themes as a basis, the workshop was launched and from October, 2003 to March, 2004 a Fieldwork Research was conducted by the workshop members in Tsukiji, Tsukishima, Higashikumo, Shinkiba, Shibaura, Odaiba, Oosaki, Ginza, Nihombashi, Sumida, Akihabara, Jonanjima and Harumi.

The workshop took place with four design teamswhich themes were A. "Body of Water", B. "Breezing Canal", C. "Flooding Urbanity", D. "Mega Scale Environment" and E. "Tokyo Canal Invisible" until its exhibition in December, 2004 and the Rotterdam Biennale, 2005, in which the first phase of Tokyo Canal was termined.

The Second Phase of the Workshop continued with the Tokyo Canal Design Lab Members from October, 2005 where there were several meetings with the members, symposiums and an exhibition at Edo-Tokyo National Museum.

In this phase were introduced the results of the Field Work:

Fig46. Landscape

Fig47. Tsukiji & Ginza

Fig48. Water Flow

Fig49. Bay Area

Fig50. Drinking Water

Additionaly it was presented a scheme for the water network in Tokyo:

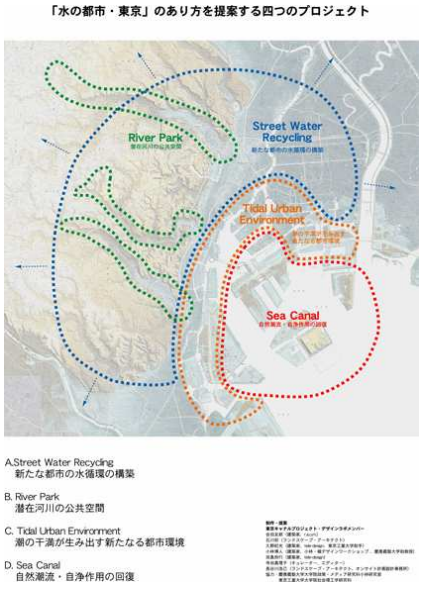


Fig51. New Tokyo Water City

It is known that nowadays Tokyo is far away from the image of a water city and although Edo is becoming a *motto* for the image of Tokyo today the goal is not to project these spaces as an Edo “imitation”. The workshop aimed to discover a new meaning for the “water city” of today. “Tokyo Ecocity” should aim to be a city where water means safety, richness, abundance, friendliness. Because of this, the edge between water and city should be rethought and redesigned in order to create a new city structure. Through the previous Field Work results, the team was able to picture a future image proposal including four areas:

A.Street Water Recycling Area

B.River Park Area

C.Sea Canal Area

D.Tidal Urban Environment Area

For these four areas were constituted four teams which projects were then formulated:

Team A: Street Water Recycling

Fig52.

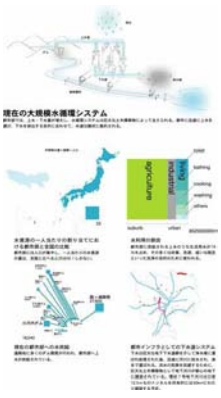


Fig53.

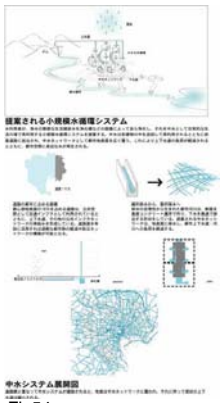


Fig54.

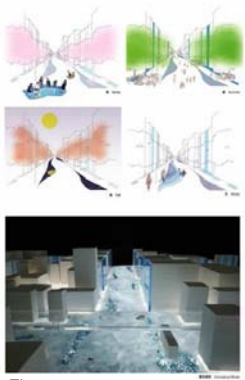


Fig55.

Team B: River Park, Flooding Urbanity

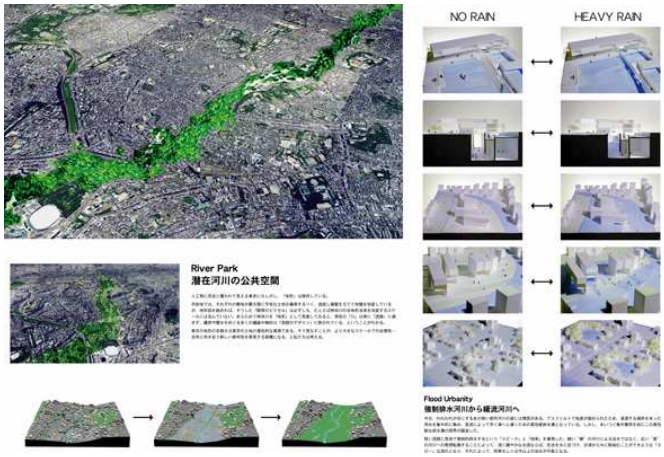


Fig56.

Team C: Sea Canal

Fig57.

Fig58.

Fig59.

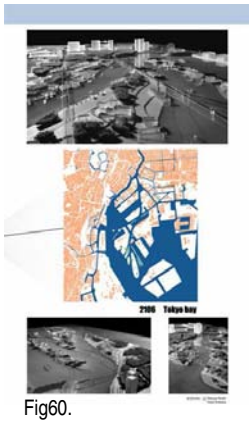


Fig60.

Team D: Tidal Urban Environment

Fig61.

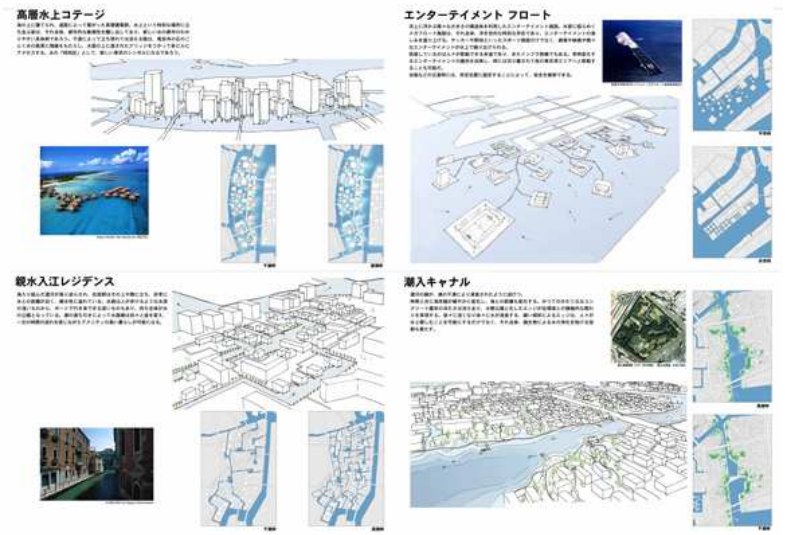


Fig62.

The Workshop is now in “Stand-By” situation preparing for Phase Three but the results were visible among the several exhibitions, symposiums, discussions and in the publication of a book entitled, “Future Vision – Image of a Future Water City”.

In this book were published not only the research and projects above mentioned, but also a series of interviews with Japanese architects and designers of recognized talent.

These designers were interviewed concerning the thematic of the Waterfront and invited to give their opinion and to show some projects related to the subject.

Among the interviewees were 16 architects or groups or architects that gave their opinion or showed realized work in the field of the waterfront issue.

Masato Okata discussing the project of Minato Mirai in Yokohama, Kiyonori Kikutake discussing projects of the decade of the 60s for Tokyo Bay, Fumihiko Maki introducing his Floating Pavilion, Arata Isozaki presenting his project “Computer Aided City”, Kisho Kurokawa and its Plan for Tokyo 2025, Noboru Kawazoe remembering experiences for World Design Conference, Itsuko Hasegawa presenting her “Yokohama Archipelago” Project, Osamu Ishiyama presenting his projects, discussing about community planning and water related projects, Motomu Uno and the plans for Shin Kiba and “Tokyo Cycle Ring”, Kengo Kuma presenting his idea on the Seaside Subcenter, Mikiko Ishikawa and her Shibuya River project, Taiko Shono and projects for public space along the shore, Kazuhiro Kojima and the plan for Shibaura Island, Mikan Group and the “Peninsula Project” and TIT Tsukamoto Lab + Atelier Bow Wow presenting their concept of “River Axis City”.

These interviews are a great example of how much the waterfront issue is dear to architects, planners and designers. Most of them agree on the same principles, ideals of releasing the waterfront, cleaning it, giving it back to the city ant its citizens, and although the same ideals are expressed, the way these ideas are expressed through their projects couldn't be more discrepant.

First it is very easy to distinguish two different phases of waterfront planning, and the first phase: the decade of the 60s and the major plans for the redevelopment or extension of Tokyo Bay (subchapter 3.1.3) – this was a period of major changes in Japan due to rapid economic development and it was a period of expansion of the country and its cities. In this sense the proposals from Kenzo Tangue, Kisho Kurokawa or Arata Isozaki were visionary and they constituted the basis of Japanese planning at that time, which made them eternal.

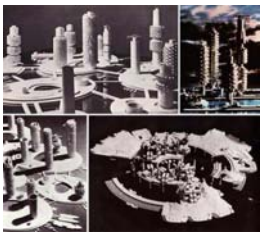


Fig63. Kiyonori Kikutake

Fig64. Arata Isozaki

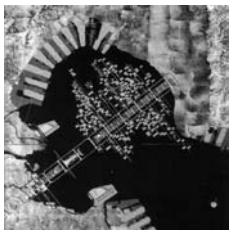


Fig65. Kenzo Tangue

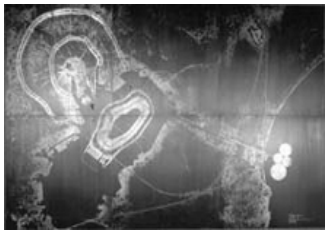


Fig66. Kisho Kurokawa

Another Phase can be seen after the 80s period. This is the generation “post- Kenzo Tangue” and they belong to a phase of equilibrium within cities, a time where no big expansion plan is needed, rather a restructure of the existing situation in order to improve it. In this sense, we don’t find the big planning of the sixties but individual, smaller scale projects that envision the waterfront in a more friendly, human scale point of view. It is possible to distinguish here even two groups, or maybe a third generation, in which the small scale turns into environmental scale and projects can be as minimum as providing urban furniture, or creating biotope gardens in the water in order to balance marine habitats.

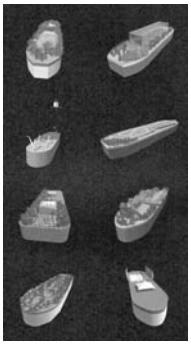


Fig67.

Fig68.

Fig69.

Fig70.

In my opinion, the interviewees whose point of view and respective project application were more close to this study's topic were Osamu Shinohara, Kengo Kuma and Mikiko Ishikawa. The reason for this choice is based on the fact that their point of view shifts the focus from the bay area into the mainland and the rivers. Other interviewees also mention rivers and their importance to the city, but in the case of these three specialists, the fact that rivers are important as 1. connectors, 2. history preservers and 3. an ecological network become clear.

Osamu Shinohara mentions that originally, in Japan, rivers were not built to be designed, like its bridges, so the concept of river design is extremely alien to the culture. Rivers "were needed to provide water for agriculture, to carry goods by means of boats and ships and measures should be taken in order to prevent the risk of floods". In this sense he argues that first of all, it is needed to improve the knowledge that rivers and river edges can be designed to provided pleasant spaces. The projects introduced in the interview, of extreme sensibility and careful design gave a sense of what water spaces could be like. The usage of materials familiar to the culture, the introduction of water roads in living quarters and the idea that water spaces can change the city produced simple but effective and beautiful projects which are considered good examples of conceptual idealism and project realization.

Fig71.

Fig72.

Fig73.

Fig74.

Kengo Kuma's interview, also very interesting, not so much related to waterfront design or riverfront design, but in the general concept of design approach to water spaces. He mentions that " since old times Tokyo's alleys were spaces where people and architecture came together, and they had a true "membrane" role in the city". It is agreed with this first statement in the sense that Tokyo's alleys are one of the most interesting spaces in the city and that its character could be transferred to the river/ waterway role in the city. Like alleys connect architecture and people, waterways should be thought of as connectors of nature and architecture, and by consequence people.

Another important statement concerns the design of water related spaces in particular: " Just building on top of the water does not necessarily means we are producing a comfortable space. The unification of Architecture and Landscape Design Intelligence is necessary otherwise there is no excellence coming from the design the waterfront." This is a fundamental truth and designers should be aware of this when doing any project, especially a waterfront project. Just because the water is close, "doesn't mean we have to touch it". Waterfront design should be subtle, sensible to the qualities of space (water space and city space), too much directness or unawareness of scales can produce terrible spaces and in this sense, the words of the architect have a tone of fundamental principle in it, and we can see it in many of his projects.

Fig75.

Fig76.

Fig77.

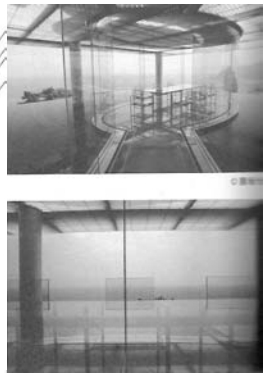


Fig78.

Mikiko Ishikawa's opinion is probably the closest to this research topic and her interview presents the Shibuya River Project. In her research she and her team studied about 317 spaces in Tokyo related to "Open Spaces to the Waterfront" and they concluded that in only ten percent of these it was possible to contact directly with the water.

She affirms that "we need to directly connect sea and land, in other words we need to directly connect rivers and land." In her research there is an attempt to consider rivers as a network and by studying their history and evolution there is an attempt to regenerate these spaces through their historical connection and sense of space.

In the case of the Shibuya river Project the aim was of changing the section of the river and trying to recover its original bank, greening margins, but maybe the most interesting aspect was the connection with this particular space with existing parks in the city e.g. Shinjuku Gyoen. The idea was to use the "River" as a spinal element of connection with green spaces around the city. In the case of Shibuya River, there was actually an old connection to Shinjuku Gyoen Park that is now covered by roads, buildings, and so on. In her research she attempts to give rivers a sense of place through historical research and good urban design concepts.

Fig79.

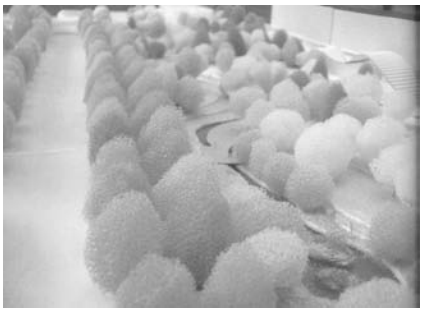


Fig80.

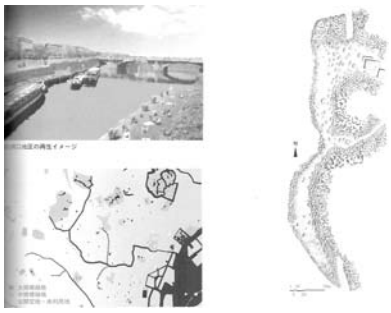


Fig81.

Tokyo Canal Workshop had and has still a great impact in the way architects, planners and designers look at the waterfront. This kind of initiatives is of large significance in the sense that provides us with new visions and fresh ideas about a certain topic.

Concerning the projects presented in the workshop, it is believed that they are important for the specific workshop and that individually they all have great importance. For the undergone research of this paper they are important in order to recognize what is being done and to provide the Japanese way of thinking about waterfront issues, however, as individual projects they are not of great significance, since this papers aims to a more comprehensive view of water spaces in Tokyo and to provide strategical guidelines to those projects. As a conclusion, it can be said that the great contribution of this workshop to this thesis, is the recognition of ideals shared from both parts. Architectural projects are important as visual stimuli but without an urban plan/ regulation behind, they are just as any other project, and that is the aim of this paper.

2. Others

Mishima, Shizuoka Prefecture

From 1992 to 1998 the city of Mishima worked in the redevelopment of its river. Based on its cultural and traditional character as a water city the population urged for the returning of its rivers. The area was divided into eight projects which based on local characteristics adacpted its design to each place.

The plan resulted by the fact that population efforts and colaboration with scholars and other entities was very active, in fact, citizen movement was the starting poin for the redevelopment of the water spaces. This in turn provoked results in accordance with the city's lifestyles and dwellers preferences as visitors to the place recall: now the city "feels like home".



Fig82. Zone 2: River Road Fig83. Zone 3: River Square


Fig84.Zone 4 & 5: River Natural Preservation

Citizens lives are now more open to the river and the city and the water become more uniform and continuous in its spaces.

Yanagawa

Yanagawa is a city located in Fukuoka Prefecture and is a popular place for Japanese tourists because of its 470 km of wide canals.

The twentieth century saw a loss in the usage of the canals and floods that in turn provoke an abandonment to the waters and its pollution. Only after 1961 people started to look at them as attraction spots. In 1968 the municipal council invested a great amount of finances to clean the canals, but since the only goal was to provide tourist spots, the citizens effort to keep the waterways clean was not enough and by 1974 the water had become dirty and polluted again.

From 1975 the current politicians started a campaign to call children and citizens to the importance of the canals and support was asked to the community. By recalling the history of the canals and focusing on its tradition of living by the water and near the water, politicians could make the shift and catch the community's attention. By 1977 the cleaning, flood prevention measures and maintenance of the canals started with the help of city dwellers. The same project that had cost so much before with no results had reached its completion by the hand of citizen participation and volunteer.

Nowadays its 470 km of canals present the major attraction of the city and the unification between land, water and buildings is visible. They represent not only a tourism attraction but they have a deeper meaning in the hearts of the dwellers which helped restoring, maintaining and keeping them alive in their city.




Fig85. Wedding in the Canal Fig86. Yanagawa view from the boat Fig87. Yanagawa Canal

The importance of the waterways declined as the city acquired wheels and streets were improved. The system of rivers, canals, and moats had been extensive, drawing from the mountains to the west of the city and the Tone River to the North.(...) Conoisseurs like Nagai Kafu said that Edo died of flood and fire, but it may be that the loss of boats and waterways had an even more destructive effect on the moods of Edo.

In, "Low city, High city", Edward Seidensticker

3.1. Tokyo: The Metropolis

This section is dedicated to describe facts about the city and metropolis of Tokyo including a first part about Tokyo's History and current urban situation and a second part in which important urban visions for the city are introduced

3.1.1. Urban Character and History

Tokyo as it today appears to be a city that, like the *phoenix*[7] reconstructed itself from the ashes. Although its hi-tech image provokes futuristic sensations when seen from the surface, the city keeps an urban structure coming from the Edo Period. Edo is the former name of the city and it was founded in 1603 by the Tokugawa Shogunate.

The city's topography contains two major opposing realities: the eastern flatlands created by the sedimentation of the Edogawa, Arakawa and Sumidagawa rivers and the Yamanote plateau which is characterized by a complex terrain of valleys carved by many small rivers. These two areas were used as town areas, in the case of flatlands, and land for the nobles, temples and shrines on the top. This division between the *Shitamachi*[8] and the *Yamanote*[9] is still visible nowadays with the Shitamachi being a dense structure of small retail facilities and housing in a grid of city areas and the Yamanote being contrasting in its mosaic of different scale plots, mixing large scale business built upon the old manors of nobility.

After the Great Kanto Earthquake in 1923, the city was largely damaged by the earthquake itself of by consequent fires and the Shitamachi areas being the most victimized had a new grid road system developed after it, however some parts were burned down again during World War II bombings and again reorganized in the post war reconstruction. Tokyo nowadays remains a patchwork of neighborhoods and city centers, some belonging clearly to the Shitamachi and some obviously typical Yamanote, but the damages that the city suffered through time and its regenerative power provided with a myriad of urban spaces that are definitely the heart and soul of the city.

When talking about Tokyo we are often referring to the Tokyo 23 wards within the Tokyo Metropolitan District. Its population dropped to 8.13 million in 1990 (from a number of 8.9 million in 1968) but recently it found renewed population growth to a figure of 8.45 million in 2005. The Metropolitan area, besides the 23 wards comprises the Tama area stretching to the West and the Greater Tokyo area includes the Chiba, Saitama and Kanagawa prefectures. These had a population of 20 million in the 60s, more than 30 million in the 80s and nowadays it contains 32 million people.

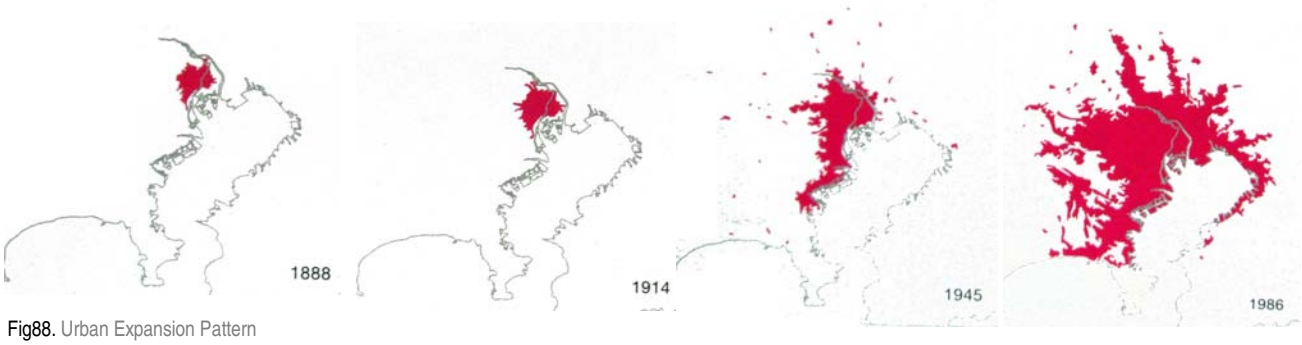


Fig88. Urban Expansion Pattern

The growth of the metropolis was mainly due to its railway development. As a result of this the city formed compact city areas around stations and the major transportation access to the city became the train instead of automobiles.

This railway system is characterized in the city center by the Yamanote Line loop, which connects several terminal stations with suburban lines and the intricate metro system. The daily rideship in the Tokyo 23 wards is of 20.6 million people, representing one third of the national ridership.

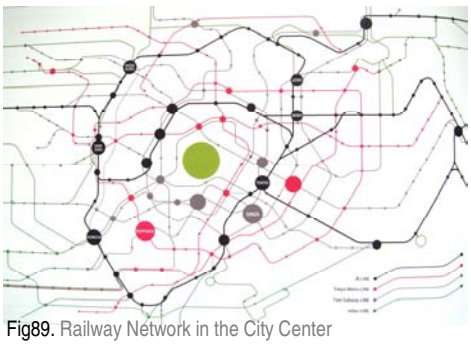


Fig89. Railway Network in the City Center

Almost all Yamanote Line Stations are connected to important urban centers in the city and it is fair to say that the development of the rail was the major factor for development of these areas. Each urban center built its own character and image and sometimes each center is recognized as having a special characteristic in the city: Kanda and its used book shops, Akihabara and the electronic town, Ueno's Park and its connection to the Shitamachi, and so on.

The city has an extremely high daytime working population in comparison to the low night time population in the city center. This in turn represents major influx of workers into the business districts in the city center. Seventy-Five percent of the commuters use the railroad or the subway and congestion at peak times is extremely high.

Tokyo faced after the World War II a serious residential shortage and in the 1950s the Government started issuing loans to promote the self building of homes by home-owners, and the construction of public managed housing. There was a boom in private housing and it grew to a count of 54 million, 15% larger than the number of total households. The cycles of residences in Japan are very short and in Tokyo the lifespan is of only 32 years, a fact which contributed for the constant mutation of the cityscape but that also is considered to be a major waste of resources. Nowadays the policies are being considered in order to increase the average life of buildings to keep the resource stock and invest in an environmental friendly city.

Concerning environmental issues, the atmosphere of the Tokyo Metropolitan Area was being polluted by both primary and secondary sources. After the 1960s the sulphur dioxide from the industrial sector was reduced steadily but the control of nitrous oxides and suspended particulate matter has not yet been successfully controlled and it represents a major challenge for the improvement of Tokyo's air quality.

Tokyo's temperature continues to increase and it is higher than other cities on the Kanto region. Some measures started to be applied, like planting rooftop greenery but its impact is still very small. The heat island effect is very common and rainstorms are heavy and concentrated.

Concerning Tokyo's green areas and farmland, a great percentage was transformed in residential areas after the High-Growth period of the late 60s. In 2004 the Tokyo Metropolitan Government initiated the "Green Tokyo Project", with actions that envision the increase of amount of greenery in parks, street side trees, and planting greenery on rooftops of newly built constructions. Although the differences are not yet very significant, it is fair to say that the increase of greenery is happening in residential areas that are former farmland areas.

Nowadays, the main issues concerning the formation of a continuous and sustainable city are the suppression of the uncontrolled sprawl and the regeneration of pre-existing city structures. Some areas designated by the government have been already tackled and private investors are trying to transform these areas into multifunctional hubs, in which residential, commercial and cultural uses come together. In the coastal areas, the airport constructions, port facilities and the improvement of the physical distribution system are being made in parallel with the construction of residential, commercial and leisure facilities in the waterfront. However, these are not yet visible and the focus on private redevelopment is suspicious and dangerous of creating areas disconnected both with the waterfront and the existing city.

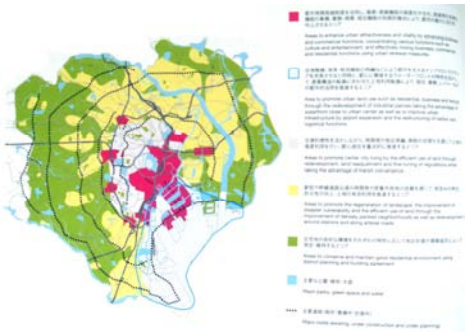


Fig90. Tokyo Masterplan of Development

But although efforts were and are being made, it seems like waterfront areas are still neglected and its real power as urban regeneration "fibers" not yet fully understood. When the city had its great economic boom, several projects concerning the city's master plan were envisioned and the Tokyo Bay was a major issue for architects at the time. These visions marked the architectural scene in the Bubble Economy period but reminiscences of that period still exist today and the waterfront can once again be included in the major planning of the city. Or not.

3.1.2. Urban Visions

The Tokyo Bay is characterized by one of the highest concentrations of mega-projects in Asia. This tradition can be traced back to the megastructural movement in the 1960s from which drew inspiration in planning and design. After the war it was said that the main problems of the Japanese city were caused by the generation of a "combination of inefficient laws, excessive land fragmentation into private plots, and the excessive economic power of big companies" (Noboru Kawazoe, Contemporary Japanese Architecture, 1968). To architects, the city appeared to be a growing gigantic mechanical structure of factories and transport arteries, surrounded by dense urban fabrics of compact residential buildings.

In the World Design Conference, held in Tokyo in 1960, among the many entries and design manifestos presented, were the proposals of six young professionals in a little book called "Metabolism" (among them Fumihiko Maki, Noriaki "Kisho" Kurokawa and Kiyonori Kiktake). Their proposals aroused great interest and represented a turning point for modern Japanese architecture. Addressing the theme of the modern technological city, many suggestions and considerations were and Tokyo was the stage for these proposals. They envisioned futuristic projects dealing with the city as a mirror of the transformations that had occurred in the society during the post-war period. They wanted to introduce into the urban fabric a new structural order based on an organic and balanced development by means of technological devices.

The projects proposed by the Metabolists, Tange or Isozaki posed for the first time in the Japanese architectural context the matter of comprehensive planning based on aesthetic principles Following the process introduced by Le Corbusier they conceived several scales of intervention, and gave high importance to visual factors contrasting the actual Japanese planning processes entrusted to bureaucrats and engineers.

The reclaimed lands across the shore of Tokyo became a central issue in the government's economic policy and its planning was urgent. In April 1958 the president of the Japan Housing Corporation, Kuro Kano proposed the land filling on the east Tokyo Bay to create residential and industrial areas, a pragmatic plan that caused much criticism but also must interest among architects and planners. Alternative projects were proposed and presented at the World Design Conference where the theme of floating cities as a solution for problems of housing and land shortage became extremely trendy.

In 1959 the city was chosen to host the Olympics and this result in a great economic and cultural growth in Japan. At the time, new visions were once again fostered to make Tokyo more beautiful and functional and utopian plans flourished. Infrastructures were built at the center of Tokyo and new expressways were laid over the old city canals and rivers. Projects such as "City in the Sky" by Arata isozaki marked the time as well as floating structures and high towers. Kenzo Tange and his famous plan for Tokyo 1960 continued the experiments for the reorganization of the city and exposed a proposal for a city of ten million people in a plan that rejected the conventional satellite-town systems. The plan announced the theme of large dimensions urban settlements and the megalopolis as the new key for the 20th century.

These plans became catalysts for further studies and they represented a new proud attitude of Japanese architects which inspired by their native culture and sensibility tried to combine their new hi-tech environment in their city visions.

Fig91. Metabolist Sketch, Kurokawa

Fig92. Tokyo Bay Plan 1960, Tange

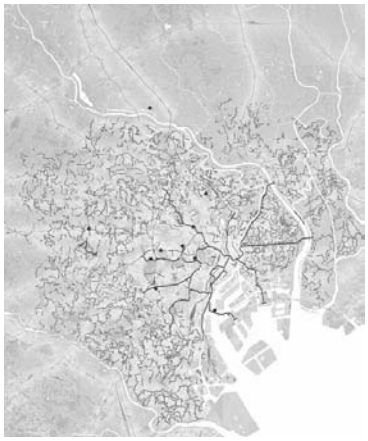


Fig93. Fibercity: Tokyo 2050

The waterfront was a popular subject among architects but their visions were not realized. The major example of waterfront redevelopment is probably the project of Minato Mirai 21, launched with the intention of dramatically transform the metropolitan area of Yokohama. The project goes back to 1981and nowadays it is representative of the city's environment and life quality.

Although bays or ports were major concerns when envisioning the future of Japanese cities, rivers and waterways were not so popular. One of the architects that included Tokyo's waterways in its vision for the city was Kisho Kurokawa with its Tokyo Plan 2025. He referred that when "stimulating the events that would occur if an earthquake on the scale of the Great Kanto Earthquake were to hit Tokyo again, there were only two ways to reduce the number of casualties – trees and water, in the form of forest and canals" (Each One a Hero, p265) In his plan he included existing canals and new ones as firebreak areas. He recalls that in the rescue efforts following the Great Earthquake in 1923, fire engines could reach fire sites but could not fight them because there was no water. "Had canals been kept or restored, water should have been available for firefighting and boats could also have been used for evacuation and rescue efforts. And in more tranquil times, residents could still appreciate the pleasant streets along their banks." (Each One a Hero, p268) . His plan and vision for the city is the first to include waterways as major factors for city redevelopment and safety.

Among urban visions for the city of Tokyo there is a last one that is having a great impact and projection nowadays- the Fibercity: Tokyo 2050 proposal.

Contrary to the great expansion of the 1960s, Tokyo and Japan are facing now a decreasing in population that will serve as the basis for the Fiber City Theory: the fact that cities are shrinking and have to tackle problems and adversities not faced until now. The name Fiber refers to "thread-like objects that in the context of urban space are used to describe structures that extend linearly or in tubular spaces." (JA no.63, p18) The author presents the fact that Japanese cities have a linear-type development contrary to a surface development present in other countries. Japanese cities evolved through waterways, roads and recently railway and highway structures providing with fiber-like spaces that have a special character. The author argues that Modernist urban planning was based in surface development, dynamics, separation, machine and inventing concepts. The Fibercity proposes for Tokyo a linear, fluid, exchangeable fabric, editing concept. The theory incorporates four strategies that together would engage in shrinkage-type urban development: Green Finger, Green Partition, Green Web and Urban Wrinkle. However, there is no strategy concerning waterways in the Fibercity theory, which leaves an open blank in order to be filled. Aspects of the theory are very much in agreement with aspects of waterway restoration and its inclusion in the city, as presented in the following chapters, such as the fact that waterways are linear spaces and directly

connected with the city's history and evolution, that as linear spaces have the characteristics of being editable in parts that can then be connected to each other and to the city, that in a shrinking city they represent opportunities for improvement of the city's quality of life and environment and that these are spaces that can have maximum results with minimum intervention, one of the biggest premises of Fibercity.

Following is a section concerned with Tokyo's waterways and its historical relevance in the city's evolution.

3.2. Tokyo's Waterways: History, Background and Evolution

In the Jomon Period[10], Tokyo as we know today was almost entirely submersed. Through the process of sedimentation land was gradually gained to the sea and Tokyo grew to the city we know today, with some artificial additions over Tokyo Bay.

At that time, the areas near the sea, and especially cape areas, were considered to be portals into the Other World, since Water was considered the Home of the Dead. For this reason, capes and areas on the shore were considered sacred and important points of worship for Gods and Spirits and people built shrines, temples and cemeteries, some of them still remaining today.

At the time, people started building small settlements along water areas, especially rivers that were abundant in the region. Kanda River and Zenpukuji River were at the time flowing in their magnitude towards the bay and along its banks and shores people made the first settlements. This close relation with the water formed not only the city we discuss nowadays but much of the spiritual culture of the natives that one way or another still keep in their collective memory some reminiscences of a city of water in which imaginary spirits, monsters and sacred creatures emerged from the depths of the water.

Water was the first reason for people to settle in Tokyo Bay and with time it grew to be the reason the city grew and became the giant metropolis we know today. This happened in Edo period, some people say the most prosperous era of Japan.

Fig94. Tokyo, Jomon Period

Edo saw the growth of the city in an unimaginable way and the canals were one of the strongest factors for this growth and prosperity.

In the 15th century, a small castle was built and subsequently expanded by Tokugawa Ieyasu who founded a later warrior government, the Tokugawa (or Edo) Shogunate, in 1603. Under his government and subsequent generations of Tokugawa leaders, the town grew to become what was at time the largest city in the world. The name of the city, Edo means "bay door" and it was chosen by the fact that the town was settle in the low wetlands where the Sumida River flowed into what is now Tokyo Bay.

The beginning of the construction of the town was the castle and its protection moats followed by the layout of subdivision plots for residents: warriors, clerics and townspeople.

The building of canals was especially important for the city since they were critical for moving building supplies and daily necessities. The first canal to be built was Dosanbori followed by the Onagi River to the east. Drinking water was a big problem in the city since it was very near the ocean. Most wells didn't provide fresh water and a waterway was run from Koishikawa Marsh in the northern section of the city which became the beginning of the Kanda Water System (Kanda Josui). A second system draw the water from Tameike Pond and thanks to the construction of these huge projects, Edo was able to accommodate a gradually growing population.

Fig95. Edo, 1602

Fig96. Edo, 1608

Fig97. Edo, 1632

Fig98. Edo, 1644

Fig99. Edo, 1670

The first part of the town to develop was the area along Dosanbori Canal. Subdivisions grew up on both sides of the canal such as Zaimokucho for lumber, Funecho for shipping or Yokkaichicho as a market. The upper part of the Sumida River, called Arakawa River was spanned by Senju Ohashi Bridge in 1954 followed by Rokugo Bridge over the Tama River in 1600 and Edo was growing into a great center of transportation network and a great urban center as well.

The economical expansion brought with it population growth and the city had to expand. The new scenario was for the city to expand in a spiral fashion, with Edo castle in the center and canals spiraling out from it clockwise. This plan was incorporated into the preexisting plan of five radiating great roads and this innovative solution made the city grow even more and become as large as it ultimately did. Works begun in 1603, after Ieyasu was appointed shogun to regularize the coastline of Edo harbor and build wharves in order to offload the stone and lumber required for the building project. Earth from Kandayama Hill was used to fill the shallows of the Hibiya Cove and at the same time to the east, a canal was dug through Suzaki to connect Dosanbori to Hirakawa River which was renamed Horikawa. The Nihombashi Bridge spanned this new waterway.

With the advent of a peaceful atmosphere Edo Castle had to adapt to a non-bellicose function. Projects started to the northeast, leveling part of Kandayama Hills and changing the course of Hirakawa River to connect it with Sumida River. This amazing feat of engineering was accomplished in 1620. The old outer canal became the inner canal and the new outer canal, named Kandagawa River included Koishikawa, Ochanomizu, Syjikaibashi and Asakusabashi. This new expansion increase the area of the castle and ended the flooding of the Hirakawa River.

The expansion of the city required an upgrade to the water system and the Aoyama system was built to enhance the new warrior districts. The expansion of the Koishikawa Canal was also done making it possible for boats to do from Edo harbor all the way to Ushigome which led to even more urbanization to the outskirts of the city.

The waterways were then a great asset for the economical and urban expansion of the city and without its constant upgrade it would not be possible for the city to continue its life of ever growing city. The townspeople were proud of their waterways and took particular pleasure in excursions to the Sumida levee to enjoy the cherry blossoms in spring, the evening cool in summer or the snow in winter. The water system was a main source of civic pride and all residents, warriors and townspeople alike paid for the privilege of using it with fees called water-money which then were used for maintenance and development.

Fig100. Nihombashi Bridge

Fig101. Ryogoku Bridge

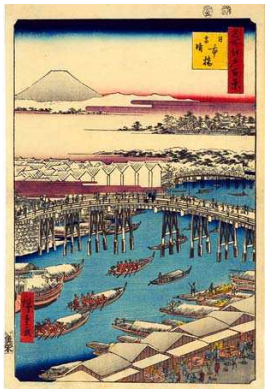


Fig102. Nihonbashi Bridge

With the end of Edo period and the initiation of the Meiji restoration, the role of Tokyo's waterways was condenmed to gradually disappear and be left to a secondary role. With the opening of the country to the west and the willingness in reforming japanese culture to reach "western standards" japan started a period in which major changes were done from 1868-1912 reaching the status of world power.

After this period and through the 20th century, Japan suffered dramatic changes and Tokyo was radically transformed as the way it used to be.

Fig103. Edobashi, Nihombashi area, 1872

Fig104. Nihonbashi Bridge, 1911

Fig105. Nihonbashi Bridge, 1933

Starting with the Meiji Restoration, the Great Earthquake of 1923 in which the city was greatly devastated to its reconstruction shortly after, to the bombings of the World war II which left the city down to nothing again, to its regeneration and turning into a major economical power in which the decade of 60s saw an economic resurgence comparable to a miracle in which Japan became a great economical "giant" the 20th century was the stage for the loss of Tokyo's waterways and its relegation to isolated, backyard spaces in the city. With Tokyo Olympics this was even more dramatic since the construction of infrastructures covered existing rivers and canals filing them of leaving them to be abandoned as sewer spaces under canals of movement- the elevated expressway. The waterways, which once were the proud of the city, which helped in its evolution, growth and expansion became leftover spaces in a city in which movement of people and goods turned faster and faster.

The situation continues nowadays with the existing rivers and canals still waiting for a restoration, a revival, to once again becoming a part of a city that would be nothing without them.

3.3. Waterfront Planning

3.3.1. Tokyo's Reconstruction Plan, 1933 Report

After the big Kanto earthquake, the city was immensely destroyed and plans for its recovery were held. Concerning the waterways, the Reconstruction Plans Report of 1933 expressed that the total of canals and rivers, which could be used for water transportation uses numbered 67 with more than 86.4 km length and an area of 4 297 520.65 m^2. Most of these canals and rivers required fundamental improvements and under the Reconstruction Program, carried out by the Home Affairs and 11 canals were to be improved. The construction works started in 1924 shortly after the Earthquake and the primary aim was to make these canals available for the navigation of vessels.

The canals which could not be used for transportation or drainage purposes were filled in, and the reclaimed land was used for roads, landing places or grounds for parks, and as land to be allotted under the land readjustment system. There were 12 canals filled in.

This report is important to understand the main issue concerning the Tokyo's waterways at the time: their function as transportation canals was the main focus and they were not considered as an amenity for the city's quality. The time was characterized by the devastation and destruction of the city and pragmatic solutions were held, destroying many of the old canals. This situation was not isolated to the period of reconstruction, but also in the following decades where canals were gradually covered for gaining land

purposes or to construct infrastructures important for the city, as was the case of the coverage of rivers during the preparation works for the Olympic Games in the 60s. Only in the 80s did government authorities start to have a different attitude concerning rivers and waterways.

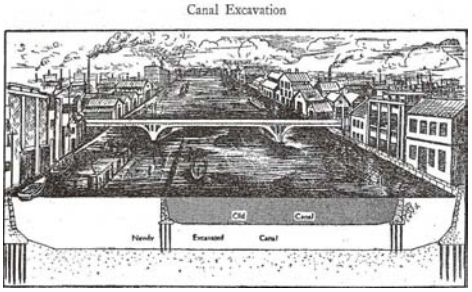


Fig106. Typical Section for Reconstruction

Fig107. Ochanomizu Before Reconstruction

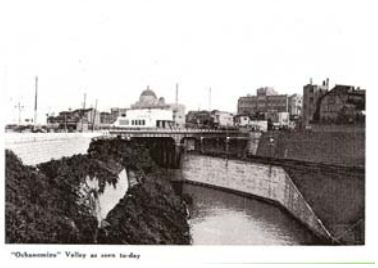


Fig108. Ochanomizu After Reconstruction

3.3.2. Tokyo's 2nd Long Term Plan 1987

Tokyo's second long term plan of 1987 had a different attitude concerning the waterway system. It included an interest in its cultural and urban potential but still concentrated its focus on safety measures. Among its proposals were such as:

■ The promotion of Comprehensive Flood Control Measures – river wall protections, regulator ponds and diversion channels;

■ Flood Control Projects respecting Waterside Recreation – maintain the landscape and function of rivers and beaches as a natural environment. Provide greenery and adopt moderate inclined riverbanks and sea embankments – construct promenades and create other facilities to give citizens occasions to enjoy the waterfront.

■ Developing excellent and harmonious Cityscape – develop cultural designs giving symbolic images to regional public facilities, help to create an attractive cityscape by making the most of topographical features such as cliffs, lakes and rivers, on which most of the city's attractive views are based, etc.

■ Renovation of Famous Bridges – over the Sumida River and other rivers familiar to citizens – 60 bridges were to be renovated.

The decade of 80s saw a resurgence on the role of natural features in the city and its position as cultural assets. At the same time pollution control measures and the cleaning of rivers and waterways was a major issue, concerning the pollution left by a century dedicated to industrial and urban expansion.

3.3.3. Environmental White Plan 2006

The 21st century saw a boom in issues such as urban sustainability and eco-friendly cities, and in Tokyo the situation is not different. It is proved that Tokyo's temperature has increased by about 3ºC over the past 100 ears and the city is warming at a pace far exceeding the global main temperature increase of 0.6ºC.

This is not only due to global warming but also to the heat island phenomenon. Causes for this trend can be summarized as follows: an increase in energy consumption due to urban activities and artificiality of ground coating. Countermeasures to mitigate these causes include control of energy consumption that entails exhaust hear by utilizing efficient air-conditioners, greening of rooftops/walls, and covering the ground and building surfaces with materials that retain water or do not accumulate heat. At the urban level the maintenance and increasing of green and water areas in the city can be a major strategy to tackle this too.

Concerning the quality of rivers in urban Tokyo it is expected to continue to improve. There are about 120 rivers flowing through Tokyo and the quality of the water deteriorated significantly during the period of economic expansion. But since the early 70s thanks to the control of sources such as factories, and improvements to the sewage system, many of these spaces have now much more clean water preparing them to be used by citizens as an urban recreation area.

This paper focuses on the importance of waterways as a natural asset that can be used to improve the city's environment helping to improve at the same time the city's life quality.

3.3.4. Tokyo Government Priorities 2007

The Tokyo Metropolitan Government also provides with some issues in its strategic plan concerning the future of the city's waterways.

In principal Policy 7 "Tokyo's Initiatives to Open the Future of Japan" in Priority Project 5 it is proposed to create an attractive and elegant cityscape. In addition to regulations and incentives for urban landscaping, comprehensive landscape policies dealing with the development of roads and waterfronts, cultural and tourist sites and other locations will be implemented with the aim to revitalize Tokyo as the attractive and elegant capital of Japan and as a city that also has a view toward hosting the Olympics. Developing pleasant roads and waterfront spaces and enhancing the attractiveness of cultural and tourist sites is a major issue.

Priority Project 7 proposes to promote the allure of Tokyo, the waterfront areas of Tokyo such as rivers and harbors which should be turned into attractive urban spaces. Project's are expected for the revitalization of Tokyo as a city of water: studies should begin on new water transport networks and centers of vitality on the waterfront. In the Sumida River are expected the improvement of existing promenades and the incorporation of more barrier-free features that should promote regional tourism and communities.

Among with other policies, it is visible the shift concerning the waterfront. Once again Tokyo is betting in hosting the Olympic games with the strong conviction that it can bring a second renewal to the city. One in which infrastructures are not made for machines like the case in the 60s but one in which waterways, green areas, tourism and the creation of a cosmopolitan, international environment can bring reasons for Japanese pride.

3.4. The Importance of Rivers and Canals

So, why are waterway's and rivers important for the city of Tokyo and what is their role in the urban realities nowadays?

Tokyo tops the world city lists. Within its 2187km^2 it houses some 12 500 000 inhabitants and it is a major international financial center with the largest Stock market in the world. These criteria puts the city at the top of World cities but where would the city be in the ranking of world cities, if the criteria, besides economy, included ecological and social quality? Some calculation of ecological footprints of World Cities shows that everyday life in Tokyo demands between 1.2 and 3.6 times the area of whole Japan. The debate of world cities should include broader processes than the ones of economic flow and capital and nowadays with the urgent problems of global warming and urban pollution or over-consumption, cities have to reframe their policies and their attitudes towards a more balanced, sustained development.

Cities need new agendas, new theories and new practices and urbanism deals with not only statistics and physically measurable factors but also with the immeasurable: cultures which are unique, messy, complicated and difficult to express in urban design theories or designs. Cities which take in consideration these factors and try to overcome its need for global mediatization or economic recognition are cities that work for their citizens for their culture and for their environment. Otherwise they are nothing but consumption machines, banal expressions of capitalism and Tokyo is one of the world cities that needs a radical reappraisal of its own urbanity.

As referred in previous chapter, in 1700, Edo't streets were bustling in theatres, bookstores and the canals were built to both carry goods and expres local pride. The city thrived among its unique cultural framework coming from patterns of specific local ettiquete resulting in a different urbanity characteristically Japanese.

The city was a center of vibrant publishing activity and its inhabitants had an urge for fun which was even kept secret from foreign visitors, like something decidedly Japanese that should be kept and maintained for local pleasure only.

Waterways represent to Tokyo one of the lost links with the past of the city. They represent a lost contact with nature and a lifestyle far away from the one we testify nowadays. They include in their character possibilities beyond the ones that are currently being explored and considering their importance in shaping the city as it is today, they can represent also the future of Tokyo in a world where competition between cities is facing a new paradigm and where sustainable development is being chosen in detriment of pure economic growth.

The fact that waterways represent a typology of linear development typical to Japanese urban development and expansion, reinforces their power as connectors to Japanese culture and Tokyo's past as a city. Their editable linearity represents a type of urban assets that can be edited, transformed and improved in order to serve as connectors, of "fibers" in the city.

The fact that waterways are spaces in which the natural and the artificial world come together provides them with a hybrid character in which a new kind of symbiosis can be achieved. They represent boundaries in the city but they also represent a kind of intermediate space in which several urban activities are possible. They incorporate in their history, physical characteristics and lost charm realities that can serve as a basis for the regeneration of urban Tokyo in the 21st century as a city living in harmony with its natural environment and its past. A city that can become proud again for recovering its heritage and for providing its inhabitants and its visitors with a great reason to live and visit Tokyo.

For the reasons stated above, and for the ones that will continuously appear on this study, waterways can be considered as one of Tokyo's major resources in which to base its future urban redevelopment.

Chapter 4: Tokyo's Waterways

Water is the great connector and coordinator.

Garrett Eckbo (1990)

After the previous chapter where it was confirmed that waterways have a crucial importance for the city and metropolis of Tokyo this chapter focuses in the field work elaborated in the course of this research, its analysis and conclusions. This constitutes a decisive chapter forming the basis for the fifth and sixth chapters.

The first part describes the methodology followed and the types of collected data. It presents information concerning the rivers studied on an individual basis as well as information concerning a general basis at a city scale level.

A second part focuses on an individual river classification and short "character" analysis in which each waterways or waterway group is classified according to its uniqueness and analyzed take in consideration its urban context.

Finally, conclusions based on the field work and river analysis are presented forming a general image of how waterways function in Tokyo, how they look like, what are their problems and potentialities.

4.1. Field Work Analysis

4.1.1. Methodology

The methodology concerning the selection, observation and analysis of Tokyo's waterways was mainly resolved by Field Work observations. The field work started in January of 2007 and had the duration of approximately five months finishing in May of 2007. Although this period's visits and observations were the most important for the work presented, punctual visits occurred when necessary through the years of 2006 and 2007.

The selection of the studied waterways was based on their character as linear spaces in urban Tokyo. For this reason, bigger waterways like Arakawa river or Tama river were not included, since their size, scale and urban integration were not in accordance with the interest of this study. The waterways selected included the Kiba canals, Furukawa, Shibuya, Kanda, Kitajukken, Komatsu, Meguro, Myoshoji, Nihombashi, Onagi, Ooyoko, Sendaihori, Shakujii, Sumida, Yokojukken and Zenppukuji rivers, the Imperial and Outer moats and Shinagawa area waterways. Some of these waterways were observed in all their length, and some others were only observed partially. This can be explained by the fact that some waterways extend themselves way out of Tokyo's urban center to the suburbs, and those areas were not the fundamental part of this study.

Field work observations were done by walking along the waterways, taking pictures from every existing walkable bridge and taking personal notes about the character and image of the waterway. The pictures taken can form a sequential view of each river providing with a clear image and general trend for each of these spaces (see subchapter 4.1.2). The notes taken were used for the individual analysis of each waterway presented in subchapter 4.2.

Adding to these field observations, a more technical approach to each waterway was also effectuated (4.1.3), in which real maps were observed and designed to show the shape, studied area and river scale of each waterway. To these maps, zoning typologies were added in order to provide a more technical "picture" of how these spaces should look like in reality and how they should be approached when creating interventions in them.

4.1.2. Picture Gallery

The following pages present some of the serial pictures taken in each waterway studied during field work observation.

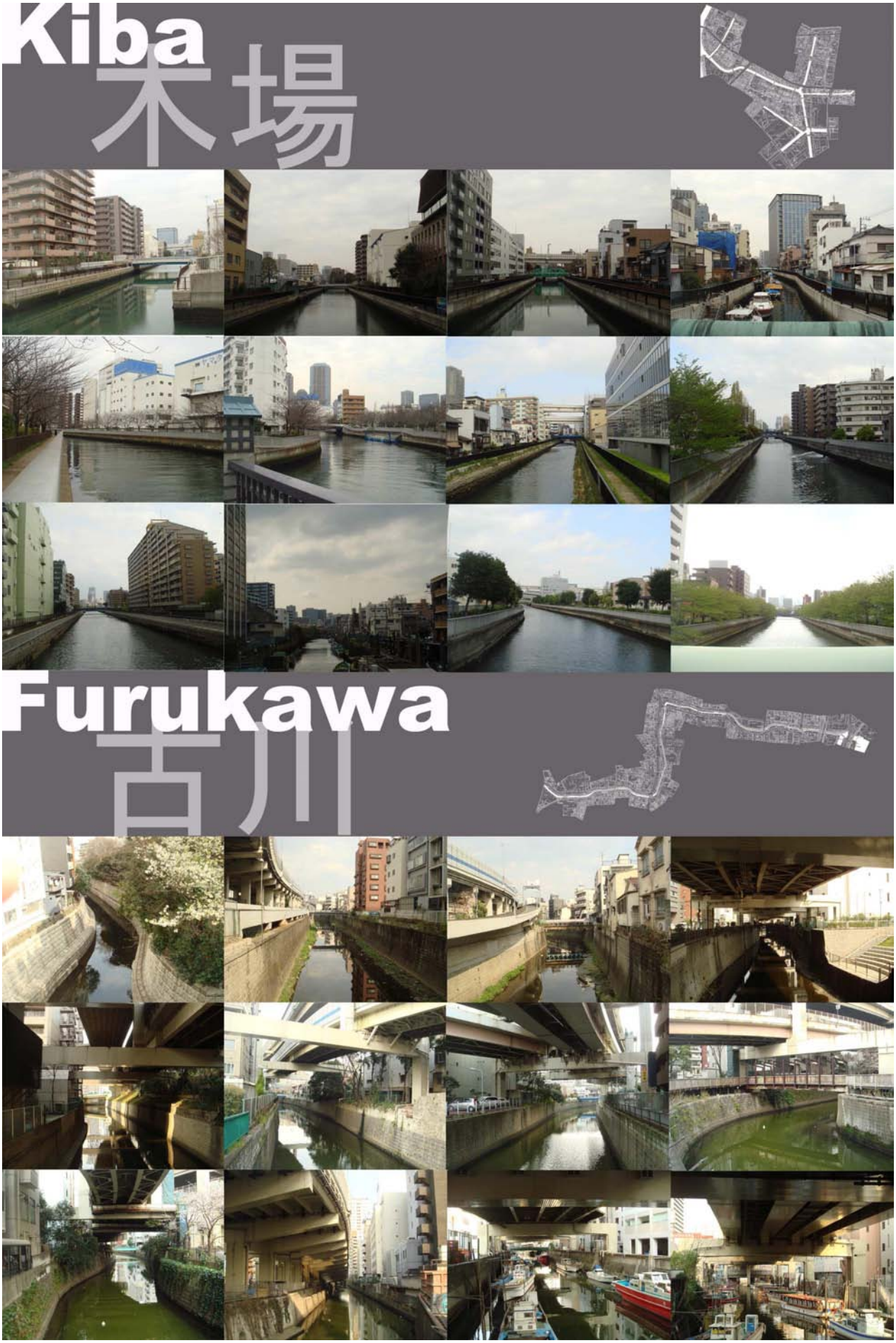


Fig109. Kiba and Furukawa Images

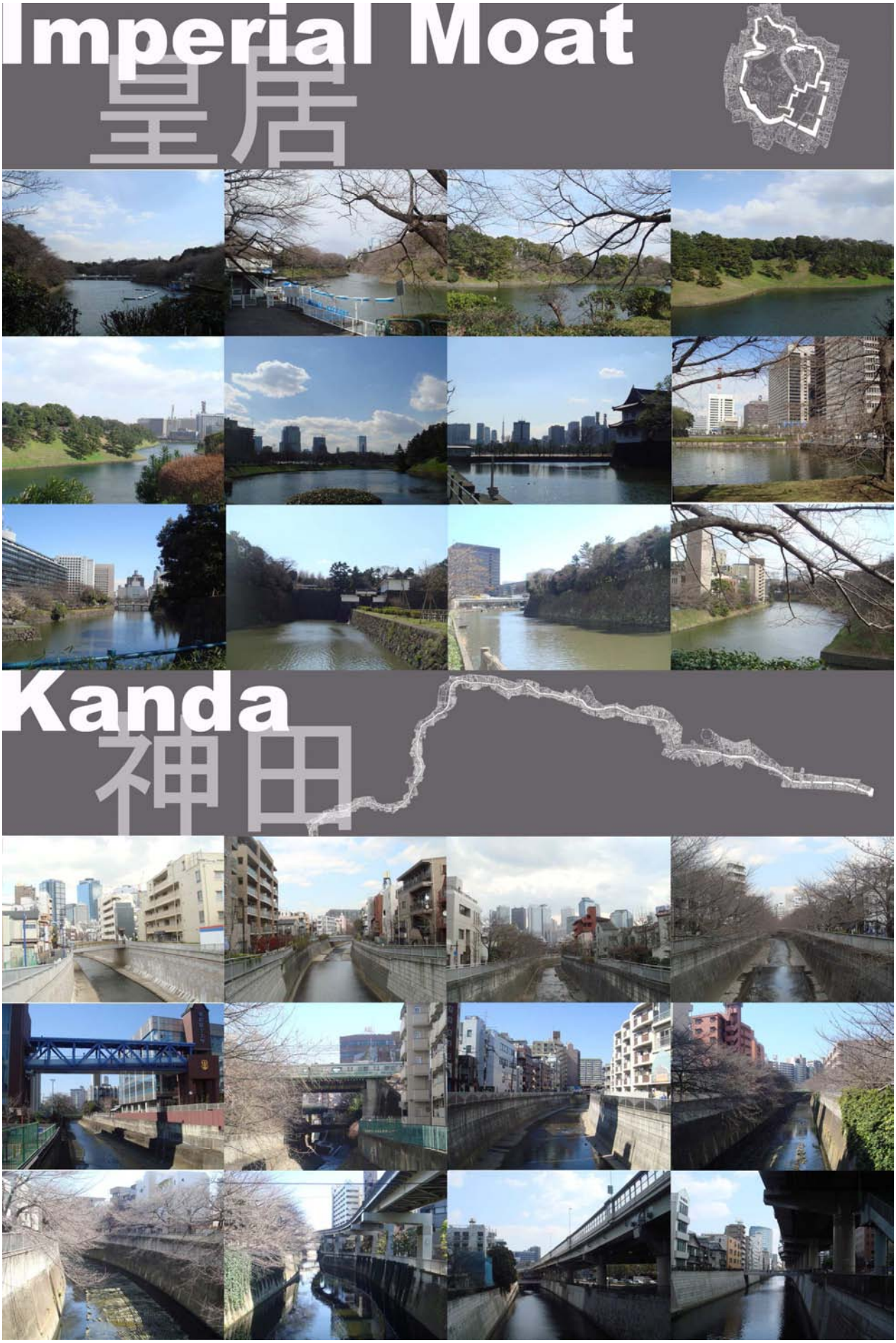


Fig110. Imperial Moats and Kanda Images

Fig111. Kanda, Kitajukken and Komatsu Images

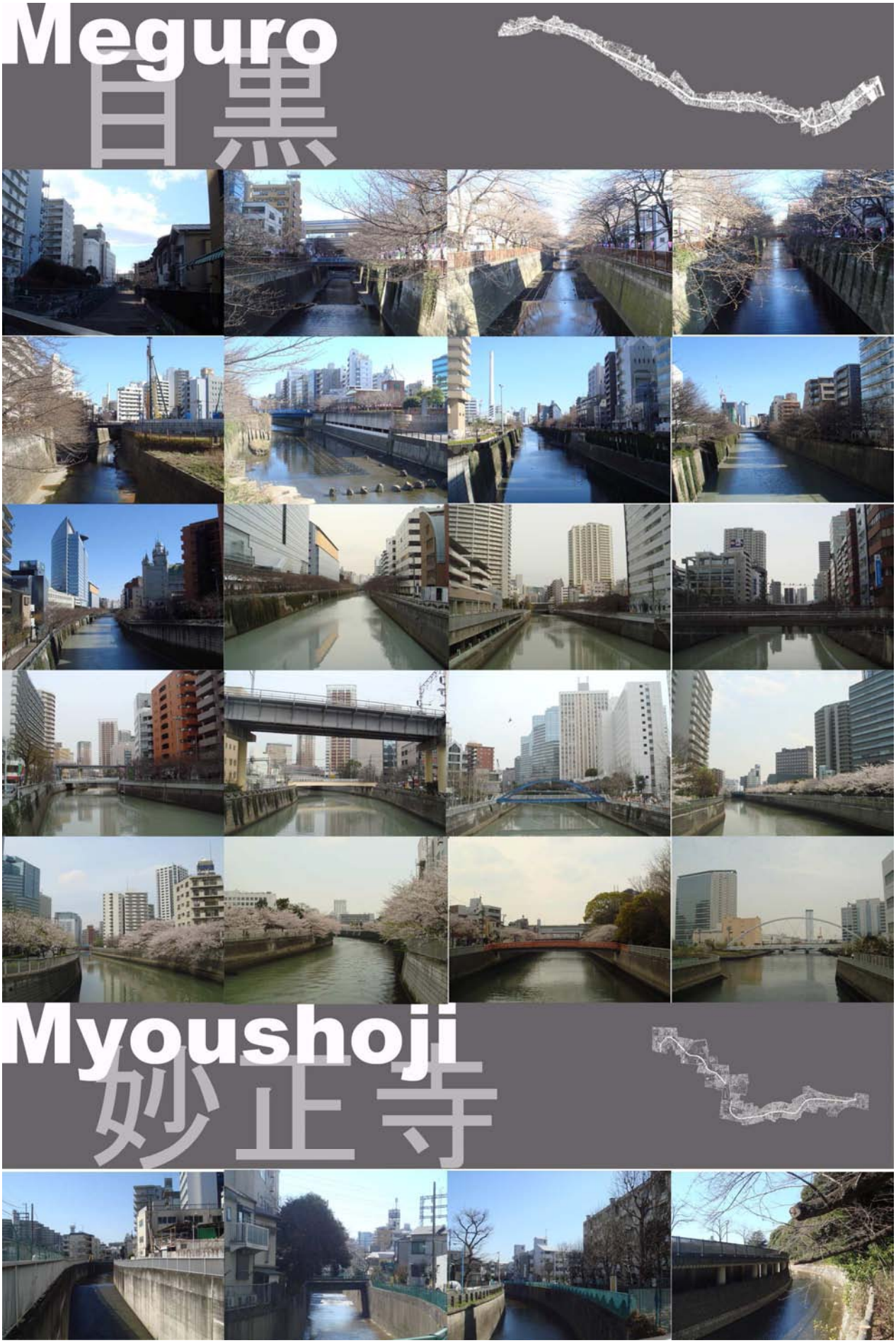


Fig112. Meguro and Myoshoji Images

Fig113. Nihombashi, Onagi and Ooyoko Images

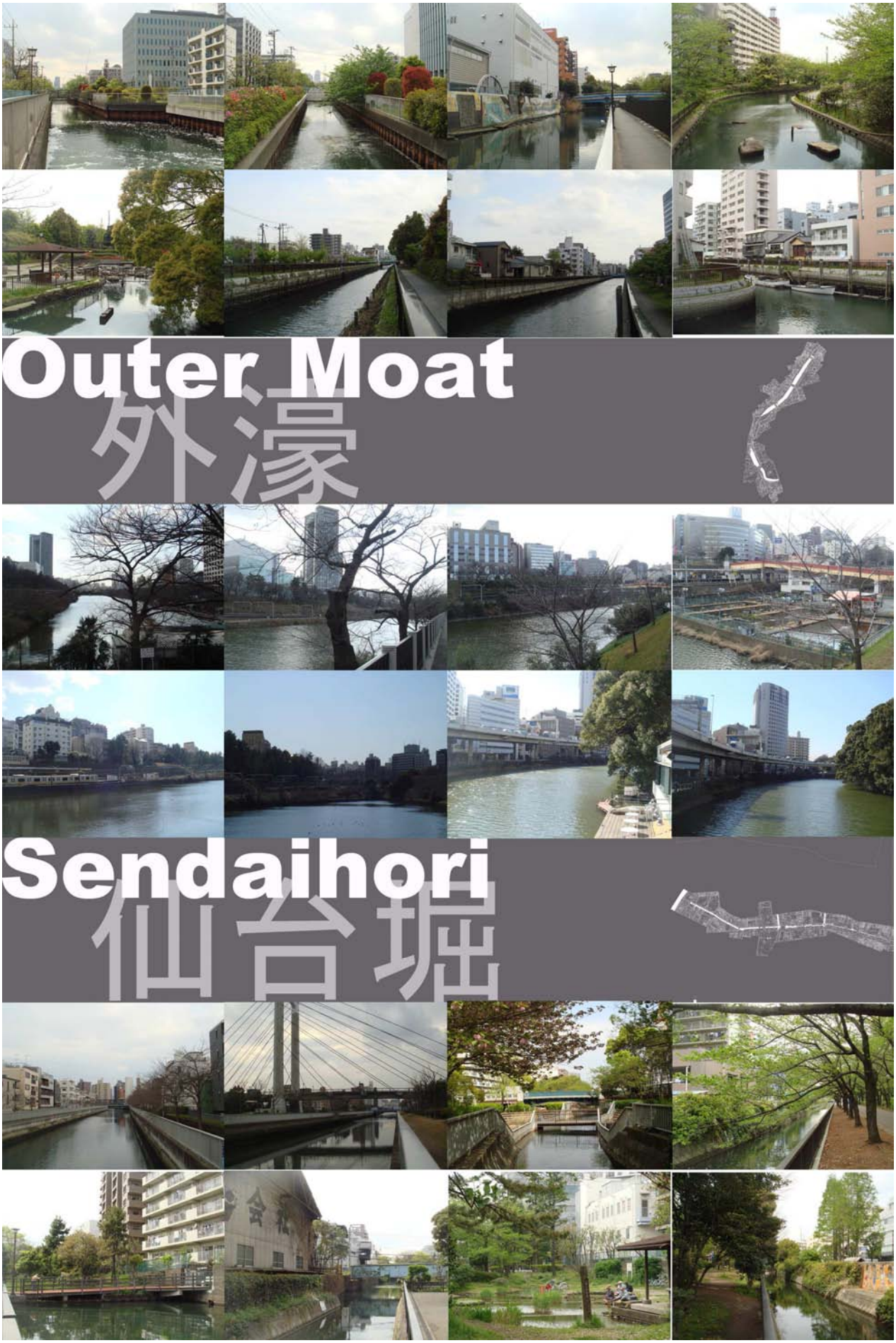


Fig114. Ooyoko, Outer Moats and Sendaihori Images

Fig115. Shakujii and Shibuya Images

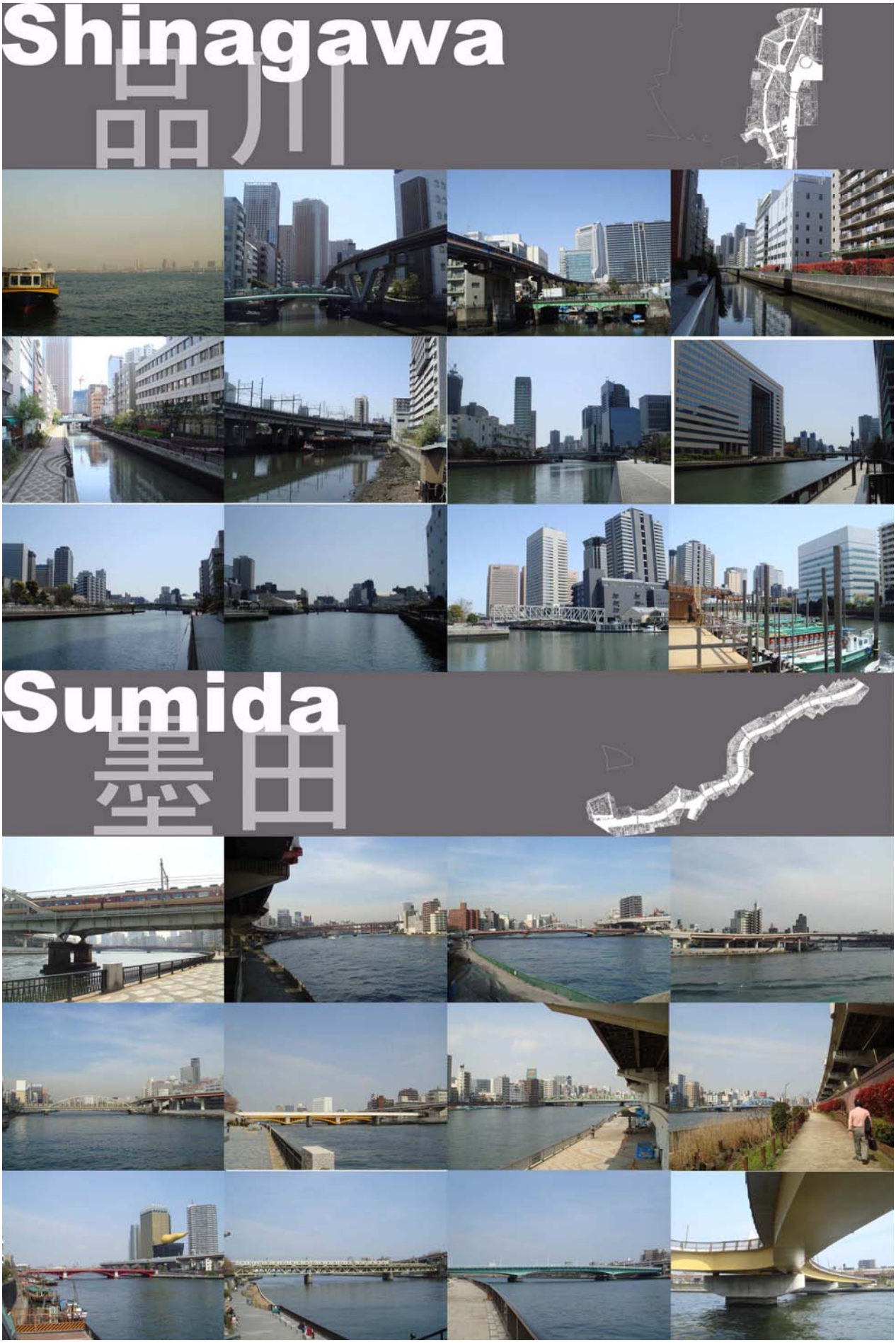


Fig116. Shinagawa and Sumida Images

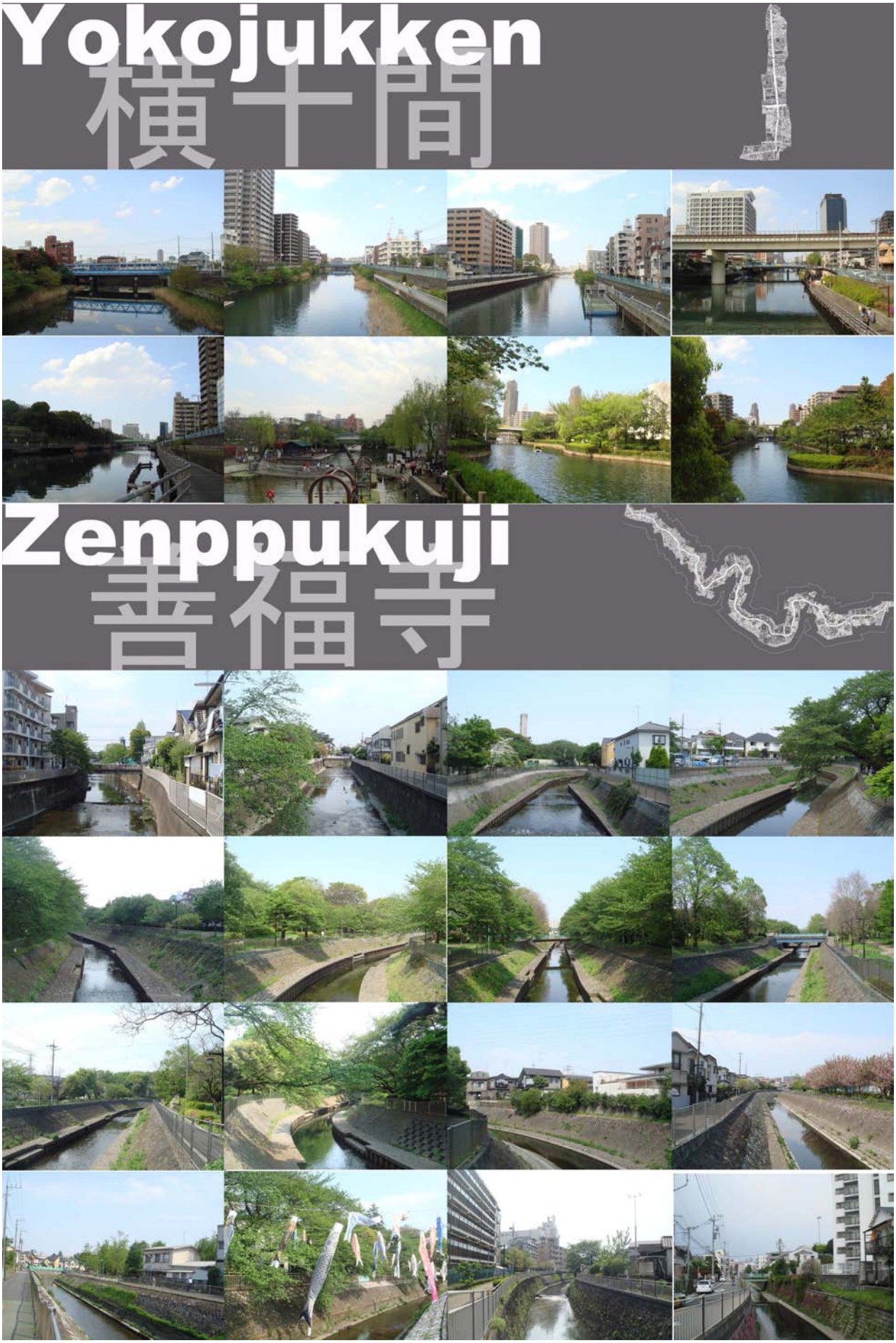


Fig117. Yokojukken and Zenppukuji Images

4.1.3 River Mapping

After field work observations, maps of each river were elaborated, showing the riverbank and its urban surrounding areas, as well as a simple zoning, based on the observations around the areas.

The zoning had the purpose of providing "flat", direct characterization of the areas around each waterway, in order to understand its character and role in the city.

There were designated six zoning typologies:

- Suburban areas: Areas in which building heights have in average three floors and in which urban activity density is small. These areas predominant functions are residential and small community support facilities.
- Urban Park: Green areas like parks or gardens were designated in this category. Buildings are practically null except for park supporting infrastructure volumes;
- Urban Residential Areas: Areas in which the residential function is predominant, but urban activities density is higher: building heights can reach about six floors and the predominant function is still residential, but activities such as convenience stores, small shops and restaurants can be found. These areas have usually also schools, day care centers, hospitals or parks in their nearby vicinity;
- Urban Areas: Areas in which there is a clear mix of function and a certain amount of activities which are considered urban: office, commercial, small industrial, facilities, residential, etc.
- Urban Dense Areas: Areas in which building density is very high and in which the predominant activities are office and commerce. Often these areas are close to major train stations and present important clusters in the city. Green areas and open spaces are not so often, although they may appear in the vicinity;

All maps present a legend with the zoning distinctions, and proper orientation. In addition each map has a delimitated area which will serve as the basis map for subchapter 5.2's Conceptual Guidelines Application Examples. These areas were chosen according to its classic pattern in the river in question.

All maps are presented in the Annex section in the final part of this study.

4.1.4 River Network

After the collection of picture data, map data, and so on, it was possible to unify the studied areas into the city of Tokyo's map. In this map, analyzed rivers were depicted together with their most distinguishing images. In addition Tokyo's major urban centers were represented in order to understand not only the general picture of Tokyo's waterways but also how they relate or not with each other and how they relate or not with each important urban center.

It is possible to see in Fig. 118 that Tokyo, contrary to common knowledge, has still a great part of its rivers intact, and it is possible to understand that most waterways are "attached" to a major urban center. For example Shakujii river and Ikebukuro, Kanda river and Shinjuku and Akihabara, among others.

Although this proximity is visible in this general map, its is not possible to comprehend its real connection. This will be explained thoroughly in the river individual analysis and in the following chapter.

Another important assessment from this map is that rivers and urban centers form a species of network. An "unfinished" network, since there are many disconnections but a network with the potential to become one of the city's great assets.

Communication linear spaces in the city are fundamental: roads, sidewalks, highways, and so forth, and there is no city planning without traffic assessment, and road planning. However, there is the common idea that roads, highways and traffic "canals" are

polluted, dirty spaces: a necessary evil to the city. If waterways are though in this network perspective, and following the previous way of thinking, they could function as the counterbalance of these “fast networks”.

Contrary to these “fast” traffic canals in which carbon dioxide emissions and polluting gases are being expelled, waterways could be seen as “slow” traffic canals, in which people and nature come together and oxygen is produced.

Tokyo’s water network should be seen in this perspective, like a great natural asset in the city that properly managed and designed can provide for a counterbalance for all the dense, city-like spaces that characterize Tokyo.

So a reinforcement in these areas design, management, protection and its right connection to each other, and to Tokyo’s major urban centers could provide for a major urban regeneration plan for the city, for the next 50 to 100 years.

Fig118. Central Tokyo Waterway and River Network

4.2. River Individual Characterization

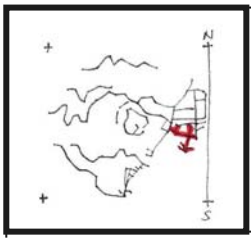
This subchapter presents data and analysis of each waterway individually and its goal is to provide a clear image of each waterway while at the same time formulates a basic SWOT analysis (Strengths, Weaknesses, Opportunities, Threats). Each Waterway is presented with the names of their different canals (when existing), length studied, average section width and water depth, type of topography, number of bridges, major stations and a first Image based on sensorial field work.

A second Image is provided according to several patterns existing in the city based on the Kevin Lynch idea of the elements that constitute a city: Paths (roads, rivers, linear spaces, etc.), Edges (barriers, boundaries, etc), Districts (recognizable urban centers or character areas), Nodes (crossings, etc) and Landmarks (urban elements that by their size, history or importance are distinguishable in the urban tissue).

Ilustrative drawings are presented for each river with their main features, sections or characteristics important to mention. These river illustration are at times acompannied with smaller sketches representing peculiarities such as typical sections or urban tissue particular disconection.

For each subchapter it is possible to consult their respective Plans in the Annex section.

4.2.1. Kiba Canals



Names: Ootori, Ooyoko, Nishisasae, Hirahisa Rivers & Shiohama canal

Lenght Studied: 5.5 Km

Width: 20~35 meters

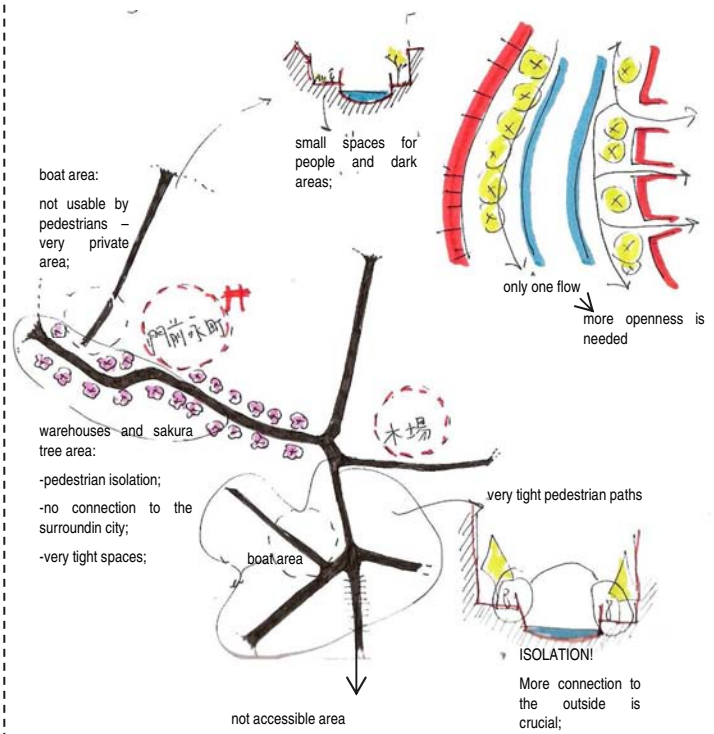
Nr of Bridges: 26

Topography: Flat

Major Stations: Monzennakacho, Kiba

Water Depth: Medium

Image: Residential Area with a seasonal character due to the presence of Cherry Blossom Trees but the City is turning its "back" to the River



K. Lynch Image:

Paths: The waterways and small sidewalks;

Edges: Fencing, Trees and Buildings;

Districts: Kiba and Monzen Nakachou Areas;

Nodes: not particularly of reference;

Landmarks: Sakura Trees, Industrial Buildings;

SWOT:

Strengths: Sakura Trees and its seasonal character;

Weaknesses: Old character of the river area is not reflected nowadays;

Complete disconnection with the surrounding city;

Trees are extensively planted in some areas blocking visual and physical continuity;

Pedestrian Spaces are hidden and not attractive;

Lack of activity near increases isolation;

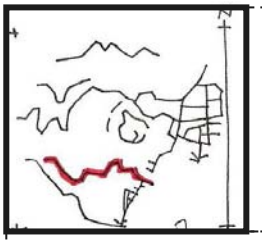
Opportunities: Industrial areas can serve as future redevelopment areas for the river;

History of the area can become a reason for the development of the river areas;

Threats: Land speculation & Public disinterest; Aging population & consequential loss of energy;

Fig119. Kiba Area Analysis Sketches

4.2.2. Furukawa & Shibuya Rivers



Names: Shibuya and Furukawa Rivers

Lenght Studied: 8.8 Km

Width: 10~30 meters

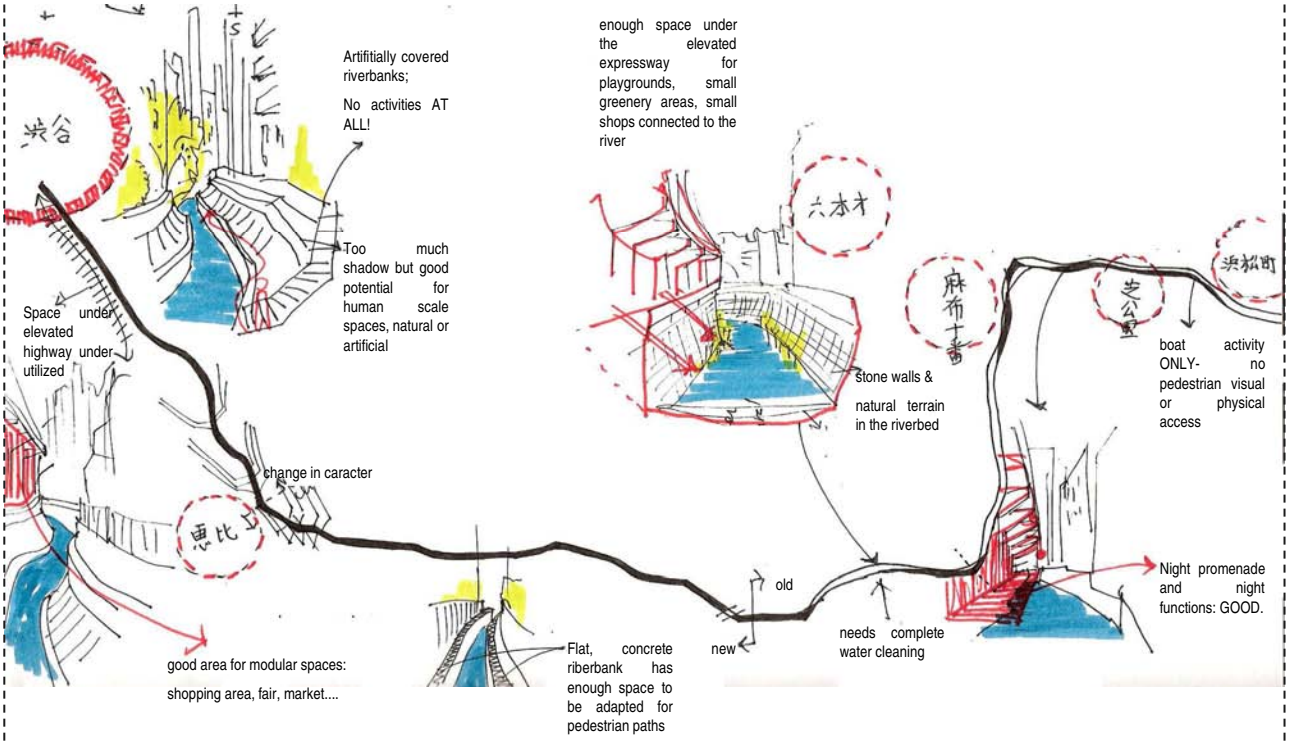
Nr of Bridges: 32

Topography: Flat

Major Stations: Shibuya, AzabuJuuban, ShibaKouen, Hamamatsucho, Ebisu

Water Depth: Very Shallow ~ Very Deep

Image: Abandoned, dirty, backyards area. Strong contrast between natural and artificial elements. Functions as a seaside connector and contains interesting small spaces;



SWOT:

Strengths: Closeness to the Sea strong urban centers and residential areas: Multifunctional Character;

Weaknesses: To be seen as a backyard sewerage area;

Blockage from buildings along the banks;

Opportunities: the fact that it crosses Tokyo's center into the sea can become a factor of connectivity in the city;

It's history and old connections to Shinjuku area;

It's urbanity;

Threats: Land speculation, Non Governmental Public Interest;

K. Lynch Image:

Paths: Concrete or Stone Walls, Buildings, the Waterway the Elevated Expressway;

Edges: Buildings and Topography;

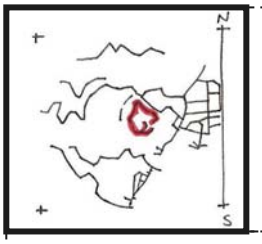
Districts: Shibuya, Ebisu, Azabu, Hamamatsu and Shiba areas;

Nodes: Bridges, Azabu Crossing and Square;

Landmarks: Shibuya district, Hinode Pier;

Fig120. Shibuya and Furukawa Rivers Analysis Sketches

4.2.3. Imperial Moats



Names: Imperial Palace Surrounding Moats

Lenght Studied: 7.2 Km

Width: 50~100 meters

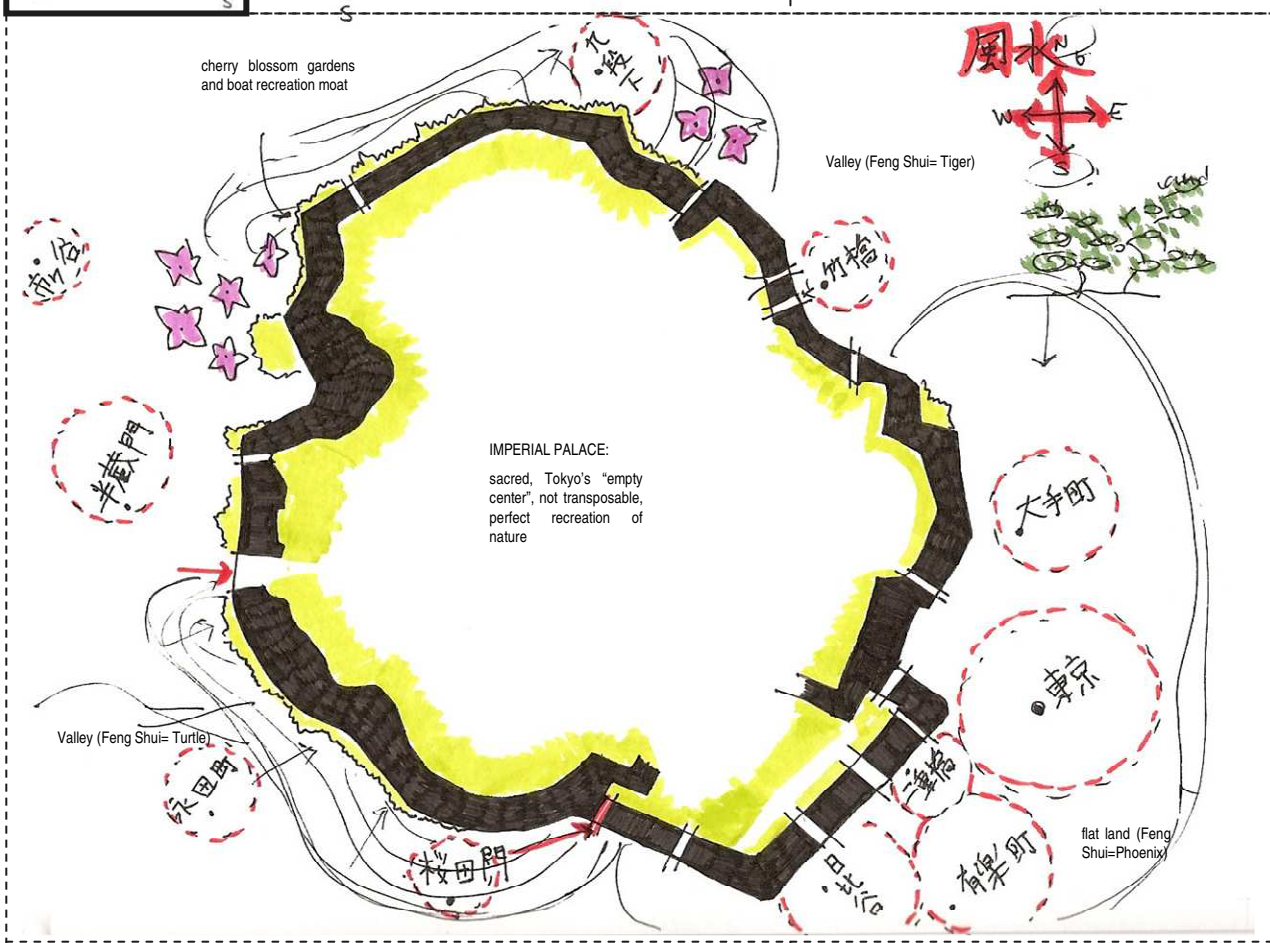
Nr of Bridges: 14

Topography: Hilly

Major Stations: Hibiya, Tokyo, Yurakucho, Sakuradamon, Hanzoumon, Otemachi, Takebashi & Kudanshita

Water Depth: Deep

Image: Majestic, clean, green, untouchable historical place.



SWOT:

Strengths: The water "protects" the imperial palace and beautifies its "island";

Spaces are well maintained and clean;

The topography is used to increase the visual impact of the visitors when aproaching the palace area;

Weaknesses: Closeness;

Opportunities: As a tourism area it keeps its image and good maintenance;

Threats: no major threats;

K. Lynch Image:

Paths: Public Promenades along the canals;

Edges: Imperial walls, topography;

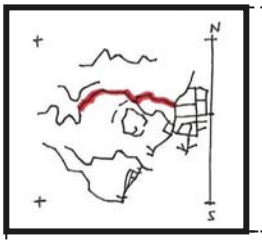
Districts: Imperial Palace, Tokyo, Hibiya, Kudanshita;

Nodes: Bridges and Palace Garden entrances;

Landmarks: Imperial Palace Gardens, Bridges, Highrise districts;

Fig121. Imperial Moat Analysis Sketches

4.2.4. Kanda River



Names: Kanda river

Lenght Studied: 14 Km

Width: 10~35 meters

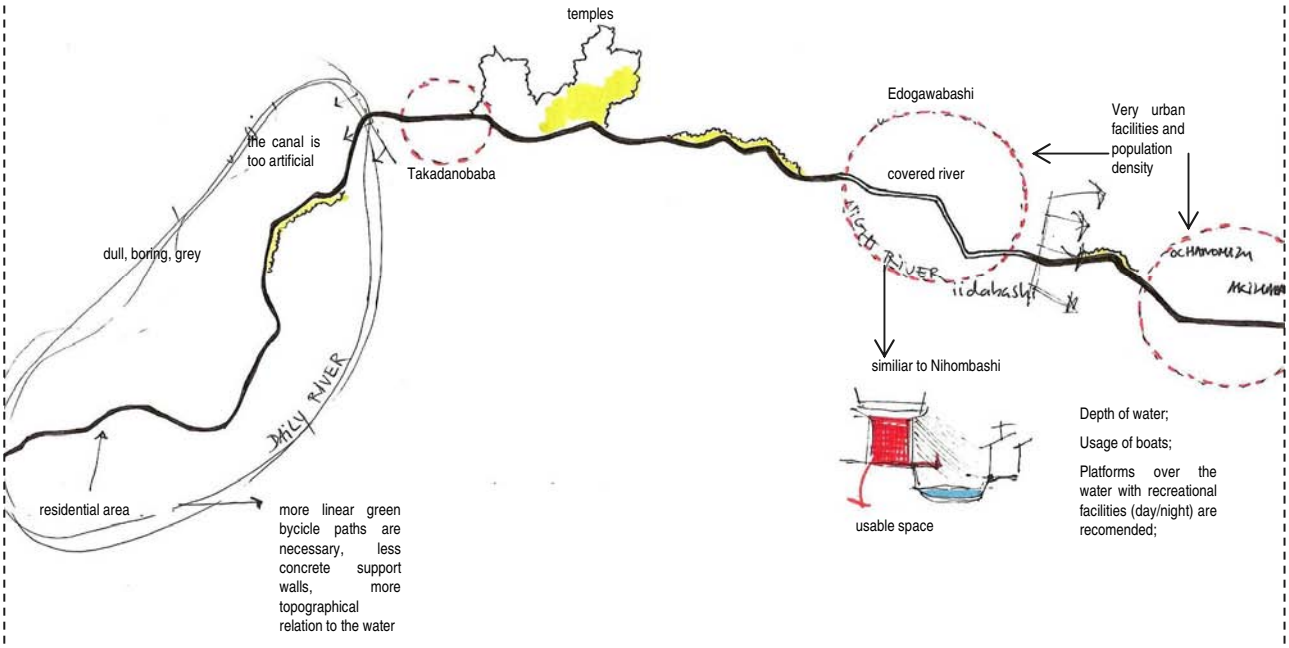
Nr of Bridges: 84

Topography: Hilly

Major Stations: Nakano Shimbashi, Higashi nakano, Takadanobaba, Edogawabashi, Iidabashi, Suidobashi, Ochanomizu, Akihabara, Asakusabashi, Ningyoumachi

Water Depth: Shallow ~ Deep

Image: Urban and suburban contrast is visible in a very diversified, densely occupied river.



SWOT:

Strengths: Diverse landscape and interesting serial view;

Historical strenght;

Weaknesses: Artificiality;

Opportunities: to create pedestrian and bicycle paths along the river and connecting other centers nearby;

The creation of Strategical Linear Parks;

Threats: Lack of interest and Urban Speculation;

K. Lynch Image:

Paths: River, Linear Parks, Elevated Expressway;

Edges: Fences, Walls, Topography;

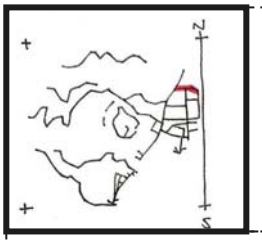
Districts: Ningyoumachi, Akihabara, Ochanomizu, Waseda areas;

Nodes: Bridges, Train Stations;

Landmarks: Bridges, University areas, Ochanomizu Valley Elevated Expressway;

Fig122. Kanda River Analysis Sketches

4.2.5. Kitajukken River



Names: Kitajukken River

Lenght Studied: 3.2 Km

Width: 20~25 meters

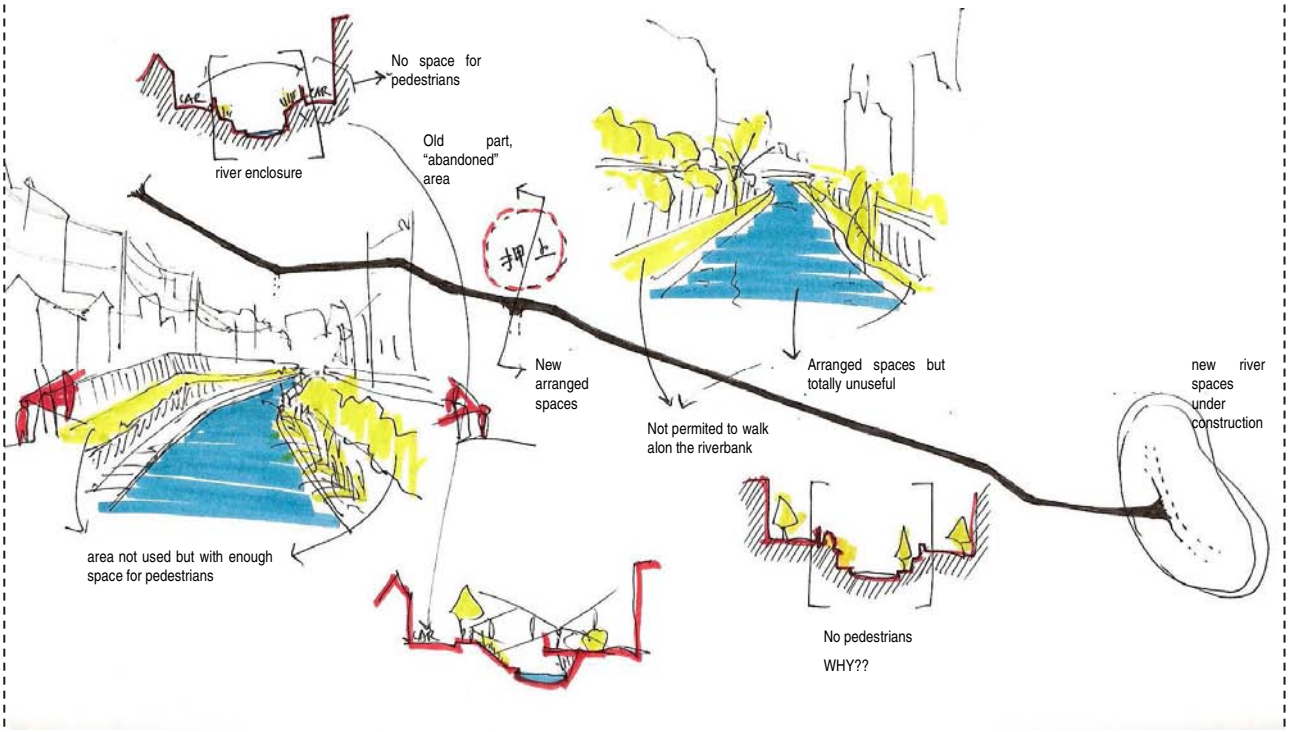
Nr of Bridges: 14

Topography: Flat

Major Stations: Oshiage, Honjo Azumabashi

Water Depth: Medium

Image: Old, abandoned, lacking character residential waterway;



SWOT:

Strengths: Some maintenance is visible near suburban areas;

Weaknesses: Its connection with the Sumida River is very poor;

It is ugly and dirty in some parts, still functioning as a city "backyard";

Opportunities: Luminosity, Greenery and River Depth;

Residential areas around the river can take advantage of it to create familiar spaces in which natural elements are used in a daily life basis;

Threats: To remain the same;

K. Lynch Image:

Paths: Roads, The Waterway, The River Bank, Walls and Fences;

Edges: Fencing and Greenery;

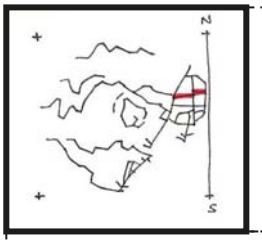
Districts: Oshiage;

Nodes: not significant;

Landmarks: not significant;

Fig123. Kitajukken River Analysis Sketches

4.2.6. Komatsu River



Names: Komatsu, Tatekawa River

Lenght Studied: 2.5 Km

Width: 30~40 meters

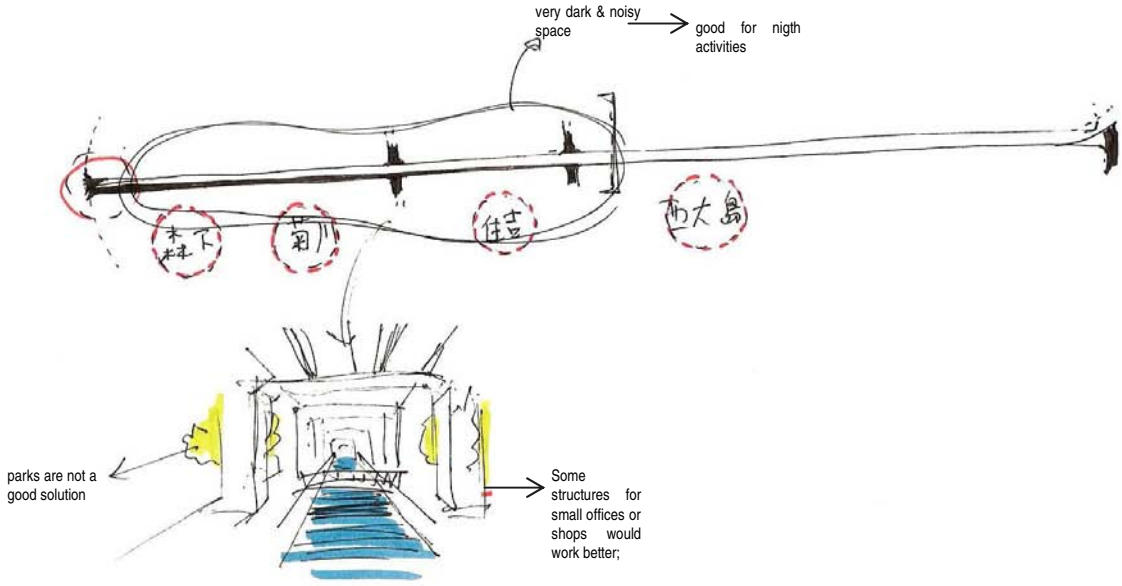
Nr of Bridges: 10

Topography: Flat

Major Stations: Morishita, Kikukawa, Sumiyoshi, Ryougoku

Water Depth: Medium

Image: Dark, dirty, noisy and has a very prominent sewage image;



SWOT:

Strengths: Existing vacant spaces under the expressway;

Weaknesses: The complete coverage of the riverbed (contrary to the example of Nihombashi, this case it doesn't promote any interesting spaces);

Too dark, insecure and noisy;

No connection to the adjacent neighborhoods;

Opportunities: Vacant plots;

There seems to exist a will of treating this space, although the methods are not the best (parks under the expressway);

It can be used as office space allied to night activities and small pockets of public spaces to bring daily illumination to the area;

Threats: The ignorance of this space will continue to make of it the neighborhood's backyard increasing insecurity;

K. Lynch Image:

Paths: Elevated Expressway, The Waterway;

Edges: Buildings, Concrete Walls, Fences;

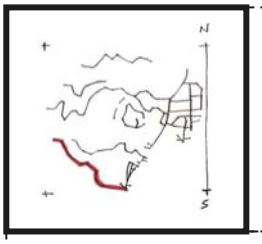
Districts: Ryogoku;

Nodes: no significant;

Landmarks: Elevated Expressway;

Fig124. Komatsu River Analysis Sketches

4.2.7. Meguro River



Names: Meguro River

Lenght Studied: 7.7 Km

Width: 15~30 meters

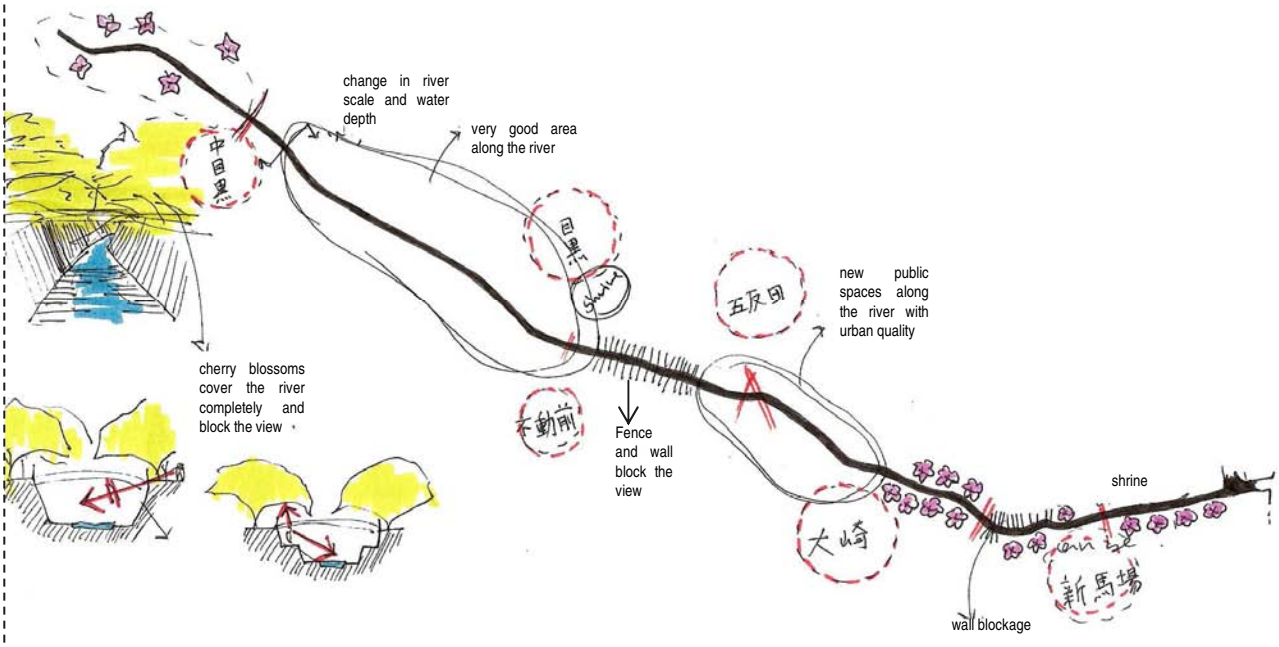
Nr of Bridges: 73

Topography: Flat

Major Stations: Naka Meguro, Meguro, Gotanda, Oosaki, Shinbaba

Water Depth: Shallow ~ Very Deep

Image: Old, historic character. Plenty of Greenery, lively and adaptive area. River water in the process of cleaning. Poor visual connection to the river due to many trees.



SWOT:

Strengths: Strong Seasonal Character;

River diversity and lenght;

It's history and loveable character;

Temples and Shrines in the proximity;

Weaknesses: Weak connection to the surrounding neighborhoods;

Lacks public spaces and facilities directly connected to the river;

Trees block the view;

Opportunities: Strong private activity concerned small, specialized shops and restaurants;

Can serve as a city connector (spinal cord to other spaces);

Threats: Land speculation with no public concern;

K. Lynch Image:

Paths: Fences, Sidewalks;

Edges: Fences, Walls, Trees;

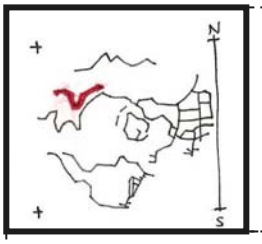
Districts: Meguro, Gotanda, Oosaki, Shinagawa areas;

Nodes: Gotanda Station;

Landmarks: Cherry Blossoms;

Fig125. Meguro River Analysis Sketches

4.2.8. Myoshoji River



Names: Myoshoji River

Lenght Studied: 3.1 Km

Width: ~10 meters

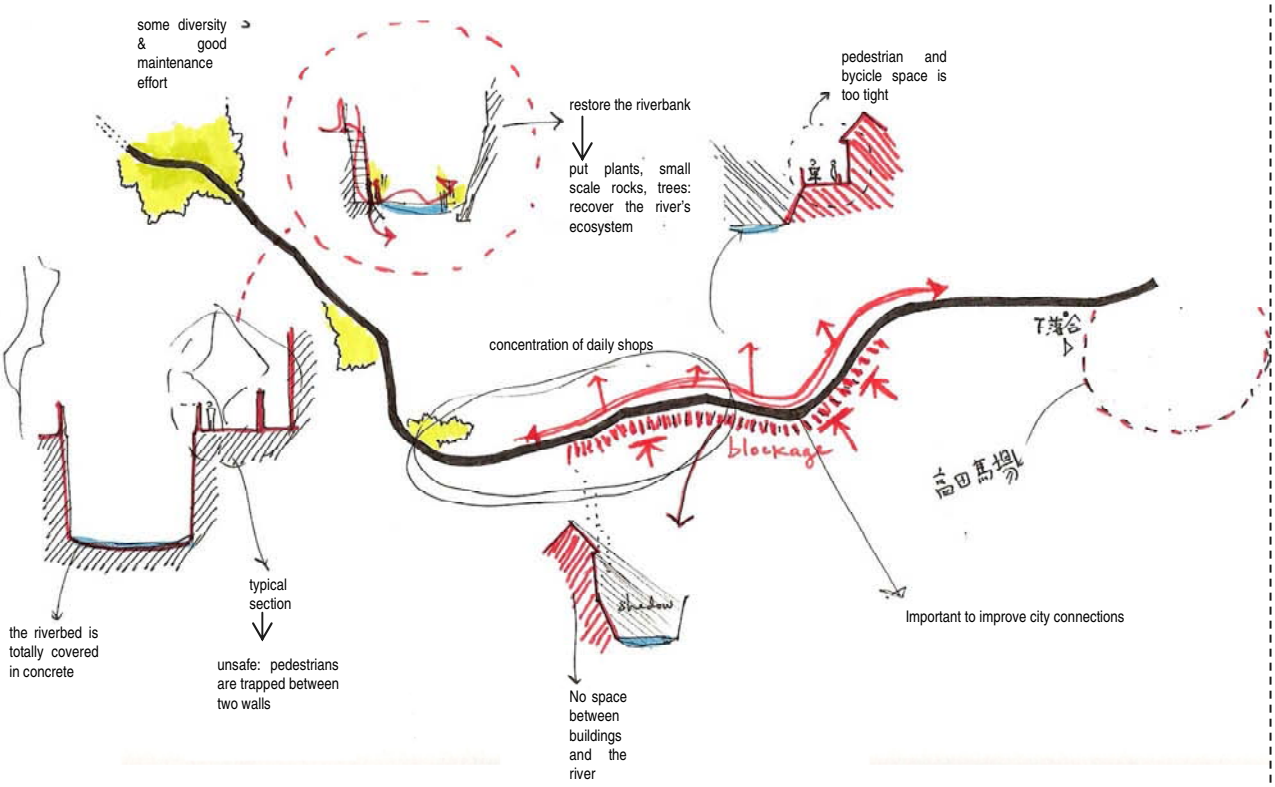
Nr of Bridges: 22

Topography: Flat

Major Stations: Nakai, Shimo Ochiai

Water Depth: Very Shallow

Image: Artificial river banks in a residential area. Quiet neighborhood, sunny but with few people and quite degraded which makes it feel unsafe



SWOT:

Strengths: Residential area with a familiar character;

Proximity with the river;

Weaknesses: Lack of maintenance and care for the river;

Pedestrian places are not continuous;

Opportunities: Small "Familiar" Commerce typologies;

To recover the stream in its original context and revive its ecosystem;

Community activities can be the starting point to the recover of the river;

Threats: Isolation due to low density;

Aging population;

K. Lynch Image:

Paths: Concrete or Stone Walls, the Waterway, Sidewalks;

Edges: Buildings and Fences;

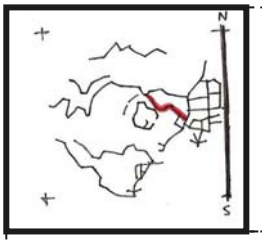
Districts: Takadanobaba;

Nodes: not significant;

Landmarks: not significant;

Fig126. Myoshoji River Analysis Sketches

4.2.9. Nihombashi River



Names: Nihombashi River

Lenght Studied: 4.8 Km

Width: 25~50 meters

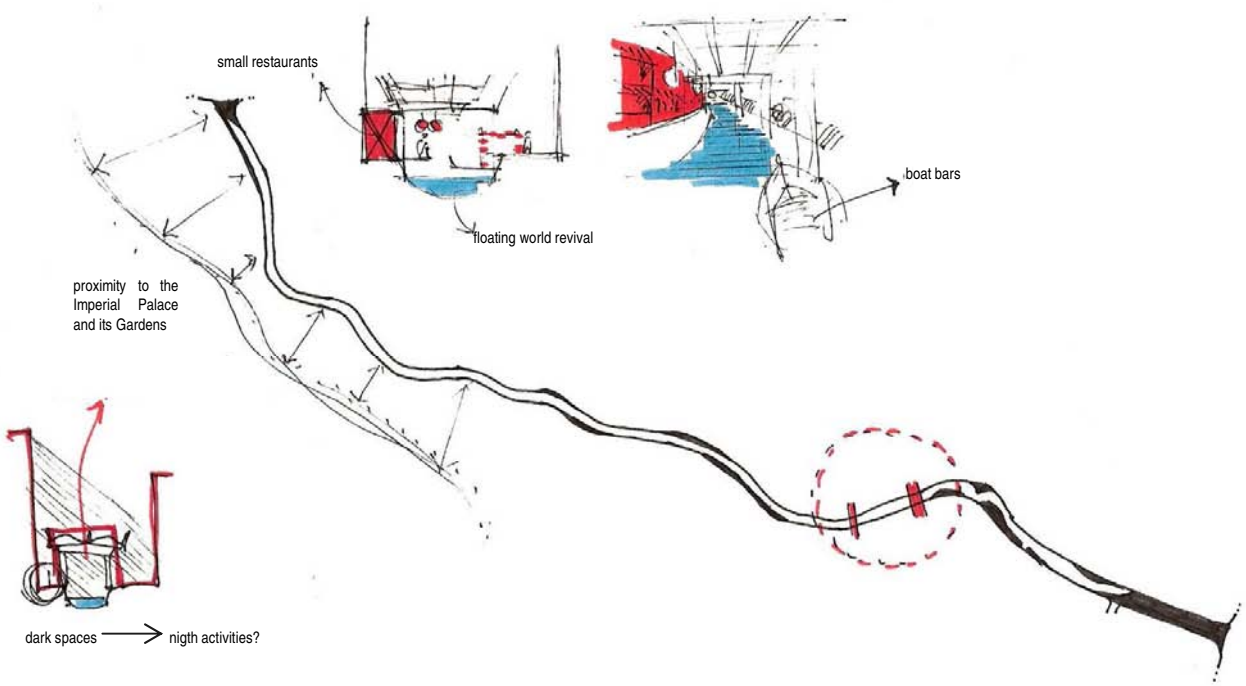
Nr of Bridges: 23

Topography: Flat

Major Stations: Nihombashi, Mitsukoshimae, Suidobashi, Tokyo, Otemachi, Takebashi, Kudanshita

Water Depth: Medium ~ Deep

Image: Very urban river trapped among concrete walls and the elevated expressway, being for that noisy, dark, but at the same time interesting and provocative.



SWOT:

Strengths: Water depth permits vessels for transport or other functions;

It's Historical character and Landmarks;

It's dense urban character and proximity to major city centers;

Weaknesses: Blockage of the river access by adjacent buildings;

Opportunities: Interesting urbanscape with the expressway covering part of the river;

Big presence of day activities and office space would gain in turning the river into a night district (=balance);

Threats: Private Land speculation without river regulation;

K. Lynch Image:

Paths: Elevated Expressway, the Waterway;

Edges: Construction Sites, the Expressway;

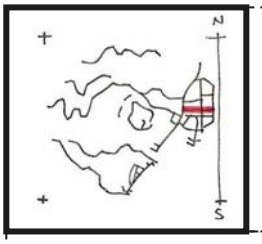
Districts: Imperial Palace, Tokyo, Kanda areas;

Nodes: bridges;

Landmarks: Nihombashi Bridge, Edobashi Bridge, the Expressway;

Fig127. Nohombashi River Analysis Sketches

4.2.10. Onagi River



Names: Onagi River

Lenght Studied: 2.5 Km

Width: 20~50 meters

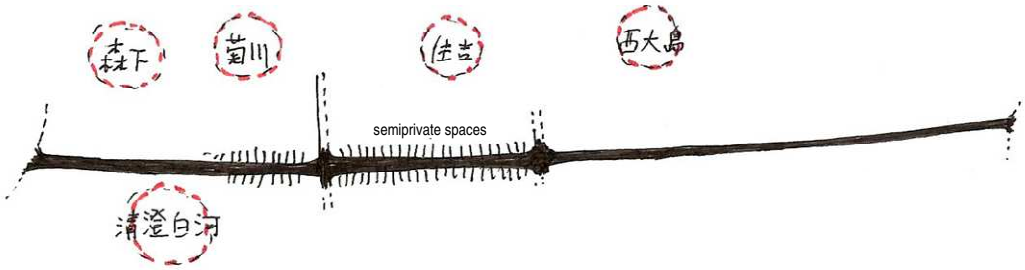
Nr of Bridges: 10

Topography: Flat

Major Stations: Sumiyoshi, Morishita, Kikukawa and Kyosumishirakawa

Water Depth: Medium ~ Deep

Image: Urban Residential character with the river as a "backyard" space. Private fenced gardens facing the river are common destroying its public character. Cool, fresh and sunny place.



SWOT:

Strengths: Space along the Riverbank;

Greenery;

Weaknesses: Blockage from Private backyards;

Opportunities: Potencial for daily water activities;

Sunshine and water depth;

Threats: Privatization of the Riverbank;

K. Lynch Image:

Paths: The Waterway, Sidewalks, Private Green spaces;

Edges: Private Green spaces, Fencing, Walls;

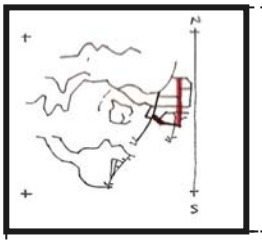
Districts: Fukagawa;

Nodes: crossing with Ooyoko River;

Landmarks: not significant;

Fig128. Onagi River Analysis Sketches

4.2.11. Ooyoko River



Names: Ooyoko River

Lenght Studied: 3.7 Km

Width: 5~30 meters

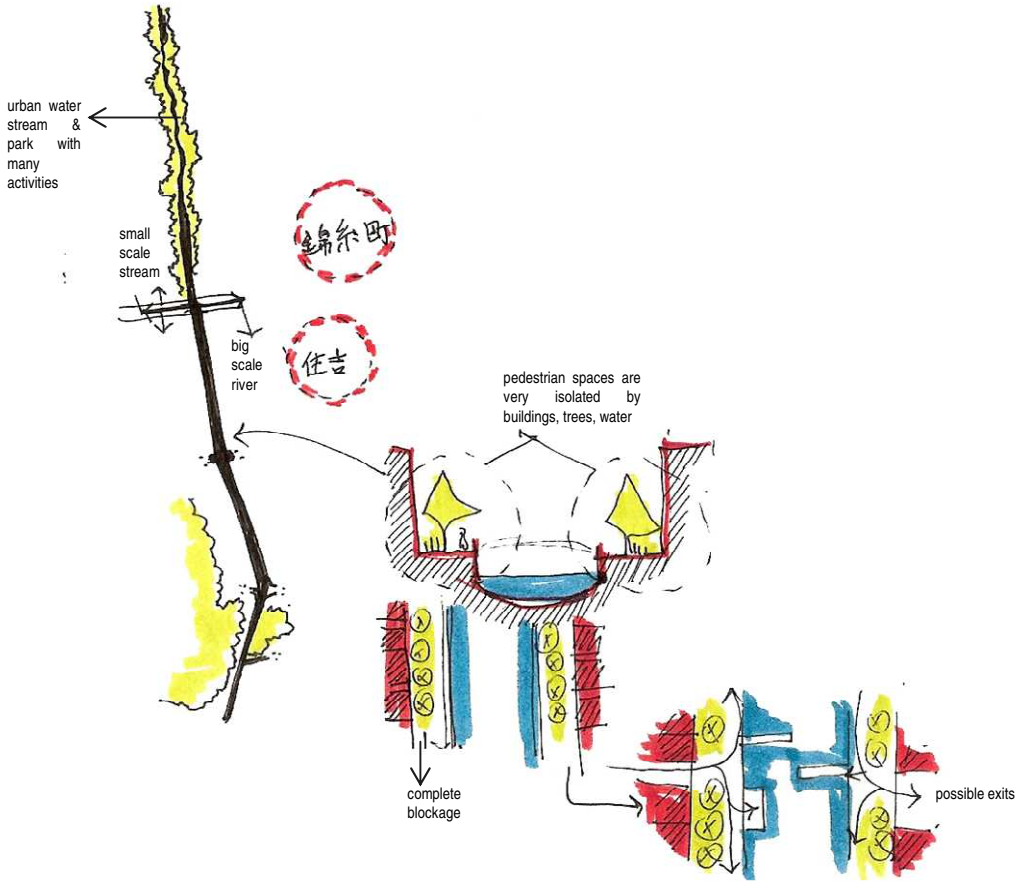
Nr of Bridges: 31

Topography: Flat~Slightly Hilly

Major Stations: Kiba, Kinshicho

Water Depth: Shallow ~ Medium

Image: One of the few rivers including a linear garden designed to serve as a connector between people and the river. Scale contrasts are although common being the small scale river rich in its spaces and the big scale river very poor in its character.



SWOT:

Strengths: Scale contrast creates diverse landscapes;

Small scale spaces are successful;

Water & Greenery balance in the stream garden area;

Weaknesses: Large scale spaces are not successful;

Isolated spaces in the river provoke some level of insecurity;

Opportunities: Extend the stream park concept to the river and the adjacent city spaces;

Threats: not significant;

K. Lynch Image:

Paths: The Waterway, Sidewalks, Green Paths;

Edges: Fences, Trees;

Districts: Kiba area;

Nodes: Elevated Expressway and other Rivers crossings;

Landmarks: Stream Garden, Bridges, Elevated Expressway;

Fig129. Ooyoko River Analysis Sketches

4.2.12. Outer Moat Kagurazaka

Names: Sotobori, Benkeibori

Lenght Studied: 2.5 Km

Width: 10~70 meters

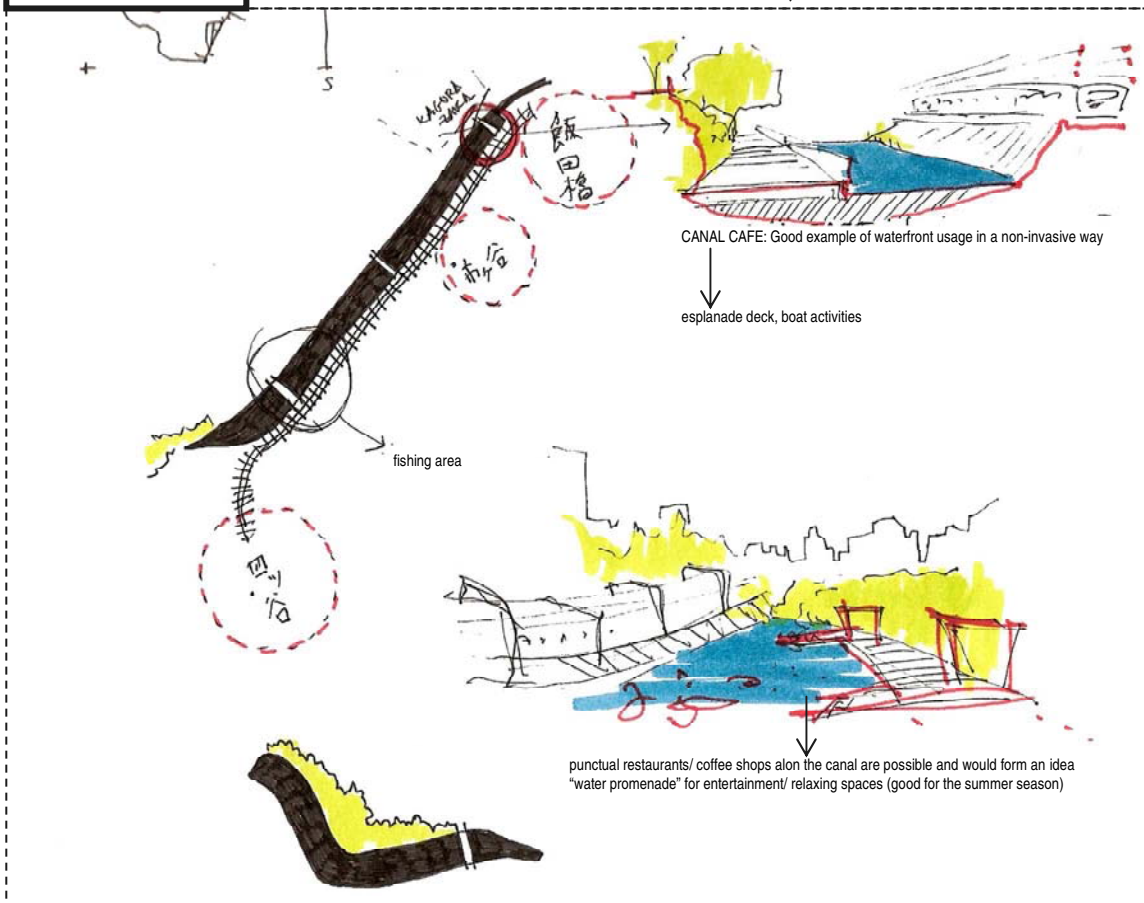
Nr of Bridges: 4

Topography: Hilly

Major Stations: Iidabashi, Ichigaya, Yotsuya, Nagatacho

Water Depth: Deep

Image: A slightly abandoned place with a great potential and the proof that water spaces can incorporate interesting spaces (e.g. Canal Café)



SWOT:

Strengths: Facilities in the water;

Solar exposition and water stillness;

Proximity to historical & touristic areas;

Weaknesses: The Train tracks block physical access from the east bank and the topography constitutes another barrier;

Trees and park in the upper east side do not help creating good views to the moat;

Opportunities: Boat activities and fishing are two of the possibility direct water activities in the moat;

Stillness of the water provides "ground" to many typologies of public spaces and activities in the water;

Threats: non particular;

K. Lynch Image:

Paths: The Waterway, the Train Tracks, Sidewalks;

Edges: Roads and Train Tracks;

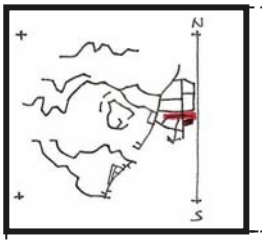
Districts: Iidabashi, Kagurazaka, Yotsuya areas;

Nodes: Bridges;

Landmarks: Elevated Expressway, Trains, Yasukuni Shrine Kagurazaka neighborhood;

Fig130. Outer Moat Analysis Sketches

4.2.13. Sendaihori Moat



Names: Sendaihori River

Lenght Studied: 3.5 Km

Width: 20~30 meters

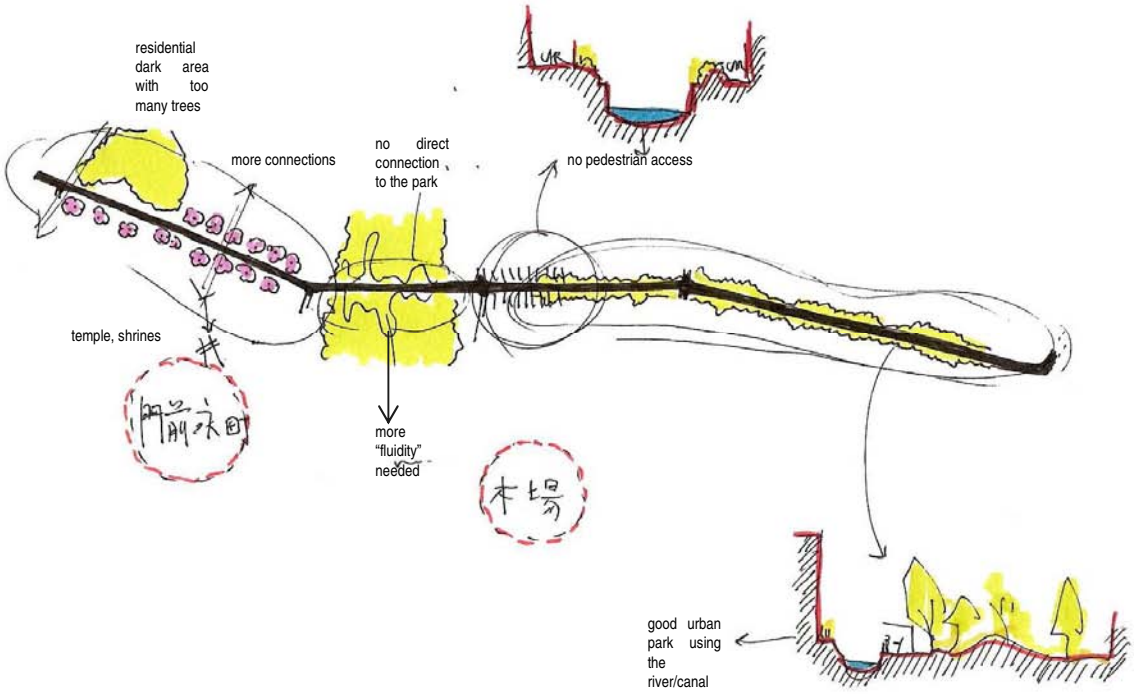
Nr of Bridges: 23

Topography: Flat~Slightly Hilly

Major Stations: Monzen Nakacho, Kiba, Minamisunacho

Water Depth: Shallow ~ Medium

Image: Dull canal with abandoned spaces and a grey atmosphere all along. Pedestrian spaces are narrow and trapped between water, walls, and fences. Cherry blossoms are its basic asset.



SWOT:

Strengths: Good solar exposure;

Cherry blossom trees;

Linear park in the east section;

Weaknesses: Dull urban landscape;

No special activities besides watching the cherry blossoms (in the spring);

Greenery works as a buffer between the city and the water and creates a visual and sometimes physical barrier;

City and river connection almost inexistent;

Opportunities: Vacant spaces;

Edit existing gardens and connecting them to the city;

Threats: Lack of maintenance;

Privatization of the Riverbank spaces;

K. Lynch Image:

Paths: Cherry Blossom Trees, Pedestrian Paths, the Waterway;

Edges: Fences, Buildings, Greenery;

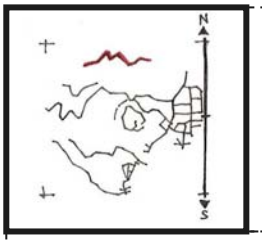
Districts: Monzennakacho and Kiba areas;

Nodes: not significant;

Landmarks: Park Bridge;

Fig131. Sendaihori Analysis Sketches

4.2.14. Shakujii River



Names: Shakujii River

Lenght Studied: 6.2 Km

Width: 15~20 meters

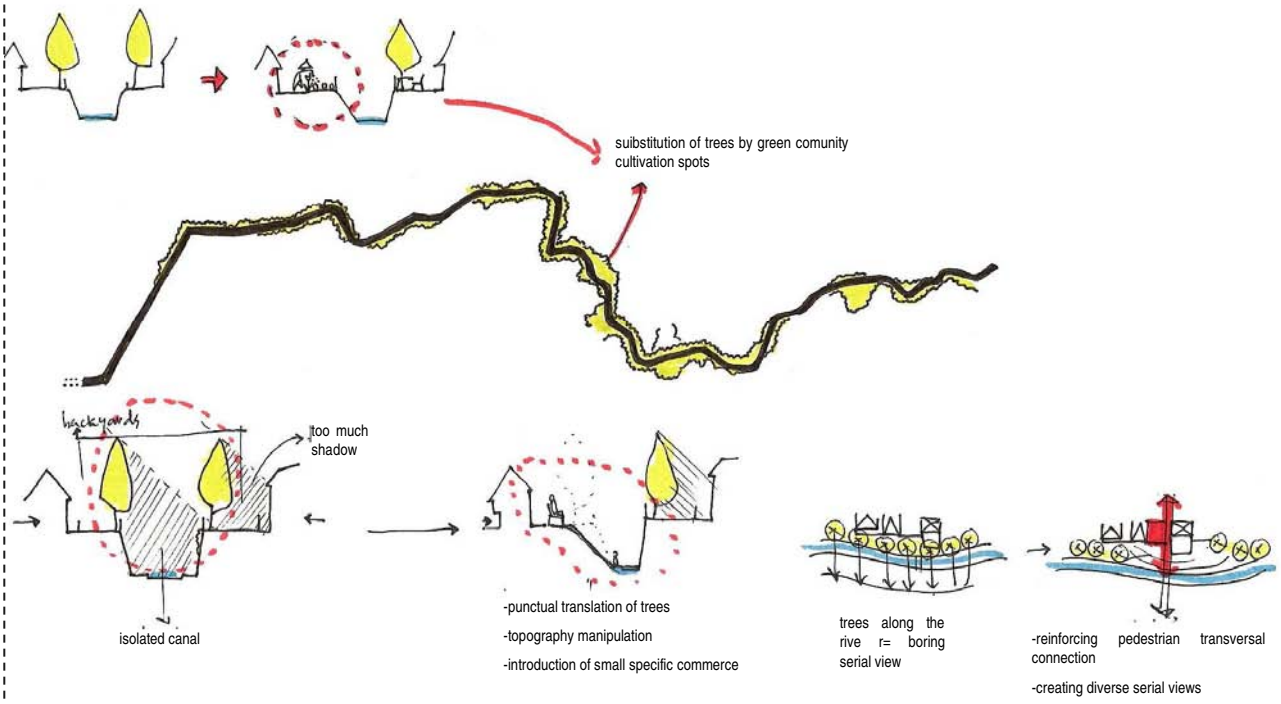
Nr of Bridges: 39

Topography: Mainly Flat

Major Stations: Oji, Nakaitabashi

Water Depth: Very Shallow

Image: Almost suburban character with clean water and abundant green spaces. Greenery isolates the space and it brings calmness but also an unsafely feeling;



SWOT:

Strengths: Residential character;

Weaknesses: Uninteresting serial view;

Too many trees and greenery block the river physically and visually and provoke shadows which turn the place into an insecure area;

Lacks residential-type public spaces and activities;

Topography and topography arrangement impedes access from pedestrian directly into the water;

Opportunities: Editing the existing Green spaces and create activities and attractive spaces for locals;

Revive the River's ecosystem;

Threats: Abandonment;

Continuing the "river backyard" typology;

Land speculation without regulation of the riverbank areas;

K. Lynch Image:

Paths: The Waterway, Sidewalks;

Edges: Fencing, Trees and Greenery, Roads;

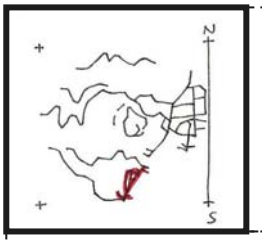
Districts: Oji park;

Nodes: Bridges;

Landmarks: not significant;

Fig132. Shakujii River Analysis Sketches

4.2.15. Shinagawa Canals



Names: Shibaura, Shin Shibaura, Keihin & Tennouzu canals

Lenght Studied: 9.1 Km

Width: 50~150 meters

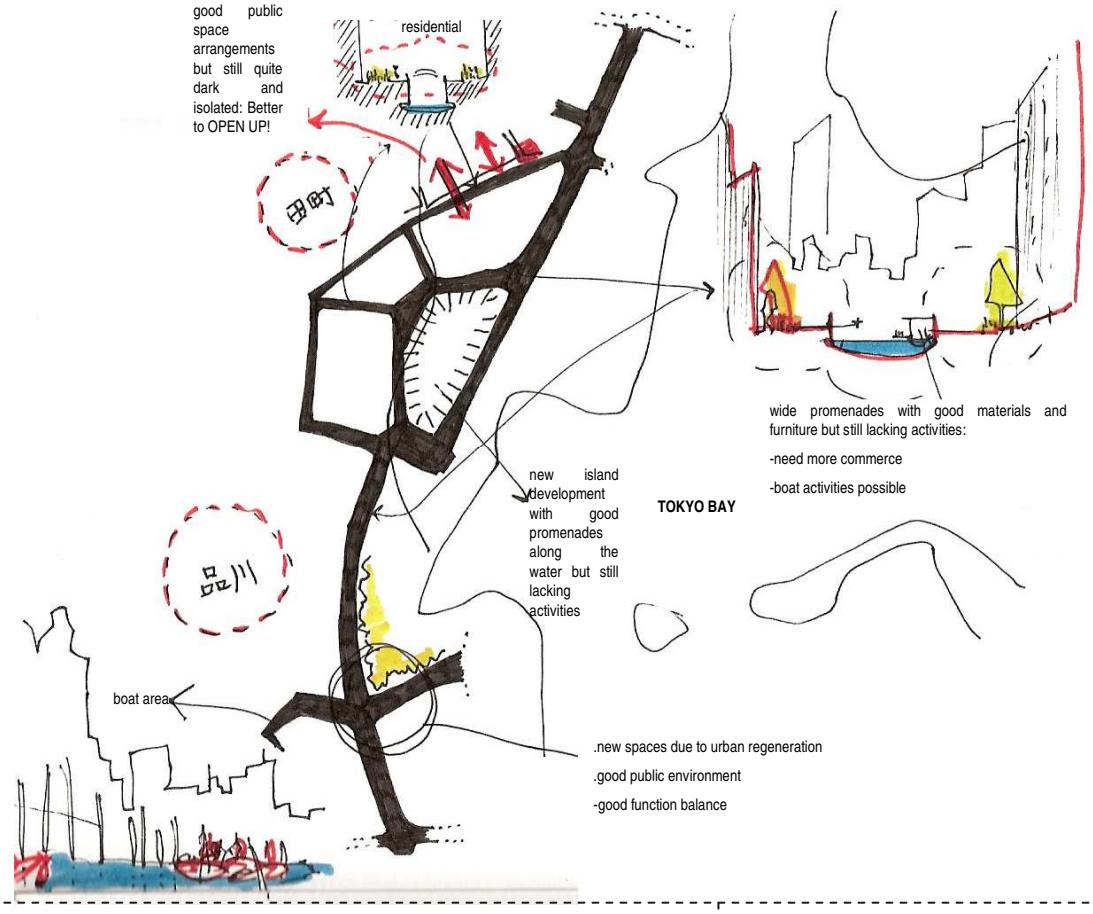
Nr of Bridges: 35

Topography: Flat

Major Stations: Tamachi, Mita, Shinagawa, Tennouzu Airu;

Water Depth: Deep

Image: New, fancy but also industrial spaces. Big plots and high densities create an interesting skyline and serial vision.



SWOT:

Strengths: Good effort in Riverbank Public Spaces;

Some urban regenerated areas have a very positive atmosphere;

Weaknesses: Lacks activities along river spaces;

Office Space is not balanced with other building activities: monofunctional area?

Few vessels although history and water depth provides for it;

Disconection of many promenades cutting pedestrian "flow";

Abandoned areas left to homeless and cats!

Opportunities: to continue urban regeneration processes already started;

High investment in the area can be an opportunity to improve public spaces near the waterway;

Threats: Land speculation without river regulation;

K. Lynch Image:

Paths: The Waterways, Sidewalks, Promenades, Roads;

Edges: Roads;

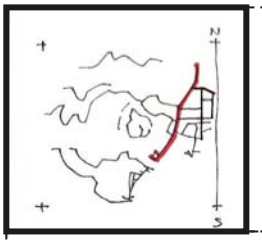
Districts: Shinagawa, Tamachi areas;

Nodes: Bridges, Artificial islands;

Landmarks: Bridges, Towers, New Promenades;

Fig133. Shinagawa Area Waterways Analysis Sketches

4.2.16. Sumida River



Names: Sumida, Kametori, Nihombashi Rivers

Lenght Studied: 10.3 Km

Width: 150~ meters

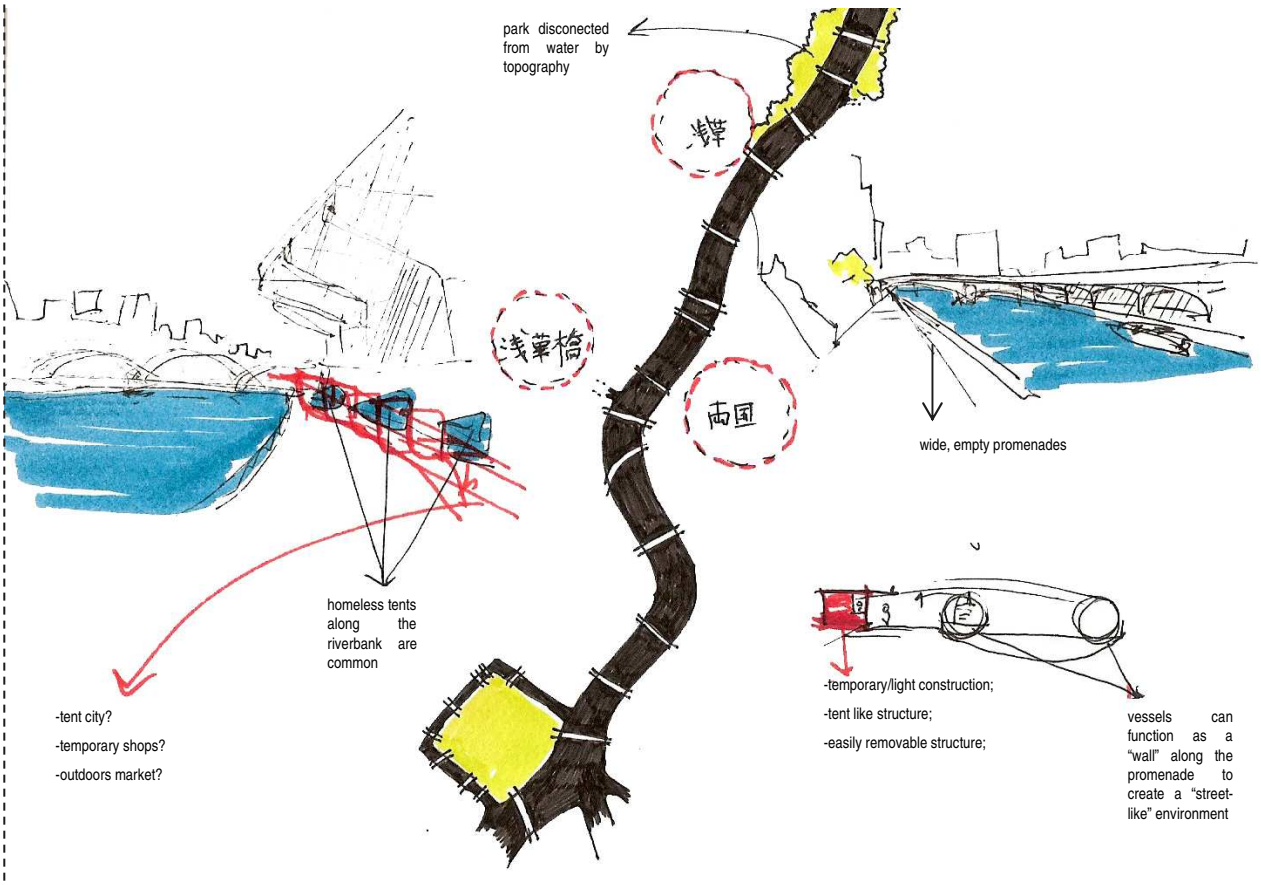
Nr of Bridges: 25

Topography: Flat

Major Stations: Morishita, Asakusa, Kuramae, Asakusabashi, Ryougoku, Hamamatsucho

Water Depth: Very Deep

Image: Unique in its scale, wide and beautiful river. Underused and difficult to transpose. Its function as city connector is not being used;



SWOT:

Strengths: Majestic Scale;

Wide vacant spaces along the riverbank;

Seasonal festivals;

Vessels;

Park spaces along the riverbank;

Weaknesses: Majestic Scale;

Fragmented spaces along the riverbank;

No activities along the riverbanks= increase of "marginal" activities;

Homeless tents;

Vessels are not being used at its highest potential;

Opportunities: Edit parks along the riverbank connecting them to city and river properly;

Use the Elevated Highway proudly taking advantage of its structure and vacant spaces under it;

Threats: Land speculation, Floods, Privatization;

K. Lynch Image:

Paths: The River, Sidewalks;

Edges: Concrete walls, Construction sites;

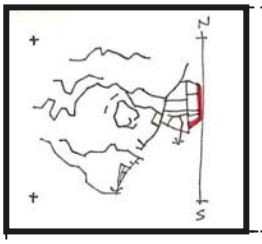
Districts: Asakusa, Ryogoku, areas;

Nodes: Bridges, Water Gates;

Landmarks: Bridges, Asahi Building, Boats, Elevated Expressway;

Fig134. Sumida River Analysis Sketches

4.2.17. Yokojukken River



Names: Yokojukken

Lenght Studied: 4.7 Km

Width: 40~60 meters

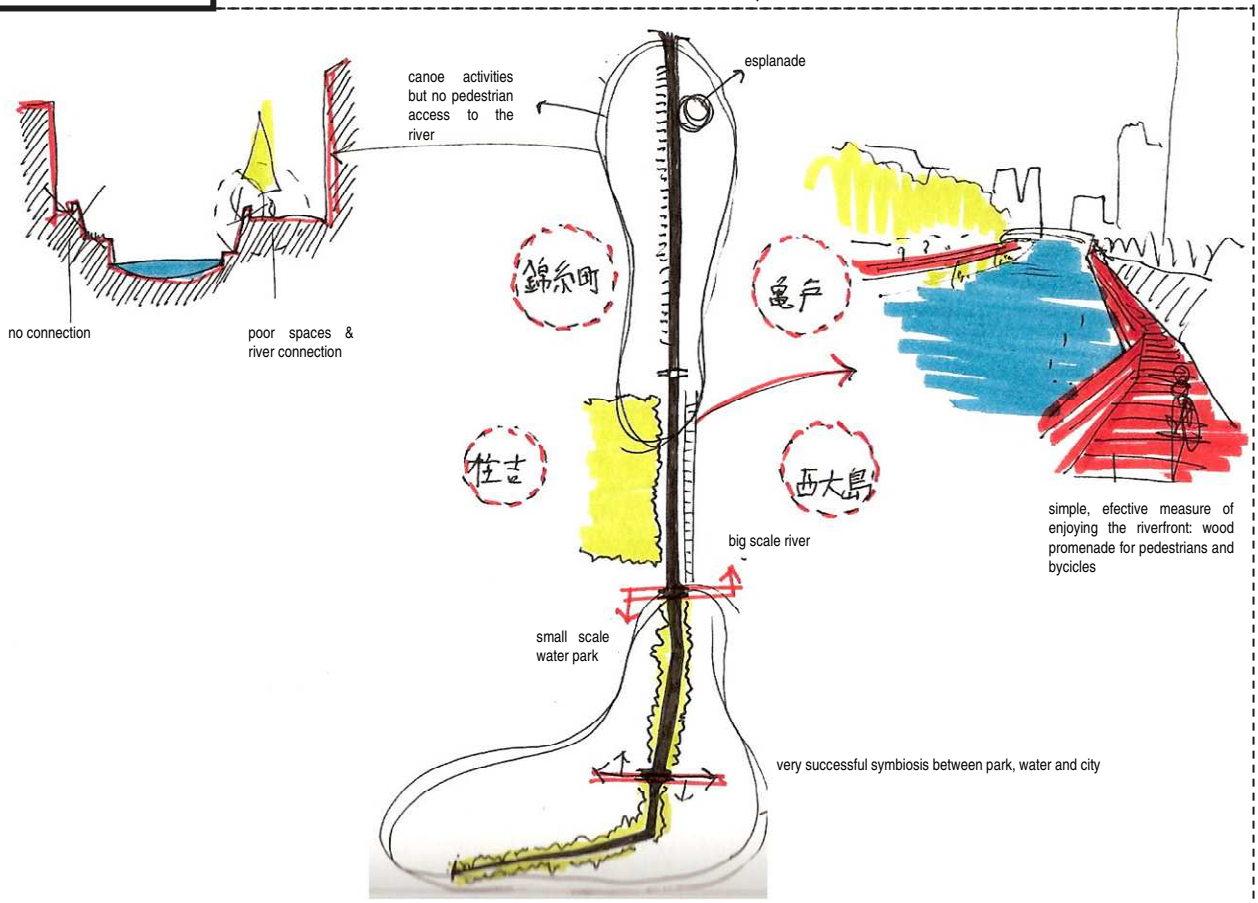
Nr of Bridges: 28

Topography: Flat

Major Stations: Kamedo, Sumiypshi, Kinshicho

Water Depth: Deep ~ Shallow

Image: Scale contrasting: urban & residential suburban. Activities in the riverfront are present: canoeing, running, promenades, bicycles, etc.



SWOT:

Strengths: Good park and river design;

Good promenades along the water;

Water activities present: canoeing, walking, resting, seeing,eating, etc;

Plenty of Urban Greenery;

Water depth and stilness permits water sports activities;

Good natural and artificial element combination;

Weaknesses: River scale conditions activities;

Isolation of Northern part;

Opportunities: to serve as a good example for other similar waterways;

To improve the connection between inner neighborhoods and water spaces;

Threats: not significant;

K. Lynch Image:

Paths: The Waterway, Green paths, Sidewalks, Promenades;

Edges: Buildings, Roads;

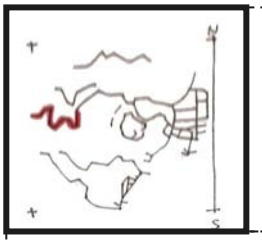
Districts: Sumiyoshi, Kamedo areas;

Nodes: Bridges, Parks;

Landmarks: Park in the stream, Wood decks, some high rise buildings;

Fig135. Yokojukken River Analysis Sketches

4.2.18. Zenppukuji River River



Names: Zenppukuji River

Lenght Studied: 7.4 Km

Width: 5~12 meters

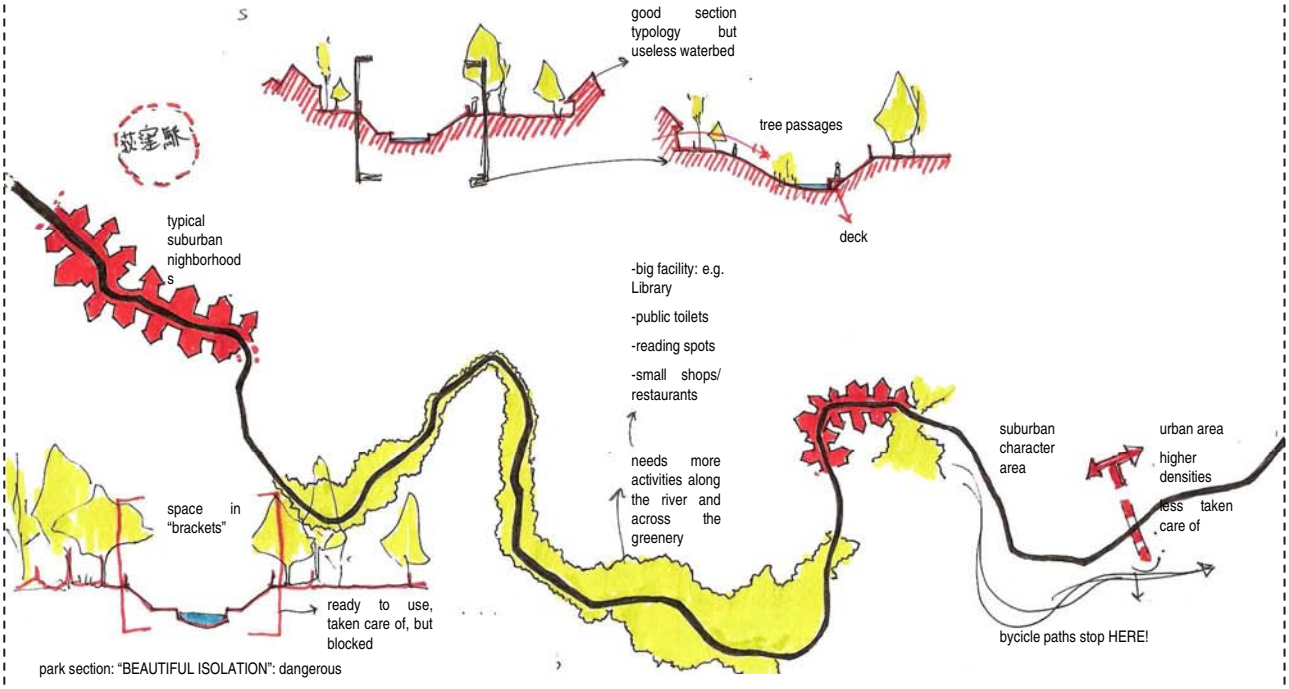
Nr of Bridges: 45

Topography: Flat

Major Stations: Ogikubo, Hounancho, Nakano Fujimicho

Water Depth: Shallow ~ Medium

Image: Suburban type: green areas are predominant and the peaceful character allied to the isolation of the river provoke unsafe feelings in the pedestrian.



SWOT:

Strengths: The parks;

Greenery, clean environment and clear river water;

Weaknesses: Lack of activities;

Low density= insecure area by lack of people;

Too much greenery isolates the river area;

Opportunities: Good area for outdoors activities: bicycle paths, skating, fishing spots, running, picnic, etc…;

Threats: Isolation by lack of activities;

Could be converted into a dangerous area;

K. Lynch Image:

Paths: The Waterway, River Walls, Trees;

Edges: Fencing;

Districts: Ogikubo, Zenppukuji Park areas;

Nodes: Parks;

Landmarks: Parks;

Fig136. Zenppukuji River Analysis Sketches

4.3. Synthesis

After the fieldwork observations and its first analysis, the conviction that rivers in urban Tokyo were important was especially reinforced for several different reasons.

From the beginning of this study, there was a strong conviction that water spaces in Tokyo were possible to be restored, revived, that the restoration of covered rivers could bring back the image of Edo with its canals and lively water spaces, that lost waterways could once again come back to the city and recover its lost role. However after the observation of so many waterways, just in central Tokyo, the conviction changed into a certainty.

The uniqueness of these spaces, its length along the city and its power as linear spaces its tremendous, however they lack countless features and they are overly "protected" and lowly regarded from people, both people in power and citizens.

This study comprehended around 106.7Km of waterways in central Tokyo, and although most of these rivers, canals, waterways, moats, have special characteristics that distinguish them from each other, most of them had the same problem: They are not included in urban life. The city forgot about these spaces, the functional character they maintained for years and years was lost with modernization and the city continued its life, its expansion, its scrap and build without regarding them as a part of it.

Most of these spaces are linear "tubular" spaces trapped in concrete protection walls, in order to protect the city from floods, trapped in fencing, in order to protect people from falling, reaching or even seeing into the water, trapped between buildings whose design has nothing to do with the water behind them, separating urban life from these "still-life" spaces. Most of these spaces stopped in time, and have not be maintained or arranged to cope with modern lifestyles in a major world city. Most of these spaces were arranged according to simplistic views of designing a linear space: trees were planted along its artificial riverbanks, once again trapping physical and visual access, creating shadow when there is no need of it, isolating even more what should be there out in the open.

Until recently these were forgotten spaces, abandoned to engineering rules of flood protection and only recently designers, architects and planners have started to look back at them, understanding somehow their power of changing the city they live in.

Water spaces are known by their character to change a city's "face". Bays, marinas, the sea, were since the decade of 60's privileged spaces in which to allocate the modern face of the city. That was a period of expansion, of economical power in which cities wanted to compete for economical power and world visibility. Nowadays, cities are changing their focus into a different kind of competition: the competition for a healthy, world and environmental friendly city. In this sense, cosmetic productions of city life are already out of date. There is a need for real projects in which cities become more natural, more green, in which people live better in contact with natural elements, it can be said that this kind of operation is something that goes on deeper, into the profound spaces of the city, not just at the surface.

River spaces are in this sense the perfect candidates for this kind of urban regeneration operations and this is visible in other countries, in which riverbank recovery, stream design are major successes among politicians and citizens. As linear spaces they incorporate several advantages: their design can be sectioned, they can function as continuous spaces that penetrate several parts of a city changing as the city's character changes, they can function as "spinal" connectors and help producing a better connected city, as rivers and natural spaces they can function as "slow" networks for pedestrians of bicycles creating a network of intricate, combined public spaces along the whole city, by recovering its natural riverbanks and water ecosystems can be recovered turning life in the city completely different! These are just the fundamental bases that turn waterways unique elements in a city, and usual cities have one major river. In the case of Urban Tokyo, there are more than 20!

The rivers studied have many problems, that is a fact. But they also have many potentials. The basic ones were mentioned above, but each river contains in itself other impending functions which can be used in its advantages. The river scale, its water depth, its bank typology or the city in its surroundings all contain already the tips to provide good designs, and some ideas will be presented in the following chapter. In other cases there exists already positive aspects: The Imperial Moats can serve as a basic example for all other waterways in Tokyo. The emperor's "house's" moats contain already the fundamentals of river design, maintenance and even fundamental cultural design aspects that should be taken in consideration, and since the Imperial Palace area is one of Tokyo's main "faces", it's surrounding waterway could serve also as a basic example for the design of the rivers in which "normal" Japanese citizens live.

Other potential already mentioned is the capacity of these spaces to function as a network. This is a great potential capable of restructuring the way people see and live the city of Tokyo and could be a plan for the next 50 to 100 years. With global warming and the possible rise of water levels, water spaces will very surely be coming their way, and a good plan should be accomplished to prevent situations like the one nowadays, in which waterways were left to abandon.

Individually, each river possesses its own character, sometimes monotonous at times dynamic, or mutable. The point is that each can serve as a reinforcement of its surrounding urban space's character. In residential areas the river can provide for a space in which families have their Sunday picnic, or in which kids go fishing with their friends. In urban areas these places can serve as meeting points in which people have their morning coffee or their afternoon tea. In dense urban areas rivers can serve as night entertainment areas or they can simply contain paths for pedestrians and bikers to come to work in a more environmental-friendly means of transportation. Generally, water spaces can incorporate completely natural features, such as hills, valleys, greenery or animals and they can incorporate totally artificial elements, like protection walls, promenades, illumination, etc. The best should be to reach a good balance between both. Cities are artificial settlements made by man, and they will continue to be, but in a world where cities pollute so much and in which environmental issues are so present, natural spaces inside cities are crucial for a good city environment.

In this sense, it is possible to say after this field work and analysis, that Tokyo incorporates in its urban realm a great "treasure", one that should be kept, maintained and invested in.

In the following chapter these spaces will be looked even more deeply taking in consideration its problems and potentialities and a "River Agenda" is proposed, with network, scale and individual strategies and proposals that should constitute the basis for each river intervention in urban Tokyo.

Chapter 5: Waterway Agenda

The act of creation is not just an invention from nothing, but an intervention in a pre-existing context, or a rearrangement of elements. It is, in other words, a kind of editing

In, "JA: Fiber City 2050", Ohno Hidetoshi

Waterfront projects are long- term affairs.

In, "Remaking the Urban Waterfront", Urban land Institute

Until now, general considerations about the waterfront were established and an extensive analysis to Tokyo's waterways was presented. In the present chapter, considerations about the future of Tokyo's waterways, and how these spaces should be developed are offered. The goal of this chapter is to create a comprehensive urban agenda focused on Tokyo's waterways and to provide an urban vision for these spaces and the way they should be developed and designed.

The first part focuses on a River Vision. How should these places look like? What is their role in the city of Tokyo and why are they important? What kind of image they should incorporate and how does that image contribute to the improvement of the quality of life in the city? These are some initial questions that urge to be answered and a certain level of madness and imagination is needed in order to be able to see into the future: a future in which waterways are a part of the city.

Following this vision, general goals are established in order to understand what kind of extra, the redevelopment of waterways can and should bring to the city. According to the initial waterway vision, these goals set up the basic layout in which waterway development or design should be set upon.

A second subchapter focus on more specific strategies in which two main scales are presented: a network scale and a river scale. The network scale part introduces considerations about Tokyo's waterways as a system and examples of how these should be improved in order to enhance that system. The river scale section provides a categorization of the studied waterways according to their size. Waterways were divided into four scale typologies and each serves a specific purpose in the urban realm. After establishing these purposes specific strategies and proposals are presented for each scale typology in a written and pictorial presentation.

A third subchapter focuses on design conceptual guidelines. For the definition of these, some considerations about Japanese architecture, cities and traditional landscape design were taken into account, in order to better formulate rules in accordance to some aspects of the Japanese tradition. Following are introduced four basic conceptual guidelines which should serve as a basis for each and ever design applied to Tokyo's Waterways. To better understand these rules and its application, small areas in each studied waterway were selected and rules applied. These drawings accompany this section and they comprehend area analysis, with problem and potential identification, guidelines application and an exemplification proposal drawing.

Finally, six design areas were selected according to its urban identity and projects were elaborated for each of these areas: Kitajukken, Nihombashi, Shibuya, Meguro, Outer Moat Kagurazaka and Zenppukuji. These final six projects have the purpose of providing a final image of how projects in the waterfront could look like. Included are existing sections and photos as well as proposed sections and final rendering images.

The present chapter aims like this to provide the main contribution of this study and it formulates the main basis for the Conclusion Chapter.

5.1. Tokyo: Waterway Vision

Tokyo is a major urban center in Japan and the world. When visiting the city, the main contact with the remaining of a city of water are probably some tourist trips to the Sumida River, the Imperial Moats, and not much more. Even when living in Tokyo for a couple of years, the recognition of waterways as a part of the city is very vague. Strange as it may seem, even living in Tokyo all our lives is not a premise to understand and recognize waterways as a part of the city. Of course, Tokyo is one of the largest cities in the world and to know all its alleys and neighborhoods is an incredible difficult task, even for residents, but after studying about one hundred kilometers of waterways in urban Tokyo, and still understand that their presence in the city is comparable to traces of antiquity or relishes from pre-historical times, doesn't stop surprising me.

In a city that was once compared to the "Venice of the East" in which canals and rivers flourished and helped the city's development and growth, it is a pity that these spaces were forgotten and left to abandon.

In a city where the image of waterways is vague, inexistent or very negative, it is necessary to provide positive stimuli to the citizens and politicians in relation to these spaces: show them that waterways can once again help the city flourish and grow, in a different way.

The present vision for Tokyo's Waterways is one in which water flows continually along the city and in which people are attracted to it by its uniqueness. An image in which the city becomes more rich by the combination of waterways, green areas and urban neighborhoods. The image of river valleys and hills in the midst of the city is possible and should be encouraged: Tokyo has the potential of becoming a city in which natural and artificial worlds come together to provide a more symbiotic relation taking advantage of the best of both worlds.

The basic assumption that waterways are just canals in which water exists is too simplistic: Clean waterways provide running water, ecosystems in which plants and animals coexist, they provide spaces in which natural recreation activities help improving the citizens lifestyle, they can provide with water in case of fires in the city or even shelter spaces in the advent of an earthquake. Waterways can become places in which children learn about nature and help to build it by increasing community activities and active citizen participation. Well designed and managed waterways can increase land value and provide quality housing, jobs or retail facilities. In general, Tokyo only has to win by changing its relation to the waterways, in a local level and in a world level.

Urban regeneration activities are increasing in every developed country and the main issue is sustainability. It is an overused and overrated term, but it matters, especially in a global level, it matters a lot.

Waterways in Tokyo provide a great opportunity to show the world this city and this country cares. A city that cares not only about ecological sustainability, but also about cultural sustainability. The redevelopment of waterways presupposes the revitalization of the city's history and that is something that Tokyo lacks a lot.

This urban vision concerning the waterways hopes for places in which the city and the water relate in a friendly way. In which people are attracted to the water and use these spaces as they please remembering that the city also came from there. To recover these spaces is to recover memories, natural and historical ones and that is a amazing vision.

Goals:

The following goals are divided in three sections:

1. Restore Waterways Ecosystems
2. Reconnect Waterways to the City
3. Create Value: For the City and the Citizens

5.1.1. Restore Waterway Ecosystems

By restoring waterways ecosystems several other urban revitalization processes occur and this goal is extremely important in a long term perspective. The complete restoration of the waterways is not always possible due to flood control measures or engineering technical conditions, however, the restoration of riverbanks into its natural state is a priority that should gradually come into realization especially taking into consideration the decrease in population in the city: this factor should contribute for the release of land along the riverbank in order to restore its natural flow and topography and create a natural buffer zone in which people can enjoy the water and at the same time be safely protected in the advent of floods.

For this goal three conditions should be managed and realized in an interconnected way when designing or elaborating waterways master plans:

1. Develop Flood Storage Mechanisms

Flood waters should be seen in a broader perspective, not only as a threat but as a plus in the way that they can be diverted in order to be stored. Flood storage mechanisms should be designed, in order for peak flood storage places outside the canal to store, and divert waters decreasing water flow in critic times. Stored water can be after diverted back into the water flow channels or used for fire prevention or greenery and soil irrigation.

Whenever possible, and again this point should be seen in a long range plan, buffer zones along the riverbank should be established. In these areas constructions should be avoided or controlled, and nature protection spaces should be designated in order to first: improve the rivers water flow; second: prevent major flood damage, and third: release the riverbank and recover it into a more natural state, improving the river's natural environment.

2. Improve Water Quality

Water quality is crucial for the restoration of waterways and several measures should be implemented. Landscape treatment facilities along the river and green infrastructures should be used in order to emphasize a more natural recovery of these waters. Water treatment facilities should be placed at major confluences of rivers and waterways to treat pollutants. An important measure also carried on in other river planning examples is the creation of landscape-based "green strips" at the top of riverbanks and in adjacent linear parkland and streets in order to treat stormwater run-off from steets. This system will avoid pollutant diversion from streets into the river, since it becomes trapped in these strips soil and vegetation.

3. Restore Ecosystems

Ecosystems within rivers and waterways in Tokyo were severely damaged with urbanization but in a long term, several of these spaces could be recovered and create major ecological strips in the city. The restoration of these places takes not only major investments, it also takes time and probably the investments should start in waterways belonging to residential or suburban neighborhoods. The success of these would then serve as a basis for more urban waterways. Recommendations include the creation of continuous corridors in which habitats for birds, mammals, amphibians, reptiles, invertebrates, and fish within the channel bottom can flourish. These corridors should them be connected to other significant green areas within the city, such as parks gardens and other waterways.

5.1.2. Reconnect Waterways to the City

The biggest problem of Tokyo's waterways can be resumed in their "autistic" character in relation to their urban surroundings. This second recommendation presents strategies that should be applied in order to reconnect these spaces. By reconnecting waterways and their surroundings we are reinforcing city and nature relationships and creating new stimuli in the city possible to be then used in a similar way in order to create more interconnected spaces in the metropolis. Fundamental for this process are the following five points:

1. Facilitate Safe Public Access

This is a very important recommendation since lack of Public Access is one of the major problems for Tokyo's waterways. In this sense, planning of these spaces should provide for opportunities for safe access to the water, ensure that people can easily enter and exit the channel and establish a flood warning system.

Planning and design should consider the creation of spaces for temporary pools or lakes including water-based recreation activities. A variety of Public Spaces is crucial, including small pocket water features or green areas, promenades or urban squares in the proximity of the water channel. Pedestrian and eco-friendly non-motorized transportation measures should be encouraged along the riverbank connected to the urban adjacent spaces.

2. Create Continuous Open Spaces Along Waterways

Spaces along the water, and especially spaces concerning the riverbank should be released in order to provide opportunities for continuous and uninterrupted movement along the waterways. When Possible a river/waterway buffer zone should be established within and adjacent to the water, and finally open spaces including adequate public open spaces should be created with bike and pedestrian paths.

3. Connect Urban Centers and Neighborhoods to the Waterways

This strategy is of exreme importance and the guidelines provided here should be followed thoroughly. Whenever possible, green arterial connections to the water should be created in which suitable landscape areas should be designed to meet upland habitat requirements.

Safe pedestrian streets between important areas in the city and the river should be created: especially cultural facilities, parks, civic institutions, transit terminals, educational facilities or commercial and employment centers within a radius of 1500 meters from a waterway. These connections should provide with direct pedestrian physical and visual access to the river.

4. Increase Greenery, Water and Recreational Spaces

Open spaces troughout the River Corridor and provide a diverse system of interconnected parks, recreational fiels or outdoor classroms, since the direct contact with nature can provide with suitable environments in which children can learn. Identity brown field sites for potencial open space acquisition and carefully think of waterways in which the historical character is important: open air city museums along the river are another possibility (e.g. Kanda River or Zenpukuji River). Recreational Spaces should be adapted to the character of the area: green areas, parks, commercial or residential areas should have different typologies of recreational spaces.

5. Include River activities

River activities should include opportunities in which to use public art and community or school projects in an open way. These art programs should reflect and celebrate the history of the waterway and the diverse cultures of its surrounding neighborhoods.

Activities along the riverbank should be diverse and they should improve the attractiveness of the waterway developing its urban image and encouraging local and diverse characters within the waterway corridor.

5.1.3. Create Value: For the City and the Citizens

Until the present, communities have turned their back on the waterways, understanding these spaces as unpleasant or unsafe. This neglect have influence not only the relation between citizens and Tokyo's waterways, but also the way the market deals with these spaces. Land along the riverbank is usually cheaper for the same reason that it is not attractive. This is a fallacy and a misunderstanding that has to be opposed and transformed: it is important to prove that waterways and its surrounding areas can be attractive for investors and residents, that these spaces can create value to citizens, and the city. Creating value means to increase the attractiveness of these areas, enhancing public health for both residents and visitors as places to work, live and visit. Along with this it is important to enhance environmental-sensitive, sustainable projects: encouraging "green buildings", rooftop gardens, and so on in relation to the waterways.

Value is also realized by providing the chance for new employment, housing or retail spaces and also by enhancing the community participation in the processes of planning, decision and enrolment in city and waterway activities. Following are five strategies that should help to create value in Tokyo's waterways:

1. Improve Urban Life Quality

To provide spaces in which people can feel confortable and safe and in which urban diversity provides a richness of encounters and activities. To reinforce connectivity between residential and work areas allied to the waterway as an intermediate space in which the previous functions come together with the recreational ones present in the waterway. Urban life quality should not be restrained to residents but also to visitors and waterways should provide with places in which some tourist welcoming activities are present.

2. Create Environmentally Sensitive Urban Projects

Planning of the waterways and the urban design along its adjacent areas should thrive for environmental friendly projects in which buildings use clean energies, local materials and are designed according to the local climate and environment. Scrap and build should not be an option unless the situation requires it, and buildings should be designed and built taking in consideration a long life span. Green spaces should be designed in celebration to the Japanese tradition and species should be carefully chosen according to its native character. Water treatment facilities along the rivers can be integrated in the urban realm and designed to serve as educational facilities or cultural spaces in which people learn about ecology and the importance of eco-friendly measures. "Water gardens" can be created in which plants and animals are used in symbiosis to help cleaning and purifying the river water.

3. Boost Land Value along Waterways

By improving spaces along the water land value will be naturally increased. However, this increase in land value, should become a factor for an improvement of not only the spaces along the water but its adjacent architecture, which should require maximum quality.

Land speculation for purely economical profit should be avoided by controlling and regulating land along the rivers and waterways in order to prevent mistakes and architectural disasters. Careful planning and land regulation measures should be applied in order to create spaces in which architectural quality comes together with urban quality and river quality.

4. Cultivate Civic Pride

The regeneration of waterways can be a factor for pride in the communities. To celebrate the waterways as part of the city's history and culture is an opportunity for the creation and recover of memories long gone in the heart of the citizens. To rediscover one's history and one's past and fully understand it and live it in one's city, is an opportunity to create concerned citizens that love their city and are proud of it. Opportunities should be created along the rivers in order to revive past memories: by creating open air museums, open air class rooms, public art, festivals, and so on. Urban traditions should be encouraged in these spaces and the celebration of national or religious holidays, fairs or entertainment traditions should be a factor in which people reconnect to their past in their present, and the regeneration of waterways can be an important process in this cultivation.

5. Create Opportunities for Citizen Participation

Together with the previous point, waterways should provide for spaces in which citizens are able to participate actively in urban life. With the aging population problem, an important factor is to create spaces in which elderly can provide for an active population: create elderly facilities nearby the water, spaces in which elderly can easily access the waterfront, connections between elderly and young citizens or community gardens or farms in which old people can teach the young ones about farming, cultivating trees or plants and exchange important information and life experience with the youngest.

Citizens should actively participate in the process of design of the waterway and their opinion should be taken in consideration.

Volunteer activities along the waterway should also be encouraged, especially in activities related to the cleaning and maintenance of the riverbanks spaces. It is important to foster urban responsibility awareness among citizens and by helping to clean or maintaining the riverfront, citizens can connect to the space in a deeper level.

The strategies provided above should be applied seriously and according to the waterway vision also presented above. The following subchapters provide with gradually detailed strategies and proposals that can show in a gradual way, how the process of planning and design of Tokyo's waterways should be conducted.

5.2. Scale Based Strategies & Proposals

In this subchapter are introduced strategies and proposals for central Tokyo's waterways according to two major principles: the fact that waterways can and should constitute a network in the city and the fact that waterways can be categorized according to their scale in the city, having for that specific functions or characters.

5.2.1. Network Scale

As it was already mentioned, the analyzed waterways constitute a sort of disconnected network in the city of Tokyo that should be reinforced. This existing network has the power of reconnect rivers in Tokyo but also the influence of reinforcing urban important urban centers in their character.

Following this idea a proposal for the waterway network of central Tokyo was elaborated according to few principles (Fig137).

The basic theory is that a network is only a network because it functions as a interconnected group or system. It is basically a method of sharing information between two or more systems. In this case, the water could function as an urban network, or an ecological network if correctly interconnected with the urban or the ecological system.

The urban system is a major network with many layers communicating between themselves. For the waterways to become a part of this, they have to open themselves to the urban realm, which means that they have to incorporate characteristics in their physical reality common to the urban reality: buildings, public spaces, green areas, etc. This incorporation, if done in direct relation to the nearby city centers can not only include the waterway in the urban network system, but also the urban center in the waterway network system.

These two layers can reinforce each other by thinking of strategies that connect them in their characters together: This can be done by creating direct connections between water and urban centers in which features common to both are present: water or green features together with commercial or typical elements of an urban center, as an example. The basic idea is that by reconnecting a waterway and its neighborhood, we are creating connections where they do not exist nowadays and for that, providing reasons for people to use spaces that they didn't use before.

A second network can be called an ecological network and waterways constitute already a part of it: the water system. The proposal is to join the water system with the green system: parks, gardens and similar. In the Fig137. the idea was to create connections between the waterways and the existing parks and green areas (dark green areas). These connections could, once again use elements common to both networks: new canals or streams, garden streets, etc.

Since we are dealing with a metropolis and this kind of proposal is a conceptual one, we have to think of a large span of maybe 50 or more years for this kind of proposal to be concluded. With this in mind, it is possible to not only connect existing parks, but to create new ones in strategic locations in order to better distribute green areas in the city (light green areas).

These three networks: city, water and green should then be improved gradually in order to create a more diverse network in which the three of them are present in most city areas.

Finally how to connect these networks? As already mentioned, waterways biggest advantage is its linear shape. Linear shape spaces are one of the basic elements for Japanese cities and this formal aspect should be used and improved when developing these networks. These new fibers, to use another term can include water, greenery, streets, roads, transportation means, lighting and so on. They should be dynamic but constant in their character and they should prepare their spaces to receive other "fibers".

Linear spaces have the power of connecting things in a longitudinal way but also of overlapping with other lines in a transversal way in order to create happenings. These crossing spaces or happenings would be designed very carefully since they will become the joint spaces in the city and those people will recognize more easily.

In 50 years Tokyo could be a city in which urban centers are not only connected by a central loop train system but also by a slow network in which natural and artificial work come together.

Tokyo's green spaces would increase in its distribution along the city providing not only big green areas in which to go on Sundays but which people can enjoy in their everyday life. And waterways would once again belong to the city and make a part of it in its totality. In the next subchapter, specific scale based proposals are described taking as a basis the improvement of this network.

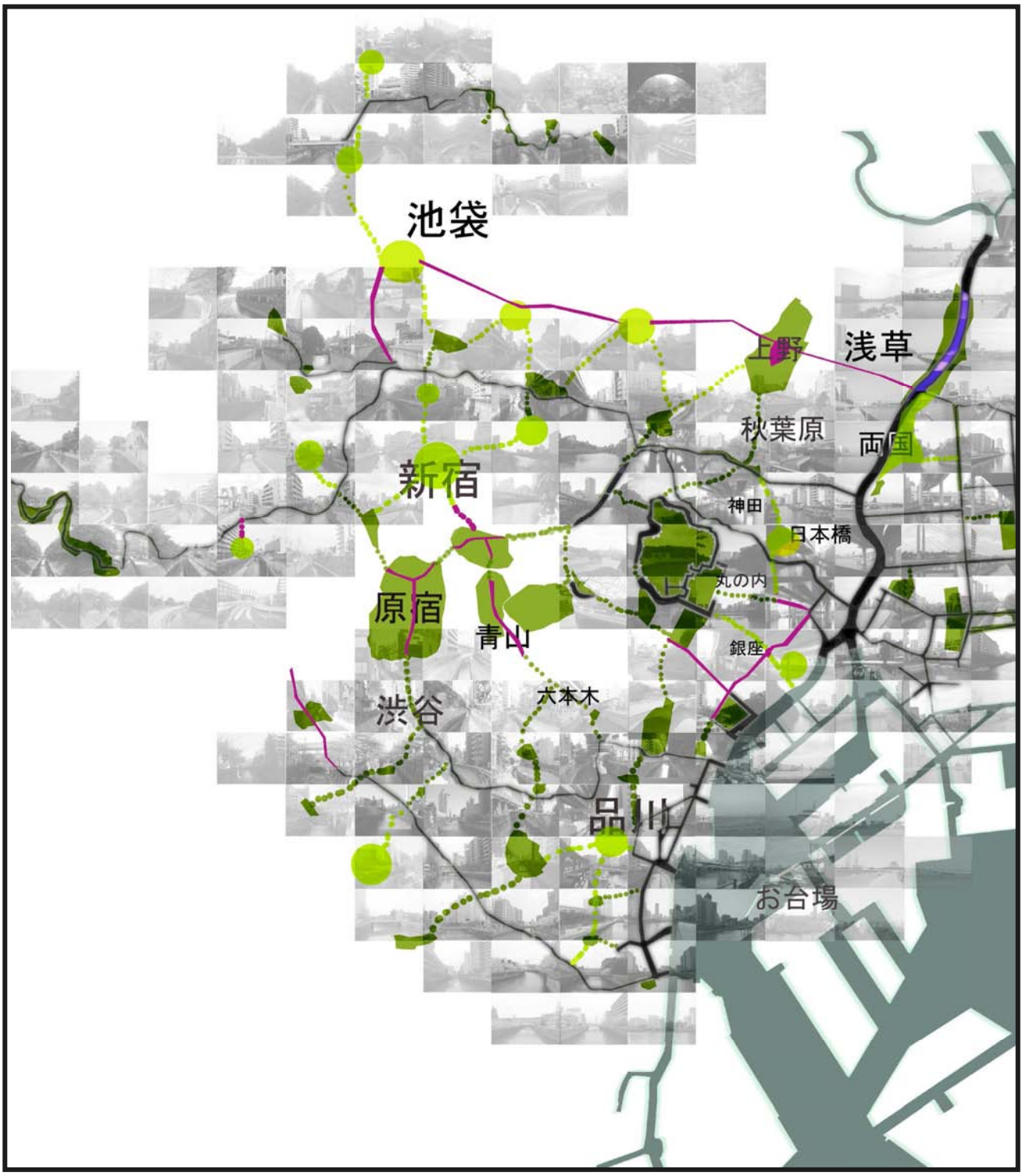


Fig137. Proposed Network Typology

5.2.2. River Scale

Until now the strategies presented for Tokyo's waterways were based in general conceptual waterfront realities and global views of a possible network made by these spaces.

In this subchapter it is firstly introduced the idea of river scale and introduced strategies according to this applied to the river's urban sphere.

After the extensive analysis introduced previously, it is possible to affirm that waterways, as linear spaces in the city, do not have a constant character. As they penetrate the city, its center or its suburbs, they change in section width, embankment typology, water flow, etc, which turns these spaces dynamic in terms of urban scale. Among the studied waterways, it was possible to define at least four different scale typologies.

Scale I: Belong to this scale rivers whose transversal section width has more than 100 meters, and whose depth and water flow is considerably high. Among the studied examples, only Sumida River belongs to this section (Arakawa Canal or Tama River could probably be included in this section, but they were not an object of study for this paper).

Scale II: Waterways or Rivers whose transversal section width has between 50-100 meters. These have still a considerable water depth and flow, and present themselves as important assets among the city space defining sometimes their surrounding urban character. These include: Nihombashi River, the east part of Kanda River, the Outer and Imperial Moats, waterways in Shinagawa and Tamachi area, Yokojukken River and Onagi River.

Scale III: Waterways or Rivers whose transversal section width has between 20-50 meters. Although water depth is still medium, water flow is poor giving these waterways a "moat" character. 36% of the studied waterways belong to this category: The Kiba Canals, Furukawa River, Kitajukken River, the east section of Meguro River, part of Ooyoko River,, part of Yokojukken River and Komatsu River.

Scale IV: Rivers whose transversal section width has no more than 20 meters and which water depth is very shallow. Among these we encounter Zenppukuji River, Myoushoji River, Shibuya River, the west part of Kanda River, the west part of Meguro River, Shakujii River, part of Ooyoko River and the Sendaihori Moat.


Fig138. Scale I: Sumida River


Fig139. Scale II: Shinagawa waterways


Fig140. Scale III: Ooyoko River


Fig141. Scale IV: Shakujii River

Each river scale typology plays an important role in the city and each contains diverse potentials that should be encouraged when designing them individually. As mentioned in the previous subchapter, waterways can function as a network and in different scales they can produce different space typologies in order to interconnect themselves in a better, more complete way.

Before describing the design strategies and proposals in each scale it is important then to mention what each of these scales could offer in the city scenario.

Scale I: City Spinal "Water Body"

Due to its size and enormous presence in the city of Tokyo, this river typology could serve as a spinal type of structure in the midst of the city.

A spinal structure has the power of serving as a support element for other structures and this scale typology could be serve as that support element. For its size and presence in the city, it can also serve as a reflection of the city's lifestyle, its history or traditions, in fact it should serve as a "picture frame" as how the city wants to look to the world: a tourist spot in which specific functions are carried. Considering this thematic there are basic policies that should be applied to four major fields:

1. Activities: Activities in scale I rivers should take a city or national character. It is important to allocate functions in strategic spots along the waterway (river crossings, important road/street connections, peninsula shaped areas, etc). These functions could be as diversified as Universities or Schools, Libraries, Museums, Research Centers and basically cultural facilities in general. These should be carefully integrated between the water space and the city spaces serving as joint areas in which people gather to enjoy some cultural activity near the city and the river. Cultural functions have also a great power in projecting the city's ambition in becoming recognized in the world cities realm.

2. Transportation Means: This scale rivers should activate its role as transportation vessels: boats should be used for tourist purposes but also for the citizens in general (Ferry boats or Aqua Taxis are some examples). Terminals should be allocated in crossings with other rivers and nearby important urban centers or facilities, such as the ones presented in point 1.

3. Public Spaces: Public spaces in these places should become a reflection of the city's aspirations, and the city's cultural traditions. Public spaces should be designed not only as places where people do something outside everyday, they should be designed and thought of as infrastructures for seasonal activities: Summer festivals, concerts, Matsuri (Japanese fair), outdoor events or firework watching spots. Whenever possible, these spaces should integrate elements traditionally Japanese, by the choice of their materials, greenery species, of structure typology.

4. Ecological System and Green Areas: The ecological system of the river is of extreme importance and for that considerations about the water quality and its cleaning are of course crucial. But the ecological system in the river and the city's edge is also very important. Scale I rivers are also a mirror of the city's character, and green spaces along the riverbank should increase: linear parks along the riverbank with direct openings from the city into the water, biotope gardens in the water are also another idea that could increase vegetation and help purifying the water, and so on. These green areas should also be allocated near important activities or centers in which people come together often.

Scale II: Central City Connectors

Scale II waterways, by its size and usual allocation in the city are perfect to function as connectors between scale I or scale III rivers and the city center:

1. Activities: activities along these waterways should be considered as clusters. Contrary to the previous scale, in which some monumentality is needed, in the present scale waterways, more urban functions are needed, in its diversity. By that reason, activities along the riverbank should be organized into clusters in which several types of functions come together: office and commerce, schools and restaurants, parks and offices, night activities and office, and so on. Buildings do not have to be allocated along the riverbank, in

fact only the most significant activities in a cluster should be placed in direct contact with the river, and the others should be organized in a perpendicular way starting from the riverbank.

2. Transportation Means: These waterways are perfect for water taxis or urban transportation along the canals. In some cases, some tourist boating can also be added, as well as some pleasure boats typical used in ponds. Another kind of transport infrastructure that should be added to all scale II rivers are pedestrian and bicycle paths. Waterways in Tokyo have the characteristic that their riverbank is mainly flat. In a city so hilly as Tokyo, flat spaces in which eco-friendly means of transportation can be safely used are necessary and waterways are the perfect spaces for this, as long as safety measures are carefully taken care of. A reinforcement in bicycle paths starting in these waterways can be expanded to further river scale typologies and create an enormous network of walking paths and bicycle paths in which people can use not only for their recreation but to commute as well.

3. Public Spaces: Public spaces in these waterways should respond to their urban environment. If the urban area is too bustling and noisy, public spaces should provide with calm, quiet resting spaces in which people can breath some fresh air. By the contrary, if the area lacks in urban functions or people, public spaces should be attached to some new activities in order to push people into the waterfront. Typologies of public spaces are infinite and some more specific examples are presented in the next Strategies & Proposals subtitle.

4. Ecological System and Green Areas: The water quality and treatment of these waterways should be increasingly improved and green areas should be allocated in small pockets along the riverbank. Trees along the riverbank for long lengths should be avoided in order to keep the riverbank open but transversal green areas can and should be reinforced to connect important spaces in the inner city into the water: some hospital or school, nearby offices or shopping streets.

Scale III: Residential Oasis

Most Scale III waterways belong to some sort of residential neighborhood and for that they should serve as places in which families and residents can enjoy a natural environment without traveling big distances:

1. Activities: Activities along the riverbank should be increased in order to attract investment and people to the water area. Activities should serve as infrastructures to the residential function: small shops, restaurants, the local laundry, supermarkets or community places like homes for elderly connected with children activities. The aging population is a major condition for city planning in Tokyo and most Japanese cities and this population should be allocated near residential neighborhoods and near places in which they still can be useful: gardens, children playgrounds or kindergartens, the contact between the aged population and the young is an activity that can be enjoyed by both parts and elderly people can feel useful in their lives. Another strategy would be to allocate community gardens or community farms in places nearby elderly facilities: people can come together to cultivate plants or vegetables and the waterway can become a central spot for these activities.

Other activities associated with the residential activity and the river scale typology are water sports: canooing, motorbikes, fishing, and so on, can all be activities encouraged in the waterfront areas.

2. Transportation Means: In this scale typology, boat activity is not so encouraged, at least in the way mentioned in the two previous scales. Boats should be used in this scale only as pleasure boats: rowing boats, floating bars or restaurants, etc. As in Scale II, pedestrian and bicycle paths should be encouraged and well designed in order for people to use them on a daily basis. When possible these should be connected to other waterways and the inner city.

3. Public Spaces: Public spaces along the riverbank should be attached to urban activities. Formal aspects are free to be designed and interpreted when designing these spaces.

4. Ecological and Green Areas: In scale III waterways it is important to control the greenery and park scale along the riverbanks. Small size gardens, playgrounds and community farms should be encouraged, as well as places in which contact with the natural world is possible: fish farms, fishing spots, small ponds in which children can play safely, places with a strong diversity of plants and trees or even botanical gardens are best.

Scale IV: Green Streams

By its size, scale IV waterways are more similar to a stream than a river, and for that reason they are perfect candidates for a complete "makeover" in which the restoration of its riverbed and riverbank is complete.

1. Activities: These areas are usually either trapped between too much greenery or too much concrete, and for that dense activities are not the solution. The typology desired is a light construction, even temporary type. Activities should take care of the surrounding area and what is needed: public toilets, info boxes, some shop, restaurant or kiosk. The important aspect of these activities is their connection to the water and the surrounding city: isolation is not a solution and good streets with quality materials and illumination are fundamental.

2. Transportation Means: Transportation in these waterways is only possible by foot, skate or bicycle which means that all transportation along these riverbanks should be eco-friendly and light typed ones. In some cases bike paths can be connected to Scale III waterways, continuing the bicycle network. In other cases, these bike paths should be connected to city centers in the neighborhood of the waterway in order to function not only as pleasure spots, but functional spots.

3. Public Spaces: Public spaces should take a linear character along the water (promenades, decks, hills, etc) but its transversal connection into the city is of extreme importance. In many cases it is fundamentally necessary to remove buildings or greenery in order to open up the streambed to the city.

4. Ecological System and Green Areas: Finally the ecological system should be the one more focused on. The riverbed of these areas should de redesigned in order to consider water flow, and water ecosystems regenerated: water plants, fish and others should be increasingly augmented in order to create a balanced stream ecosystem. The riverbanks should be recovered to some sort of natural state: with topography landscape design (hills, small valleys, rice fields are also possible, etc) careful choice of flora not indigenous to the landscape and water spaces should be placed whenever possible: stone steps, small bridges, small ponds, fishing ponds, etc. These spaces should become as natural as possible in the urban and suburban realm in order to provide to residents and especially children a contact with nature not usual in cities.

With these four typologies in mind, it is possible to start formulating possible proposals according to river and corresponding urban scale. For each Scale Typology there is a listing of thematic topics which can at times be used among other scales with slightly different results. The proposals and strategies presented subsequently are simple diagrams which can be consulted before starting any project in Tokyo's rivers.

Strategies & Proposals:

Scale I:

1. Increase Water and City's Contact Surface

The present status of the Sumida River concerning its importance in the urban context is poor, although there were some attempts to increase spaces along the river: large promenades, some gardens along the river bank, etc. These spaces are not necessarily poor in their design or characteristics but in the way they are connected to the city, and in this sense the connection is extremely poor and most of the times inexistent. The first important strategy concerning Scale I is then to increase the perimeter in which city and water frontier coexist.

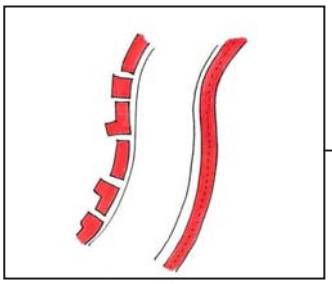


Fig142. Possible Proposal Typology

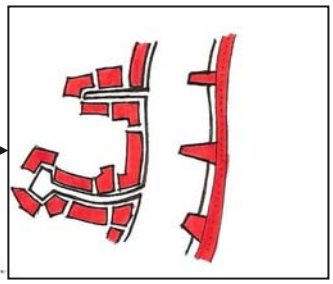


Fig143. Possible Proposal Typology

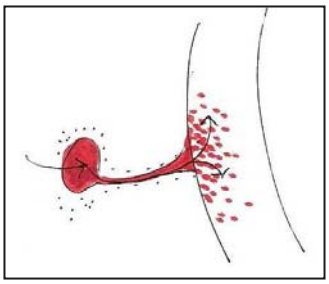


Fig144. Water Calling Feature

This can be done by re-designing the border areas between the city and the river, as seen in Fig. 143. Water can penetrate the city creating small canals or public spaces using water features, or the city itself can create "cape-like" areas in which the buildings enter to the river and take advantage of its views and marine character. This strategy can also be effectuated by designing spaces in the inner city area which by its character serve as "Water Calling Features" (see Fig.144). These can be Water Mirrors, Openings to the river from an inner courtyard, greenery that conducts the eye into the water, or the planning of new streets and buildings that serve as direct axis into the water.

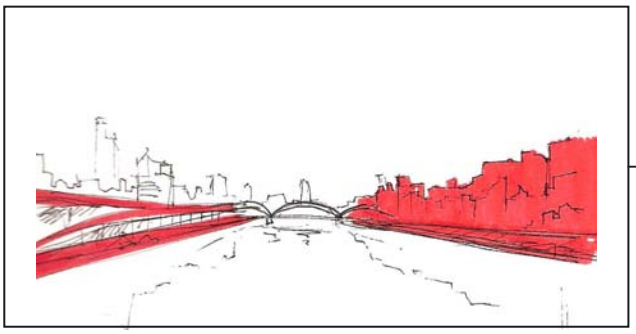


Fig145. Existing Typology

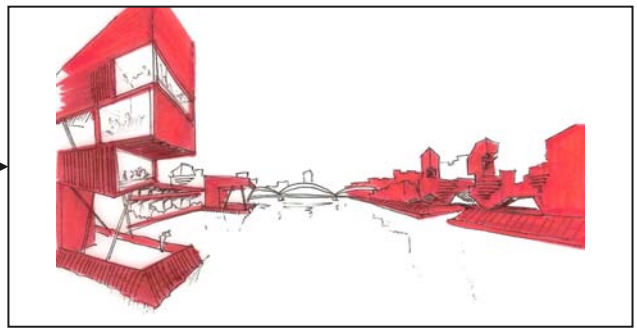


Fig146. Possible Result

2. Public Spaces & Open Spaces

This topic is common to all river scales and probably the most important of all. Concerning their formal aspects river adjacent public spaces can take several shapes and typologies: the typical promenade, the water deck, the square (which can be an inner square or a water square depending on the function attributed to it;), the playground, the green area, etc. All of these can be applied along the river banks or in the city's inner part in order to serve as connectors. However, an important point is to never create public spaces without some activity/function attached.

Promenades are made for walking, running, seeing or even resting, but to design a linear road and to design a promenade are two different things. The design of public spaces should always take in consideration the functions around it: Why do people go there? Should they rest, walk, watch, sleep? Do we want people to shop around the public spaces? Do we want the space to be used at night?. These and other questions are of extreme importance when designing public spaces and their surrounding buildings.

Do we want the space to feel tight, do we want it to feel grand? Do we want to hide the water view leaving just a little peak or so we want to show it in all its "grandeur"? After answering these we can advance to the next set of questions: How is the topography? How much insulation do we have? Do we need trees or do we need sunshine?

Questions related to the climate and immediate environment are crucial to achieve a greater level of comfort in public spaces. Places prone to have strong winds require a different design than places where the air is stale and moist.

Last, but not least: Urban Furniture and Illumination. A city without furniture and illumination is like an empty house and public space design should take these very seriously. Resting spaces should be equipped with proper benches, trash bins, water fountains, tables for picnic, barbecue areas, etc. Sometimes, places to sit down can be incorporated in the design of the space: stairs, support walls, outdoors auditoriums, green areas, etc can all be designed to achieve several performances: the public space in itself and its usage by the common passenger. Illumination should also be carefully chosen: vertical illumination with a higher or lower degree of brightness according to the typology of the space, wall or greenery illumination, and horizontal illumination usually used to mark directions in the pavement or to create different moods for the walker.

As seen above, public space design can be endless and for this scale typology the possibilities are infinite when respected the basic rules mentioned.

3. River Views from the City

This topic is related with Topic Nr.1 in the sense that its goal is to increase the sense of proximity with the River. The present situation is of continuous blockage by buildings along the River and views are important to inform the pedestrians that the river is near. In this sense River Views can be enjoyed from a higher point of view (e.g. buildings), medium (e.g. esplanades) or low (e.g. streets) or from other words, Private, Semi Private and Public Spaces.

Private and Semi Private Spaces are harder to control since their allocation and design obeys to basic economic market rules. However, when building along the river, views should be taken in serious consideration. The public sphere is somehow more controllable and there are several ways of showing the river to the common passer by:

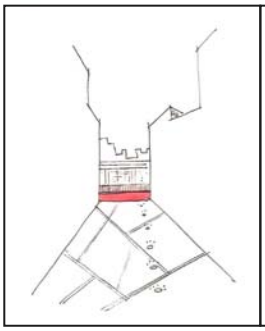


Fig147. Pavement Design

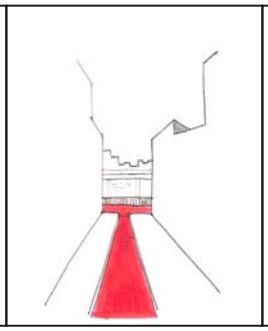


Fig148. Water Feature

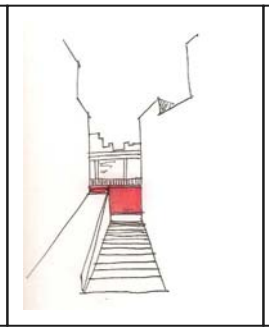


Fig149. Topography Manipulation

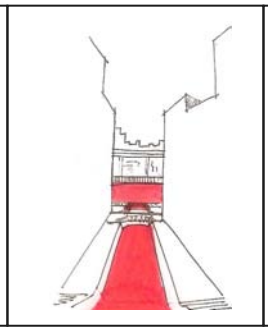


Fig150. Canal Design

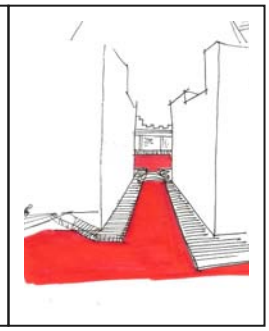


Fig151. Water Square & Decks

These openings can take several typologies as seen above: simple street opening with pavement design, the addition of a water feature (water mirror, fountain or splashing water squares), the manipulation of the topography (addition of stairs, ramps, hills and its contrast with flat spaces) the addition of a canal coming from the main river (with streets on both sides or only one, with small bridges and proper illumination) or the addition of a "water square" to the previous example creating inner water spaces protected by the city but still connected to the main water body. These typologies can then be manipulated in order to provoke different feelings in the user: proximity, relief, security, excitement, etc. While walking along the inner streets parallel to the river, nowadays it is almost possible to ignore completely the fact the Sumida exists just next to the buildings between us, but these small strategies can completely change the character of these inner streets and the way people look to the river.

4. City Views from the Water

Because of its scale and its history of transporting goods, the Sumida River still has a considerable amount of boats floating up and down its waters. For this reason it is admissible to say that a revival of pleasure boats and the increase of boat transportation is possible. In this sense, the city viewed from the water should also be a matter of concern.

Right now the views of the city have a predominant linear condition, from the buildings themselves and from the Riverbank's protection walls. According to the river size, this type of linearity translates the river into a uninteresting place in which it seems impossible to create diversity.

This kind of diversity can be achieved by an altercation of building density in area and height and by a more dynamic riverbank design. A dull riverscape can be transformed into a vibrant landscape in which, riverbank, building density and a mixture of open spaces achieves a more balanced status.

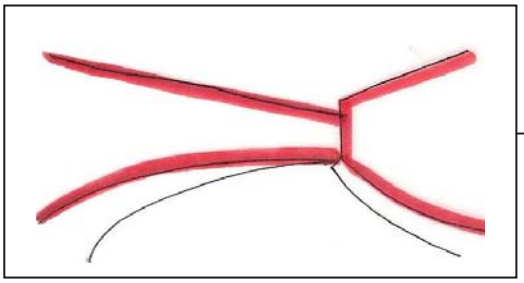


Fig152. Typical City View

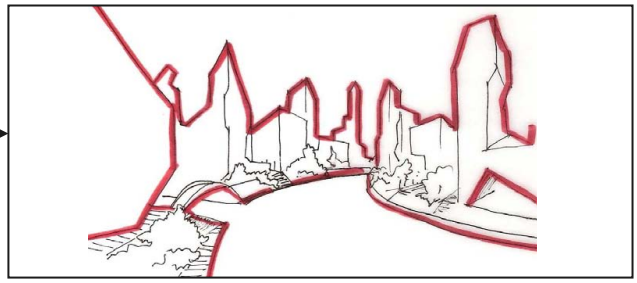


Fig153. Dynamic Landscape

5. Flood Friendly Strategies

Because of its size and water flow, Scale I Rivers are prone to floods in a yearly basis. This flood risk is the main reason for the underdevelopment of riverbank spaces and its a major setback in designing these areas. However one rule that can create diversity in flood risk areas without compromising them and the people that use them is to create temporary structures and/ or activities which can be done weekly, monthly, seasonally or yearly.

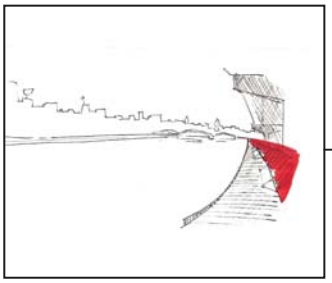


Fig154. Typical Perspective View

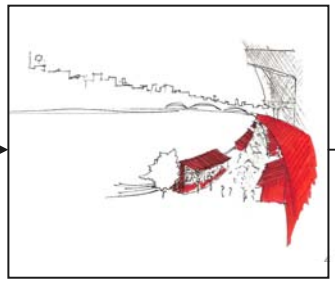


Fig155. Monthly "Floating" Market

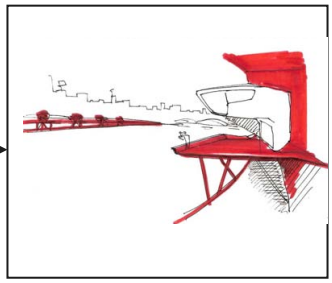


Fig156. Suspended Esplanades

Among the possible activities are season festivities like fireworks or culture related festivals, weekly or monthly street markets, concerts, and so on (Fig155). These activities can bring a new life to the river and the temporary structures that support should be designed to be easily removed when necessary.

Another example of spaces that can be designed to resist flood are suspended promenades or esplanades that bring activities to the river while protecting themselves from the water raising (Fig156). In some cases the existing structure can be used as a support basis, like the protection walls or the elevated highway. In the case of the Sumida River the existence of a kind of "homeless territory" where people live their lives in tents along the riverbank gives it a unique character. The design of temporary structures or suspended spaces can also be done in accordance with these people, who clearly belong there and are a part of the river landscape.

6. Greenery & Topography

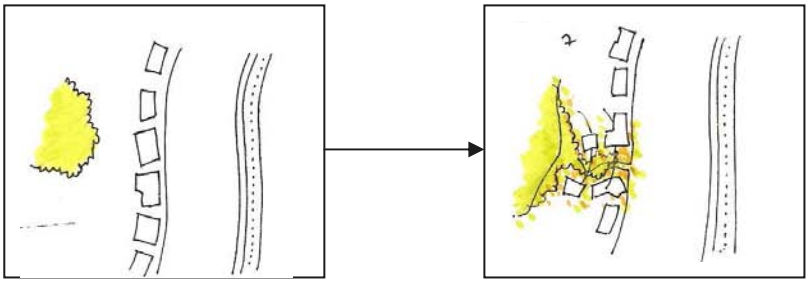


Fig157. Park & River Existing Situation

Fig158. Recomended Greenery & River relation

As the figures above illustrate parks and river are usually not connected. Linear parks along the riverbank exist but they do not serve as connectors between urban space and riverspace, being for that reason refrained. The desirable situation would be as the one illustrated in Fig.158 where parks and green areas in the hear of the city are connected to the river in a transversal way. This connection can continue to be a green space, it can be done by topography manipulation or by street design.

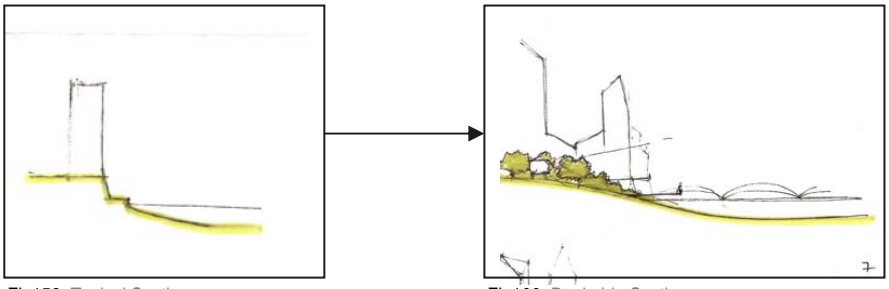


Fig159. Typical Section

Fig160. Desirable Section

Topography should also be manipulated in order to create a more smooth transition between city level and water level. When possible, a buffer zone should be continuously designated along riverbanks in order to be used just as green space. In this way a more smooth landscape design is possible while also putting aside flood risk among buildings along the bank. With the predictions of decreasing population for Japan and Tokyo, it is actually possible a solution in which river banks are constituted as protected areas in order to restore its original or approximate design and its peculiar ecosystems.

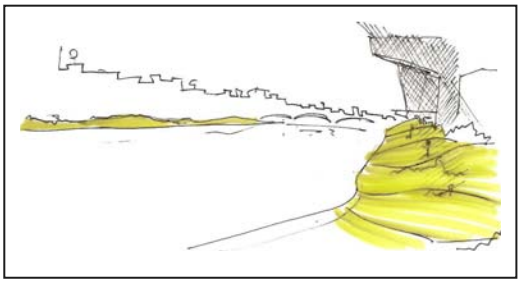


Fig161. Topography Manipulation and Bank Redesign example

7. Boats & Marinas

As mentioned earlier, boats are a constant presence along the Sumida River but its presence is weak if we compare Tokyo with other world capitals. Marinas and ferry terminals are quite common in many cities and in Tokyo this reality is still far away from becoming true. However the Sumida has a potential to recover its marine character and it should invest in pleasure boats with restaurants and entertainment places, transportation boats along Sumida and inner Rivers, ferry boats to cross the river and boat terminals that constitute landmarks to the riverfront. Marinas are another possibility and it should be encourages since it brings a new character into the River and a new status since boats can be recognized as a symbol of the city's cosmopolitan environment.

Scale II:

1. Increase Water and City's Contact Surface

Like in Scale I, increasing city and water boundary spaces is fundamental and for that it is necessary to open transversal spaces along the river banks.

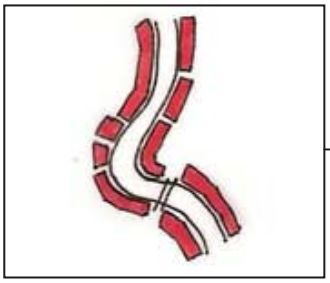


Fig162. Typical River & Urban Structure

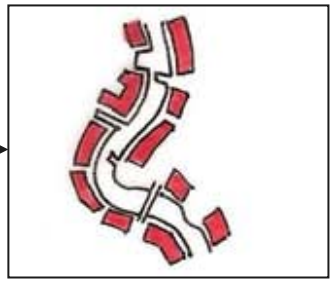


Fig163. Desirable Boundary Typology

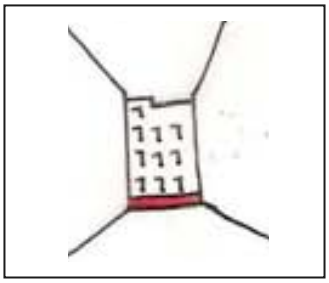


Fig164. Normal Opening

These openings, like in previous examples will increase the visual and physical proximity between the normal pedestrian and the river and the vacant space can be designed in several ways:

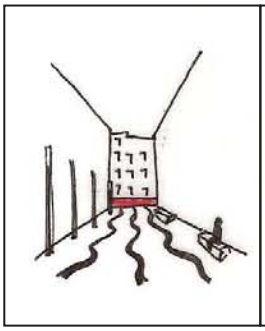


Fig165. Pavement & Furniture

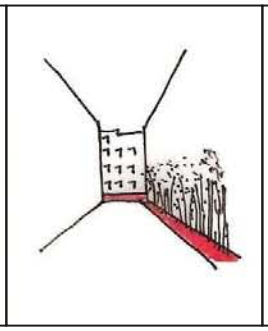


Fig166. Water & Greenery

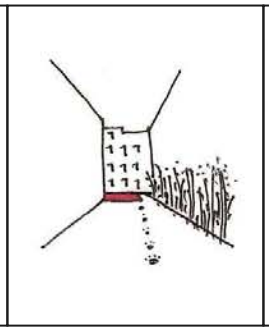


Fig.167 Greenery & Lighting

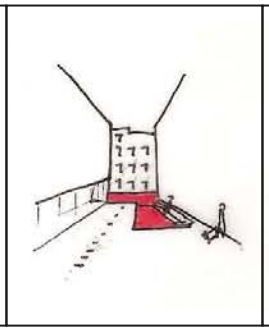


Fig168. Building & Water Space

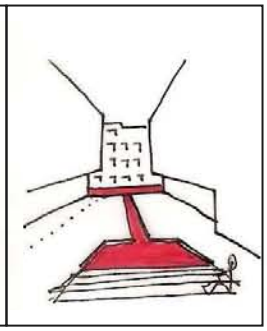


Fig169. Canal or Water Mirror

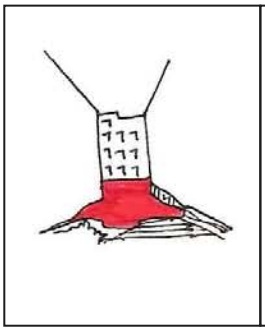


Fig170. Full Canal

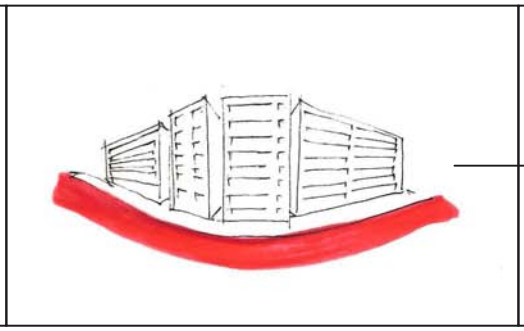


Fig171. Typical Building Blockage

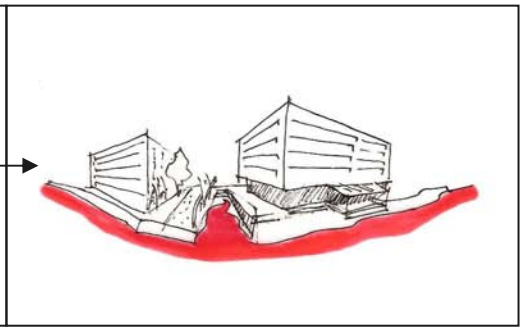


Fig172. Water Openings

These spaces can be manipulated just by pavement design and furniture placement, by creating directional spaces with water and/or greenery, by applying pavement illumination and wall greenery, by redesigning the street building's façade in order to create functions to attract people, by adding water features to esplanades and creating resting spaces, by fully open canals visible from inner streets, and so on. These examples are only a few among the possibilities of street/square design and they should be fully explored in order to improve these spaces. The existing "Wall of Buildings" along river banks would open and create spaces until now practically inexistent along rivers of this scale.

2. Public Spaces & Open Spaces

As in the previous scale, the same rules are applied, however, in this scale there is no need to keep both riverbanks completely public. The fact that there are public and private spaces also brings richness to the river area and the design of dull, long river promenades should be avoided in a large scale. Diversity is always the key word.

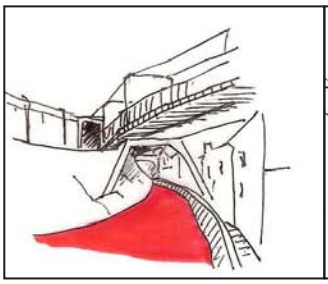


Fig173. Existing View

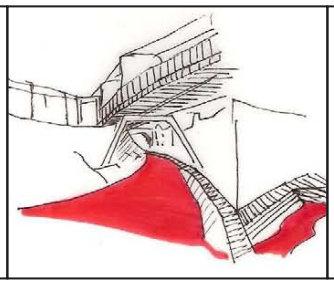


Fig174. Promenade & Deck

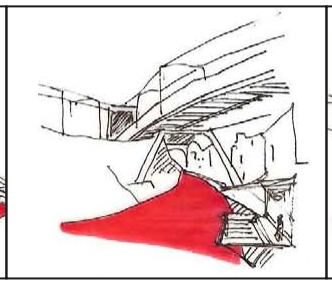


Fig175. Suspended Decks/ Esplanades

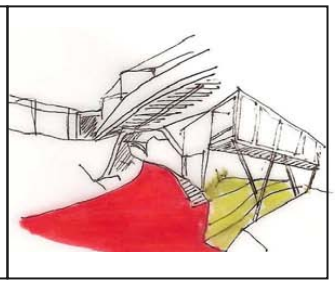


Fig176. Topography & Building Design

In the figures above it is possible to see how the same space can have a complete distinct character by the manipulation of its open spaces. Simple promenades should be used in areas where people feel a pleasant atmosphere to stroll like green areas, shopping areas, etc (Fig174). Promenades can incorporate also different pavements, different levels, bicycle paths, green paths, it can incorporate trees and greenery or have a dry landscape around it, there is no dullness in a well designed promenade. Suspended esplanades increase the contact with the water and create an attraction to the transient walker (Fig175). Esplanades can be semi-private when a shop, café or restaurant has its right of usage, but when attached to a promenade it should never be blocked and kept closed in order to keep the flow of pedestrians along the promenade space. These suspended spaces can incorporate pergolas or some protection from the sunshine or be completely open. They should have some sitting spaces to serve as resting spots and illumination should be appropriate to its urban character. Finally, suspended buildings can serve as protection for ramp squares or hills that connect to the river. Building design should be innovative in order to create a good balance between the public and private sphere with the riverscape (Fig176).

3. City Views & Bridge Views

Like the previous Scale, the view of the river and the surrounding city from bridges or boats is possible. According to this it should be possible to master plan the areas along the river in order to create a diversity of building heights, open spaces and greenery. Once again the problem is the dullness of the riverscape and by simple rules applied in a linear way along the banks it is possible to create different typologies of buildings and their relation to the water.

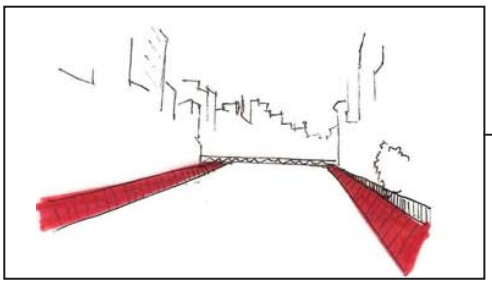


Fig177. Typical River View

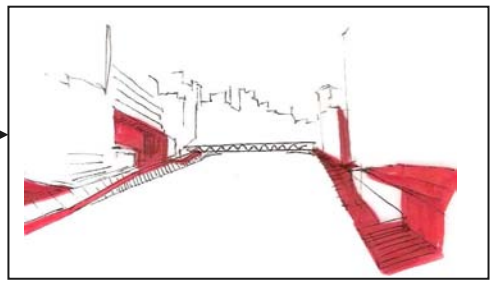


Fig178. "Breaking the Lines"

4. Greenery & Topography

In this Scale Typology it is common to find that greenery is used in a linear way along the banks. This typology is also common in the following Scales and it is one of the great problems of the riverfront in Tokyo. Trees are planted in sequence along the river without much care for diversity of species or great maintenance. Greenery is very often used as a physical barrier between pedestrians and the river space and for that greenery control is of much importance. The most basic rule is to refrain planting trees or greenery in a linear, sequential way along river banks for a long extension. It is preferable to create transversal greenery and tree lined streets which guide the pedestrian into the waterfront spaces, instead of creating a green barrier along the bank. Just because it is a green wall it doesn't make it good, it is still a "wall".

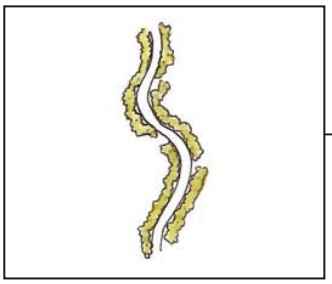


Fig179. Typical Tree Alignment

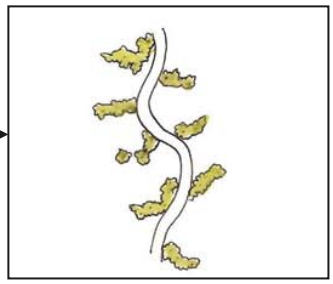


Fig180. Preferable Greenery Displacemnet

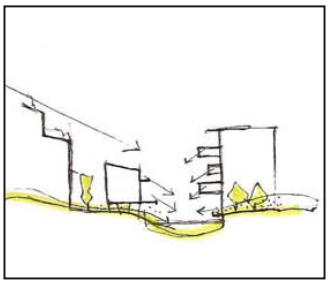


Fig181. Preferable Section Typology

Along with greenery placement and control, topography also plays an important role in connecting the river and the city, but this option is nearly ever used.

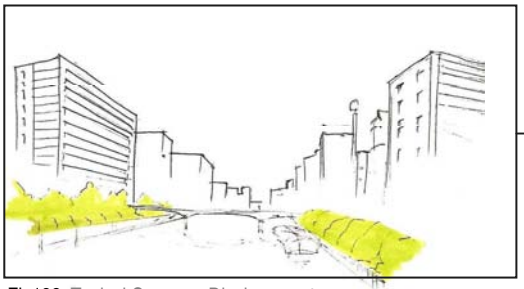


Fig182. Typical Greenery Displacement

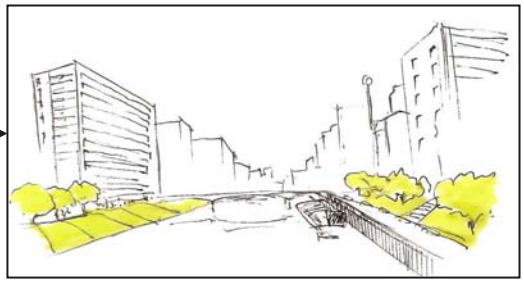


Fig183. Preferable Greenery and Topography Arrangement

This abundance of greenery happens also in cases where no greenery is actually preferable, like in spaces where the river is covered with the elevated expressway. In this case it is preferable to reduce greenery and manipulate topography in order to create a better insulation into the river.

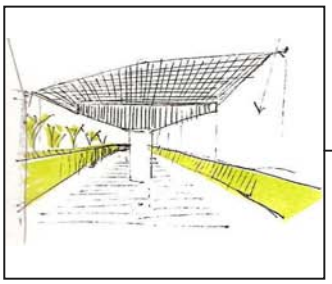


Fig184. Typical Covered River

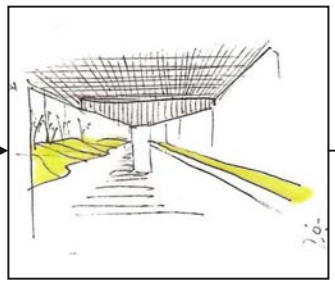


Fig185. Promenade & Landscape

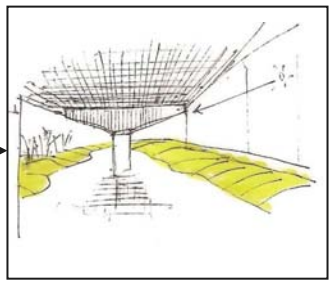


Fig186. Landscape in Both banks

It is important to remember that openness to the river is lacking in Tokyo's rivers and too much greenery is not always good. Control and placement as well as species choice should be carefully studied in order to create pleasant spaces in which sunshine and shadow co-exist and in which trees do not play the role of visual and physical blockers.

5. Buildings

For Scale II the focus on building typology should be on 1.Facilities, 2. Commercial, 3. Housing and 4. Office in this order. Most of these places are already very dense in terms of Office area, so the focus should be in Facilities like schools or Day Care Centers and Commercial buildings, big scale or small scale according to the local character and area.

Along this scale typology housing area is low and for this it should be considered. After the place achieves a certain balance between Office, Facility and Commercial spaces Housing area is of extreme importance since without it there is no Night/Day balance and rivers and its neighboring area should incorporate both typology's buildings.

6. Flood Control Strategies

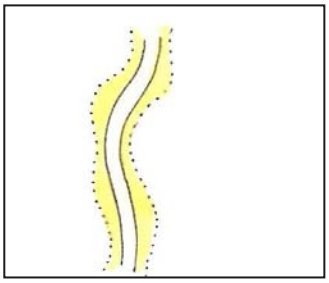


Fig187. Buffer Zone

In most European countries rivers constitute an opportunity to create a natural environment inside the city, but it also constitutes a threat, mostly of flood. For this reason, urban regulation designates a buffer zone along the riverbanks in which high density buildings are not permitted. In these areas, which in some cases become protected areas, most constructions are light-type or temporary ones, pavements cannot cover the whole ground to permit water passage and most of these areas become parks or natural reserves in some cases.

In Tokyo it is well known the shortage of editable land, and for that this rule has trouble in being applied. The fact that the city planning doesn't have a strict public regulation code and is left to private speculation is another reason. However, a buffer zone should always be created and designated as "flood danger area". The simple formulation of this rule can give space in order for Tokyo's future development to consider river space as a protected area in which construction should be controlled and left to the public realm.

7. Boats & Marinas

Like in the previous Scale strategies, it is also possible to have boat recreation, transport or marina environments. Kandagawa still has boats along its banks and Shibaura Island Area is extremely favorable to marina-like spaces. Not only boats can be used for recreation but mere floating decks or suspended spaces in which the contact with the water is very close is possible in this Scale Typology due to the water stillness and depth.

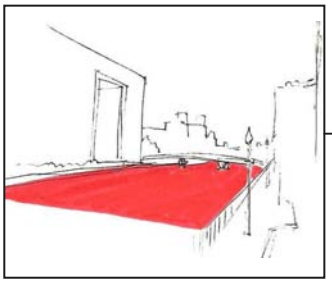


Fig188. Typical Section View

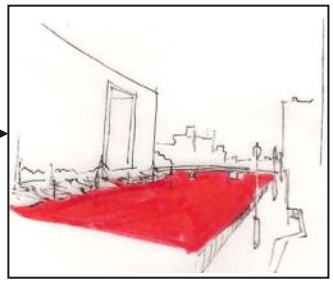


Fig189. Small Marina

Scale III:

1. Increase Water and City's Contact Surface

Scale III rivers are very common and probably the one's that should be more carefully designed, since they penetrate parts of the city in which residential neighborhoods often exist. In the previous scales, office and commercial buildings have a bigger percentage and for that the possibility of investment is also bigger. However, in residential neighborhoods, spaces along the river can constitute a major asset for the inhabitants and their power in deciding what to do and how to do it is of major importance. Like in previews scales though, river spaces are usually trapped between "building walls", roads or too much greenery and bad topography arrangements. For this reason, once again, is of major significance to open spaces straightly to the river.

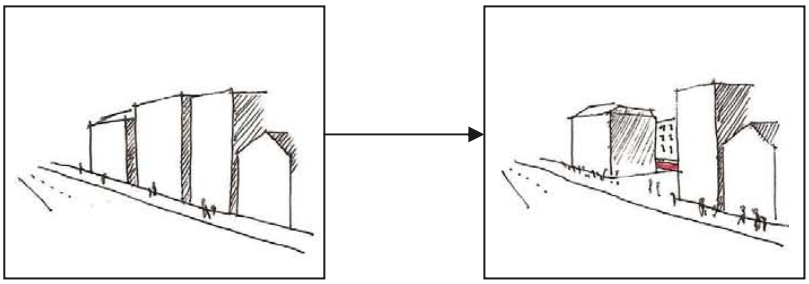


Fig190. Typical Street Structure

Fig191. Basic Opening Into the River

As seen above, the basic rule of this topic is to open spaces directly into the river. These spaces can take then several scale and formal typologies, and the ones focused here are the basic narrow street type, typical in Japanese neighborhoods (Roji) and the wide street type with a more public character.

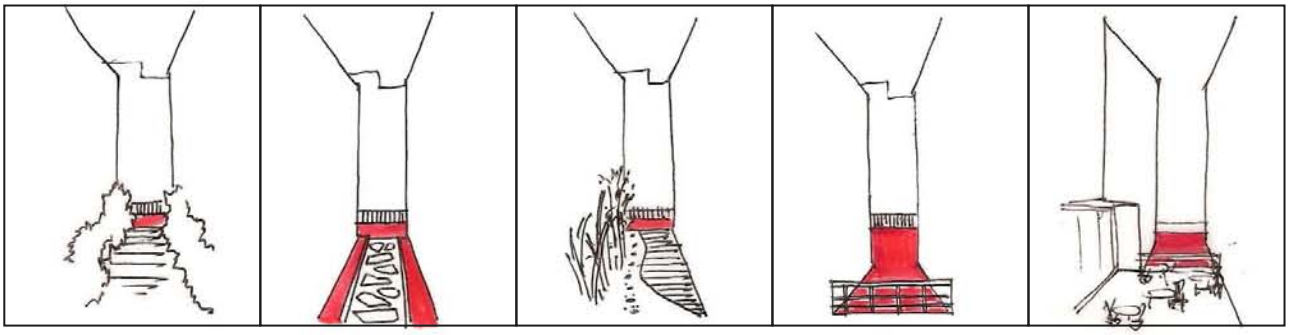


Fig192. Typical "Roji" Fig193. Water & Pavements Fig194. Greenery & Lighting Fig195. Canal Type Fig196. Small esplanade

In the "Roji" Type Opening there are several basic ways of designing the access to the water: keep the typical semi private character of the street with normal pavement and private greenery serving as buffer zone between public and private, Introduce typical Japanese water features dividing private and public space with pavement distinction, using greenery and pavement illumination to direct people into the water, create a small canal directly into the inner street or rearrange the adjacent building's first floor in order to create some esplanade with a water view. All these typologies can serve the purpose of opening the water view into the inner neighborhood streets but they also can serve as physical connectors into existing river spaces like promenades or decks.

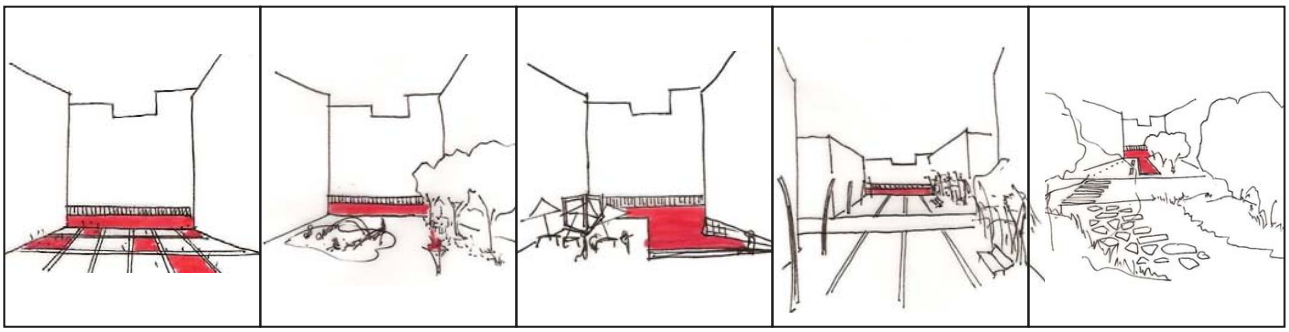


Fig197. Square Type Street Fig198. Playground Space Fig199. Water & Esplanade Fig200. Street Conection & Urban Furniture Fig201. Garden Concetion

In the Wide Opening Typology Spaces can take a more public character: Through pavement design transforming a street in a square type space, by adding greenery and playground spaces facing the water, by transforming the adjacent building's first floor into semi public spaces and adding water features directly to the inner streets, by connecting other streets giving public continuity deeply into the city (through furniture, illumination, greenery, pavements, etc), by connecting inner green areas directly into the water and opening views from inner gardens.

These two basic opening typology can serve as a basis to infinite connections with the inner city and by its application the river visual connection becomes more clear and for that more close to people.

2. Public Spaces

Public Spaces along a River can essentially be divided into two major categories: spaces to move and spaces to rest. Among spaces to move, promenades are probably the most significant formal typology and they can take several shapes. Amongst spaces to rest, esplanades, hills, decks, and so on can be named. With these basic types in mind it is possible to play with different shapes, levels, materials, etc to create a diversified range of public spaces along the water.

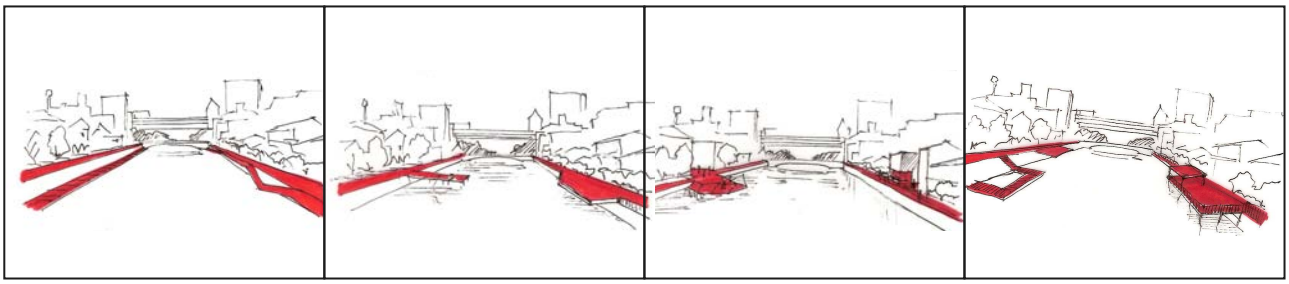


Fig202. Promenade Manipulation Fig203. Deck's Typology Fig204. Esplanades or Resting Hills Fig205. Walk & Rest Mixture

3. Buildings

Buildings along the water are already a constant and the most common way of allocating them is along the river bank, becoming usually great barriers avoiding the connection between inner neighborhood and the river spaces. Besides the typical building distribution, other typologies can include "band type" buildings, Suspended Buildings, Buildings in the Water or Isolated buildings.

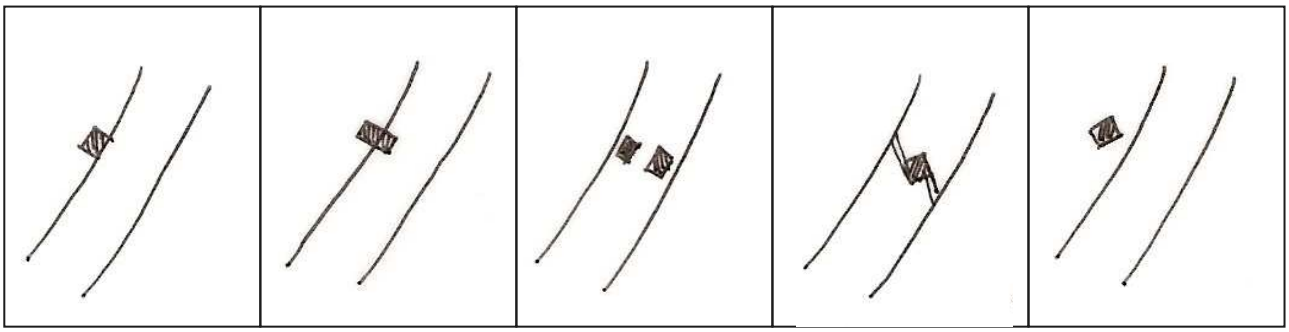


Fig206. "Band Type" Building Fig207. Suspended Building I Fig208. Suspended Building II Fig209. Building in the Water Fig210. Isolated Building

"Band- Type" Buildings are usually allocated along the river bank between other buildings. Instead of the normal box type building, these should take care of the surrounding heights and the pedestrian connection directly to the river (Fig212).

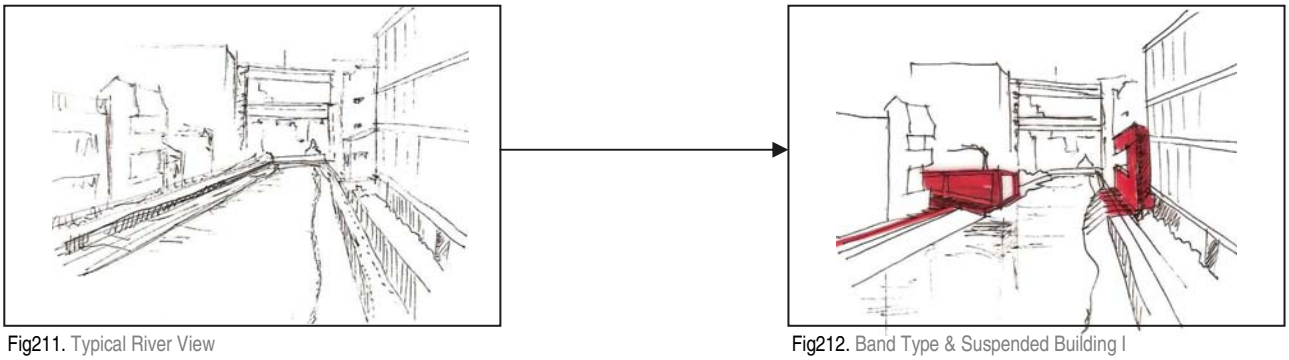


Fig211. Typical River View Fig212. Band Type & Suspended Building I

Suspended Building Type I is different from the band type in the sense that it enters directly into the water space and creates a new feeling for the user, new water views from the inside of the building and a new perspective view to the river from the outside (Fig212).

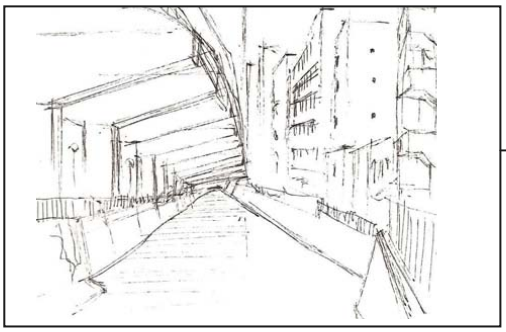


Fig213. Typical River View

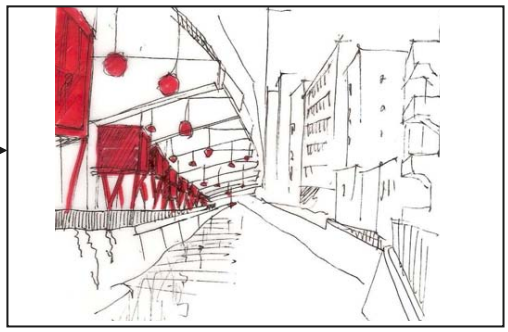


Fig214. Suspended Building II

Suspended buildings can be applied in areas where the Elevated Highway Structure can serve as a support for small structure buildings (Fig214). This typology can bring a new life to covered rivers and change their isolated character into a vibrant nighttime atmosphere with “flying” spaces over the river become an attraction.

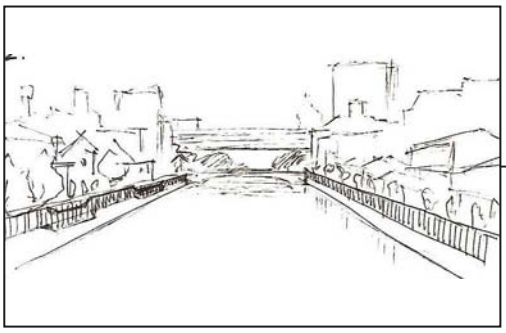


Fig1215. Typical River View

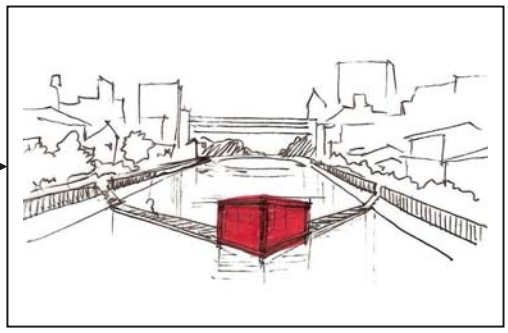


Fig216. Building in the Water

In some cases, it is possible to create buildings inside the water. In these cases it is necessary to confirm water levels, flood risks, etc, in order to be possible to do this. When possible, this typology can create complete different urban spaces in people can be completely surrounded by water and have a unique sensation concerning water spaces. These buildings should be small, and include functions like coffe shops, restaurants or shops and public spaces where people can enjoy both sunshine and shadow, rest, fish, etc.

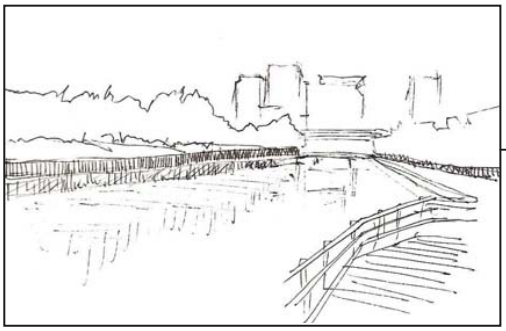


Fig217. Typical River View

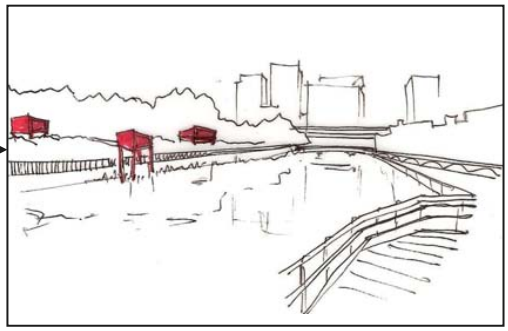


Fig218. Isolated Buildings

Isolated buildings can serve as reference points from the outside viewer and can create view into the river from the inside unique in their surrounding areas. They should be used in open space like parks or big squares in order to create an impact in the public space and the river view.

4. Parks, Greenery and Topography

This topic repeats itself from the previous scale, and the strategies are basically the same. Greenery should be controlled and well applied in order not to become a visual and physical barrier and topography manipulation can become a great asset connecting parks with the river or the city itself with the river spaces.

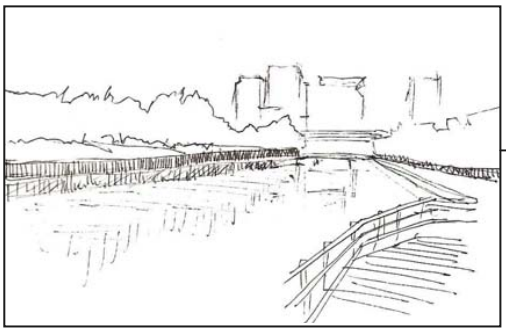


Fig219. Typical River View

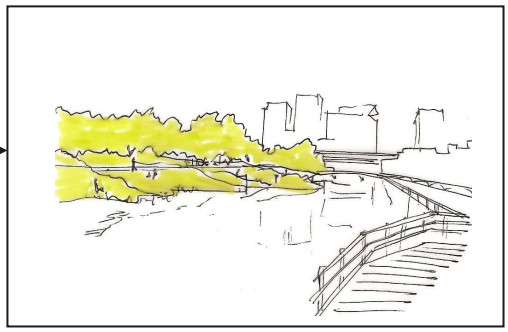


Fig220. Topography Manipulation and connection to the water

5. City and Water Connections

This last topic is similar to the first one in the sense that the goal is to provide examples of how to connect the city and the river. But contrary to point one, this connection is not direct. Instead of only providing openings along the river, this connection is deeper in order to provide subtle orientation from important points from within the city: parks, significant facilities, shopping streets, etc.

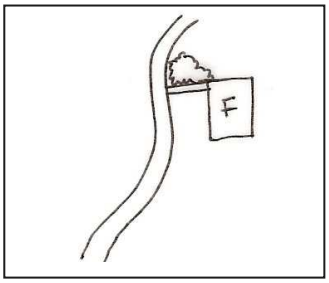


Fig221. Facility and River Conection

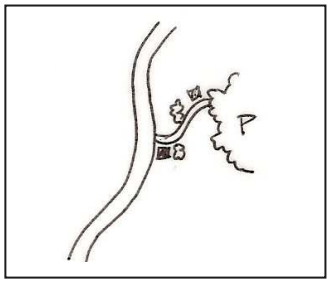


Fig222. Park & River Conection

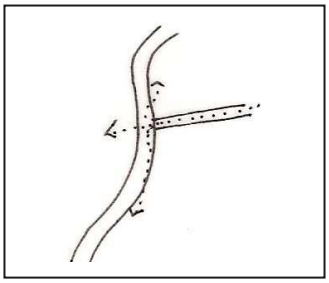


Fig223. Shopping Street & River Conection

Although this is not a direct connection and at times it can be completely disconnected from one point to another, there are ways of keeping a uniformity in space in order to guide people to the places we want them to go. This can be done by pavement design, linear shop design, tree and illumination alignment, building alignment and pavement diferenciation, etc. The examples shown are very basic and are to serve as a starting point to the way designers think of urban connections between far away elements.

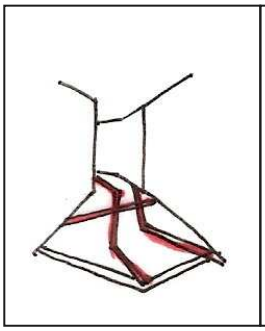


Fig224. Pavement Design

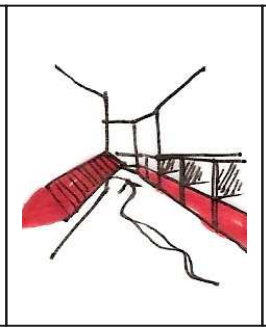


Fig225. Shopping Street Design

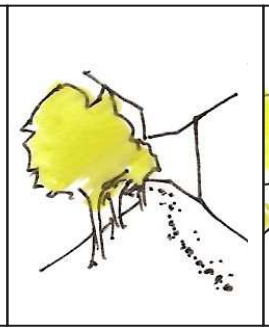


Fig226. & Fig226. Tree & Illumination Design

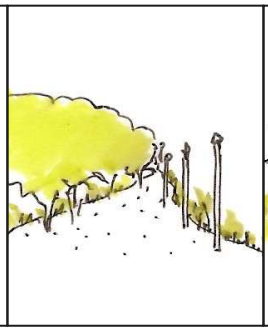
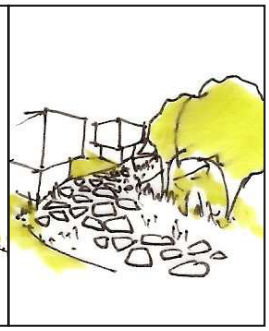


Fig227. Building, Greenery & Illumination Alignment



Scale IV:

In this Scale we can find two Types of Urbanity: a more suburbian one (Type I) where green areas are abundant and open spaces are constant and an urban type (Type II) in which building density is quite high and the river bed encounters itself trapped between massive concrete blocks.

Type I:

1. Topography and Greenery Control

In this typology Green spaces are usually very dense becoming visual barriers to the pedestrian. This density also provokes a sense of isolation between city, greenery and river which can provoke insecurity in these spaces.

For this reason, cuts in greenery are essential to improve city and river connection and to bring a sense of safety to these places that lack activities and for that people (Fig228). Topography is another factor that can completely change the image of the river bed: nowadays most waterways are trapped in concrete walls and become static in their design. Topography manipulation and the creation of buffer zones can bring some dynamism to the river bed and its adjacent spaces increasing the possibilities of creative spaces along the river (Figs229, 230). Not only topography can change the spaces along the river bank, it can change the river itself. In shallow rivers it is possible to change the linearity of the river bed creating a more organic shape which will reshape water flow and the view of the river from bridges and promenades (Figs231, 232, 233, 234).

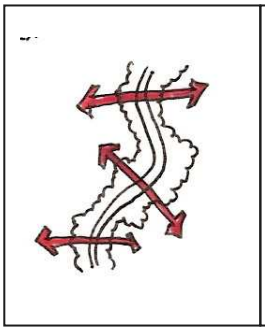


Fig228. Greenery Cuts

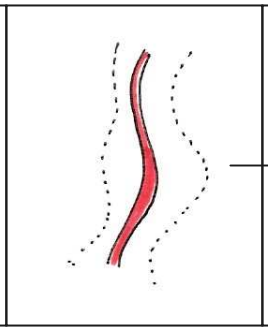


Fig229. Creating Buffer Zones

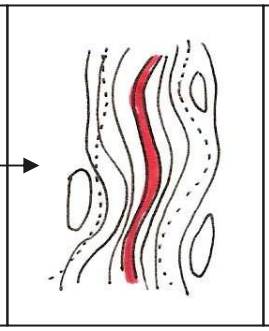


Fig230. Changing Topography

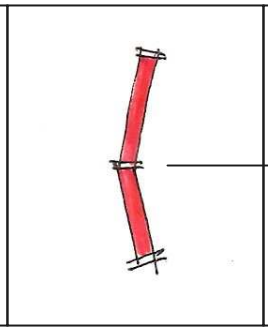


Fig231. Normal River Shape

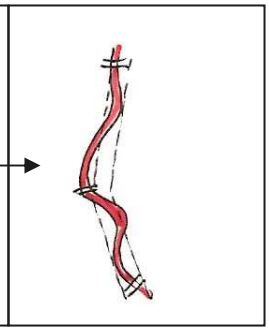


Fig232. Redesigning Riverbeds

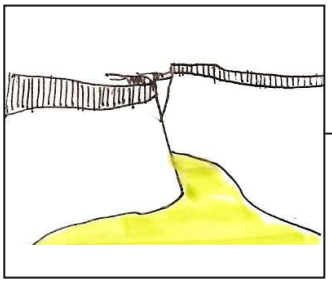


Fig233. Typical Riverbed

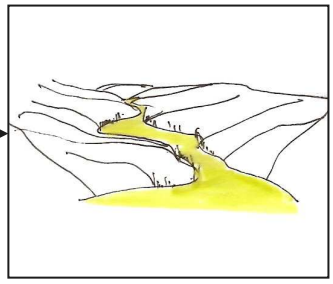


Fig234. Riverbed after Topography manipulation

2. Provide Activities

In these typologies, activities are lacking extremely, increasing the insecurity feeling. Although there are activities near river spaces, they are usually not directly accessible visual and/ or physically. The spaces in which functions and activities can be more easily allocated are bridges, and from there they can expand along the riverbanks. After creating openings among the dense greenery, the second step is to create reasons for people to go there, being it shopping, living, working, etc.

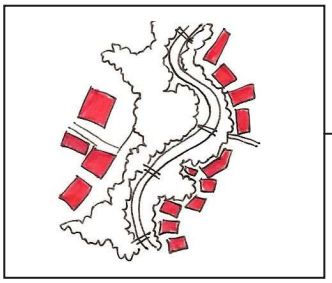


Fig235. Typical Urban Structure

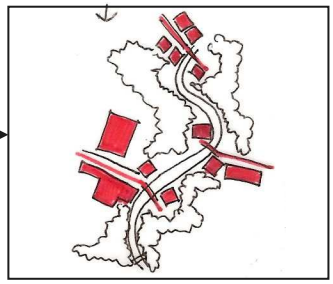


Fig236. Desirable Urban Structure

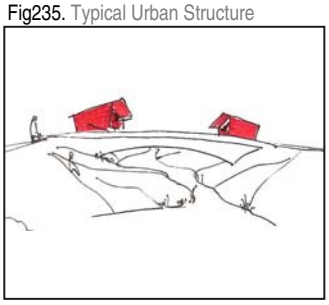


Fig237. Functions in Bridges

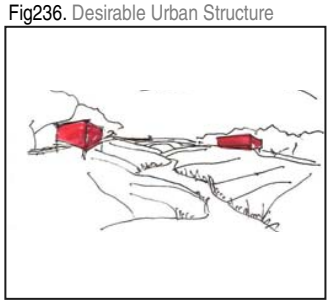


Fig238. Activities Along the Riverbank

3. Public Spaces

Public spaces for this Scale are similar to the previous scale, however, since greenery is abundant and open spaces are more easily provided, public spaces can take a more bucolic character: green hills and fishing areas, small farms or rice fields are also possible and neighborhood people could be responsible for the maintenance of these places. Community spaces should be encouraged and instead of a more urban character shown in the previous Scale III Public Space examples, a more rural image is possible and desirable in order to improve a contact with natural elements, being it the river, greenery, animals, etc.

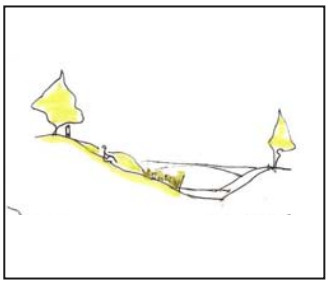


Fig239. Desirable Section

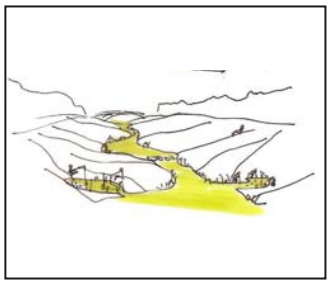


Fig240. Desirable River View

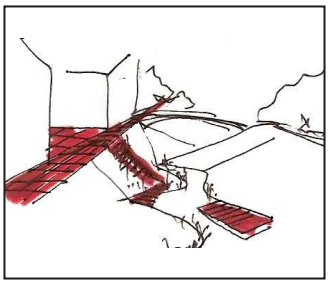


Fig241. More Urban Public Spaces with different levels

4. Buildings

The existing urban tissue in these areas seems to avoid direct contact with the riverbank and that is to be avoided. Buildings should face the river and provide direct access into it, visual and physical. Building scale should be controlled in order to increase density when distances are longer from the riverbed. When topography is transformed along the riverbank it is also possible to create small buildings “buried” inside the hills, visible only from the opposite side creating diversity of spaces and a surprise factor lacking in these waterways.

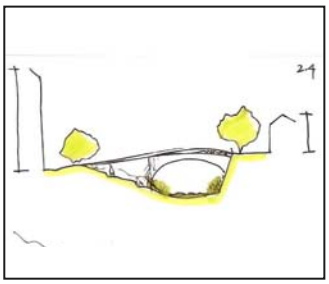


Fig242. Building Scale Control

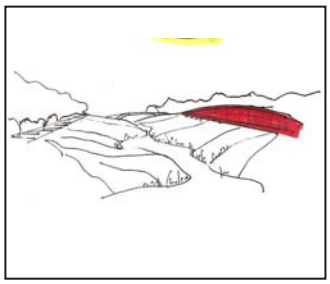


Fig243. “Hidden” Buildings

Building typologies in previous Scale examples can also be consulted and used in these spaces, focusing on “Band” Buildings, Suspended I Buildings, Isolated and Buildings in the Water.

Type II:

1. River and City Connection

As mentioned before, these riverbeds are constantly trapped between concrete walls, their adjacent buildings and it is practically impossible to feet the presence of the river even from adjacent streets. Buildings form a huge blockage into the river and this situation has to be changed in order to incorporate the waterway into the urban envolving tissue.

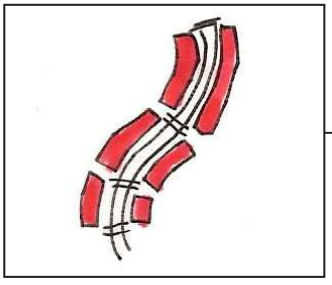


Fig244. Typical Urban Tissue

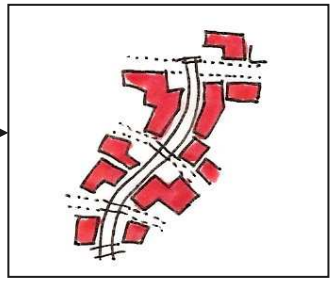


Fig245. Optimal urban Tissue

Another typical river blockage occurs often in these areas when roads are allocated in both sides of the river choosing cars in detriment of pedestrian. Frequently tree alignment increases this situation by blocking the view and access to the river.

When possible, these roads should be converted into pedestrian only areas in order to not only attract people but also investors which can allocate there confortable housing or shoping areas.

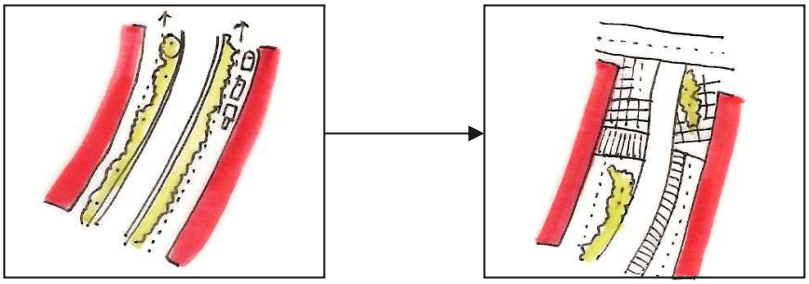


Fig246. Typical Road & Tree Blockage

Fig247. Desirable Urban Tissue

2. Greenery and Topography

This topic is similar to Scale III and strategies are similar and consultation of the previous ones is fundamental. Tree alignment is too dense in most areas where trees exist and their maintenance is essential, otherwise trees become obstacles instead of assets for the river space. Topography is also an important issue, however, for being dense urban areas it is difficult to manipulate river bank levels so easily and in previous type I examples. In some cases it is possible to redesign the riverbed and riverbank by the usage of artificial hills and this practice should be motivated .

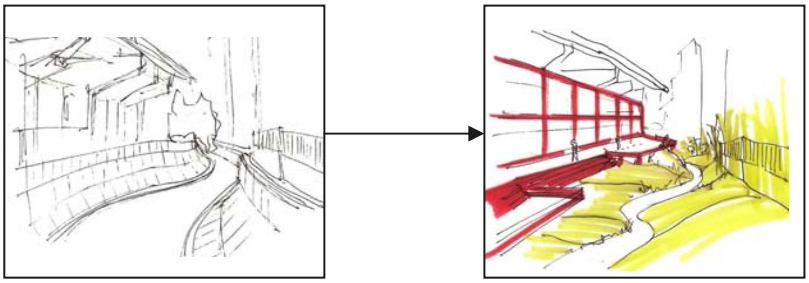


Fig248. Shibuya River View

Fig249. Possible Redefinition

3. Public Spaces

Concerning Public Spaces the situation is similar to Scale III and the recommendations for these should be consulted in this case too. The main goal of public spaces for this typology is to open the riverbed to the city, to increase diversity along riverbanks and to create different levels of spaces. With these three points in mind the possibilities are infinite and carefully choice of materials, greenery or illumination is essential for the success of these spaces.

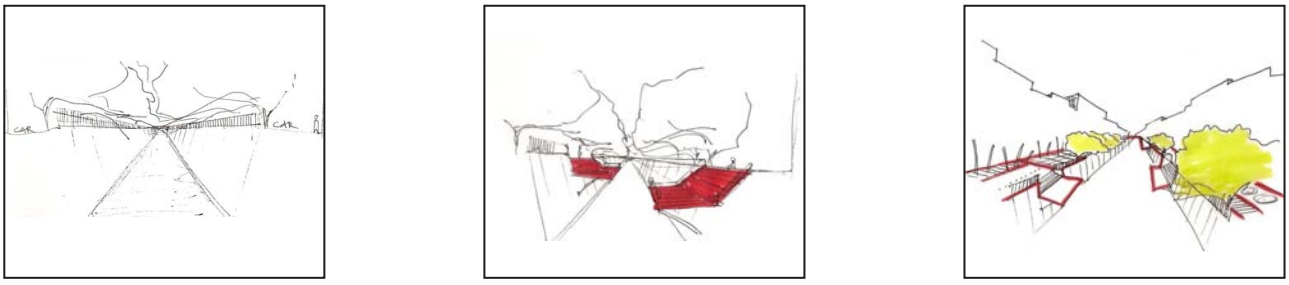


Fig250. Typical River View

Fig251. Possible Redefinition

Fig252. Possible Redefinition