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WATER MANAGEMENT IN THE WATERFRONT REGENERATION

Water is closely related to every human activity and is an inseperable part of our lives. We are made of water and water makes us to be. There is something about the water what will fascinate us. The water as one of the basic nature elements and can be present in three well known consistencies (gas, liquid, stiff). The liquid for is the most natural form for us and can be seen in nature in the form of a river, pond, lake, sea, ocean.

There is always something great about the cities with this strong water element. It is the remarkable coincidence of the unique geographical relation of the cities to their waterfronts on the river, lake or sea harbour. A city with a great river almost inevitably becomes a great city. Great rivers generate great economies, trade and industry and by consequence great art, architecture and a symbolism which reflect great cultures and civilizations.

WATERFRONT DEFINITION

Waterfront is a land, land with buildings, or a section of a town fronting or abutting on a body of water (http://www.m-w.com).

A waterfront is the boundary between a body of water, such as a lake or river, and the land abutting it (http://wx.toronto.ca/zoning.nsf).

Waterfront means the common boundary between a waterbody or watercourse and an area of land(http://wx.toronto.ca/zoning.nsf).

WATERFRONT TYPES

It is possible to recognise several types of waterfronts. The basic division depends from the specific dynamic features of the water (still or flowing water).

Lakes and dams belong to the still water type. They have approx. the same water level over the whole year and are missing the typical dynamic feature of water.

On the other hand rivers, oceans and seas reflect the continuous change in nature through the continuous water flow and change of the water level depending from the day time, month phase as from the year season. Floods, either river or surge tides are inseperable part of them. For a city, floods represent as well the threat but as well as the potential for narture of the landscape.

WATERFRONT REGENERATION

Revitalization of the waterfront has been a principal feature of urban development especially over the last 30 years. Opportunities exist for more experimental approaches that accommodate a wide range of uses and users, and that adapt their form to the uniqueness of their place and topography.

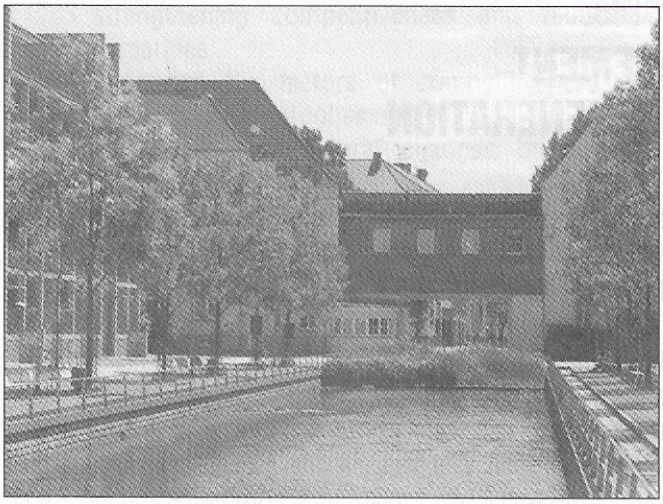
Over the last two decades many cities all over the world have attempted to reclaim their waterways. City officials and developers radically restructured abandoned and underused urban waterfronts; transforming their physical layout, function and use. In the nineteenth century the waterfront was a place devoted to commerce and industry. A post-war era was specified by informational and service economy (leisure, recreation and tourism) followed by the emergence of a wide range of new uses for waterfronts - from parks and walkways, restaurants and casinos to mixed-use and residential projects.

The first attempt for the waterfront regeneration began in America during the late 1950s. The rest of the world followed in 1960s and 1970s. Improved means of transport like the intercontinental jet aircraft, the automobile, and the railway have weakened the dominance of the city port as principal transport centers. Maritime passenger traffic was rapidly eliminating its use. At the same time, there was a need to relocate ports away from the city to achieve lower costs. The combination of large plots of derelict land in the heart of cities with the rapid growth in the service sector industry made waterfront redevelopment a valuable opportunity for city planners and stakeholders.

Developers need to identify opportunities that are specific to their city rather than replicate the experience of others. The aim is to connect the city with the waterfront through different activities such as residential, office, retail, entertainment, and open spaces. The waterfront offers the opportunity to create an urban environment that may not be experienced in other parts of the city. It is a place suitable for experimentation and innovation.

Water is now seen as a vital regeneration tool that can spice up a scheme and change perceptions about a rundown area. But what it is about water that can light a place, and how developers can best exploit it, is something of a mystery. A crucial factior in waterside schemes is to make sure that development is linked to the area's sense of its past. We cannot turn our back on the past, but we need to use it for developing the neew scheme so that it can act as a record of the former use.

For some waterfronts it will mean to make one step back and two to the front. There is huge potential for creating a such development thus will give the comformity not just visitors, but to the city residents as well. Public spaces and walkways must be created very carefully according to the human scale so a pleasant living space can be achieved.



Innenhafen Duisburg - river Rhein cul-de-sac channel

Decission on the main waterfront use after regeneration should be done after carefull consideration of all potentials, opportunities and threats of the waterfront area. There are two main ways we can decide for. One is a single use for the area or creating a wide mixed range of uses on one place. The second option can in the best case work as a small in-/-dependent "city within a city" with all necessary functions already included within the waterfront area. One use area can work in especially in cities where is a strong absence of one function and can be implemented into the waterfront regeneration such as a strong need for leisure and sport area or public space.

Planning is crucial to making waterfront developments work. The key is making the waterfront accessible to the public and ensuring varied building uses. Equally important is a design that specifically addressess water and a strategy for actively using it throgh moorings, wetlands or docks.

In this context the limitation of use of greenfield land and bringing back into use formerly used brownfield land belongs to the priorities, especially where this can take advantage of existing urban infrastructure and contribute to the reduction of urban sprawl, to the achievement of urban sustainability and the preservation of the quality of urban life. The responsibility for achieving sustainable, desirable and competitive urban environments is the most important from the multiple responsibilities of the municipalities.

Climatic and environmental factors aggect open water disproportioately and these must also e planned for. The greater sensitivity of waterside ecologies means that an environmental impact assessmetn is necessary.

Transport projects were, are and will be the key to the success of each plan and project. Not only the areas but communities should be linked to each other as well.

Transport connections are important, as waterfront can often be cut off from their surroundings. It is necessary to create transport connections from all existing means of transport such as, public transport, pedestrian routes and suficient walkways, cycling routes and use the potential of water for water transport not only for leisure. Waterside walkways should not only be accessible for wheelchair, but also must allow views to wheelchair users.

Significant investment in transport infrastructure and services is crucial because new and old communities must be linked to existing ones, and all must be linked to the new employment, educational and service opportunities. The private sector and stakeholders will not invest unless the transport schemes making linkages are provided by the city.

For waterfront redevelopment success, the city must be prepared to finance infrastructure. City officials must be receptive to new ideas and encourage a creative, flexible and entrepreneurial environment for developers and other partners.

We really should be looking for creating sustainable, economic, socially healthy communities. A waterway can be a stage for its commerce, festivals, bridges and ferries. In some places this will involve greenfield development, in others brownfield and in still more a mixture of the two. Overall, successful waterfront regeneration involve more complications than most other developments.

Hydrological cycles

The vast, never ending cycle of distillation and circulation known as the hydrological cycle is a well known phenomenon. The most important feature is its dynamic quality. Water is constantly being replenished. Evaporating off the oceans, it circulates over land masses, falls as rain or snow, percolates below the surface and is returned to the ocean via rivers and lakes. At every point in this movement some water is constantly being returned to the atmosphere as water vapour, to circulate round the earth and fall again as rain or snow. As a result the atmospheric water content remains practically constant.

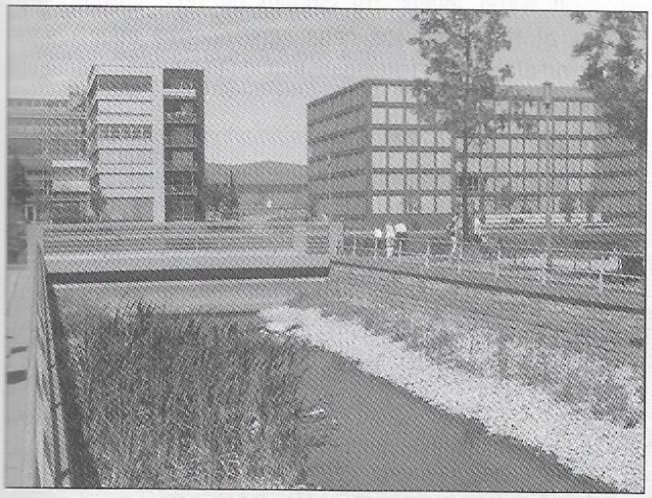
The water which falls over the land as precipitation may follow a number of directions. Some of it is intercepted by vegetation and is either evaporated, or transpired back to the atmosphere; some filters into the soil and underground reservoirs, and some runs off to enter streams, rivers, lakes and marshes on its way back to the ocean.

Water is hidden in all sorts of pruducts used on a every-day basis. Agricultural products, fabricated products, lumber and other products that are manufactured are using huge amount of water. Mountains are bounded with trees that absorb rainwater and keep it underneath theground. After a long while, the water wets the field and is revealed in the form of a subsoil water for a men's use.

The urban hydrological cycle

Urbanisation creates a new hydrological environment. Asphalt and concrete replace the soil, buildings replace trees and the catch basin and storm sewer have replaced the streams of the natural watershed.

The amount of water runoff is governed by the filtration characteristics of the land and is related to slope, soil type and vegetation. It is directly related to the percentage of impervious surfaces. In forest land, run-off is generally absent, as a glance at the undisturbed litter of the forest floor, even on sloaping ground, will show. It has been estimated that runoff from urban areas that are completely paved or roofed might constitute 85 percent of the precipitation. Remaining 15 percent is intercepted by streets, buildings, roofs and walls and other paved and soft surfaces. Piped drainage, designed to carry excess water away from urban surfaces, has two major effects, particularly in those climates that suffer from sudden storms.



Innenhafen Duisburg - ecological drainage system, water filtration

SUDS - Sustainable Urban Drainage System

Sustainable drainage is a concept that includes long term environmental and social factors in decisions about drainage. It takes account of the quantity and quality of runoff, and the amenity value of surface water in the urban environment. Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not proving to be sustainable.

Sustainable development and Local Agenda 21 was introduced to manage the balance between social, economic and environmental requirements minimising the conflict that can exist between economic development and the protection of the environment.

Drainage systems can be developed in line with the ideals of sustainable development, by balancing the different issues that should influence the design. Surface water drainage methods that take account of quantity, quality and amenity issues are collectively referred to as Sustainable Drainage Systems (SUDS). These systems are more sustainable than conventional drainage methods because they:

- Manage runoff flowrates, reducing the impact of urbanisation on flooding
- Protect or enhance water quality
- Are sympathetic to the environmental setting and the needs of the local community
- Provide a habitat for wildlife in urban watercourses
- Encourage natural groundwater recharge (where appropriate).

It is achieved by:

- Dealing with runoff close to where the rain falls
- Managing potential pollution at its source now and in the future
- Protecting water resources from point pollution (such as accidental spills) and diffuse sources.

Urban drainage is moving away from the conventional thinking of designing for flooding to balancing the impact of urban drainage on flood control, quality management and amenity.

Built-up areas need to be drained to remove surface water. Traditionally this has been done using underground pipe systems designed for quantity, to prevent flooding locally by conveying the water away as quickly as possible. The alteration of natural flow patterns can lead to problems elsewhere in the catchment.

Water quality issues have become increasingly important, due to pollutants from urban areas being washed into rivers or the groundwater. Once polluted, groundwater is extremely difficult to clean up. Conventional drainage systems cannot easily control poor runoff quality and may contribute to the problem. The amenity aspects, such as water resources, community facilities, landscaping potential and provision of varied wildlife habitats have largely been ignored. Conventional drainage systems are not designed with these wider considerations in mind. Continuing to drain built up areas with limited objectives and ignoring wider issues is not a sustainable long-term option causing an impact on the terrestrial and aquatic environments.

In many cases, where the pollution risk to the aquifer is acceptable, the water can then recharge the groundwater. Where possible, water from roofs can be discharged to soakways for each house, again preventing it from rapidly becoming surface water. Even road drains can be discharged to soakway, although the risk of groundwater pollution must be duly considered, since road runoff can contain toxic substances from tyres, spilled oil and residues from fuel combustion. Where the water will not infiltrate, perhaps because of a heavy clay soil, the water from beneath a permeable surface will have to be discharged to surface water. But soaking through the permeable surface introduces a time delay which is valuable in reducing flooding risk.

Surface water drainage systems can be designed to include small scale storage, ranging from broad ditches

and flat areas that are usually dry, to wetlands and small ponds. Wetlands and ponds can be designed to be attractive elements of the urban landscape, thus producing a double benefit. In addition to slowing the water down, reducing the risk of flooding and damage to river life these structures provide time for sediments to settle out and for biological process to break down some of the pollutants. Permanent ponds and wetlands with shallow water and water plants are the most successful in removing pollutants, but there may not always be space for these.

When applying the philosophy of sustainable drainage, the adage "prevention is better than cure" can make practical economic sense. Managing the site can significantly reduce quality and quantity problems, and can provide improved amenity. Site management includes design and maintenance as well as the education of users.

Sustainable drainage systems must be part of any planning proposal and calls for a ban on building on flood-plains, except for water management purposes. Integration of drainage and flood risk management should be improved to prevent flooding in urban areas caused by sudden downpours that overwhelm local drainage systems.

TECHNICAL WORKS

Technical works are being constructed to protect people and to help them to improve their way of life, to make it more comfortable. One of them are technical works such as barriers and barrages build directly on the water to protect people agains floods.

When talking about the barriers, we do not talk anymore only about the masterpiece or technical work, we are talking about one of the most significant landmarks of environment. They are build to prevent people and their dwellings and the land against the floods, either river floods or surge tides.

Flood and tidal effects

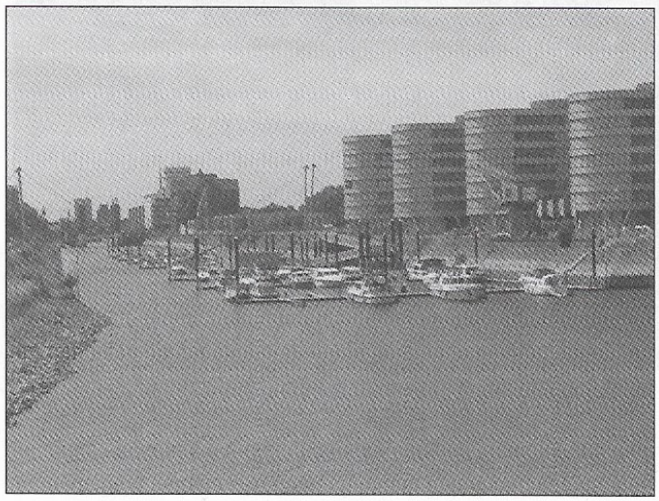
Flooding is a concern for everyone because it can endanger both life and property. It can occur as a result of rivers or canals overflowing, tidal surges in estuaries and the impact of the sea directly on low-lying coastal land. Flooding is a natural phenomenon and is inevitable. Some areas are more prone to it than others, especially river flood plains.

A tide is a change in the water level that is actually caused by the gravitational pull of the moon rotates around the earth. Normally this daily cycle is not a problem, but when certain weather conditions occur in confluence at the correct time in the lunar cycle, a surge tide is created.

The actions of the tides (the rise (flood) and fall (ebb) of the water level) are one of the most significant differences in lower and upper part of estuary rivers. Spring tides happen about every 2 weeks just after the Full and New Moon when the Sun and the Moon are pulling together. At Spring tides High Water is very high and Low Water is very low. Neap tides also occur about every 2 weeks but just after the Moon is in its first and last quarters when the Sun and the Moon are at right angles to each other.

The risk of flooding on low-lying, open coastal areas is always present, but the frequency, extent and magnitude of flooding can be controlled to some degree. In estuaries, flooding can occur as a result of "surges" due to the effects of atmospheric pressure on sea level, combined with the effects of high tides and high winds.

River channels can only carry so much water. Heavy rain or sudden snow melt can cause rivers to rise to the point where they overflow. During a flood, excess water flows onto the low-lying areas on either side of a river - the flood plains. The periodic flooding of low lying areas nourishes the soil, a benefit used by farmers for centuries. The high water levels are caused by tidal surges, the melting of the polar ice caps (greenhouse effect) and narrowing of the river (drudging).



Nothingham - rain water catchment through the use of ecological materials, green roofs and lake

Flood defence

Flood defences are essential in river areas to protect human life. They also protect property, the loss of which can be both distressing and costly. However, protection by flood defences reduces, but does not eliminate the risk. The potential consequences of climate change in the world include extreme weather conditions leading to more frequent floods. Storm damage may be more severe, causing increased erosion of coastal areas and higher maintenance costs for flood defence.

Flood plain development reduces the space available to store and slowly transport flood waters. This increases the speed at which floods move downstream and the maximum height that the flood will reach. In some cases the development can also act like a dam on te flood plain, increasing flooding upstream. Drainage system and hard surfaces, such as roads and car parks, can also increase flooding by quickly transferring water from heavy rainstorms into rivers.

Any new developments on flood plains increase the risk and financial burdens for present and future generations. Risk is often most easily removed by not building in the flood plain. considered.

In the age of climate change, flooding presents the greatest problem for the waterfronts. Flood walls had to be provided as part of the development.

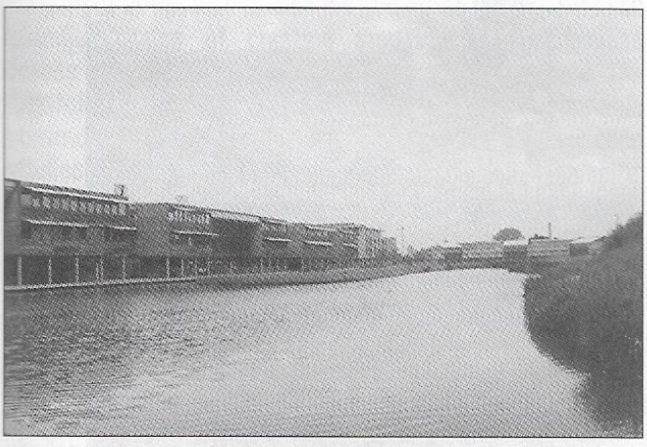
Sustainable development and management The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations.

The strategy has five principles, with a welcome and more explicit focus on environmental limits, and four agreed priorities for immediate action are as following:

- sustainable consumption and production,
- climate change,
- natural resource protection and
- sustainable communities.

The planning system has a role to play in achieving several of those goals.

Environmental management is a management agreement for an area or project set up to plan and make sure the declared management objectives for the area or project are met. Environmental Management Plans are often undertaken as part of an environmental impact assessment and are set out in several stages with responsibilities clearly defined and environmental monitoring procedures in place to show compliance with the plan.



Rotterdam - river Maas flood stone wall covered by greenery

1 - dui1 (Innenhafen Duisburg - river Rhein cul-de-sac channel)
2 - dui2 (Innenhafen Duisburg - ecological drainage system, water filtration)
3 - noth (Nothingham - rain water catchment through the use of ecological materials, green roofs and lake)
4 - rot1 (Rotterdam - river Maas flood stone wall covered by greenery)
5 - rot2 ()
6 - dui3 (Innenhafen Duisburg, Marina - accessibility allowed at any water level)

LANDSCAPE

New landscape features and open space could also help define and create the setting for new settlements, reinforcing their sense of place and local identity. The integration of flood protection measures and sustainable drainage techniques would provide the opportunity to create major new waterside landscape areas and habitats, although the sustainable management of these areas will be a key issue.

One of the key objectives should be to design a visionary, but strong and coherent landscape and open space framework which combines the existing natural assets into a sub-regional network of green spaces with a variety of uses, linked through a net of green chains and corridors.

Development

More development however will also lead to a greater requirement for potable water for domestic and industrial supply, while water quality is likely to become a greater constraint as increased development leads to higher discharges from sewage treatment works. These increased discharges will require higher river flows in order to maintain dilution and not reduce water quality.

It is likely that SUDS will have a large part to play in providing drainage for new development. But even SUDS, which mimics natural drainage processes, will change the pattern of runoff to watercourses and infiltration to groundwater.

Work needs to be carried out on a catchment basis to assess the impact of SUDS and other methods of drainage. This will allow a more strategic approach to drainage to be developed, including issues such as the management of rural land for storage, maintaining recharge to groundwater and the impact of these changes on flood risk.

Water accounts for 70 precent of the human body. Every time we drink some water, we should think of the source so that we can be aware of the importance of water. Each person using the water from rivers, lakes, dams and other water sources as potable water, have some water from rivers, lakes, or dams in their body. During the daily life it is important not to do anything harmful to any kind of the water source, because it is irreplaceable. All of us will regret it if we pollute the lake in our generation and hand it over spoiled to the next generation.

Water in the form of a river is a place where the past meets the future through the presence. Each city, each river or lake has its own story to tell. It is up to us not only to remind us on the past, but to rethink the presence and to create the future for our next generations.

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Rotterdam-Schiedam - channel surrounded by permeable green surfaces