Sustaining=Synergizing? Cities in Anticipation

Is it possible to combine urban river front renewal with spatial flood management strategies? Could these programs be capable of producing urban qualities and reducing economic damage potential while obliging to the constraints set by the river as a navigation channel? Between the Alps and the North Sea, between Basel and Rotterdam, the Rhine as an economic development corridor since Roman times has been subject to severe anthropogenic manipulations. Considerations of its role as a public realm and as a host to the iconographic have only in the phase of declining production found their way back into the arena of river front developments. In the often resulting context of Mediterranean B-side analogies in the temporal and tendencies towards musealizing not only its aligning medieval cities, developments are only beginning to combine programs in a productive way. Synergetic developments may be capable of reintroducing a spatial complexity missing in the modernist entities which these agglomerations are composed of.

As they are awakening to global contenders often more privileged regarding climate and topography, trans-industrial Rhine Cities are only reluctantly acknowledging their water front sanctuaries. Simultaneously, an increasing threat of flooding is challenging cities along the Rhine today. Narrowing the river bed in favour of naviagtion, urbanization processes in the flood plain, and an increase of probability and severeness due to climate change are the causes.

After an age of industrial efficiency it may be valid to ask how these Central European agglomerations along transportation nets and hubs, where the river as a shipping lane and an economic development corridor still forms the backbone, may orchestrate the claims made. Along the Rhine, flood forecasting technologies enable forecasts of up to 72 hours and thus a timely evacuation of inhabitants in areas at risk. Floods of this regime therefore no longer necessarily endanger lives, however they still and increasingly demand for spatial interventions in order to reduce their economic damage potential.

Investments in areas at risk have been doubling every three decades, while the room for rivers is decreasing due to urbanization processes. This will also lead to an increase in costs for future investments. Recommended are measures and strategies which anticipate higher peak discharges, while room should be preserved for future measures.[1] Translating these recommendations onto the situation of the cities along the Rhine today would imply highly protected high density conurbations leaving the spaces in between as possible flood plains or even deconstructing areas at risk. All variations of that approach imply an additional set of parameters defined by the different disciplines involved.

1. Negotiate the border between city and river

Spatial claims on trans-industrial urban river fronts along the Rhine are threefold. This complexity implies negotiation. Between the conflicting pressure for urban development of these prime locations vs. the economic damage potential due to varying water levels on a local and supra local scale, additional demands are set by the Rhine as a primary navigation channel on a supranational scale. The development of interdisciplinary design strategies which incorporate these spatial interdependencies may offer potential for novelty.

City and river begin to negotiate their border by combining flood adaptation on the scale of the object or flood mitigation on a morphological scale by re-expanding the previously channeled river bed. This negotiation may prove capable of synergizing these often contradicting demands. As of yet, flooding may be seen as the only time when city and channeled river communicate. Including gradual slopes, meandering water fronts, floating structures and a stronger play with varying water levels as a design component may also

[1] www.irmasponge.net

provide a way of managing them. The areas between concave bank and shipping lane and convex bank and shipping lane may become arenas for such new urban typologies. Flood management must always be orchestrated according to the sites potentials and demands on the scale of the river as a whole. Time and movement become integral components when negotiating the multiple borders between city and river.

2. Expand before defending

Spatial flood management strategies can be anything from a defence line such as a dike or a temporary wall to river expanding measures such as a polder or a bypass. The extremes of this spectrum often lead to at first sight either/or solutions of defending or retaining. The capacity of the single city is limited. Consequently, this implies a focus on local effects. Every defensive measure further reduces the discharge capacity of the river, whereas cutting peak floods by retaining may be part of a larger scale strategy based on accumulating measures to reduce water tables. By increasing lateral space, rivers gain additional room for storage and discharge in areas of the alluvial plains currently protected by dikes. Before executing measures which directly defend the area at risk during flooding, it should be investigated if the current city structure or planned conversion processes allow for expansive interventions in order to shave peak floods and to reduce damage potential in the areas at risk. Side channelling or steered retention are measures which also produce urban potential as they provide a structuring tool on a larger scale and may serve as a host to amphibious developments on an object scale.

Along the Rhine, there is a general consensus on the strategy of re-expanding the rectified river. More room for the river, as a flood mitigation strategy, is already being applied where rural areas of the Rhine catchment allow for such interventions. The 'Room for the River' program in the Netherlands follows the three-step strategy of retaining, storing and draining to accommodate the newly defined discharge capacities for the Dutch border at Lobith and has become the Dutch national strategy for action since 2001.[2] At the same time, the aim in the European 'Rhine High Water Action Plan' is to reinstall storage capacities along the Upper Rhine between Basel and Mainz as they were before the 19th century channeling. By implementing retention areas with free or steered flooding, water tables are to be lowered by an average of 70 cm by 2020.[3] This change in paradigm evoked from such visions as the Dutch Plan Ooievaar in 1987 and Stromenland Nederland 2030[4] and of course from the severe floods of 1993 and 1995. Water management has become a political topic not only involving engineers, but also ecologists, spatial planners, politicians, developers and the broader public.

Within urbanized areas, local river expansion strategies towards flood mitigation are still not very common due to the lack of space, higher land prices and existing building structures.[5] Arguments for river expansion within cities may also be found in the current and future state of these agglomerations. As we all know by now they are no longer fortified, but sprawling. As the rural has tendentially changed from an agrarian landscape to a highly industrialized production site and cities are no longer spatial entities with a clear boundaries to that landscape some characteristics have actually swapped sides. Issues such as the management of shrinking processes, urban biodiversity, urban heat island effects as temperatures are rising due to climate change, and the creation of land value could proactively be integrated in expansive concepts for the urban realm.

3. Adapt if possible

[2] see www.ruimtevoorderivier.nl
[3] see Irmer, H. a. o., Rhine 2020, ICPR publication, 2001
[4] see F. Hooimeijer a. o, Atlas of Ducht Water Cities, SUN, 2001
[5] see C. Redeker *Urban Flood Integration- Spatial Strategies*

Between these two extremes of defending the city or expanding the river lies a third option - the adaptation of endangered objects. This strategy is especially relevant for the number of harbour conversions taking place as these areas are traditionally planned outside of the dikes. It also changes individual risk awareness as there is a direct affectedness vs. a sometimes overrated sense of safety behind dikes. Between sustainable materials, pile dwellings and floating structures, the amphibious qualities for objects in this realm are currently being explored in a number of pioneer projects along the Rhine such as conversion projects 'Industrie- und Zollhafen Mainz' or the 'Stadswerven area Dordrecht'. Although the demand for exclusive housing, and that includes water front habitation, is as high as ever, floating homes as structures with the least economic damage potential are only slowly finding their way into the market. The development at Steigereiland in Ijburg by Amsterdam (Fig. 1) shows the economic potential of marketing water plots, but also the desire to live at and on the water.[6] This mooring infrastructure for floating houses could also be an urban typology for inner city harbours which are no longer fulfilling the demands of logistic transhipment. Another option would be the utilization of the space between water front and shipping lane as mooring sites for house boats and as an attractive alternative to the continuous sealing of ground by the horizontal expanse of single family houses in less denser areas. An advantage the singular linear organization of this model provides is the direct view onto the river of each house (Fig. 2). House boats also provide the option of being moved from one site to another not only responding to individual choice, but also to larger scale transformations.

(Fig. 1 and 2)

4. Redirect the current

The implementation of a bypass may offer a possibility to partly redirect the flood away from areas with a higher economic damage potential while creating a secondary water front and - an island. This strategy is currently being applied for the urban extension plan of Nijmegen at the height of the bottleneck of the Waal, one of the Rhine branches (fig 3). According to studies, it will provide a lowering of water tables during floods of up to 35 cm.[7]

Bifurcating side channels are a natural phenomenon of the river. Yet, during its rectification in the 19th century they were cut off from the main bed in order to provide the needed depth of the river demanded for navigation. Also on the right bank of Cologne a side arm from Poll in the South of the city reentering the river after Muelheim was capable of competing with the main bed for navigation, which would have lead to the loss of Cologne's left bank strategic position along the river. Already in the twelfth century the right bank of the city was fixed with willow barriers to control the main bed from taking its preinscribed change of course. In the thirteenth century groynes made of basalt stone and pillar structures were implemented for the same reason. In the sixteenth century harbour basins were constructed on site.[8] In the nineteenth century entire segments of the river were channeled to enable flood control on site and an adequate channel depth for navigation.

What are our measures today to adapt the new role of the river to our current demands? Could these previously existing side arms be reactivated as side channels? Could former harbour basins be elongated to bypass the main bed as in the project K20 (fig 4)? Could the left bank green belt, 500m wide and 7km long, implemented by Fritz Schuhmacher and Konrad Adenauer in 1919 on the grounds of the inner rayon, be a future site for such measures?

(Fig 3 and 4)

[6] see www.ijburg.nl
[7] see Municipality of Nijmegen, Ruimtelijk Plan Dijkteruglegging Lent, December 2007
[8] see Eberling, 2005

5. Overlap functions

With the aim to define architectural strategies for urban water fronts, correlations and constraints between the three spatial functions along the Rhine must incorporate the parameters set by the dynamics of the river system and its industrialized use as a shipping lane. Multiple programming as a synergetic concept between urban development, water management and navigation may not only provide a desperately needed degree of spatial complexity, but also offer green urban lifestyle qualities which could reduce a further colonization of the hinterland.

6. Generate differences

The argument for these kind of adaptations to the expected increase in risk and severance of floods should not ground on a path dependent cultural and social context. It needs to be based on a larger scale of influences. That applies to interdependencies in flood management for the river basin as a whole and it applies for urban developments in the context of regional and global competition. As a paradigmatic turn towards a geographic intelligence of space, it is a challenge to combine the local with the global, but almost always a disaster when only importing, conserving or reminiscing. Not only on the level of the object or the city, but also regarding the dichotomy of the urban and the rural.

7. Stretch flood periods

Floods occur in winter along the lower Rhine branches most prone to flooding, and as in 2003, may be affected by extremely low water levels in summer. The atmosphere anticipated in many of the current urban concepts which partly flood the city to create a summer-like atmosphere such as a city beach, forget to take the actual season into account. If we think about flooding parts of cities for part of the time we have to take the natural flooding pattern into account and understand how to manipulate it. Steered retention and a decelerated infeed into the main bed may create new urban qualities while mitigating the extremes of high and low water levels.

8. Bucolic landscapes evoke misunderstandings

The paradigm shift from an exclusively industrial programming of the river as a shipping lane and a wastewater transport towards its reading as a cultural landscape is a success of the ecological movement (fig 5). The ecological movement has managed to raise awareness for the needed action regarding water quality and biodiversity, leading to the implementation of the EU Water Framework Directive in 2001 and the aim to create bathing water quality for all open modified waters by 2015. Yet, a large part of the water bodies as those within the urban realm are characterized as ‘heavily modified’ and are excluded from respective measures.

The directives were recently complemented by the EU Flood directive. It includes the compilation of danger- and risk maps as well as the development of coordinated risk management plans.[9] Looking at flood management in the Rhine basin today, the division between landscape as a highly technified, but nonetheless bucolic landscape to contain water vs. the city as a fortified model based on defensive mechanisms to protect it from flooding prevail. Negotiations between these two are rarely taken into consideration.

9. Reinvent

River pools were a typology of the nineteenth century incapable of sustaining the primarily industrial use of the river (with the exception of Switzerland). Lately, improvements in water quality and a rediscovery of the urban river front are allowing for their reemergence. The returning river bath typology today is, however, a closed basin filled with chlorified water

[9] see EU Water framework Directive EU 200/60, EU Bathing water directive 2006/7/EC, EU Flood Directive 2007/60/EC

instead of a basket hung into the river. What are the possibilities of adapting this prototypology to the conditions of the soon-to-be post-industrialized river of the twenty-first century regarding filtering techniques, energy autarchy and its adaptation to varying water levels?[10] The river pool may be the precursor of a new more resilient way of water front development on the object scale, taking varying water levels and urban desires for a hedonistic experience of the river into account. Not bound to more complex morphological changes of the river and implemented in the main bed, this typology could not only become an icon for the broader understanding of the term sustainability[11], but it could also make the sensation of a physical experience of something formerly impossible safer - foreshadowing an amazing achievement.

10. Squat

Although, the inherent problematic of sedimentation remains an issue for many expansive approaches, squatting the sites between groynes, as the example in Leverkusen shows, gives an idea of potentialities within the modernist design of the river front yet to be discovered…

(Fig.5 and 6)

11. Think ahead

To overcome the modernist approach of isolating operations not just in terms of expertise, but also geographically, it is necessary to intersect previously established boundaries of parties involved and to orchestrate their claims. As the above described projects exemplify, measures towards more resilient and therefore more sustainable urban river fronts span from morphological transformations and object adaptations to temporal installations based on singular events. So what is the message?

Fascinated by the encounter with something formerly out of bounds, the reclamation of urban river fronts and rivers demands for visions based on incorporating the multiple claims and constraints on site. Yet, the implementation of previously defined plans, long term leases and the facilitation of specific uses are occupying the day to day. A new degree of complexity for these sites demands for visions and strategies capable of providing a basis for communication between the actors involved. Along the Rhine, urban development, water management, navigation and the respective ecological impacts are only beginning to synergize on site. As this process-oriented approach is integrated in the development of the areas at risk, constraints become the motor for the interdisciplinary - anticipating unforeseen typological developments for these sites.

Literature

[10] nu pool, interdisciplinary research proposal, bionic competition TU Munich, 2008

[11] The term sustainability was extended to include not only environmental, but also economical and social issues by the Brundtland Commission in 1987.

Eberling, F., Der Rhein und seine Warenströme, Rheinkonferenz Regionale 2010, 2005
EU Water Framework Directive, 2000/60/EC
EU Directive Bathing water 2006/7/EC
EU Flood Directive 2007/60/EC
Hooimeijer, F. a. o., Atlas of Dutch Water Cities, Sun Publishers, Amsterdam, 2005
Irmer, H. a. o., Rhine 2020, ICPR publication, 2001
Redeker, C, Urban Flood Integration - Spatial Strategies, in: van der Hoeven, F. D. a. O.U-Lab, TU Delft, 2007
Redeker, C. a.o., nu pool research proposal, TU Munich, 2008, unpublished
Schouten, M. a. o., Ruimtelijk Plan Dijkteruglegging Lent, Municipality of Nijmegen, 2007
Stokmann, A., Klaus U., Flussbaden – Badefluss, in: Stadt+Grün, 4/2006
WCED, Our Common Future, Oxford University Press, Oxford, 1987

www

www.dijkterrugleggінglent.nl
www.iksr.de
www.ijburg.nl
www.irmasponge.net
www.ruimtevoorderivier.nl
www.sev.nl
www.urbanpanorama.nl

Images

Fig 1 Steigereiland waterplots, source: catalogue Steigereiland, Ijburg
Fig 2 House boats in the main bed, source: SEV Congess Waterwonen Rotterdam, 2008
Fig 3 Waalsproong Nijmegen, source: Nijmegen municipality
Fig 4 K2O Urban bypass Cologne, design by author
Fig 5 former minister of ecology Klaus Toepfers Rhine dive 1988, source: www.planet-wissen.de/pics/IEPics/intro
Fig 6 parasite structures between groynes, Leverkusen, Lower Rhine, source: Google Earth