



Urban Rainwater management

Prospect for 2030

This workshop is intended for stakeholders in urban planning and professionals in water, sewerage and waste management, both decision-makers and technicians, who wish to share their experience with others. The objective of the 3 days is to make a contribution to ideas on rainwater management for the next World Water Forum (Marseille 2012).

Although rain brings great benefits, it also has its perils, in particular in urban zones. Between 1900 and 2000, the urban population was multiplied by 20, while the total world population was merely multiplied by just 4. In 2000, 50% of the world population lived in cities, and at the current rate, 65% of the population will be urban by 2025.

This concentration of the population in urban zones brings profound changes to use of the land and subsoil, as well as to the water cycle. It eats up natural areas and farmland, and seals the zones in question in a more or less ordered and controlled manner, resulting in great vulnerability. Floods, mudflows, pollution and water shortages remind us all too often of the difficulties we have coping with natural phenomena to limit risks. Is this widespread situation in both North and South an inevitable one?

In all geographical locations and climate zones, changes are underway, and new urban models are emerging in the four corners of the world. This is an opportunity to rediscover or invent new ways of managing rainwater in and around cities. The aim is to build and develop in such a way that the city is reconciled with water, and that it responds more effectively to legitimate aspirations for development, functionality, quality of life, safety and environmental protection, in the widest possible variety of weather conditions.

It would therefore seem to be the right time to question participants in the next World Water Forum on this theme, by proposing a debate with examples from all the continents, and to benefit from the latest ideas discussed three months previously at Novatech¹.

The themes addressed during this workshop will be:

- The place of rainwater in an integrated water management system that is respectful of people and of ecosystems;
- Design, development and maintenance of urban spaces and buildings, existing and innovative techniques for managing rainwater, notably control at source, harvesting and re-use, either individual or collective, solid waste management;
- Individual and social aspects of perceptions of the water cycle and of rainwater management, notably the involvement of citizens and decision-makers in setting up a form of governance that can reconcile the city with water.

Field experience, the difficulties encountered, solutions considered and implemented, and questions still outstanding will provide the basis for discussions.



→ Planning and sewerage models now insufficient

The marked increase in urban populations in the wake of industrialisation and the rural exodus came in the 19th century. The systems imagined in those days to meet the preoccupations of the times were to collect rainwater and waste water systematically and evacuate them as quickly as possible downstream, away from the city. This highly technical conception of sewerage mixed together water of all kinds to be transported underground, usually in pipes. It established itself as the model in the course of the 20th century, with successive adjustments, such as separating wastewater and rainwater.

With the acceleration in urban growth and sealing of the land this implies, this conception of the city and its sewerage has reached its technical and economic limits. It results in transporting ever greater quantities of wastewater and rainwater to the sea or rivers, with or without treatment prior to discharge. Protecting the city, its inhabitants and environment against these overflowing resources is proving perilous and increasingly expensive.

For those cities exposed to more contrasted or “productive” rainfall regimes, applying the same models or concepts proves to be particularly difficult, because the quantities of water are no longer on the same scale: the much greater intensity of tropical storms than that of rain in temperate countries is likely to lead to choosing even larger and more costly structures for the same level of protection.

Access to water resources of sufficient quantity and quality for hygiene, cooking and drinking is also a vital problem in certain regions. Harvesting of rainwater thus appears to be an obvious solution. The rapid evacuation of rainwater out of the city, meanwhile, might be close to a “heresy”, as these resources are downgraded, cleaning the city and transporting all sorts of waste.

→ Reasons for reconciling the city with water

Sustainable development of cities means finding alternatives and taking an overreaching view of urban planning, sewerage in general, rainwater management in particular, and waste management. If the city is to find an approach built around the three pillars (social, economic and environmental), it must also be capable of adapting to a wide variety of weather conditions that are likely to change. The more effectively urban areas are designed and managed to take account of the range of local rainwater conditions, the more chance they have of providing a relevant response to legitimate aspirations for development, functionality, quality of life, safety and environmental protection...

In addition, in the richest countries, rainwater is no longer of interest exclusively to sewerage technicians. Landscape architects, heat engineers and even individual citizens are taking up the subject and issues.

This new context therefore provides an incentive today, more than ever before, to give up the single model in favour of using more diversified and modular tools that are better suited to highly contrasted situations. First and foremost, these tools must fit the territory they will be applied to, taking account of its needs and assets, its physical and human dimensions. They require a good understanding of the motivations of each stakeholder, pedagogical and awareness-raising efforts, and use of a wide variety of appropriate skills.

The workshop will be in three parts:

- **6th October:** territory, land planning and urban design
- **7th October:** technical tools for urban design, rainwater and solid waste management
- **8th October:** stakeholders, sociological perceptions, organisation and governance

→ 6 OCTOBER - Territory, land planning and urban design

Planning is based on an analysis of the past and hypotheses about the future. Foreseeing the future situations the territory will be facing is far from easy, and argues in favour of plans that can easily be modulated and adapted.

It is knowledge of all the (physical, economic, social and administrative) dimensions of a clearly-defined territory that provides the necessary information to guide development choices, by highlighting the assets and needs of the territory in question. Studies can provide the information required for planning and then programming by outlining the issues and risks, etc. The water cycle and rainwater management in the territory are among the points to be studied in order to define development choices that are balanced from the social, economic and environmental points of view. It is the ideal opportunity to answer the following question: what aquatic habitats and what urban spaces do we want, and for what uses?

It would appear logical that the response should be different for the large urban lakes of Ouagadougou, Yaoundé, Hanoi or Paris, the Dutch canals, the great rivers of Africa, Indonesia, Amazonia or North America, and small watercourses around which districts have been built...

Planning documents provide strategic guidelines for development and water management, risk prevention, territorial cohesion (housing, transport, economic activities, urban spread, preservation of water quality, habitats, sites and natural or urban landscapes...). These specialised documents in terms of their subject or geographical coverage interact and are linked together via accounting rules.

The territories in question are the catchment areas of rivers subject to urban development, cities, their sewerage systems and the watercourses that run through them... The perimeter of such documents may or may not correspond to administrative boundaries (municipality or local authority).

The rules resulting from this are interesting tools for preserving natural zones and flood plains, for structuring space, for controlling urban spread and reserving certain areas for storage, regulation or even treatment of runoff water. They can also set down the conditions in which new developments may be made: connections to local networks for wastewater and rainwater coming from the site, minimum requirements for green areas, building layout, etc.

It is obvious that this description of planning applies to countries where regulations have been established on water and on urban areas more generally. However, many countries do not yet have access to such tools, although they have achieved things in terms of integrating rainwater into the city. How have these actions been undertaken? What results have they provided?

Planning provides strategic guidelines, while leaving the exact choice of the techniques and their location to programming.

→ 7 OCTOBER - Technical tools for urban design, rainwater and solid waste management

Combining diverse solutions, redundancy and adaptability, making rainwater visible in the city, are key targets emphasised by certain experts to “improve the sustainability of urban rainwater management strategies”. The aim is to restore water to its place in the city, to accompany natural phenomena rather than opposing them. The aim is also to find new ways of using existing facilities. The system must be functional in the event of drought or of rain, even exceptional rainfall².

The “technical” tools are very diverse and correspond to varied needs and situations, both individual and collective (for a house, a district or a whole city)...

Modular use of the city encompasses all the issues of “too much and too little water”: in terms of “too much”, there can be the use of certain multifunctional public spaces to store surplus water, roadways that can be used intentionally for runoff or storage of surplus rainwater, etc. In terms of “too little”, there can be rainwater harvesting, etc.

From the exact place where the raindrop falls, there are a number of different solutions to limit flows and/or volumes of runoff water. They combine the three components of infiltration, runoff and evapotranspiration to varying extents. Storage in small, scattered units or in larger centralised solutions is the key tool in controlling excess runoff water, as well as for responding to water shortages.

Limiting sealing of the land surface is also one of the key points, especially as the spread of vast areas of bitumen, concrete and other watertight materials is expensive and could often be avoided, as it is difficult to justify. However, in certain weather conditions, all urban surfaces act as impermeable surfaces and can therefore pose a problem if the situation has not been correctly prepared for. On the other hand, systematically considering the ground as an impermeable surface in all circumstances when designing projects limits the possibilities for valorisation of water and of the urban space.

The solutions that are envisaged may also contribute to:

- avoiding soiling the natural environment, runoff water or the land,
- adjusting the quality and quantity of water that is available for use (and *vice versa*).

When water needs treatment, various intensive or extensive processes exist, making use of settling, filtration, etc. Some are adapted for individual uses, while others are suited for larger flows.

To avoid soiling runoff water, an adjustment of maintenance, land use and choices of materials can be envisaged. Provisions to avoid mixing wastewater and rainwater (outside zones designed and managed for that purpose) are indispensable to avoid harming the safety of living areas or endangering uses of water. For example, such provisions might involve ensuring that conditions are not created in which latrines are likely to be flooded, or wastewater treatment system dysfunctions are likely... For cities with sewerage networks, the aim is to avoid misconnections (wastewater in rainwater pipes and runoff water in wastewater sewers). Managing runoff water on the surface and wastewater underground can no doubt limit risks of mixing in a certain number of cases.

For these developments and facilities to remain functional, the eternal question is that of their maintenance and the management of the solid waste carried in runoff water (bottles, paper, plastic bags, etc.). In order to avoid dysfunctions or to protect aquatic habitats, screen rakes, selective drain inlets, separating walls and booms are installed in cities with sewerage networks.

Taking the end user into account (customer, owner, operator, etc.) in designing urban spaces and rainwater management facilities, taking their motivations into account and the means at their disposal, are ways of ensuring that the development or facility will be of use over the longer term.

→ 8 OCTOBER - Stakeholders, sociological perception, organisation and governance

The accountability of all the stakeholders, including private individuals in their homes and users of public spaces, is indispensable, as is cooperation between all those involved in development, and the improvement of governance, awareness-raising and eco-citizenship processes.

From the private individual to the local elected office holder, not forgetting the technicians and representatives of districts or local associations, there are a large number of different stakeholders to be taken into account. The professionals in question are town planners, designers, property developers, those carrying out studies for roadways and other networks, landscape architects, employees of private or public organisations handling cleaning and maintenance of roads, parks and gardens, sewerage networks, etc. For some, water and sewerage are their core business, while others are more focused on designing urban spaces, and still others on cleaning urban spaces or on managing waste, etc. But the long-term success of the choices made in urban planning and in rainwater management depends on the ability of all these stakeholders to enter into a dialogue with each other. This means organisations must be set up to foster exchanges throughout the project development process, then during the work and throughout the lifetime of the public space or the facility.

Training courses, awareness-raising and information campaigns can also contribute to ensuring effective use of the facilities and urban spaces that are built, although errors of appreciation and unusual behaviour are always possible and must not be neglected.

For example, mixing wastewater and rainwater, or fly tipping in areas set aside for water runoff are among the problems in which awareness-raising among the public might often be necessary. Regarding decision-makers, the incentive to take account of these problems by enhancing checks on connections to sewerage systems, on the one hand, and organising solid waste collection on the other, also requires a better explanation of the issues.

There are highly effective awareness-raising tools in Africa, in particular. Information technology is also opening up some interesting possibilities...

1 - NOVATECH 2010: 7th international conference on sustainable techniques and strategies in urban water management, in Lyon (France) – 27/06 to 1/07/2010

2 - Minutes of the rainwater management seminar – GRAIE Lyon, 2008