



EAU EN VILLE

VERS UN CHANGEMENT DE PRATIQUES

Faced with the consequences of climate change, water must return to the centre of our cities and villages through clean water projects and better integration of water management. Changes in practice are needed.

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SUMMARY

WATER IN THE CITY - CHANGE IN PRACTICE IN SIGHT

Climate change will have a significant impact on the water cycle and our environment. Summer droughts will exacerbate heat island effects, extreme low water events and water shortages. Intense rainfall will cause increasingly threatening surface water runoff. In order to adapt to these changes and continue to guarantee reasonable living conditions, our built environment must become more resilient. Water plays a major role in this, but only if we bring it back to the centre of our towns and villages. This requires a change in practice. All stakeholders in spatial development are affected. Less technology, but more dialogue, more exchange, more interdisciplinarity and more projects based on shared results and goals that focus on the ecosystem services of water are the keys to success. Water must be integrated into the landscape, flow in the open air and once again become a resource for soil and vegetation, and the different types of water use must overlap and complement each other. This makes projects sustainable and geared towards climate change. To bring about change, management practices must also be made more flexible and less systematic. In addition, financing mechanisms for watercourse restoration are required that promote the emergence of integrated water management, moving away from the existing obligation to drain everything.

INTRODUCTION

The cantonal water office of the State of Geneva initiated a mandate in November 2019 to conceive an ideal concept for integrating water into the city [1]. The pilot site is a 25-hectare neighbourhood located at the heart of the PAV (Praille-Acacias-Vernets), in the midst of urban change.

This decision is included in the framework of the Cantonal Climate Plan, adopted by the Geneva State Council on 20 December 2017 [2], of which measure no. 5.3 aims to "Strengthen measures related to the urban water concept".

This pilot mandate, currently in the process of being implemented, is one of the first steps that will lead to a transition in the management of water resources in Geneva in the long term. It is also an opportunity to conduct a general reflection on the management and place of water in the built environment [3].

EAU ET CHANGEMENT CLIMATIQUE

We now have the certainty that it is no longer a question of knowing when we will suffer the consequences of climate change, but at what speed and with what intensity. From now until the end of the century, the climate in Geneva could be similar to that of the Pouilles, in the south of Italy [4]. The annual distribution of precipitation would be varied: less rainfall in the autumn, but more frequent and violent storms, less snow in the winter, but higher water volumes [5]. The imprévi-

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sibilité et la variabilité des précipitations augmenteront. It is the water cycle in its entirety that is being disrupted, with all the consequences that this will have on our planet and its ecosystems.

For a few years now, we have been helping to raise awareness of climate change. Individual behaviour is changing, voices are being heard, laws are being voted on, initiatives are being taken and action plans are being drawn up, including the Geneva Cantonal Climate Plan, which was mentioned earlier.

In the practice of the water planning service (SPDE) at the moment - the monitoring of neighbourhood, property and housing, infrastructure and public space projects - we know that the transition towards better water management is proving to be slow and difficult to implement. The projects, in their vast majority, continue to be realised in the face of a world that is unaware of the consequences of climate change, while they are now being built for the benefit of the environment.

les cinquante, quatre-vingt ou cent prochaines années.

VERS UN RETOUR DE L'EAU EN VILLE

From the perspective of climate change, water in the built environment must be analysed from two angles, the first as an element that is fully involved in adapting to these changes, the second as an element that is exposed to the consequences. Water is at once a resource for the soil and the crops, a source of moisture, a contributor to the reduction of chalk emissions [6] and a subject of concern when it becomes too rare or too abundant.

PASSER DE LA TECHNIQUE AU PROJET

The best practices in the field of water pollution control have been known, studied and documented for more than thirty years. Techniques such as pregalvanised toilets, nets, retention basins, marshes and drainage channels make it possible to sort out the looseness of the water.

gique du tout-tuyau, tout en permettant d'atteindre les objectifs de protection des cours d'eau. The solutions are simple, tried and tested, durable, sometimes even original, and have been the subject of numerous publications. One of them, and undoubtedly the best known in Switzerland, "Où évacuer l'eau de pluie?" [7], published by the Confederation in 2000, all of these techniques.

However, despite the efforts made by water and land managers, the use of these good practices remains relatively rare, whereas it should logically have become the "norm". Water management is still too often perceived as a succession of technical solutions set out in catalogues or standards, implemented step by step the sole aim of responding to a request for approval or a constraint set by the administration.

Moreover, water often appears late in the development a project. It is mainly perceived as an element to be evacuated and is virtually based on

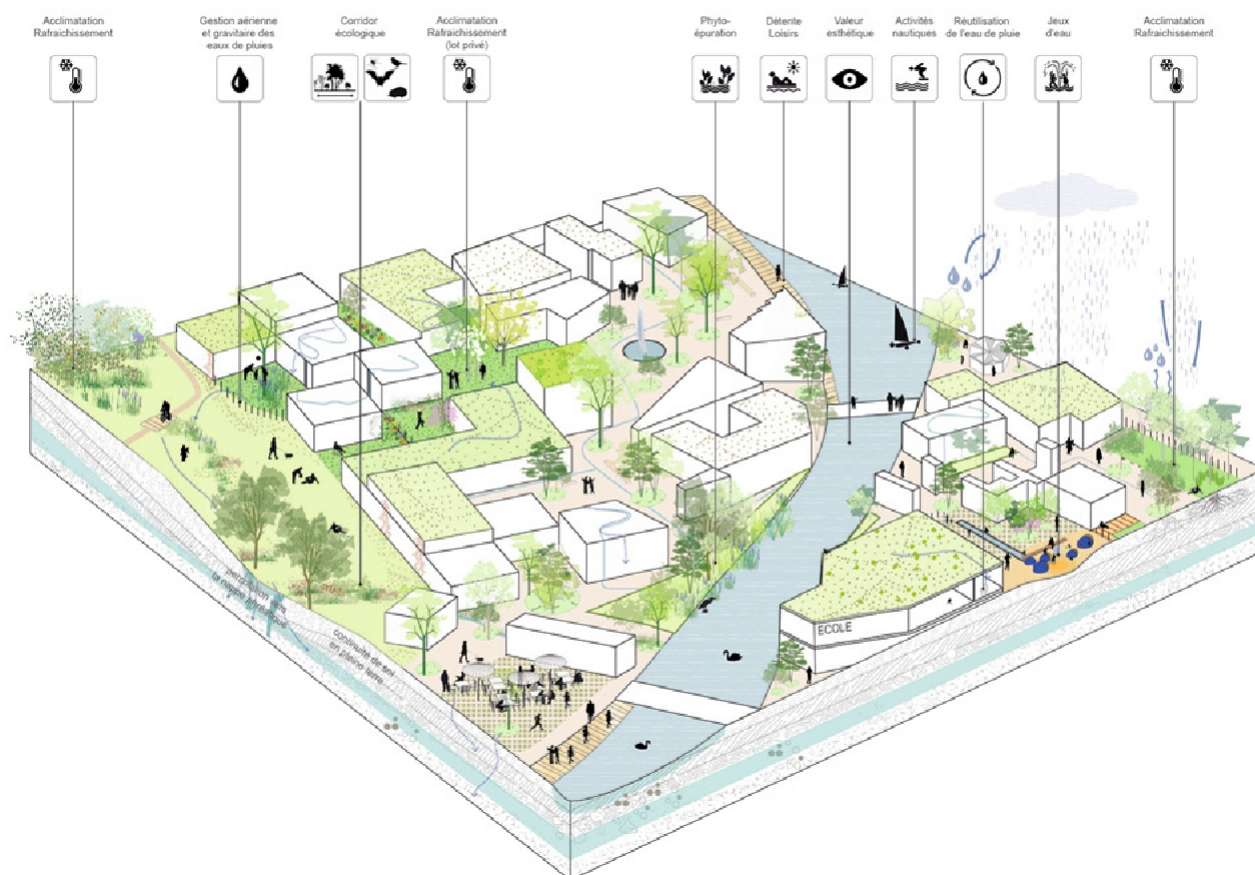


Fig. 1 Water ecosystem services in the city

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Fig. 2 Management of watercourses integrated into the public spaces of the Chêne-Bourg railway station (GE).

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exclusively on the competences of the civil engineer and / or the sanitary engineer who, intervening at the end of the project, have little or no room for manoeuvre.

It is now essential to move a purely technical approach to a project development logic in which water is a central element.

L'EAU ET LE PROJET

Diagnostic partagé, objectifs communs

The structure of each project must be based on a solid, shared diagnosis and objectives set by all interveners.

The diagnosis of water quality takes into account the constraints (pre-existing status, physical limits, polluted sites), manoeuvre margins, geography and hydrology of the site (pentes, outlets, points bas, composition of the soil and subsoil, ponds, presence of watercourses, water bodies), as well as the natural and built environment in which the project is located (location of the building, occupation of the subsoil, traces of public spaces, notable elements). Each intervener must appropriate the water in their own way, feel concerned and appreciate it with their sensitivity and experience.

One of the ways to set objectives in terms of water management is to analyse it from the perspective of the ecosystem services it provides (fig. 1). More than just an element to be managed and evacuated, water is a vector biodiversity, nature, education and play. It offers projects

an identity, a character, an attraction, and its users a living environment that is improved and adapted to climate risks (fig. 2). Ideally, if water is only considered from the perspective of the water theme, all the services it provides should be prioritised and maximised, or we know that this is not only impossible, but also desirable. Water must not take up all the space, but only the right space. The space taken up by water must be shared with other uses, recreational, sporting or environmental. Above all, it is important to define coherent objectives that serve the general interests of the project and are therefore shared by all stakeholders. This requires a global vision, dialogue, exchanges, mutual understanding, compromises and concessions.

Prendre du recul

In order to ensure the coherence of water management concepts and to guarantee their permanence in space and time, it is necessary to reflect on several levels, to sort out the building and the parcel, to take into account the rebound and the height. From a temporary point of view, any management must respond to immediate needs, but must also be able to cope with the consequences of climate change in five or ten years' time. What is its durability? Is it reversible or adaptable over the long term? Reflections should also focus on the frequency of climate events. How does the system work?

de gestion des eaux face à des pluies d'intensités faibles, moyennes et exceptionnelle? How does it deal with a chronic water shortage?

From a spatial point of view, it is important that every water management intervention finds its place and its coherence in an existing territory, from the neighbourhood to the building, passing through the neighbourhood, the street and the public space.

Every opportunity, even the smallest one, can be used for the purpose of optimising the management of water resources. For example, a street redevelopment project is an opportunity to de-impermeabilise surfaces and disconnect water from the waterway.

L'EAU DANS LE PROJET

Les chemins de l'eau

Entre l'endroit où elle tombe et l'endroit où elle est acheminée et évacuée (sol, lac, cours d'eau, canalisation), l'eau de pluie parcourt un chemin (fig. 3) à l'itinéraire plus ou moins long et tortueux. The water undergoes transformations, infiltrates, accumulates, accumulates, rales, passes through structures, traverses the payloads and the structures and comes into contact with various materials. Through its course, water recounts a history, interacts with its environment and poses its imprint.

These watercourses must be mostly open to the ground, on the one hand to ensure their continuity and coherence, and on the other hand to minimise the dips and reduce the leaks by levelling the watercourse, by reducing the pressure through a channel that runs perpendicular to the ground, by utilising rough surfaces, by multiplying the micro-storage, by disconnecting the surfaces of the watercourse and by infiltrating it manually. Faced with the increase in intense rainfall, watercourses must avoid as much as possible the concentration of pollutants and substances they contain (micropollutants, microplastics, polluting waste, etc.) in order to limit the risk erosion and prevent the flow of water.

The project must be a space for the expression and realisation of the millennia and a way of bringing the water's secrets to life. Imagining and realising them in an open and decentralised way on the ground requires a final levelling of the terrain and a

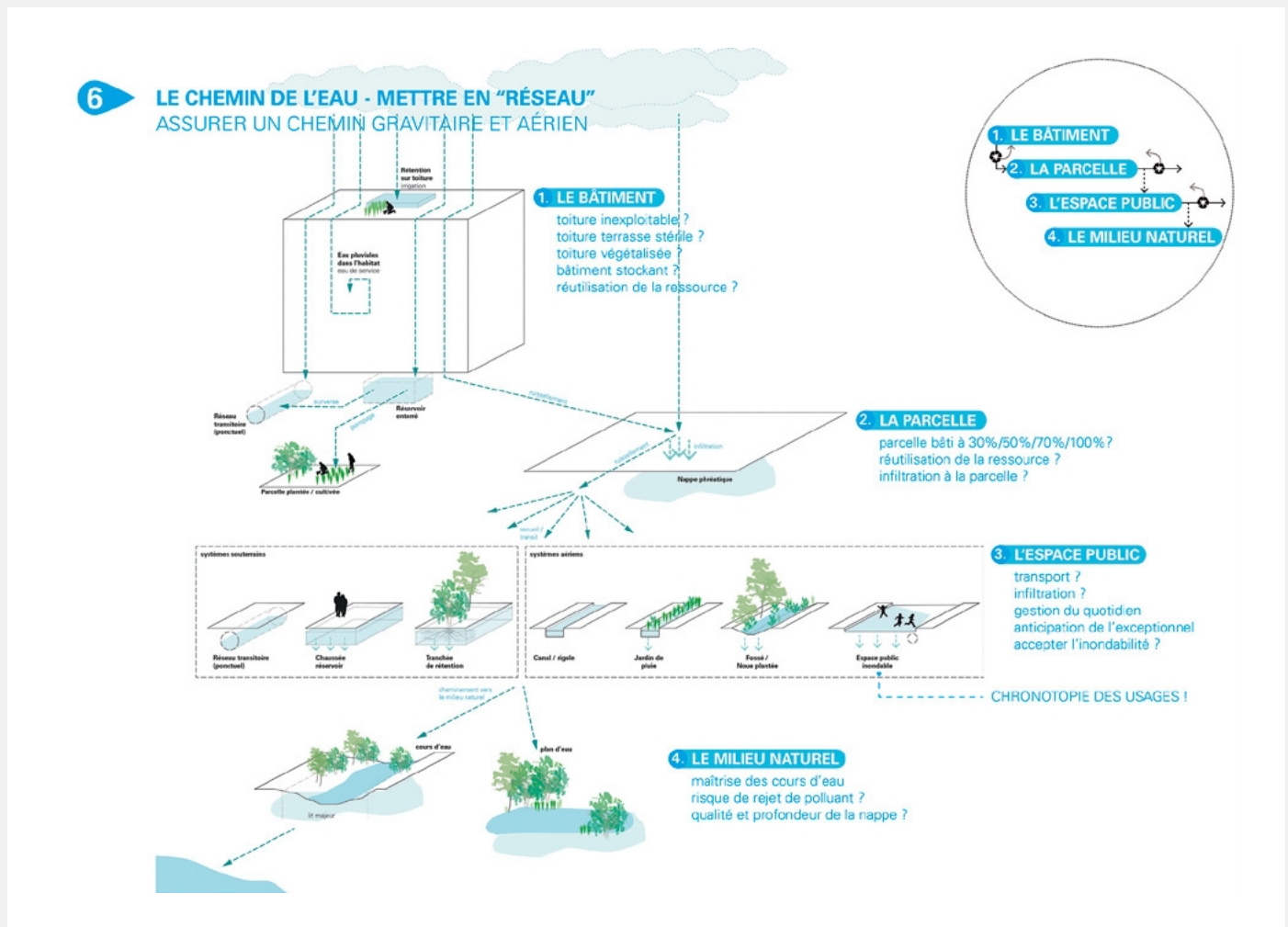


Fig. 3 Les chemins de l'eau.

(@ ATM pour l'office cantonal de l'eau)

réflexion à l'échelle de tous petits bassins-versants, de quelques dizaines ou centaines de mètres carrés.

Superposer les usages

The management of open-air water regularly raises questions about the availability of water and the use of water on the ground, especially when the applications are strictly technical and space they require is strictly reserved. The multifunctional spaces where the uses are superposed are to be privatised. Sports equipment, playgrounds, school playgrounds, parks and gardens (fig. 4), squares, streets (fig. 5), cœurs d'îlots, roundabouts and promenades can be used in one way another to manage the rainwater without losing their initial colour [8]. These areas are a priori entered regularly, which benefits the reliability of their hydraulic functioning.

It is important to bring a reflection to the frequency of the rainfall and the emissions it causes. The management of water

often creates misconceptions because the plans represent maximum surfaces, based on a rainfall of dimension. Or the rainfall

jours ne prend quasiment aucune place. It can be realised without compromise, or almost, by an open-air walkway to the sky,



Fig. 4 Prairie, jardins et bassin de rétention dans le quartier des Vergers à Meyrin (GE).

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Fig. 5 Venelle du quartier des Vergers à Meyrin (GE).

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Fig. 6 Rue de St-Jean en Ville de Genève.

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Fig. 7 Exemple de l'usage excessif de grilles dans un aménagement extérieur à Genève.

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flaques qu'elle produit ou par un arbre qu'elle arrose. The quinquennial or decennial pluvial rainfall is said to cause large patches of snow, but only for a few hours. The rest of the time, they can be used for other purposes. Extreme rainfall causes significant damage to them, which must be prevented by directing them where they cause the least possible damage.

Although it seems obvious and necessary, the superposition of uses is certainly not easy to put into practice, as the reflection of each person for themselves is very frequent during the development of a project. Moreover, it requires an evolution of mentalities and acceptance by the population. Information, sensitisation on the part of the project promoters and the authorities, and even the participation of residents and users in the conception of the development, are essential.

Ne pas systématiser les règles administratives

Systematic administrative rules often have the advantage of simplicity. In terms of water management, they are often counterproductive. Imposing a uniformised discharge obligation encourages each stakeholder to find a solution for their own parcel, project or portion of land. A situation that leads to the multiplication of small works. A respected constraint, but at what price and for how long?

The alternative is to define differentiated watercourse management trajectories based on graphical or hydrological criteria such as basin-versant, neighbourhood, parcel, public or private domain. They must be fixed jointly between the authorities and the project promoters, then included, accepted and shared. Another often counterproductive rule consists of setting a maximum impermeability coefficient. This encourages the use of semi-permeable materials such as grilles-gazons, filter pavements, or porous coatings, among others, uniformly distributed over the surface a project. On other hand, guaranteeing a percentage of the surface area to be covered with water, in which the water from the rain must be delivered immediately, allows the project to be analysed from the perspective of the water path and also ensures the maximum use of water as a resource for the soil

and végétation. Impermeabilising a space completely, for reasons of colour or aesthetics, is not a problem as long as the water generated by the watercourse is in the right place.

Le triptyque eau-sol-arbre

The tree is one of the fundamental elements of good water management and adaptation to the consequences of climate change in the environment. Conceiving and implementing arborisation and water management together must become a matter of reflection.

This offers a number of advantages: the evacuation channels are less polluted, the soil filters the water from the rain at source before it has had time to charge itself with pollutants, it feeds a vegetation that acts as an air conditioner and offers as much ozone as it can grow quickly, under favourable conditions (fig. 6). Thermal comfort and quality of life are thus improved and the natural water cycle is partially restored. Rare today are the arbours in the urban environment that benefit from the water supply from a pavement, a cycle path or a road. In the vast majority of cases, the water often drains away towards a grille (fig. 7).

The association between water, trees and soil is particularly well adapted to urban boulevards and public spaces, which incorporate aesthetic, environmental and climate adaptation criteria. In order to achieve this, it is essential that the trees have sufficient space, an adapted substrate, that the fossils are as far as possible interlinked and that everything is done to remove rainwater.

Based on the model of Stockholm, a pioneering city in this field [9], a number of cooperatives are implementing and testing arborisation techniques by adapting them to local climatic and solar conditions [10, 11]. In Geneva, several projects of this type are currently being studied. The cantonal arborisation strategy [12] is presented as an opportunity to reconcile the

public policy on water with that of nature and the countryside and strengthens the collaboration between landscape designers, civil engineers, nature conservation and water management services.

À NOUS DE JOUER

Integrating the "water reflex" from the outset of a project, i.e. taking water into account in the definition objectives, leads to sustainable and resilient realisations in the face of climate change. The future of water in our towns and villages is not based on the implementation of structures or strictly technical facilities, realised by the only services and professionals involved in water management, but on its integration into the landscape and urban development. New, more polyvalent professions need to emerge, drawing on multiple competences such hydrology, urbanism, landscaping, engineering, architecture and the environment.

In order honour this indispensable transition, we must do so. We must not be afraid to change the practices we use, to undertake not to rely solely on a technical directive or a standard, if this will allow better projects to see the light of day. The sharing of knowledge and experience must be organised between administrative services, local authorities, research offices, promoters and companies, and participation in the transfer and dissemination of practices. A dialogue with the academic community also seems essential. It is also necessary to rethink the financing mechanisms for rehabilitation in order facilitate the implementation of integrated water management facilities, including reservoirs, to the benefit of the whole country. Therefore, we, water and terrestrial stakeholders, must now change our knowledge and practices to understand and share the benefits of putting water at the heart of towns and cities, and thus promote the realisation of resilient and profitable projects for as many people as possible.

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