# TOOLS FOR TRANSBOUNDARY MANAGEMENT OF WATER AND WATER USES

## IN GREATER GENEVA

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GENEVA WATER HUB

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# FOREWORD

This introduction to the characteristics, diversity and development of the tools of transboundary water governance in the region shared by France, the Canton of Geneva and the Canton of Vaud results from a rewarding collaboration between OCEau – the Canton of Geneva's Office for Water – and the Geneva Water Hub.

We felt it would be extremely useful to share a number of perspectives with our readers, in the hope of stimulating a much-needed move towards better management of a resource that is becoming more and more crucial everywhere.

This short work illustrates the wealth of different practices and frameworks that shape water governance in our region: as things stand, there are almost 40 highly diverse public policy tools supporting transboundary co-operation around water. It also offers an analysis of the structure and development of this governance system – which, as we shall see, can be characterized as both innovative and typical.

All these elements ultimately aim to strengthen dialogue at different levels and to stimulate exchange of best practices and shared learning. We believe that, as a shared region, Greater Geneva represents an excellent testing-ground for transboundary water management, for both territorial and institutional reasons: approaches here can not only draw inspiration from but also lend inspiration to mechanisms operating in other river basins with an international dimension.

As the reader will see, this publication is not just a catalogue: it also shows the complexity and sophistication of what could be described as 'institutional assemblage' – that is, the incremental development of a system over a number of years, growing out of a proactive desire to co-operate and to establish a custom-made policy framework that recognizes the limitations inherent in institutional and political boundaries.

At the same time, we have not set out to give a solely technical or academic picture of governance arrangements. On the contrary: an implicit part of our approach is to integrate the human factor as a key dimension in issues of co-operation around water and, more broadly, around sustainability.

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# INTRODUCTION

When the idea for this booklet first came up, we wondered whether we were biting off more than we could chew... How would we get across to our readers that these agreements and ways of doing things had grown out of behind-the-scenes contacts, some even at diplomatic level, and were chosen in a spirit of pragmatism? Would a dispassionate report manage to convey just how many years of multilayered, sometimes even heated, negotiations it had taken to establish real tools to meet shared needs on both sides of the border – and that the end-result was a melting-pot for expertise in transboundary water governance?

Water is a natural resource that can hardly come to a halt at a border, so is often affected by upstream-downstream interactions: this makes it an extremely useful topic on which to examine different tools applied in a transboundary context. However, practical experience shows that, to get a full box of tools, you need time, a great deal of patience, ingenuity and some creativity.

Greater Geneva's experience covers a broad sample of possible tools for tackling several major water policy concerns, and so we felt it would be helpful to offer this assessment. Here we open up these tools not only to the local community – allowing politicians and technocrats to honour the commitment of the earlier generations who created and embedded them – but also to the international gaze, in the hope that they might inspire other transboundary regions across the world.

Digging deeper into what lies beneath and inside the current governance system gives us a chance to analyse its relevance. In that process, we should look at whether the positive development of governance in our shared region is mainly due to internal, local factors, to external causes (the international context) – or to both? Has it arisen out of periodic needs for crisis resolution – or was it set in motion by good ideas, pilot projects or innovative strategies? Was it fostered by a particular person or group at a time of increased investment – or did it result from a gradual, community-based approach? Was there a snowball effect – just one style of co-operation that became increasingly inspiring as it was rolled out across the region?

Answering these questions from a historical, reflective standpoint will allow readers (in our own region or further afield) to identify the determining factors and the elements of success or constraint at work – and may lead to the creation of similar tools for shaping transboundary co-operation in other regions and contexts. The authors hope that this snapshot, taken after almost a century of development in the Rhône, Lake Geneva and Arve basins will be as great a source of inspiration for you as it has been for us.

# Greater Geneva: geopolitical **CONTEXT**

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## PRINCIPAL WATER RESOURCES

A large part of Greater Geneva's water – both surface water and groundwater catchments – is shared between Switzerland (the Cantons of Geneva, Vaud and Valais) and France (the départements of Haute-Savoie and Ain). This transboundary region is distinguished by its great diversity of water resources and by the fact that it contains a lake, a major river, a dense web of small rivers and several strategic aquifers.

Management of all these shared resources has, over time, required the development of various transboundary tools.

### Geology: a glacial system

The morphology of the Greater Geneva region bears the traces of several successive stages of alpine glaciation and deglaciation during the Quaternary Period. At one time, the Rhône and Arve glaciers, both originating in the Alps, covered the region to a thickness of approximately 700 m. The repeated advances and retreats of these glaciers gradually carved out the terrain. Bit by bit, the movements of the Rhône Glacier hollowed out the Lake Geneva Basin until, by about 12,000 years ago, the Lake had taken on its current shape. During the same period, the gradual retreat of the Arve Glacier slowly uncovered the valley through which the River Arve now flows.

Today, the region boasts a large web of watercourses, some of which are rain fed, while others depend on glacial recharge. It should also be noted that a significant part of this network runs through a karst aquifer system.

### Surface water catchment area (Lake Geneva, Rhône, Arve, other main rivers)

Surface waters occupy a total of 13% of the Greater Geneva region (about 26,100 ha).
Its rivers stretch for a total length of 2,400 km throughout the whole area: 350 km in the Canton of Geneva, 250 km in Vaud and 1,800 km in France.

The principal water resource lying within Greater Geneva is Lake Geneva – the largest lake in central Western Europe.
At its western end, Greater Geneva reaches as far as the centre of the Lake Geneva Basin, bordered by mountain ranges.

## TRANSBOUNDARY SURFACE WATERS WITHIN GREATER GENEVA


Watercourses

Border between France and Switzerland

Boundary of Greater Geneva

The Rhône, which is the largest river upstream of Lake Geneva, descends from glaciers in the Alps, flows into the Lake in the Canton of Valais and Vaud and leaves it in the City of Geneva, where it is joined by the Arve.
It then crosses the Swiss border, leaves Greater Geneva and runs through France, finally discharging into the Mediterranean. About 87 km of the Rhône lies within Greater Geneva, of which Lake Geneva represents 34 km and 53 km is the river proper. This is just 11% of its 812 km length, but it is a major resource and brings many benefits to the region.

The Arve is fed by glaciers from the Mont Blanc Massif and has a total length of 108 km: its lower section runs through Greater Geneva. It crosses alpine landscapes, deep gorges, industrial zones, agricultural land and built-up areas, ending in the City of Geneva, where it flows into the Rhône.

**Opposite: The Rhône descends from the Alps and enters Lake Geneva.**

**Below: Leaving Lake Geneva – the confluence of the Arve and the Rhône, known to locals as 'the Junction'.**

In addition to these major transboundary surface water resources, the Greater Geneva area has a dense web of small watercourses with their upstream sections in France and their downstream in Switzerland.
The principal elements of this transboundary hydrological network are the Versoix, Allondon, Laire, Aire, Drize, Foron and Hermance rivers and their tributaries.

**The Versoix**

**The Drize**

**The Allondon**

**The Aire**

**The Laire**

**The Foron**

**The Hermance**

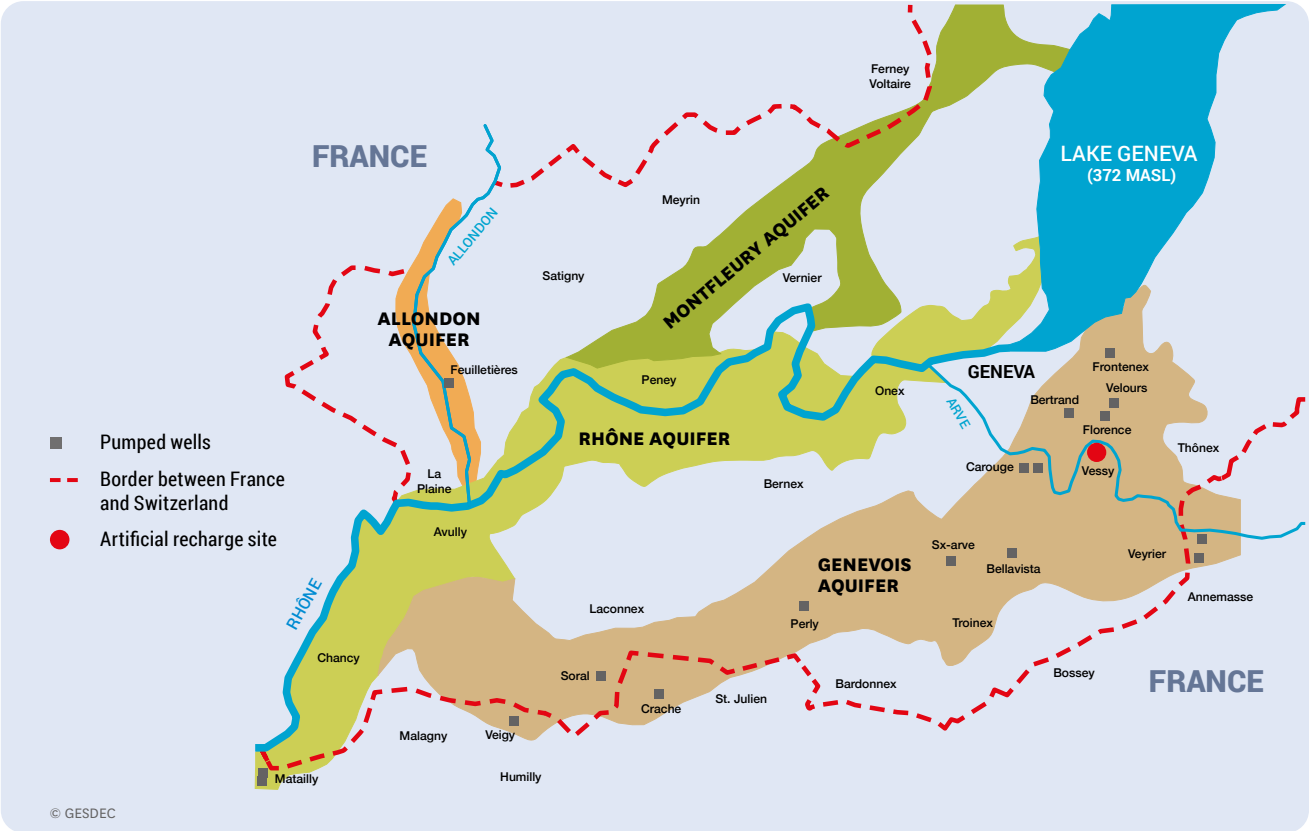
## PRINCIPAL FEATURES OF TRANSBOUNDARY SURFACE WATERS WITHIN GREATER GENEVA

| | **Lake Geneva** (west of Thonon and Rolle) | **Arve** (from Marignier-Vougx to the Junction) | **Rhône** (from Seujet to Chanay) | **Other principal transboundary rivers** (Divonne-Versoix, Allondon, Laire, Aire, Drize, Foron, Hermance) |
|---|---|---|---|---|
| **Length** | **34 km** (to Seujet Dam) | **43 km**, with 36 km in France, 9 km in Geneva | **53 km**, of which 17.4 km in Geneva, 6.8 km marking national border, 29 km in France | **Various: from 9 km** (Drize) **to 22 km** (Divonne-Versoix & Allondon) |
| **Mean flow-rate** (at river mouth) | --- | **72 m³/s** | **251 m³/s** (Rhône-Seujet)<br>**327 m³/s** (Rhône-Chancy) | **0.30 m³/s** (Drize)<br>**3.25 m³/s** (Allondon) |
| **Hundred-year floods** (conservative flow-rate values) | --- | **950 m³/s** | **650 m³/s** (Rhône-Seujet)<br>**1600 m³/s** (Rhône-Chancy) | **22 m³/s** (Drize)<br>**175 m³/s** (Allondon) |
| **Low water flow** (Q347 flow-rate)) | --- | **21 m³/s** | **Regulated flow-rate - 66 m³/s** (Rhône-Seujet)<br>**110 m3/s** (Rhône-Chancy) | **0.01 m³/s** (Hermance)<br>**1.13 m³/s** (Versoix) |
| **Hydrogeology** | Catchment area with predominantly sedimentary bedrock | Catchment area with predominantly sedimentary bedrock | Catchment area with predominantly sedimentary bedrock | Predominantly sedimentary and karst catchment area |
| **Morphological condition: ecological impacts** | 95% of shoreline within Canton of Geneva **altered**, with:<br>• **63,99%** not natural (artificial),<br>• **30.92%** seriously damaged,<br>• **4.13%** slightly damaged,<br>• **0.97%** natural or semi-natural | River banks partially straightened, sediment transport overexploited, restoration in progress | River banks partially straightened, large sedimentation zones formed in dam reservoirs | For the most part only slightly damaged – thanks, among other things, to river renaturation programmes |
| **Water quality** | Good overall, microplastics pollution & micropollutants to be monitored | Significant industrial & urban pollution when water levels are low | Good overall | Agricultural, industrial & domestic pollution – different levels in the various rivers |
| **Hydrological regime*** | Largely snow-fed & glacial, with levels regulated artificially | Snow-fed & glacial, with small tidal range caused by hydroelectric dams | Largely snow-fed & glacial, with large tidal range caused by hydroelectric dams | Fed by run-off from the Jura mountains, with low-flow levels in summer & stormwater discharges (urbanized downstream section) |
| **BIODIVERSITY** | | | | |
| **Environments** | Alpine lake with sparse reed beds | Alpine river with alluvial environments | Series of reservoirs with alluvial environments | Rivers & alluvial environments |
| **International status** | Reserves for migratory birds | --- | Ramsar Site | Partly a Ramsar Site |
| **Priority species** | Fish, wintering waterbirds, etc. | Sensitive microfauna, fish, beavers, otters, etc. | Fish, wintering waterbirds, beavers, otters, etc. | Sensitive microfauna, fish, native crayfish, salamanders, etc. |
| **ECOSYSTEM SERVICES** | | | | |
| **Drinking water** | **80-90% of** Canton of Geneva's drinking water | **10-20% of** Canton of Geneva's drinking water (from Geneva Aquifer) | Significant potential to be confirmed | Little potential, with significant abstraction at head of catchment area |
| **Hydropower production** (electricity output in GWh/year) | --- | **1 dam**<br>Vessy (1.7 GWh) | **3 dams**<br>Seujet (25 GWh)<br>Verbois (466 GWh)<br>Chancy (240 GWh) | **2 small power plants** on the Versoix (1 GWh) |
| **Navigation** | Significant use of pleasure craft (tourist cruise boats, sailing, motorboats) + several public transport lines | --- | Leisure (canoeing, kayaking) + industrial transport (Cheneviers Waste Processing Plant) | --- |
| **Leisure, tourism** | Major centre: **23 ports & 23 beaches** in Canton of Geneva + **9 ports & 16 beaches** in Thonon area + **13 ports & 13 beaches** in Canton of Vaud | Local use only<br>No bathing sites<br>No ports | Local use only<br>3 bathing sites<br>No ports | Local use only<br>A few bathing sites (Allondon)<br>No ports |
| **Fishing**** | Approx. **20 professionals & 4,800 amateurs** fish in Canton of Geneva.<br>Annual catch: approx. **700,000 fish, equivalent to 90 tonnes** (mostly perch & whitefish) | In Canton of Geneva, approx. **270 amateurs.**<br>Annual catch: approx. **560 fish** (trout) | In Canton of Geneva, approx. **460 amateurs.**<br>Annual catch: approx. **3,600 fish** (perch, trout, pike) | In Canton of Geneva, approx. **660 amateurs.**<br>Annual catch: approx. **600 fish** (trout) |
| **Irrigation** (agriculture, golf courses) | Minor impact | Minor impact | Minor impact | Significant impact on some rivers during low-flow periods |

** Greater Geneva's principal hydrological regime is fed by melting snow and glaciers, with low water levels in winter; this is in contrast to the regime that operates under the impact of rainwater from the Jura mountains, which has low water levels during the summer.*

*** Data from the Canton of Vaud and from France cover the whole Canton and all the relevant French territory: there is no breakdown showing specific data for the Greater Geneva sections.*

## HYDROGEOLOGY OF THE CANTON OF GENEVA: PRINCIPAL AQUIFERS




### Groundwater catchment areas

There are three types of aquifer within Greater Geneva, distinguished according to their water flows, how far they extend and how deep they lie: principal, deep aquifers; secondary, superficial aquifers (often referred to as 'associated groundwater'); and temporary aquifers.

Among them are several strategic transboundary principal aquifers, notably the Geneva, the Allondon, the Montfleury and the Rhône. These are large capacity aquifers, publicly protected as groundwater sources because they are or may be used to provide drinking water.
These groundwaters flow principally in gravels deposited during an 'early alluvial' phase, originating from glaciers formed during the last Würm glaciation and filling the folds of the Molasse Basin, which is considered to be the impermeable substratum and crosses several political borders.
Thus, branches of these aquifers extend under both Switzerland (Canton of Geneva) and France (départements of Ain and Haute-Savoie).

The Geneva Aquifer is the largest groundwater reserve within Greater Geneva. Recharged by the Arve, it is 19 km long, varies in width from 1.5 to 5 km and has a usable capacity of approximately 70 to 80 million m³. It is managed on a transboundary basis and used by 10 wells on the Swiss side and 3 wells in France.

However, knowledge about Greater Geneva's substratum still remains partial, even patchy. This means we need not only research and exploration but also modelling and interpretation to improve our understanding of the morphology of the region's resources, to better protect them and to evaluate their potential, notably for geothermal exploitation* and for drinking water.

**As you go deeper into the Earth's crust, the temperature rises by an average of 30° per kilometre. Therefore, at a depth of 3,000 m below the surface, the rock may reach over 100°. This resource can provide geothermal energy in the form of heat or to produce electricity (see: https://www.ge.ch/dossier/transition-energetique-geneve/energies-renouvelables-potentiel-taille-proximite/geothermie).*

## LEGAL FRAMEWORKS AND POLITICAL SYSTEMS

The transboundary dimension of Greater Geneva requires co-ordination between institutional systems that are different in nature, in terms of both how they are structured and how they function. A brief introduction to the region's political and legal systems will give the reader a better understanding of the challenges presented by a transboundary space.

### Switzerland: a decentralized system, in which cantons and municipalities have executive and legislative powers

The Swiss political system is based on the continuous interaction of three levels of government: the Swiss Confederation, cantons and municipalities. It is structured around the principle of subsidiarity and grants a considerable degree of autonomy to regional and local authorities. Consequently, the nation's 26 cantons (of which 2 have territory in Greater Geneva) and over 2,000 municipalities (of which 92 are in Greater Geneva) have substantial responsibilities related to drawing up and implementing public policies.
Coherence between the various institutional levels is achieved through 'executive federalism' – the principle that federal laws must be observed but it is the lower levels of government (i.e. cantons and municipalities) that are responsible for applying them.

As far as water management is concerned, regulatory powers lie with the Confederation, which is responsible for legislating on water conservation and water use. The cantons and municipalities are responsible for implementing directives and adapting them to specific local conditions. Thus it is fair to say that the Swiss legislative framework for water management is substantial, with a significant number of coherently implemented rules.

However, various new sets of issues have emerged, such as the effects of climate change or managing the problem of micropollutants, putting these legislative frameworks under pressure. What is more, the highly decentralized political system creates a very large number of stakeholders and, potentially, difficulties not only in achieving coherence between different policies but also in co-ordinating and aligning actions and practices.

The Canton of Geneva has the distinction of being a 'city-canton', with a significant concentration of water management powers compared to other cantons, and this has made its transboundary relationships easier from the start.

### France: a centralized system with gradual transfer of water management powers to regional and intermunicipal authorities from the 1980s onwards

In France, water policy is based on four major laws (the 1964, 1992, 2004 and 2006 Water Acts), which now operate in the context of the European Union's main water protection legislation, the Water Framework Directive (WFD).

From 1964 onwards, France moved towards managing water on the basis of the country's main river basins, creating 6 large water agencies responsible for raising taxes and ensuring balanced area-based water management through Water Development and Management Master Plans (SDAGEs).

At the same time, water law enforcement tasks are undertaken by central national services, notably the French Biodiversity Agency, which has regional departments and local units.

Despite the fact that the French political system is more centralized than the Swiss, French legislation makes use of public policy instruments for decentralized implementation – for example, drawing up a specific SDAGE for each river basin. These Plans ensure that the relevant laws are implemented appropriately for the issues particular to each basin.

Implementation of French water law takes place at various levels. National legislative codes are supplemented by legal provisions at the scale of départements (notably regulatory resolutions enacted by préfets) and of municipalities (municipal by-laws). However, it remains the case that water management in France is shaped by a supranational law (the WFD) and national codes. Water management powers, which historically have lain with municipalities, have been transferred – at first on a voluntary basis and later imposed by central government – to co operative intermunicipal public bodies. These consortia are administrative structures that bring together several municipalities to share the exercise of certain powers, including that of raising some local taxes.

### Greater Geneva

Greater Geneva is an area that crosses France, the Canton of Vaud and the Canton of Geneva, operating in several different legislative and policy-making contexts. In order to achieve shared goals, an Area Plan has been drawn up in several successive stages (2007, 2012, 2016 and 2021).

This has given practical shape to the parties' desire to move beyond political borders to a joint territorial planning rationale. By responding to a Swiss Confederation call for proposals, the Area Plan has also been able to acquire financial resources, intended mainly for local transport infrastructure projects. Recognizing the particular characteristics of a transboundary space, the Plan is structured around three strategies: urban development, mobility and the environment. By making the transboundary space into a practical, functioning reality, it can define responsibilities and plan measures, not only to create infrastructure but also for broader spatial planning and development. From the outset, the Plan has highlighted the importance of water management as an example of good practice in transboundary management.

There have been some particularly noteworthy successes, relating to management of Lake Geneva and the Geneva Aquifer and to implementation of rivers contracts (see Annex 2) – all of which were achieved before the Area Plan formally brought together France, the Canton of Vaud and the Canton of Geneva and the 'institution' of Greater Geneva was created.

# ISSUES in transboundary co-operation for durable water resources

## SAFEGUARDING WATER RESOURCES

### Quality

In general, forms of pollution with the most visible effects have been largely eliminated from the region's surface waters. This is particularly true of nutrient inputs (carbon, nitrogen and phosphorus), which cause ecosystem eutrophication. However, it is important to continue to ensure not only that wastewater treatment plants (WWTPs) are effective but that sewerage networks are properly run and well maintained right up to the point at which they reach the plants. This part of the infrastructure is vital to safeguarding watercourses from pollution.

The greatest challenges ahead involve less visible pollution, notably from micropollutants. Although we are not yet precisely sure of the impact of all the organic substances from various products found in very low concentrations in surface water and groundwater (pesticides, insecticides, pharmaceuticals, cosmetics, etc.), we know that they have long-term effects on ecosystems. While we need to improve measurement methods and knowledge of these substances, the main priority now must be to strengthen co-ordinated action on both sides of the border to reduce these forms of pollution. In this context, particular measures should include promoting the removal of micropollutants at WWTPs, behavioural change at source and the development of policies aiming to reduce agricultural inputs – and co-ordinating all this across the whole area, notably in order to tackle certain specific problems that have already been identified.

Pollution caused in the past but only recently discovered – such as perchlorate contamination of the River Arve and the Geneva Aquifer – is a crisis situation, and handling such issues requires special attention and encourages managers on both sides of the border to strengthen co-ordinated action. In the case of microplastics pollution, too, knowledge must be improved and shared solutions found. Finally, in the face of climate disruption, it is essential to strengthen joint monitoring of the temperature dynamics of water resources.

Hydrocarbon pollution of the River Aire.

Left:
The Arve in flood, May 2015.

Right:
The Hermance riverbed, dry during the summer low-flow period.

### Quantity

The hydrological regimes of the region's watercourses have been radically altered by human activities: draining peatlands and wetlands, soil sealing, stream and groundwater pumping, operating hydroelectric dams.

These activities have also intensified natural variations in flow-rates and water levels, which can become problematic for fauna and flora or for the safety of people and property. The variations in seasonal flow-rates that we are now seeing are consistent with climate change forecasts.

During periods of heavy rain, flood flows are now more frequent and more extreme than in the past. They erode riverbanks, sweep away wildlife and sometimes cause severe flooding. During dry periods, on the other hand, low water flows have adverse impacts on aquatic life and lead to rising water temperatures. In a context of both climate change and significant population growth, problems related to low-flow levels take on a new dimension, calling for sustainable solutions to maintain sufficient ecological flows, especially in streams and small rivers. In order to handle average flood flows and spate conditions that are likely to cause high levels of hydraulic stress, the negative effects of soil sealing must be minimized by significantly improving spatial planning and stormwater management. To cope with extremely high flow-rates, there will have to be further implementation of flood protection measures, most often alongside renaturation projects, allowing watercourses more space and freedom and taking a coherent upstream-downstream perspective on an entire transboundary catchment area.

### Morphological condition: ecological impacts

Most of the region's rivers have been canalized or even, in their downstream sections, channelled underground, often to make land available for cultivation or urban development. Restricting the width of a river and artificially engineering the riverbed leads to the disappearance of large parts of its natural aquatic habitats, to the detriment of animal and plant species. Rivers have also partly lost their natural capacity to mitigate floods and some types of pollution.

Although renaturation projects over the last 20 years have enabled marked improvements in the situation, sustained efforts will be needed to restore the width of watercourses and to re-establish their ecosystems, notably in urban areas. This also means continuing to improve the banks of the River Rhône and the shores of Lake Geneva, taking into account environmental aspects as well as social (access to water, including places to swim).

Artificial reach of the Nant d'Avril stream, below the ZIMEYSA industrial area.

The River Aire after renaturation, upstream of the Lully bridge.

### Biodiversity

The most pressing current issue for biodiversity is to improve the status of animal and plant populations and to promote the return of species that have disappeared from the area.
Measures vital to achieving these improvements include: controlling the development of social activities around watercourses; taking into account the needs of specific species in renaturation projects; maintaining riverside trees in a carefully differentiated way, with appropriate extension whenever safety permits (dead wood, log-jams, etc.); restoring ecological continuity (fishways, passageways for beavers, etc.); undertaking targeted control of the most problematic non-native species (preventing new ones being introduced and containing those that cannot be eliminated).

**Lake Geneva and the Rhône play a major role for waterbirds such as the tufted duck (left) and the common pochard (right).**
© J-M. Miterer

**On the edge of extinction, the southern damselfly survives only in a few clean, sunny rivers.**
© Gille Carron

**The spread of North American crayfish has almost eliminated the native white-clawed crayfish from our rivers.**
© Bureau GREN

### Groundwater

Under the combined pressures of urban development, population growth and climate change, the use of groundwater has risen over recent decades. In parallel, protection of this resource has become more complex, as it is now increasingly vulnerable to environmental risks, whether indirectly through the frequent use of pesticides and/or as a direct result of the amount of construction beside or even across groundwater tables. The most important issues here are to co-ordinate building developments that affect Greater Geneva's sub-soil and to create joined-up approaches to maximizing knowledge about the extent, morphology and capacity of the region's groundwater and its aquifer recharge areas, while still optimizing groundwater use.

## USES OF WATER

If we look at integrated water management in the context of broader public policy and apply existing typologies, we could reckon that there are some 20 or more uses and ecosystem benefits of the resource. However, not all of these raise significant issues of transboundary co-operation in the Rhône and Lake Geneva basins: only those that do are discussed below.

### Drinking water

When it comes to problems with this use of water, the susceptibility of the different areas of Greater Geneva varies depending on the water resources within their political borders and, in particular, on their access to major resources such as Lake Geneva, the Rhône and the Arve. At the regional scale, France, the Canton of Vaud and the Canton of Geneva all benefit from large natural water systems, and therefore may appear to be in a relatively comfortable position: however, in reality, this masks local situations that sometimes involve a certain amount of drinking water stress. For example, some local authorities in the French départements of Ain and Haute-Savoie foresee tensions around drinking water resources, with the risk that these could grow over the next 30 years. Improving the drinking water network – both the grid and its interconnections – offers some potential, whether for crisis management or regular operation, while reducing the impact of fragile ecosystems.

### Ecosystem benefits

Among the ecosystem benefits of water, the function that raises a major issue of transboundary co-operation is the provision of biological corridors or habitat connectivity in aquatic environments. Particular attention will have to be paid to continuity along the entire length of lake shores and rivers and to interconnections between wetlands and the rest of the 'blue' habitat network.

### Harm prevention

In view of recorded and predicted climate change, forecasting models and hazard maps must be continuously updated and shared upstream-downstream, ensuring mutual support across borders. These issues affect mainly the River Arve and, potentially, Lake Geneva, where flood expansion and retention areas and evacuation plans must be agreed, with smooth co-ordination between urbanized and rural sections of the river.

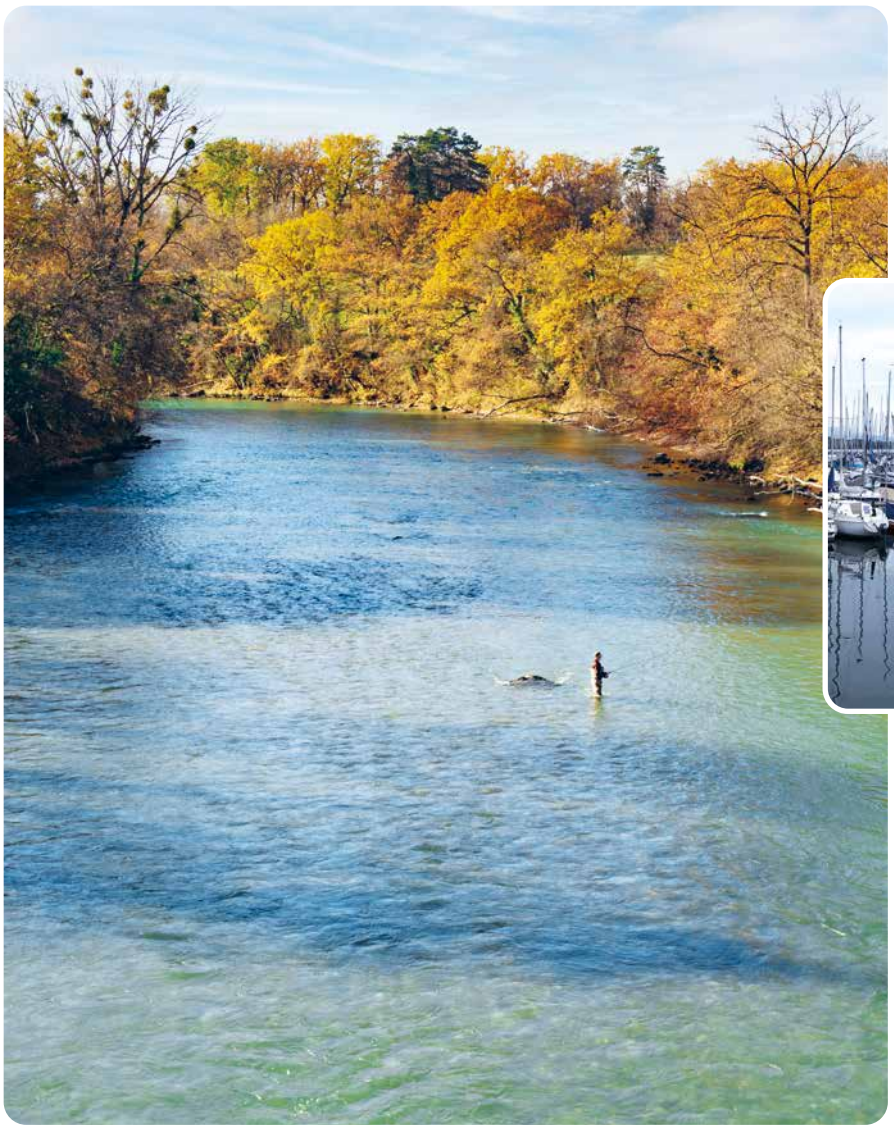
### Access to water for swimming, boating, water sports and other leisure activities

Year on year, summer weather draws growing numbers of people to the region's various rivers, lakes and pools, which offer them not just the sense of calm that being near water always brings but also a freshness they cannot find on land during a heatwave. It will be vital to achieve a careful balance of spatial designation and organization between this irresistible attraction and the many other uses of water.

### Hydrothermal and geothermal energy

The use of lake water, river water or groundwater to regulate the temperature of homes is set to be developed on the basis of current hydrothermal and geothermal energy trials.
Transboundary monitoring of the consequent impacts of water temperature and water quantity on ecosystems will need to be established to ensure sustainability, following the example of CIPEL's monitoring of Lake Geneva.

**Cooling off in the River Aire.**
© Fotolia



**The marina at Port-Choiseul on Lake Geneva.**

**Angling in the River Arve.**
© Michel Schnegg

# TRANSBOUNDARY TOOLS
## for water managment

### DESCRIPTION AND CHARACTERISTICS

**What is a tool?**

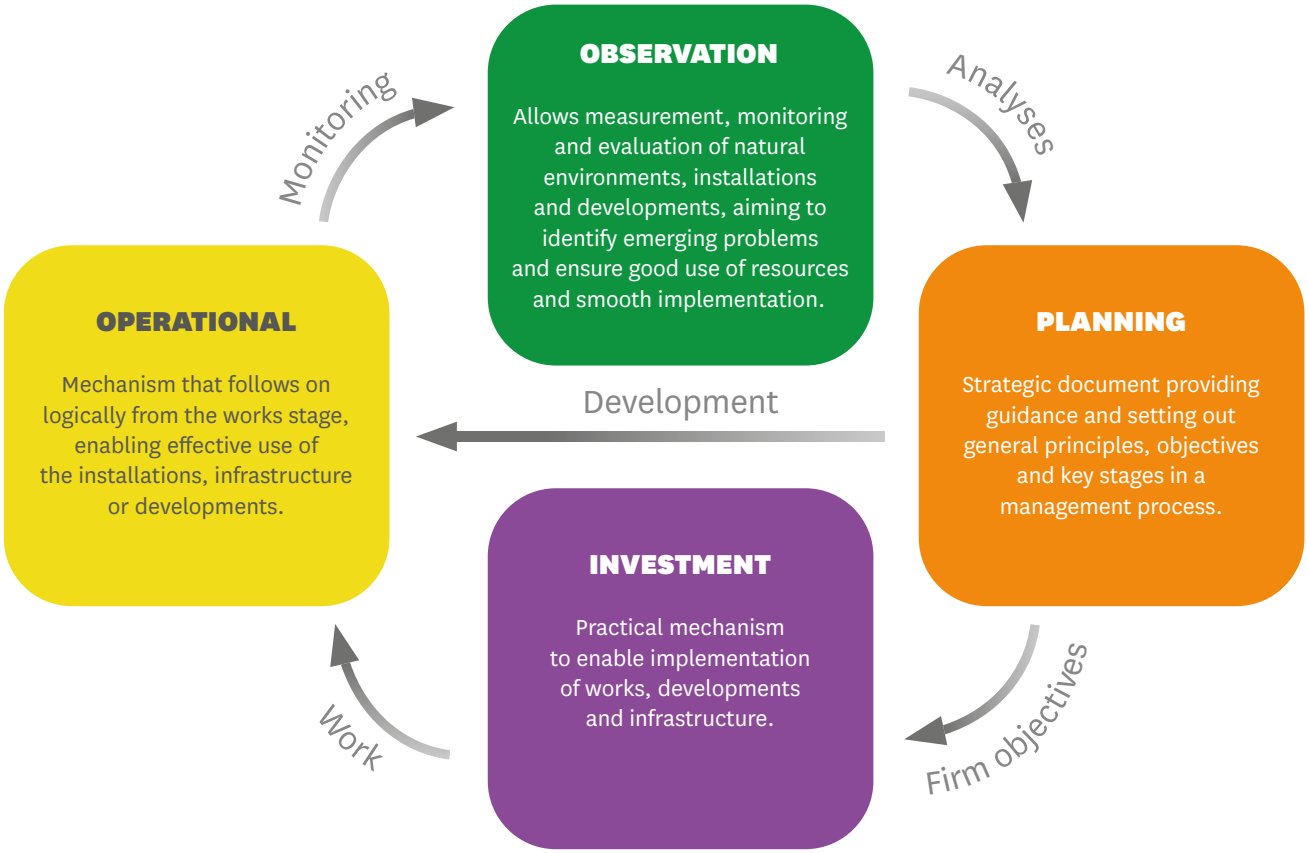
In the context of this booklet, 'transboundary tools' are all the legal instruments – whether in the form of treaties, conventions or agreements – that make it possible for two countries to co-operate across borders on different topics of concern in managing water resources and water use.

These instruments can be categorized, according to their purpose, as planning, operational, investment (to carry out works) or observation tools – or they can fall under a number of these headings at the same time.

The infographic below shows, in a schematic and simplified way, how these tools are generally intended to work in synergy. In practice, governance can be adapted to local contexts and to specific opportunities, and use can be made of more pragmatic arrangements. In addition, the cyclical relationship of the tools does not always flow in the order shown in the diagram, and variants may emerge according to context.

What is more, every tool – of whichever type – creates a need for some observation, to report on how it works and on its outcomes. Therefore an observation tool must also include an element of monitoring for all the other tools, to ensure that planning, investment and operations are consistently followed up.

### TYPES AND FUNCTIONS OF WATER MANAGEMENT TOOLS: GENERAL PRINCIPLES



Among the tools used in Greater Geneva, some have been designed and created specifically for transboundary application in a given context or to meet a particular need (e.g. the Franco-Swiss Convention on the protection of Lake Geneva against pollution, the Convention on the protection, use, recharge and monitoring of the Franco-Swiss Geneva Aquifer, etc.).

However, the majority of the area's water management tools originated on the French side and then integrated transboundary elements in order to help local stakeholders respond to specific needs for co-operation (e.g. river contracts).
The involvement of regional representatives from the two countries differs in both style and degree. In some cases, the representatives of each country, in jointly signing up to a particular agreement, have undertaken to work towards aims that will be defined while the tool is in use. In other cases, a tool is more a commitment to take part in specific activities.

For other tools again, co-operation may be limited to signing up in order to promote the visibility of the project from a transboundary point of view.

### Partners

Many different public bodies are involved in these tools, partnering to exercise their powers for planning and implementation, water use and water law enforcement (in France – central government, intermunicipal bodies and the regional Water Agency; in Switzerland – the Canton of Geneva, the Canton of Vaud, the Swiss Confederation, municipalities).
Together they define the framework for co-operation, regulate agreements, set objectives, support and facilitate stakeholder relationships, oversee the implementation of projects and ensure adherence to the terms of any contract. These technical partners are often also funding partners.
In Geneva, most powers lie with the Canton – unlike other Swiss cantons, where the municipalities have more, and France, where powers are distributed across six tiers of government, from the EU down to the municipality.

Non-governmental partners tend to come mostly from civil society or official bodies (fishing federations, residents' associations, chambers of agriculture, etc.). They are rarely involved in co-financing projects, but more often play a part in the various consultation phases.
Because water-related issues cut across many different spheres of interest, stakeholders have often had to set up new co-ordinating bodies in order to achieve a genuinely participatory process.
Thus, organizations of various types – river committees, commissions, transboundary working groups, etc. – create ties, fostering consultation and co-ordination between different institutional partners and civil society. Bodies of very different kinds, whether political, technical, decision making or consultative, can co-exist within the same management apparatus and help to make the tool more proactive and effective.

### Financement

Transboundary tools are financed partly by the local authorities that own the projects involved (directly controlled water and wastewater companies and co-operative intermunicipal bodies in France, cantons and municipalities in Switzerland) from their own resources. These come from income raised largely from water consumers or on the 'polluter pays' principle, and to a lesser extent from taxpayers. This financing is supplemented with subsidies granted by public-sector funding partners.

There are many such partners in France, funding projects according to their subject remit and policy priorities (the Auvergne-Rhône-Alpes Region, the Rhône-Mediterranean and Corsica Water Agency, the départements of Ain and of Haute-Savoie, even in some cases the European Union).

In Switzerland, subsidies are granted mainly by the Confederation. Less frequently, funding can come from outside the public sector – mainly from private-sector economic partners or third sector organizations.

***The Agreement for the provision of drinking water to the Pays de Gex Rural Area Consortium* (France) by SIDAC (the Coppet Area Intermunicipal Water Supply Service)** (Vaud, Switzerland) provides an illustrative example of the way an operational tool is funded. In this case, the Vaud water-supply syndicate and the Pays de Gex municipalities have invested jointly in drinking water abstraction and treatment installations in Lake Geneva and now share the operating costs (see details on page 42).***

* *Now the Pays de Gex Area Consortium.*
** *SIDAC is now SITSE, a water and wastewater company serving and directly controlled by the Municipality of Terre Sainte and the surrounding area.*

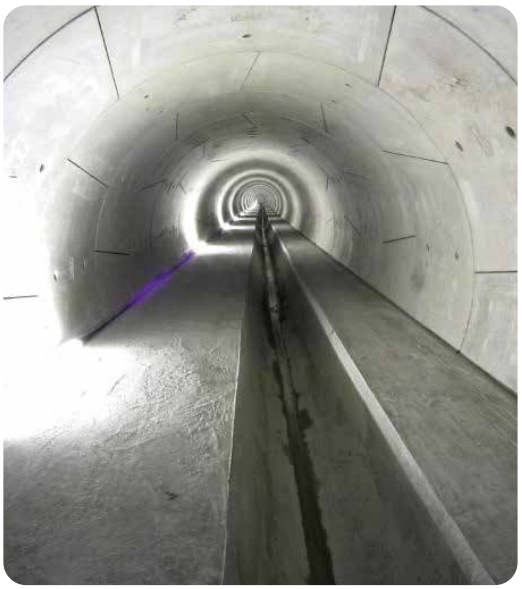
Methods of financing vary according to the kind of tool in question. For investment partnerships, funding is specific to the work involved and ceases after it has been completed according to the project aim. For operating partnerships, cost-sharing continues throughout the whole period of operation. There are also some types of hybrid financing, on the invest-then-operate pattern: with these, however, the amount allocated to investment is always larger.

Depending on whether it is creating infrastructure or delivering services, a tool will draw on various sources of public, quasi-public or private funding. Within the same action programme and according to whether each project is expected to affect the whole area or just part of it, funding can be 100% Swiss, 100% French or shared. Some may receive Franco-Swiss joint funding even if the work is to be carried out on only one side of the border: the nature and source of funding depends on the tool's expected comparative impact for each of the partners, rather than on whether it is based in France or Switzerland.

Most tools are simply made available to the areas concerned: they can decide, on a voluntary basis, whether or not to take them up. This being the case, stakeholders who choose to put these tools into effect undertake to do so on a contractual basis, which clarifies the details of the aims and objectives, implementation schedules and funding partnerships. If these commitments are not fulfilled within the time limits set, funding contributions and partnerships can be reviewed.

**Above:**
**Flood management for the River Foron at Marsaz.**
© SM3A

**Opposite:**
**The River Drize following renaturation.**



*The River Drize renaturation project at Grange-Collomb, carried out under the 2003 Transboundary Rivers Contract 'From the Arve to the Rhône', was jointly funded by French partners, even though the work took place solely in Switzerland.*
*And under the transboundary Foron River Contract, the Canton of Geneva provided 50% of the funding to create the Marsaz Water Retention Area, located entirely in France but expected to have an equally significant effect for the Canton.*

*The 2009 construction of the Choully Wastewater Tunnel, situated entirely in Switzerland, was mainly funded by the Pays de Gex Rural Area Consortium in France, with some financial input from the French partners and the Canton of Geneva.*
*This infrastructure enables wastewater to be collected from a large part (about 70%) of the transboundary area of Pays de Gex, so that it can be treated in a newly built WWTP in Geneva.*

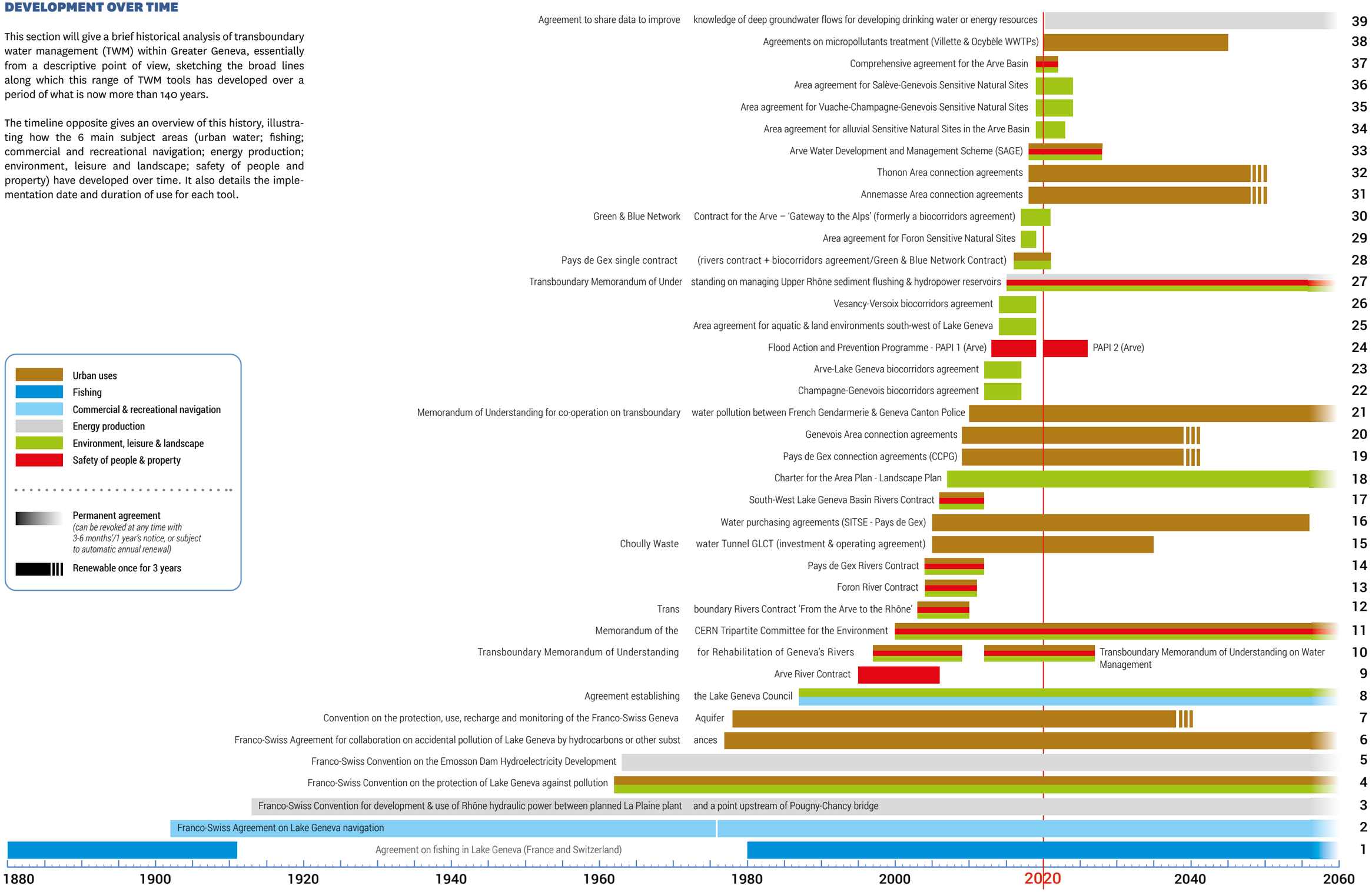
## OVERVIEW OF TOPICS OF CONCERN

We have structured our analysis around a set of 12 topics of concern which are the subject of transboundary collaboration in relation to water management and water use.
In total, almost 40 tools are used on a daily basis to tackle these topics, which fall into six main subject areas, as illustrated below.

## DEVELOPMENT OVER TIME

This section will give a brief historical analysis of transboundary water management (TWM) within Greater Geneva, essentially from a descriptive point of view, sketching the broad lines along which this range of TWM tools has developed over a period of what is now more than 140 years.

The timeline opposite gives an overview of this history, illustrating how the 6 main subject areas (urban water; fishing; commercial and recreational navigation; energy production; environment, leisure and landscape; safety of people and property) have developed over time. It also details the implementation date and duration of use for each tool.



Four main historical phases have shaped the development of transboundary water management tools:

## 1880 to 1962

### Shared use of water resources across a transboundary area

This phase began in the late 19th century, with the introduction and formal signature of the first transboundary agreements. These first tools were primarily oriented towards industrial production and other human activities, aiming to regulate the ways in which water resources were used and exploited. During this phase, the tools developed were essentially applied to fishing, navigation and hydropower production.

## 1963 to 1986

### Protection of water resources through wastewater treatment

In the early 1960s, the visible signs of pollution in Lake Geneva, which were largely due to direct discharges of wastewater into the Lake and into tributaries of the Rhône, alerted the authorities and raised concerns in civil society. This was the context in which, in 1963, the first transboundary monitoring and environmental conservation tool was created, in the form of the Franco-Swiss Convention on the protection of Lake Geneva against pollution (CIPEL – see detailed analysis, p. 32).

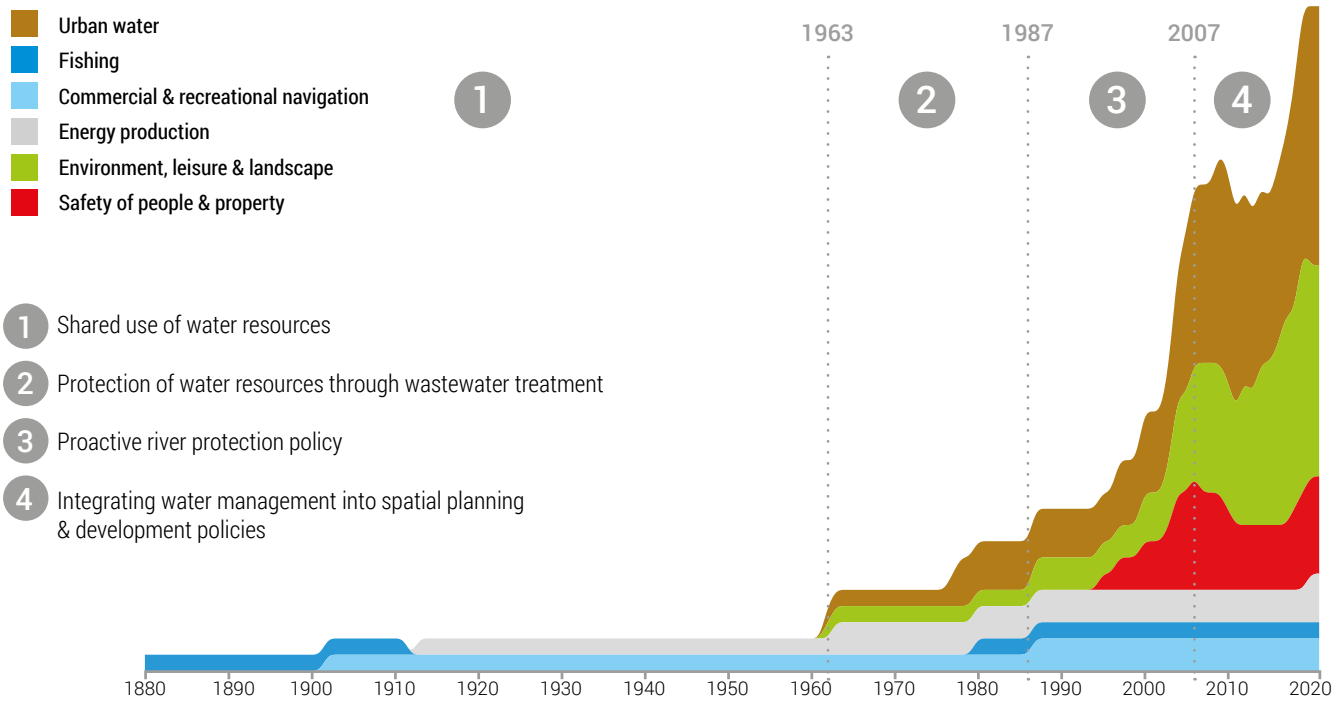
Legislators were equally concerned about water quality beyond the Lake itself, and therefore legal frameworks to increase protection of water resources were already tending to become stronger and more complex on both sides of the border. In Switzerland, the second Federal Waters Protection Act (1972) required all sewerage systems and other sources of infiltration leading to pollution to have treatment measures in place by 1987. Also of note is the introduction of the Federal Ordinance on Wastewater Discharge in July 1976 – a major tool in combating water pollution and enabling new infrastructure financing. In France, the 1964 Water Act created Water Agencies to take charge of managing water in 6 major river basins. We should also mention France's 'Clean Rivers Deals' of the 1970s – contracts for the restoration of watercourses, made between central government and local authorities on a voluntary basis: these led in turn to the first river contracts of the early 1980s.

Despite these different measures, the state of watercourses in the Lake Geneva Basin remained unsatisfactory. In the 1980s, many rivers failed to meet 'good ecological status' objectives, suffered from drought during periods of low flow or led to flooding at times of high water. The situation continued to cause problems for Lake Geneva, and numerous stakeholders stepped up to try and improve the situation. Among them were CIPEL and its partners, including those from civil society – for example, the Lake Geneva Safeguarding Association, which organized a scientific conference in 1983 to look at the problems of eutrophication and water pollution.
Among the sources of these were inadequate sewerage systems and the growing pressures of urbanization and human activity, including soil sealing and artificial alteration of watercourses, as well as lack of co-ordination between stakeholders.

## 1987 to 2006

### Proactive river protection and restoration policy across political borders

These findings made regional stakeholders more aware that better safeguards for water resources were needed and that management of the catchment area should be more integrated across borders. The early 1990s saw the start of a new dynamic. Greater commitment on the part of visionary politicians,



changes in the legal bases for action and the introduction of new financial mechanisms all strengthened management of the region's water resources.

In 1990, the Canton of Geneva launched the 'Ten years to save our rivers' programme, a plan of action to raise the visibility of the area's river pollution problems. On the French side, the Water Act of 3 January 1992 gave water a new status, recognizing it from then on as part of the nation's common heritage. Funding generated by this innovative law would help the country's territorial authorities to manage their water resources responsibly.

In 1993, the subject of the environment at the transboundary scale was brought into the spotlight by the France-Geneva Regional Committee (CRFG), which held the first transboundary environmental forum, placing particular emphasis on the health of the region's watercourses. Driven by the same concerns, in 1997 Geneva amended its Cantonal Water Law to create a Rivers Renaturation Service, with special funding and a programme that is updated every 4 years according to the rivers' ecological needs. In this context, the political will emerged for a transboundary partnership to fund shared thinking, practical actions and management tools.

This was formalized this within the framework of the CRFG on 4 December 1997, when the Transboundary Memorandum of Understanding for Rehabilitation of Geneva's Rivers was signed. This Memorandum concerns the catchment areas of all the transboundary watercourses between France and the Canton of Geneva, and creates a financial and legal framework for a river rehabilitation programme, under several headings: wastewater treatment, protection of people and property against floods, restoration of riverbanks and riverbeds, regenerating aquatic environments and landscapes, raising public awareness.

This first Transboundary Memorandum of Understanding would help to create a new generation of tools, notably transboundary rivers contracts, the number of which was to increase significantly in the space of a few years (2003-2006). This period also saw a proliferation of tools that could respond to the involvement of more – and more specialized – funding bodies.

## 2007 to 2020

### Greater Geneva emerges as a functional transboundary space for water management

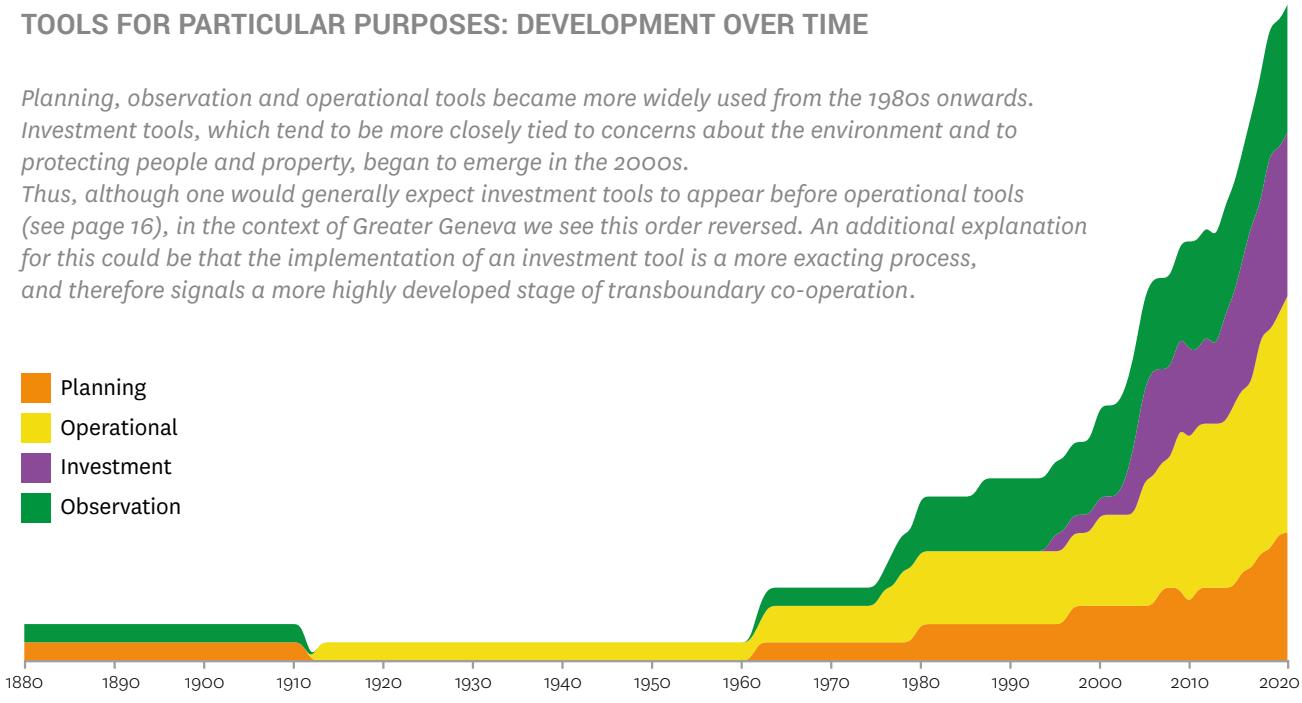
The late 2000s saw the Greater Geneva Area Plan become a practical reality (2007). This lent impetus to the number and strength of tools shaping transboundary water management.

Between 2007 and 2020, 22 new tools were created, for application at different scales and for differing purposes and therefore varying in nature. During this last phase, water management has moved from being solely sector-based towards greater integration, in particular with spatial planning and development policies – for example, in biocorridor agreements or area agreements for designated Sensitive Natural Sites. The transboundary aspect of water management is obviously becoming increasingly embedded in the sphere of spatial planning and development, and Greater Geneva is taking its place as the functional reference space for this.

In the context of this historical analysis, it is interesting to focus more closely on the changing scope of instruments that have come into use since 1880 (see infographic below).

### TOOLS FOR PARTICULAR PURPOSES: DEVELOPMENT OVER TIME

*Planning, observation and operational tools became more widely used from the 1980s onwards. Investment tools, which tend to be more closely tied to concerns about the environment and to protecting people and property, began to emerge in the 2000s.*
*Thus, although one would generally expect investment tools to appear before operational tools (see page 16), in the context of Greater Geneva we see this order reversed. An additional explanation for this could be that the implementation of an investment tool is a more exacting process, and therefore signals a more highly developed stage of transboundary co-operation.*



## THE RIGHT TOOLS FOR TOPICS OF CONCERN

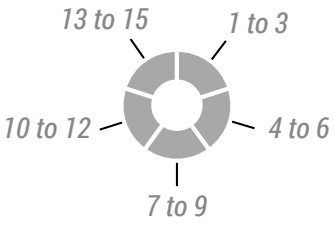
This section describes the dynamics of interaction between various transboundary water management instruments and the topics of concern that they aim to tackle. The table below illustrates the types and numbers of instruments put into effect (observation, planning, operational, investment), under headings referring to the main subject areas.

Tools for handling issues of fishing, navigation and energy production – historically the earliest to emerge as concerns at transboundary level – still remain very limited in number by comparison with those relating to the other main subject areas. We should also note that, when it comes to the subjects of 'Urban water', 'Environment, leisure and landscape' and 'Protection of people and property', most of the existing tools are investment instruments. This is because, as the region has developed and become more densely populated, transboundary co-operation has highlighted the need to prioritize these issues and channel funding towards them. In particular, most tools directed at uses connected with the environment or with amenities are intended to implement investments, which is not the case for other uses of water.

To illustrate this in more detail, we have divided two of the main subject areas – 'Urban water' and 'Environment, leisure and landscape' – into a number of more specific issues, which we characterize as 'topics of concern' (see infographics on page 25).

### TYPES OF TOOLS BY MAIN SUBJECT AREA

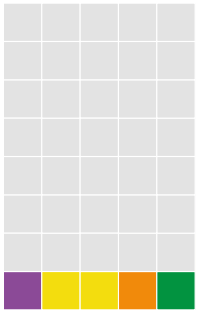
| MAIN SUBJECT AREAS | Planning | Operational | Investment | Observation |
|---|---|---|---|---|
| URBAN WATER | 5 | 9 | 8 | 5 |
| FISHING | 1 | - | - | 1 |
| COMMERCIAL & RECREATIONAL NAVIGATION | - | 1 | - | 1 |
| ENERGY PRODUCTION | 1 | 3 | - | - |
| ENVIRONMENT, LEISURE & LANDSCAPE | 6 | 2 | 15 | 3 |
| SAFETY OF PEOPLE & PROPERTY | 4 | 2 | 8 | 2 |



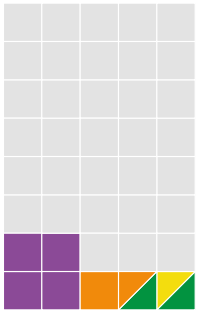

*Number of tools used*

## TYPES OF TOOLS BY TOPIC OF CONCERN

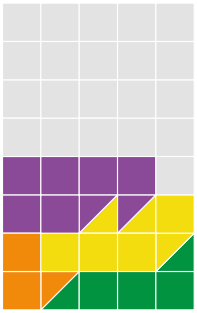
### URBAN WATER



**Drinking water**



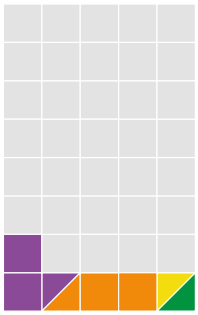
**Stormwater**



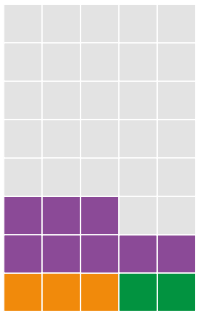
**Wastewater treatment/Water quality**

The least numerous transboundary tools for collaborating on urban water are those dealing with drinking water. This could be explained by the fact that stakeholders generally take a pragmatic approach, focusing their co-operation on solving water quality problems (pollution and sanitation measures) rather than on water abstraction.
The topic of drinking water involves not only issues of universal access to water resources but also management of low water flows – the latter a growing transboundary concern. Nowadays, pressure on the use of drinking water arises predominantly from vigorous real estate development in the region and from the limited availability of drinking water resources, notably in France.

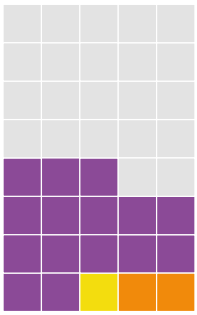
### ENVIRONMENT, LEISURE & LANDSCAPE



**Low-flow replenishment**



**Leisure and landscape**



**Biodiversity**

Transboundary tools dealing with low-flow replenishment are less numerous than those promoting biodiversity or for enhancing leisure and landscape. From this angle too, low water flows are a fairly recent concern and are intrinsically tied up with climate disruption, which is strongly evidenced by the repeated droughts of recent years. This high-stakes issue is playing a growing role in transboundary relations (recent motions and debates in the Grand Council of the Canton of Geneva, articles in the press, etc.) – without, as yet, policies or tools having emerged to meet the challenge.
There is no observation tool directed specifically at biodiversity. However, this topic of concern is the subject of numerous transboundary collaborations, through investment tools such as biocorridor agreements, transboundary river contracts or area agreements for designated Sensitive Natural Sites.

- Planning
- Operational
- Investment
- Observation
- Tool does not cover this topic of concern

*The same type of tool can be replicated at different administrative levels (e.g. river contracts, area agreements for designated Sensitive Natural Sites, biocorridor agreements), including the various area consortia (e.g. connection agreements).*
*Implementation of different types of instrument: each block represents one instrument, which may have one purpose (single-colour block) or 2 (two-colour block).*

# **ANALYSIS** of factors shaping the system and its development

*Managing water in a transboundary context involves challenges arising from the presence of a large number of stakeholders and from different political and legislative frameworks. Therefore transboundary water management requires institutional arrangements to ensure that the system functions at its best – and sometimes these need to be custom made. Where roles, responsibilities and organizations have varied legal statuses and differing objectives and resources, operational management involves overcoming fragmentation, defining methods of working that go beyond political borders and co-ordinating the region's various legislative frameworks.*

*With the emergence of Greater Geneva as a functional reference space, it now seems obvious that the transboundary perspective is the right one. However, when considered historically, Franco-Swiss water management stands out as a pioneering field: needing to move rapidly beyond political borders, it has demonstrated a degree of innovation in its practices. Of particular note are the transboundary framework agreements that were made relatively early and still remain benchmarks at the international scale – for example, the 1963 agreement establishing CIPEL and, in 1978, the first co-operation agreement for the Geneva Aquifer.*

*In classifying the region's tools and analysing their development, we have found that approaches to implementing this system over time have been structured around four factors:*

## 1 | The existence of a community of practices, functioning in the transboundary dimension and cutting across different sectors

Transboundary water governance as it now stands has been created incrementally, as a function of the region's changing concerns and socio-economic development. During this process, the structure of water management has pivoted around a practice community made up of the same stakeholders, each often occupying a number of different key positions and coming together in different types of decision-making arenas.
The existence of this community and these platforms has enabled them not only to exchange ideas and shape a shared vision of what is at stake across borders, but also to set up numerous informal interactions that facilitate both negotiation and implementation.

From this base has emerged a capacity for operational flexibility: the stakeholders can think innovatively about transboundary projects, implement them within a reasonable timeframe and respond rapidly to shared needs. Yet flexibility is combined with legal robustness: these practices have been formalized into public policy instruments, some of which – river contracts, for example – are unprecedented at the transboundary scale.

## 2 | The existence of a shared political will and vision, carried forward by regional policymakers with more room for manoeuvre than central governments

This practice community could never have become a reality without a certain amount of visionary political thinking.
Determining the kind of instruments required and tailoring particular mechanisms to suit local circumstances has involved a significant degree of pragmatism.
This has meant taking a step back from issues of sovereignty, in order to put the emphasis on getting things done at the regional scale and on identifying appropriate mechanisms to overcome the fragmentation intrinsic to operating within different legislative and political frameworks.
In the case of transboundary water issues, we can reasonably assume that bodies operating at the national level have

consciously allowed the lower levels room for manoeuvre in drawing up responsive, custom-made agreements.

In addition, existing political structures (the subsidiarity principle in Switzerland, for instance) or certain changes in the political and administrative fabric (for example, the introduction of co operative intermunicipal public bodies in France) has helped to reduce the number of stakeholders and to simplify interactions within a multilevel institutional apparatus.

However, it is really thanks to a Franco-Swiss group of policy-makers with a shared view of the challenges of transboundary water management and to competent public administration that it has been possible to establish and implement action programmes funded from the public purse.

## 3 | The evolution from an essentially sector-based, trouble-shooting outlook to an integrated, pre-emptive perspective

Historically, the region's transboundary water governance system has never experienced a major crisis demanding a root-and-branch rethink of existing practices. On the contrary, the system has adapted and changed gradually in the light of emerging problems that require policy and practical responses. In this sense, the issue of quality has been a decisive driver in the dynamics of transboundary water management, whether relating to surface waters or groundwater, whether for the Lake or for rivers.

For a long time, changes to the design of the system were essentially reactive: now, however, it has moved towards more preventative practices. This evolution can be explained, in particular, by a stronger link between water management and urban planning and development, requiring infrastructure forecasting and provision for the long term.

This transition, although welcome from the point of view of sustainability, also brings its own difficulties, since integrating water management into multiple plans and programmes leads to a degree of fragmentation in the sector and some dilution of its priorities.

## 4 | The role of civil society

While the governance system has enjoyed consistent commitment by key decision-makers, we should not forget civil society, which has also helped to keep questions of transboundary water management on the political agenda. For example, the Lake Geneva Safeguarding Association, through its publications, campaigns and events, has actively involved local people in issues relating not only to the Lake itself but also to the rivers of the Lake Geneva Basin.

However, civil society stakeholders have gone beyond straightforward environmental activism, also supporting greater understanding of the water system through the production of scientific studies.

From this angle, the scope allowed to civil society and the input of academics have certainly helped to position water as a key issue at the transboundary scale and to influence the policy programmes implemented to tackle the sector's problems.

# Thinking about **DIRECTIONS FOR IMPROVEMENT**

The situations of various cities vulnerable to climate change have shown us that it is crucial to continuously interrogate and challenge a governance system – and to bring about change. This need to reflect on transboundary governance is all the more crucial because the context involves larger numbers of stakeholders and some institutional fragmentation.

As we have tried to show in this publication, the Greater Geneva region holds a significant wealth of experience in its institutions for promoting transboundary water management. Cutting across different hydrological systems (the Geneva Aquifer, Lake Geneva and surface waters), the range of tools presented here has been enhanced over time and continues to support a perspective that is moving increasingly towards significant integration of the transboundary governance system.

We aim not only to take stock of things as they now stand, but also to provide a bridge to managing the challenges still to come. Our region will need to be equipped with instruments to guarantee continued water quantity and quality and to anticipate and plan for available water supplies, smooth operation of the different uses of water and support for the environment and biodiversity. Here we propose six possible directions, any or all of which could be useful for developing the transboundary governance system in future:

## Direction 1

### Legislative policies and co-ordinated legal approaches

The region's authorities acting in this binational context enjoy the advantages of the many bilateral agreements already concluded at various political and administrative levels – but they still undoubtedly need to develop a framework for better harmonized, unifying collaboration, to avoid splintering into too many, potentially energy-wasting co-ordination bodies. Following the examples set by the Intercantonal Agreement on Correcting and Regulating Lake Geneva Water Flows or even the prospective Franco-Swiss framework agreement on the Rhône, governance tools need to be developed or recast on a shared basis, in order to achieve the greatest possible integration of management – as CIPEL has for some 60 years. What is more, the global debate on the rights of nature, in particular on the legal personality of aquatic ecosystems (lakes, rivers, aquifers, wetlands, etc.), could lead the two countries concerned to make changes to their legal regimes.

## Direction 2

### Data and information sharing

Although there is a plethora of available information, which could be exchanged and then transformed into useful indicators for cross-border management of resources, there is as yet little actual data pooling. Whether the goal is simply to improve monitoring of the natural water system or, more ambitiously, to be in a position to make decisions that arbitrate between different water uses and water users, Greater Geneva lacks tools for true joint observation – despite the numerous examples available in other regions (notably France).

It will be important to open channels of communication and exchange instances of good practice – but, further than that, it will become increasingly necessary to establish which data is most relevant and to review the overview indicators for joint management of water resources in the catchment areas concerned.

## Direction 3

### Joint funding

Each of the local authorities in the region has financial resources that are, overall, substantial enough to maintain and develop all its various uses of water and major everyday services (drinking water, wastewater, hazard mitigation). However, as the example of the Canton of Geneva shows, a number of the different funding mechanisms internal to public water policy, shaped under each locality's prevailing 'historical' conditions, should now be reconsidered and, where necessary, rebalanced.

The accounting system applied to drinking water provides a pertinent example. In France, for instance, a law passed in 2005 established an international co-operation mechanism, allowing local authorities and regional water agencies to use 1% of their operating budgets to support water and sanitation projects in the Global South. On this model, perhaps other forms of mutual co-operation could be agreed and (re)organized to integrate environmental externalities for safeguarding water resources or for crisis management (e.g. joint investment for network interconnections).

An additional approach could be to establish a joint transboundary fund to facilitate shared decision-making on prioritizing and phasing in activities.

# Direction 4

**Shared planning and implementation**

This field is probably the one where the greatest experiential capital has been built up over the last three decades, not only permanently optimizing plans and projects, but also promising potential benefits for planning at the transboundary scale. The most widely discussed experiences of recent years are those relating to drinking water and to recreational activities on Lake Geneva.
To ensure that the learning acquired from these is useful and effective, the ambition now should be joint development of future resources for a population catchment area to match the water catchments: not only the Lake Geneva, Rhône and Arve basins, but also those of the Divonne-Versoix, the Allondon, the Aire, the Drize and the Foron, to name just a few.

# Direction 5

**Consolidating political will and strengthening ties with civil society**

Although water was one of the first issues to be discussed by the France-Geneva Regional Committee in the early 1990s, for the last 15 years the transformation of the Greater Geneva transboundary area has been driven mainly by urban development and mobility.
At the transboundary level, the Memorandum of Understanding on water – expanded and renewed in 2012 – has not led to sufficient funds being available to meet the challenges of the coming decades. Therefore it is time to strengthen any transboundary forums in which elected representatives can explore all the topics of concern and start to negotiate balanced responses. Local water commissions (the Arve CLE, for example) could provide a synergistic model for this work, bringing issues of biodiversity and soil into discussions of water. These spaces for dialogue will be essential if good transboundary management of water resources is to be achieved in the context of climate change.
However, any such locus of exchange between politicians needs not only to be a driving force in itself but also to establish solid interconnections with civil society, as the latter increasingly often stakes a strong claim to have its say on topics relating to natural resources and the climate.

# Direction 6

**Raising public awareness**

With so many issues involved, it will be impossible to persuade individuals to integrate the changes needed into their own everyday lives if no attempt is made to communicate, unpack and explain the various complex cycles that depend on water resources. It is crucial for everyone to understand that simple activities like drinking, swimming or sailing are only possible if the quality and quantities of water in its many forms and functions are managed responsibly.
For that to happen, joint strategies for raising awareness will need to be developed at the transboundary level, including sharing ideas on campaigns and exhibitions or taking educational programmes into schools. Luckily, this will be helped by the fact that the whole region is French speaking.

*Greater Geneva provides an excellent testing-ground on which to find ways of illustrating and thinking about the challenges of managing water in a transboundary space. This publication aims to illustrate the region's wealth of experience by presenting a range of its tools, showing how the area has evolved and highlighting the issues it faces today and will face tomorrow. We hope it will provide a relevant entry point to discussions with other regions – bringing exchanges of views, comparisons and attempts to find approaches that draw inspiration from and lend inspiration to other practices supporting transboundary water management.*
*This reflects our conviction that it is helpful to highlight the know-how of one region, encouraging consideration of changes in practice and the development of regulatory frameworks for institutional arrangements that will ensure the sustainability of water resources and water services over the long term.*

# ANNEX 1

| | FULL LIST OF TRANSBOUNDARY WATER MANAGEMENT TOOLS |
|---|---|
| URBAN WATER | Choully Wastewater Tunnel GLCT (investment & operating agreement) |
| | Pays de Gex connection agreements (CCPG) |
| | Genevois Area connection agreements |
| | Annemasse Area connection agreements |
| | Thonon Area connection agreements |
| | Agreements on micropollutants treatment (Villette & Ocybèle WWTPs) |
| | Memorandum of Understanding for co-operation on transboundary water pollution between French Gendarmerie & Geneva Canton Police |
| | Franco-Swiss Agreement for collaboration on accidental pollution of Lake Geneva by hydrocarbons or other substances |
| | Convention on the protection, use, recharge and monitoring of the Franco-Swiss Geneva Aquifer |
| | Water purchasing agreements (SITSE - Pays de Gex) |
| SAFETY OF PEOPLE AND PROPERTY | Flood Action and Prevention Programme - PAPI 1 & PAPI 2 (Arve) |
| | Arve River Contract |
| ENVIRONMENT, LEISURE & LANDSCAPE | Area agreement for Foron Sensitive Natural Sites |
| | Area agreement for alluvial Sensitive Natural Sites in the Arve Basin |
| | Area agreement for Vuache-Champagne-Genevois Sensitive Natural Sites |
| | Area agreement for Salève-Genevois Sensitive Natural Sites |
| | Area agreement for aquatic & land environments south-west of Lake Geneva |
| | Champagne-Genevois biocorridors agreement |
| | Arve-Lake Geneva biocorridors agreement |
| | Vesancy-Versoix biocorridors agreement |
| | Green & Blue Network Contract for the Arve – 'Gateway to the Alps' (formerly a biocorridors agreement) |
| | Charter for the Area Plan - Landscape Plan |
| ENERGY PRODUCTION | Franco-Swiss Convention on the Emosson Dam Hydroelectricity Development |
| | Franco-Swiss Convention for development & use of Rhône hydraulic power between planned La Plaine plant and a point upstream of Pougny-Chancy bridge |
| | Agreement to share data to improve knowledge of deep groundwater flows for developing drinking water or energy resources |
| FISHING | Agreement on fishing in Lake Geneva (France and Switzerland) |
| COMMERCIAL & RECREATIONAL NAVIGATION | Franco-Swiss Agreement on Lake Geneva navigation |
| MULTI-TOPIC TOOLS | Memorandum of the CERN Tripartite Committee for the Environment |
| | Franco-Swiss Convention on the protection of Lake Geneva against pollution |
| | Pays de Gex single contract (rivers contract + biocorridors agreement/Green & Blue Network Contract) |
| | Comprehensive agreement for the Arve Basin |
| | Transboundary Rivers Contract 'From the Arve to the Rhône' |
| | Foron River Contract |
| | Pays de Gex Rivers Contract |
| | South-West Lake Geneva Basin Rivers Contract |
| | Agreement establishing the Lake Geneva Council |
| | Transboundary Memorandum of Understanding on managing Upper Rhône sediment flushing & hydropower reservoirs |
| | Arve Water Development and Management Scheme (SAGE) |
| | Transboundary Memorandum of Understanding for Rehabilitation of Geneva's Rivers<br>Transboundary Memorandum of Understanding on Water Management |

# ANNEX 2

## Examples of transboundary water management tools

For this Annex, we have selected 7 representative tools, according to the range of different topics of concern they cover, the amount of project funding involved and their impact on the natural environment:

EXAMPLE 1

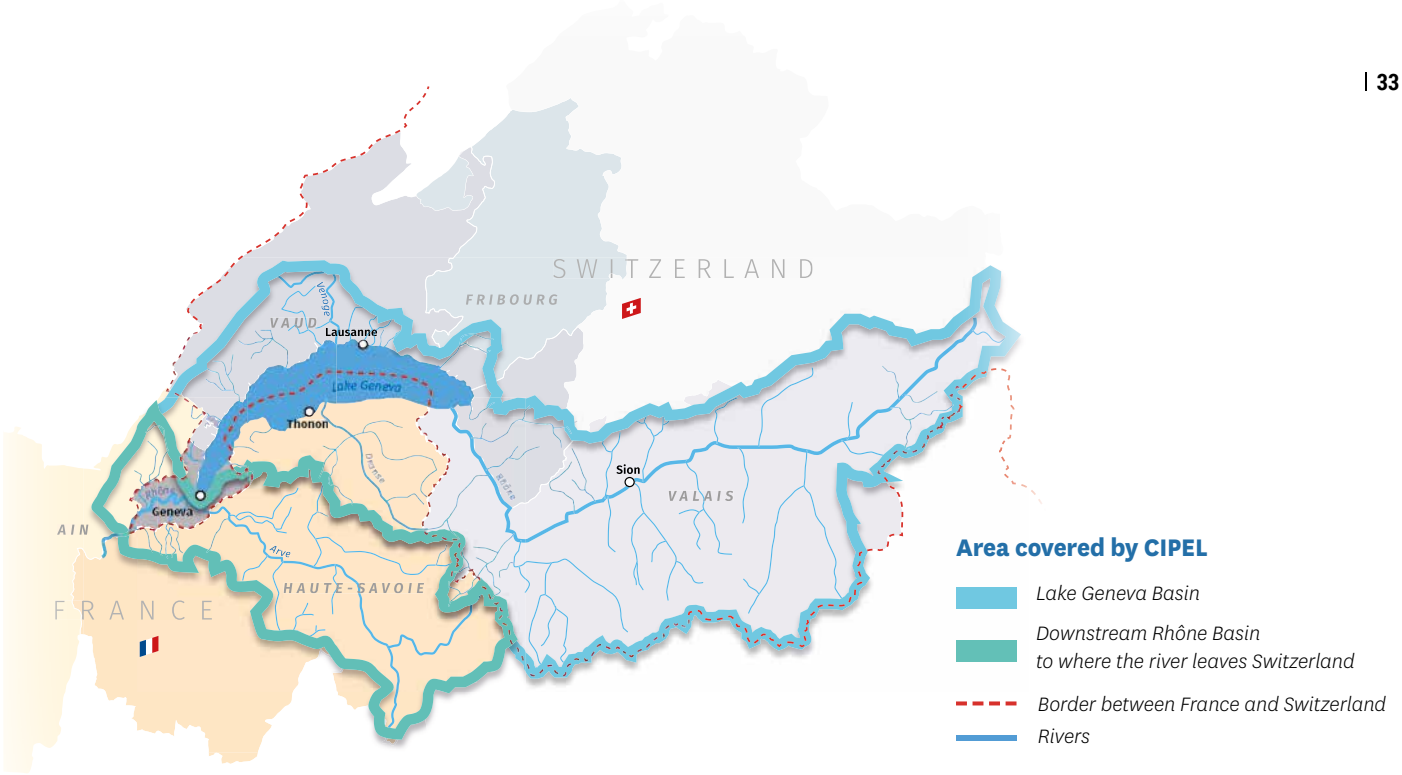
# Franco-Swiss Convention on the protection of Lake Geneva against pollution

© J-M Zellweger

This Convention is an observation tool for monitoring changes in the water quality of Lake Geneva and the rivers flowing into it, of the downstream River Rhône to where it leaves Switzerland and of the Rhône's tributaries. It facilitates research to determine the level and content of pollution and makes recommendations to the relevant government bodies on the anti-pollution measures needed.
The Swiss Federal Council and the French Government concluded this convention in 1962 in order to co-ordinate their efforts to protect the waters of Lake Geneva against pollution, with objectives relating not only to the Lake but also to the downstream Rhône Basin to where the river leaves Swiss territory.

The Convention established the International Commission for the Protection of Lake Geneva (CIPEL), whose remit covers the following:
- It organizes and carries out all the research needed to determine the nature, extent and sources of pollution, and makes use of the results of this research.
- It makes recommendations to stakeholders on remedial measures that need to be taken against existing pollution and on how to prevent future pollution.
- It can help to draft any international regulation that will have an impact on the health of Lake Geneva's water.
- It examines any other questions relating to water pollution.

Within the framework of the main Convention, a further Franco-Swiss agreement was concluded in 1977, this time concerning steps to be taken by bodies responsible for combating accidental pollution of the Lake by hydrocarbons or other substances that could adulterate the water. A permanent Franco-Swiss Collaborative Working Group of such bodies was set up to plan emergency action by land, lake and air on both sides of the border: its work is facilitated by internal regulations and operational intervention planning.




## Objectives

The Convention aims to protect the waters of Lake Geneva and the downstream Rhône in Switzerland against pollution, including the surface waters and groundwater of their tributaries insofar as these contribute to any pollution of Lake Geneva and the Rhône.
CIPEL's 4th Action Plan provides a framework for activities along three main strategic lines:

- Safeguarding water resources and managing impacts of various uses of the Lake.
- Driving improvements to water quality and aquatic environments.
- Promoting strategies for adaptation to climate change.

## Topics of concern

The scope of CIPEL's activities covers 12 topics of concern, including water quality, water use, and environmental pressures arising from water use and from climate change. It also engages in cross-sector activities on aspects of governance and communication

## Partners

France (central government), the Auvergne-Rhône-Alpes Region, the départements of Ain and of Haute-Savoie, the Swiss Confederation, the cantons of Vaud, Valais and Geneva.

## ORGANIZATION AND DECISION-MAKING


© CIPEL

# Franco-Swiss Convention on the protection of Lake Geneva against pollution

## Governing body

- The decision-making body, which is also responsible for the smooth running of the International Commission for the Protection of Lake Geneva (CIPEL), consists of two groups of delegates, made up of elected representatives and senior officials from French and Swiss central government administrations.

- The Technical Subcommission, made up of the Operational Steering Committee and the Scientific Council, supervises implementation of CIPEL's work.

- The Permanent Secretariat is in charge of co-ordinating all the Commission's work and of administrative, financial, technical and scientific management.

## Financing

- France : 25%
- Switzerland : 75%
  - *Swiss Confederation: 30%*
  - *Canton of Vaud: 23.85%*
  - *Canton of Valais: 9.45 %*
  - *Canton of Geneva: 11.70%*

## Timescale

**Preparatory stage:** 2 ans

- Diplomatic talks began in 1960.
- CIPEL was created and the Convention was signed in 1962.
- The Convention came into force in 1963, after ratification by the parliaments of both countries.

**Duration:** signed in 1963 for an indefinite period.

## THE TOOL IN ACTION — Example

### REDUCING PHOSPHORUS POLLUTION

**Context:** Between the 1960s and the 1980s, excessive phosphorus inputs from human activities caused severe eutrophication of Lake Geneva. Over those 20 years, phosphorus levels increased sixfold, from under 15 µg/L before the 1960s to as much as 90 µg/L in 1979: the oxygen content of the Lake and its ability to support aquatic life were under threat.

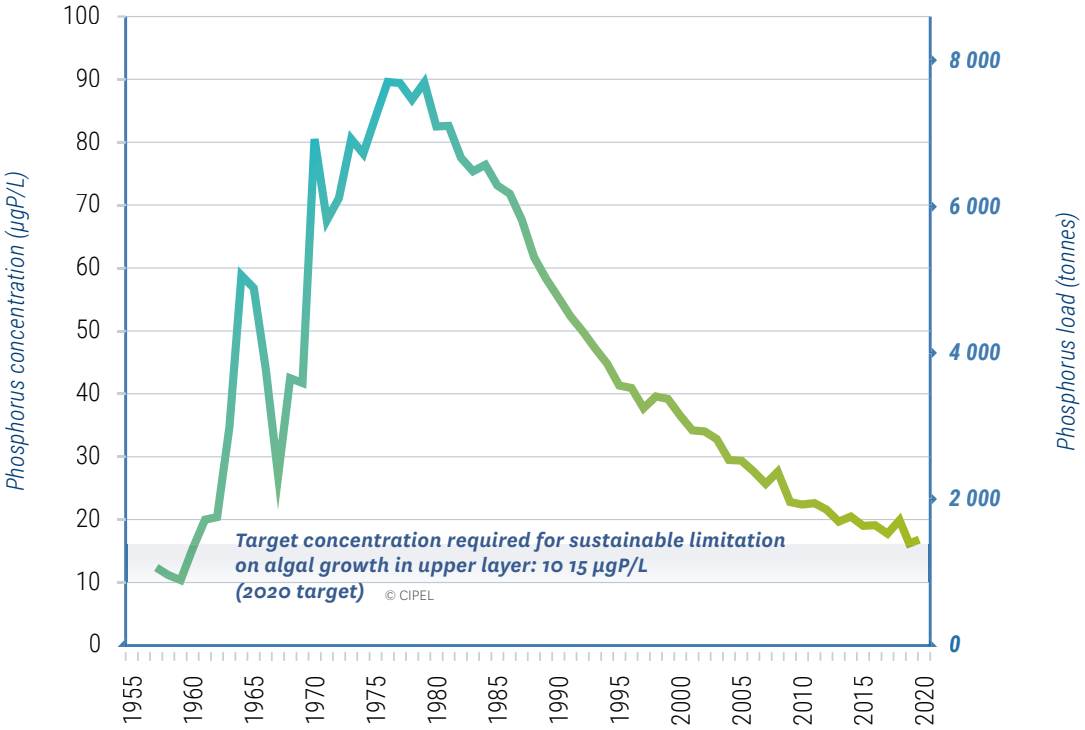
**Action:** CIPEL has made the issue of phosphorus in the Lake a major focus of its work ever since it was established, conducting research on phosphorus levels, and then, on the basis of these studies, setting targets for phosphorus concentrations in Lake Geneva and issuing recommendations to the governments and stakeholders concerned.

Alongside this work, all the Lake Geneva Basin stakeholders have taken other measures, including:

- Major work to improve wastewater treatment, notably by building a large number of WWTPs and improving sewerage networks.
- Banning phosphates in detergents, in both Switzerland (1986) and France (2007 in domestic laundry products, 2012 for industrial uses).
- Raising awareness of the issue among the general public, politicians, the farming community and water stakeholders throughout the region.

The total concentration of phosphorous has now fallen below 20 µg/L, with a 2019 figure of 16.2 µg/L.

TOTAL PHOSPHORUS
(measured in the deepest central section of the Lake)



© CIPEL

## THE TOOL IN ACTION Example

### COMBATING MICROPOLLUTANTS


Lake Geneva drains a catchment of almost 8,000 km², an area subject to the pressures of a large human population, of agriculture and of industry. The contaminants emitted by these different sources end up in the Lake's water, sediments and organisms. For more than 40 years, CIPEL has tracked these pollutants, monitoring changes in contamination by mercury, PCBs, pesticides, pharmaceuticals and, as new forms of pollution have emerged, a range of other substances.

Mercury and PCBs were the primary contaminants detected in sediments during the 1970s. Although mercury contamination of fish seems to have been brought under control, PCBs still pose problems for oily fish such as Arctic char and lake trout.

In 2005, CIPEL highlighted the fact that pesticide pollution of the Lake had almost reached the legal limit in water for human consumption – concentrations that were not consistent with the known use of such pesticides on local farms. It turned out that the peak concentration of pesticides was at depths of between 30 and 100 metres, corresponding to the range within which the Rhône enters Lake Geneva. Therefore additional analyses were carried out along the length of the river upstream of the Lake, in order to get right back to the source of this contamination.

Once that had been identified, measures to reduce discharges of these substances were put in place by the cantons' authorities and by industry. These took rapid effect, bringing a dramatic fall in pesticide concentrations in Lake Geneva.

This example illustrates once again the crucial role of CIPEL, as a transboundary body, in providing anti-pollution safeguarding, monitoring and alert warnings in the Lake Geneva catchment area.

CIPEL also plays an important role in informing the public and raising awareness of the enormous, complex problem of micropollutants. A major public exhibition on the topic was launched in 2002: 'Eau d'yssée, sur la trace des micropolluants' – tracking the 'journey' of micropollutants into the region's water.

**For more information, visit www.cipel.org**

EXAMPLE 2

# Convention on the protection, use, recharge and monitoring of the Franco-Swiss Geneva Aquifer

This Convention is an operational tool to facilitate joint use and management of groundwater for drinking water. It is one of few substantial formalized agreements for managing an aquifer.
The Geneva Aquifer is recharged principally from the River Arve and discharges to Lake Geneva on one side and to the Rhône on the other. From the 1960s onwards, increased pumping from the Aquifer led to a significant drop in the average groundwater level (7 to 9 metres in 20 years). As a response to this problem, the Canton of Geneva planned to embark on artificial groundwater recharge, and initiated negotiations with the French authorities to operate this jointly.

The culmination of these negotiations was an agreement between the Canton of Geneva and the Préfet of the département of Haute-Savoie, entitled 'Arrangements for the protection, use and recharge of the Franco-Swiss Genevese Aquifer', which was signed in 1978. This agreement gave rise to the Geneva Aquifer Management Commission, with three members from Switzerland and three from France. The Commission's chief remit is to draw up the annual programme for use of the Aquifer and to recommend measures for its protection.

The first agreement lasted for 30 years and gave rise to a fruitful transboundary collaboration to revive the Geneva Aquifer, bringing it back to an adequate level and maintaining it there. In 2008, a new Convention replaced the 1978 agreement, on the same terms. The new Convention was signed directly by the area's regional and local authorities, and benefited from international experience by basing itself on the model of the 1996 Karlsruhe Agreement.

## Objectives

- Achieve sustainable water use by finding a good compromise between pumping and recharge, to maintain average groundwater level at an acceptable elevation for reasonable drinking water use.
- Manage groundwater on a seasonal basis, to respond to high summer demand while ensuring good water quality (in both the River Arve and the Aquifer).

## Topics of concern

- Aquifers.
- Drinking water.

## Partners

Regional Health Agency (Haute-Savoie Division), Annemasse Area Consortium, Genevois Rural Area Consortium, the Saint-Julien en Genevois Sub-Prefecture, the Republic and Canton of Geneva, Services Industriels de Genève. The signatories are, for Switzerland, the Canton of Geneva and, for France, the Annemasse Area Consortium, the Genevois Rural Area Consortium and the Municipality of Viry.

## Governing body

Geneva Aquifer Management Commission: this Commission, which has a broad technical remit, draws up the annual programme for use of the Aquifer, taking the different users' needs into account as far as possible.
It can put forward proposals to the responsible authorities for any measures that could be put in place to protect the Aquifer and to remedy possible causes of groundwater pollution.

**The River Arve recharges the Geneva Aquifer by direct infiltration: the Aquifer provides the largest drinking water reserve for the Canton of Geneva, the Genevois Area and the Annemasse Area.**

In particular, the Commission gives its technical opinion on developments that could impact the Aquifer, whether to build new operating or abstraction infrastructure or to modernize existing installations. The Commission also audits investment expenditure and operating costs.

## Financing

The Commission has no budget of its own: organizational costs are charged to the operating budgets of each body involved.

## Timescale

**Preparatory stage:** a decade.

**Duration:** under the terms of the 2008 Convention – 30 years (2008-2038).

EXAMPLE 3

# Transboundary rivers contracts

A rivers contract is an investment tool covering a whole catchment area, where it funds a varied programme of activities aiming to restore and enhance aquatic environments (carrying out studies, undertaking work, raising awareness). This makes it a truly comprehensive, area-wide operational tool, which is able to deal with a large number of water-related issues.
In the context of Greater Geneva, a rivers contract is an emblematic tool of transboundary co-operation, providing a framework for the whole Lake Geneva Basin (although excluding the Rhône corridor).

## THE LIFE OF A RIVERS CONTRACT (7 TO 9 YEARS)

**1 year**
**Diagnosis**
*(taking stock, reaching conclusions)*

**6 months**
**Draft version**
*(main objectives, studies required, action proposed)*

**6 months**
**Final version**
*(fixed targets & action programmes)*

**2 to 5 years**
**Implementation**
*(work, interim report, final report)*

### Objectives

- Improve water quality of rivers in order to support many different uses.
- Satisfy the population's needs without endangering the aquatic ecosystem.
- Improve groundwater resource protection and management.
- Protect human habitation while still allowing the river the space it needs.
- Rehabilitate aquatic environments.
- Improve understanding of the rivers, resulting in better protection.

### Topics of concern

- Wastewater treatment/Water quality.
- Stormwater.
- Risks (floods).
- Low-flow levels.
- Biodiversity.
- Restoring and enhancing natural environments.
- River maintenance.
- Raising stakeholder awareness.
- Groundwater resources.

### The various contracts

- Arve (1995-2006).
- Genevois (2003-2010).
- Foron du Chablais Genevois (2004-2011).
- Pays de Gex - Lake Geneva (2004-2012).
- South-West Lake Geneva Basin Rivers (2006-2012).
- Pays de Gex - Lake Geneva – now under a single 'mixed' agreement (2016 - 2021).

### Partners

The relevant French local authorities and the Canton of Geneva develop each rivers contract jointly and then commit to it for 5 to 10 years, along with various partners: French central government, the Auvergne-Rhône-Alpes Region, the département (Ain or Haute-Savoie depending on the contract), the Rhône-Mediterranean and Corsica Water Agency and relevant users (the fishing and hunting communities, nature conservation associations, farmers, industries, etc.).

### Governing body

Rivers committee.

### Financing

Subsidies ranging from 20% to 80 % for each action undertaken, with an average subsidy rate of over 50%.

### Timescale

**Preparatory stage:**
2 years.

**Duration:**
5 to 10 years.

### THE TOOL IN ACTION — Example

**CHOULLY WASTEWATER TUNNEL TRANSBOUNDARY RIVER CONTRACT PAYS DE GEX - LAKE GENEVA (2009)**

**Context:** Effluents from 2 obsolete wastewater treatment plants (WWTPs) in France were polluting the Allondon River on a regular basis. In 2006, in response to this problem, the Pays de Gex Rural Area Consortium and the Canton of Geneva set up the 'Choully Wastewater Tunnel' GLCT (Local Transboundary Co-operation Group).

This Group provided the legal foundation for an action plan to build and operate an underground wastewater transport tunnel linking French and Swiss sewerage networks, in order to protect water quality in the Allondon.

...

## 3 Transboundary river contract

**Action:** Building an underground tunnel more than 2.7 km long meant that the obsolete WWTPs could be dismantled. From then on, the region's wastewater – both Swiss and French – would be collected and treated in a new WWTP, to be built in Switzerland.

After treatment, the effluents from this new WWTP go into the Rhône, where the flow-rate is much higher than that of the Allondon. This action spectacularly improved Allondon water quality, with the return of rare insects that had almost disappeared from the area, such as the green drake mayfly, an emblematic species of the region – and familiar to those who fish in the river, since it is a delicacy for trout! The new WWTP also meant that an old one beside the Rhône could be dismantled, and a start could be made on renaturing that site.

Total cost: **€15,500,000**

Although the tunnel is located entirely in Switzerland, financial responsibility for its construction was taken principally on the French side – by the Pays de Gex Rural Area Consortium, with support from the Rhône-Mediterranean and Corsica Water Agency, the Auvergne-Rhône-Alpes Region, the EU's Interreg programme and the Conseil Général of the Ain département – with some input from the Canton of Geneva..

The Allondon

Green drake mayfly (Ephemera danica)

## THE TOOL IN ACTION — Example

### RENATURATION OF THE RIVER DRIZE AT GRANGE-COLLOMB – 2003 TRANSBOUNDARY RIVERS CONTRACT 'FROM THE ARVE TO THE RHÔNE'

**Context:** The historic bridge at Grange-Collomb and canalization of the Drize were acting as blocks on the river's natural water system, leading to serious flooding of the Grange-Collomb industrial area.

**Action:** Buildings and a parking area above pockets of the river were demolished. The hard protective walls were removed, and natural riverbanks restored using bioengineering techniques. The riverbed was broadened and branched channels were created, allowing a natural meadow and amphibian habitats to be established. A second bridge was built alongside the historic bridge. his action helped to protect local residents against flooding and to increase the biological and landscape value of the river, in an essentially suburban area.

Total cost: **1,018,500 CHF**

The main financial responsibility for this project was borne by the Canton of Geneva. From the French side, the Conseil Général of the Haute-Savoie département and the Genevois Rural Area Consortium contributed sums of 137,000 and 225,000 CHF respectively.

*Flooding*

*Before*

*After*

EXAMPLE 4

# Comprehensive agreement for sustainable management of water

A comprehensive agreement is principally an investment tool for water resource management and/or restoration of aquatic environments, enabling integrated implementation of practical work and research studies. In the context of Greater Geneva, this tool is directed specifically at implementing a programme of complementary activities covering the whole Arve Basin, intended to respond to the region's needs and to initiate actions that contribute to tackling climate change.

The programme includes spatial planning, maintenance, restoration and management of aquatic environments, as well as modernizing drinking water infrastructure and wastewater treatment installations and implementing water-saving measures.

## Objectives

- Respond to directions set by the 2016-2021 Water Development and Management Master Plan (SDAGE), which integrates obligations imposed by the Water Framework Directive.
- Improve water quality by combating all forms of pollution.
- Adapt to climate change at local level, while safeguarding rivers and giving them back their more natural functions, as well as restoring biodiversity and river hydraulics.
- Help local authorities anticipate future water shortages by protecting strategic resources and introducing wastewater management innovations.

## Topics of concern

- Water quality/Wastewater treatment.
- Water quantity.
- Stormwater.
- Drinking water.
- Strategic aquifers.
- Biodiversity.
- Governance.

## Partenaires

Rhône-Mediterranean and Corsica Water Agency, the département of Haute-Savoie and the Canton of Geneva, with 44 signatories including SM3A, the Genevois Rural Area Consortium, drinking water & wastewater treatment organizations (including local authorities), the trade union SNDEC, EDF (Electricité de France), ATMB (Mont Blanc Autoroute and Tunnel), CDC (Caisse des dépôts, the public sector loan agency), etc.

## Governing body

The Local Water Commission (CLE), which ensures that different actions taken under the comprehensive agreement, the SDAGE and the Water Development and Management Scheme (SAGE) are compatible.

## Financing

The comprehensive agreement represents €125 million in expenditure, including €34 million covered by the Water Agency and €8 million by the département and central government. The project owner of the particular work undertaken supplies the rest of the financing.

## Timescale

**Preparatory stage:** 6 months – introduced as a matter of urgency.

**Duration:** 3 years (2019-2022).

**Renaturation of the River Foron between Puplinge-Ambilly & Ville-La-Grand.**

© SM3A

## THE TOOL IN ACTION — Example

### MORPHOLOGICAL RESTORATION OF THE DOWNSTREAM ARVE AND ITS TRIBUTARIES (EAUX BELLES AND FORON DU CHABLAIS GENEVOIS) ACTION PLANNED FOR 2020 TO 2022

There is enormous potential for morphological restoration of the reach of the Arve at Gaillard and Etrembières: as things stand, its condition poses problems in terms of flood risk and for ecological connectivity on land. The first step will be to determine and evaluate the feasibility of a morphological restoration project with two principal objectives:

- Improving the ecological functions of the Arve and its tributaries (Foron and Eaux Belles): in-channel benching, creating a patchwork of streams and alluvial environments favourable to biodiversity, etc.
- Reducing the risk of flooding through the Flood Prevention Action Programme for the River Arve (PAPI), established under the local SAGE.

...

Renaturation of the River Foron between Puplinge-Ambilly & Ville-La-Grand.
© SM3A

...

In the same area, provision is also being made for renaturation of the confluence of the Arve and the Foron du Chablais Genevois, to take place in 2023-2024. Complete renaturation of this reach of the river will involve making the riverbed uniformly average in depth, creating islets for dragonflies and amphibians, recreating riparian vegetation and rebuilding all the dikes and low walls using up to date approved flood protection methods.

Cost: **€ 1,800,000**

## THE TOOL IN ACTION

Example

### NITROGEN TREATMENT WORKS WORK TO BRING THE OCYBÈLE WWTP UP TO STANDARD: BIOGAS PRODUCTION, WITH INJECTION INTO DISTRIBUTION NETWORK (ACTION PLANNED FOR 2022)

The Annemasse Area Consortium is implementing plans to establish nitrogen treatment processes and to bring its Ocybèle WWTP up to acceptable standards.

Existing installations will be modified for sludge digestion and injection of the resulting biogas into the town's gas grid.

Cost: **€1,400,000**

EXAMPLE 5

# Water Development and Management Scheme (SAGE)

This is a planning tool for a comprehensive water management policy, setting community-based priorities and objectives, and then planning actions that will help to create a balance between water uses and natural environments. In the context of Greater Geneva, the Water Development and Management Scheme (SAGE) is applied at a slightly wider scale than the Arve Basin strictly defined (covering 106 municipalities).

**The SAGE is signed at Lake Bénit, 2018.**
© SM3A

## THE TOOL IN ACTION

Examples

**STEERING 3 QUANTITATIVE STUDIES: NEEDS – RESOURCES – ENVIRONMENTS**
of priority sectors in the downstream catchment area: the Foron du Chablais Genevois, the Menoge, the Foron de la Roche and the Nant de Sion.

**PRIORITIZING A LIST OF WORKS**
to re-establish ecological continuity of watercourses.

**ADVICE & ADVANCE WARNINGS FOR DEVELOPMENT PROJECTS IMPACTING WATER**
(e.g. waste recovery platform, hillside dams, micro-hydropower plants).

Document available at **www.sage-arve.fr**

## Objectives

The Scheme sets a policy framework and translates shared ambitions into objectives, rules and mechanisms for management, for various activities and for ensuring coherence.

It then assists in implementing priority actions (works or studies), which are carried out on the ground by various project owners. It also ensures that spatial and urban planning documents are compatible with best practices in water management.

A SAGE has regulatory functions, under which some of its decisions are binding on third parties. It also acts in an advisory capacity: the Scheme's Local Water Commission (CLE) reviews and comments on projects planned for the Scheme's area, when these require environmental permits under the Water Act.

## Topics of concern

- Water quantity.
- Water quality.
- Strategic aquifers for drinking water supply.
- Aquatic environments (watercourses and wetlands).
- Risks.
- Stormwater.
- Governance.

## Partners

The CLE has 91 members (elected representatives, users, government services), plus 3 representatives from Switzerland: the Canton of Geneva, CIPEL, Electricité d'Emosson.

## Governing body

The CLE is a consultative and decision-making body, bringing together the various stakeholders in the Arve Basin.

It organizes and manages the entire SAGE – facilitating, consulting on and approving the smooth running of the various stages of the Scheme, helping to resolve conflicts, monitoring activities and steering any revision needed.

## Financing

Facilitation of the tool is jointly funded by the Scheme's key organizations, which are SM3A (the Regional Authority for Management of the River Arve and its Tributaries) and the Rhône-Mediterranean and Corsica Water Agency.

Studies may also be jointly funded by other partners, depending on the topic (e.g. the département, the Canton of Geneva).

## Timescale

**Preparatory stage:** 8 years in development (begun in 2010)).

**Duration:** 10 years (2018-2028).

EXAMPLE 6

# Agreement for the provision of drinking water to the Pays de Gex Rural Area Consortium by SIDAC (the Coppet Area Intermunicipal Water Supply Service)

This is an operational tool that allows Pays de Gex, an area of France, to buy drinking water from Services Industriels de Terre Sainte et Environs (SITSE, formerly SIDAC), a municipal water and wastewater company in the Swiss Canton of Vaud.

In 2002, the Préfet – the regional representative of French central government – ordered that the La Mélie Spring, situated in the centre of Divonne-les-Bains (in Pays de Gex) should be replaced by another water source. At the same time, services operated by the Pays de Gex Rural Area Consortium (CCPG) reported a repeated drop in the level of their area's principal aquifer, the Pré-Bataillard.

The combined effects of these two sets of problems prompted a comprehensive study to look at:
- Providing sufficient good quality water for the Municipality of Divonne-les-Bains;
- Supporting municipalities supplied by the Pré-Bataillard Aquifer;
- Relieving Divonne-les-Bains' water problems through the use of Pré-Bataillard groundwater.

In July 2005, SIDAC (the Coppet Area Intermunicipal Water Supply Service, now SITSE) and the CCPG signed an agreement for the former to provide the latter with drinking water at a maximum flow-rate of 6,900 m3 per day.

## Objectives

- Obtain a drinking water supply for the Municipality of Divonne-les-Bains, since its principal source – the La Mélie Spring – was situated in an urban environment and could not be protected.
- Significantly reduce abstraction from the Pré-Bataillard Aquifer in order to restore good water resource management.

## Topics of concern

Drinking water.

## Partners

Pays de Gex Area Consortium and SITSE.

## Governing body

Pays de Gex Area Consortium Joint Council and SITSE Joint Ownership Council.
There was no need to establish a special management body, since each local authority had the powers it needed to sign the Agreement and to manage water purchasing and joint investment.
Each authority carried out the work in its own area.

## Financing

Joint funding of the works was split at 59% from SIDAC (Switzerland) and 41% from the CCPG (France) to install a lakeside pipe, a raw water pumping station in the Les Saules locality and a discharge line between Les Saules and Balessert, as well as to build the Balessert treatment plant. The CCPG covered 100% of the funding to establish a pumping station from Balessert to Divonne-les-Bains and for installation of a discharge line, both essential to the project. The subsequent costs of connecting Divonne-les-Bains to Gex in order to maintain the Pré Bataillard water table were met by the CCPG, with financial support from the Rhône-Mediterranean and Corsica Water Agency.

## Timescale

**Preparatory stage:** 5 years.

**Duration:** 50 years (2005-2055)

EXAMPLE 7

# Agreement for transboundary co-operation on micropollutants treatment

This is an operational and investment tool to enable the treatment of micropollutants in the effluents from 2 wastewater treatment plants (WWTPs), one in France and the other in Switzerland, in a single shared treatment plant sited in Switzerland.

The Ocybèle WWTP, under the control of the Annemasse Area Consortium, is situated in the French Municipality of Gaillard, beside the Arve and close to the Swiss border. The Villette WWTP, owned by Services Industriels de Genève (SIG), is in the Municipality of Thônex, in the Canton of Geneva – and only about 550 m from the Ocybèle WWTP. Between them, these 2 WWTPs are currently treating wastewater produced by 135,000 residents (Population Equivalent), before discharge into the River Arve – and their capacity will be increased to 216,000 PE over the course of the 2020s.

This agreement governs the treatment of residual concentrations of micropollutants in these effluents from France and from Switzerland, in a single micropollutants treatment installation sited in Switzerland and remaining under SIG ownership.

## Objectives

Treating micropollutants.

## Topics of concern

Wastewater treatment/ Water quality.

## Partners

Annemasse Area Consortium, SIG, Canton of Geneva

## Governing body

An audit and monitoring body was established, with 4 members:

- 2 municipal councillors nominated by the Annemasse Area Consortium Joint Council.
- 1 representative of the executive government of the Canton of Geneva.
- 1 SIG representative.

The auditing body meets at least once a year, and reports to the partners in detail on – among other things – investment and operating expenses, price structure (or how prices are to be calculated), performance conditions and service quality.

In addition, it may give its opinions on technical aspects and, where there are differing views, put forward any solution that will lead to an amicable settlement between the parties.

## Financing

**Investment:**

55.3% from Annemasse Area Consortium and 44.7% from SIG – a total of 14,451,155 CHF before receipt of a subsidy from the Swiss Federal Office for the Environment (OFEV), which covers 75% of the chargeable costs.

**Operation:**

Operating costs, estimated at 600,000 to 700,000 CHF per year, are shared between the Annemasse Area Consortium and SIG according to a formula that takes into account their respective flow-rates, dissolved organic carbon loads and ammonium loads.

## Timescale

**Preparatory stage:**

6 to 8 years.

**Duration:**

25 years (2020-2045).

Villette WWTP (Thônex)

© SIG

Ocybèle WWTP (Annemasse)

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