Renaturation of the Seymaz river, Switzerland

Year of issue

2025

Summary

Located in eastern Geneva canton, the Seymaz renaturation replaces concrete channelization with a softer, wider river corridor and recreates marshland, under the canton’s long-running programme to improve ecological and landscape quality and reduce flood risk by managing peak flows. Governance has relied on the “Charte Seymaz” negotiation forum and a management group to coordinate local arrangements; land tenure and agricultural impacts were key constraints that required dialogue and compensation for farmers.

Since 2020 the canton has consolidated and showcased results (book + short film). In 2024–25 a new phase at Bel-Air (Vandœuvres–Thônex–Chêne-Bourg) removed illegal bank fill, narrowed the low-flow channel, installed terraces, root wads/blocks and fish shelters, and stabilized banks with bioengineering, while reorganising heavy recreational use along the riverside path. Client: Office cantonal de l’eau; engineering: Karakas & Français SA and EcoEng SA; works: SCRASA SA and SITEL Environnement-Paysage. Six months on, beaver activity is already structuring flows and habitat. Maintenance of the Haute-Seymaz wetlands and channel has been handled by SITEL since 2019 with local association oversight; mowing/faucardage is adapted to hydrological conditions. Coordination around Bel-Air also required short Greenway bridge closures in March 2024.

Photo Gallery




Location

46.198248, 6.180665

Project

NWRM

National ID

Switzerland_01

Sector

Hydromorphology

Installation Date

1998 - 2005

Implementation status

Completed

Contact

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Overview

Location of the project

NE of Geneva city: from Rouelbeau/Sionnet plain (Meinier–Choulex) down to Chêne-Bougeries, near Route de Jussy, along the Seymaz valley.

Country

Switzerland

NUTS2 Code

Ticino

Sponge measures implemented in the case study

Stream bed re-naturalisation

Wetland restoration and management

Removal of dams and other longitudinal barriers

Objectives

Reduce flood peaks and urban flood damages (e.g., Chêne-Bourg sector).

Restore habitats & status from medium→good; re-establish wetland complex.

Provide ~800,000 m³ of natural storage.

Involved partners

Authority type	Authority name	Authority role	Comments

Other	Grand Conseil and Conseil d'Etat of Genève State	Financing	Responsible for voting two laws/programs on Seymaz renaturation
Local water authority	Geneve Canton: Genaral Direction of Water, renaturation of rivers and banks service ; Genaral Direction of Nature and Landscape ; Agriculture and the environment Department	Initiation of the measure	Responsible authority for the implementation of the renaturation program
Farmers	Members of the Charte Seymaz group (all actors concerned by the project)	Determination of design details of the measure	"negociation" group on the renaturation program
NGO	—	—	—
—	Members of the management group	Determination of design details of the measure	Responsible for coordinating and managing the local arrangements

Documents

cs-ch-01-final_version.pdf (965.48 Ko)

Site Information

Climate Zone

Cool temperate moist

Precipitation

971.00 mm

Temperature (°C)

9.80 °C

Imperviousness

0.09 %

Elevation range

430m

Slope range

1-2%

Vegetation class

Agricultural land use includes cereals, and some vineyards and vegetable crops. Artificial land is mostly for residential use.

WFD Ecological status

Moderate

WFD Chemical status

Failing to achieve good

Water quality status

Physico-chemical quality was bad upstream until 2001 and downstream until 1981. It became “medium” then. (Nitrates, phosphorous, organic carbon, metals and pesticide pollution). Biological quality did not cope with cantonal requirements.

Design and Implementation

Project scale

Meso

Project scale specifications

Project scale corresponds to the Seymaz river and its neighboring lands.

Project area

2920

Project area specifications

The Seymaz watershed covers 3660 ha and is divided in two sub-basins; the one upstream, located in a rural area and concerned by the NWRM is 2920 ha.

Area subject to Land use change or Management/Practice change (ha)

400.00 ha

Size

5.10

Size unit

km

Principles

Principal principles followed in the design of this application have been:
- acceptability through participative process and governance
- compatibility with local economic activities (farming)
- acceptable costs
- public perception and social benefits (tourism)

Factor constraints

Land use constraints have been the initiator factor to the implementation of the measure, since frequent floods happened to occur on farmlands in the Seymaz basin itself, linked to the artificialisation of the river during the past centuries. Floods in the urban areas downstream were already a problem.
Political context, legislation and existing funding sources have been a main factor leading the choice for the implementation of the NWRM, instead of “traditional” works for flood management.

Constraints

A main constraint have been the nature of land use and property in the area concerned by the NWRM, since famers were mostly impacted by the project and first opposed to it. Negotiation have finally enabled to choose the NWRM and have impacted on the way to implement it.

Favourable preconditions

Seymaz river basin used to be partly a wetland before being drained; natural hydrology could be restored

Financing

Total cost

61000000.00 €

Costs investment

23600000.00 €

Costs capital

22000000.00 €

Costs capital information

Investments financed by specific laws on renaturation

Costs land acquisition

1600000.00

Costs land acquisition unit

€ (total value)

Costs land acquisition information

This amount was transferred from the renaturation department to the regional,agriculture promotion fund in order to finance compensations linked to losses of agricultural lands.

Costs operation maintenance

37000000.00 €

Costs operation maintenance information

Including:
15 million € for works financed by Cantonal renaturation fund
22 million € for functioning

Financing authorities

Authority name	Type of funding	Comments
Cantonal renaturation fund	Sub-national funds	45 millions CHF
Geneve State	Local funds	Two laws on renaturation (27 million CHF)

Compensations

Oui

Compensations annual

230000.00 €

Compensations annual information

Total amount was of 1,6million€.

Compensations basis information

The price for compensations was:
1,6€/m2 for farmers (owners or not)
And 819€/ha more for farmers who didn't sell their lands

Compensations scheme information

Compensation schema: farm owners and farmers have received financial compensation, either for selling their land or keeping it and managing it respecting a "nature contract". The payment was function of the number of concerned hectares. Moreover, punctual compensations have been done, for instance during works periods and for a loss of three year yields during when land was leveled. Farmers also beneficiated for tax advantages.
The State also created a fund for regional agriculture promotion, beneficiating for land sales. The renaturation department transferred 1,9million CHF to this fund.

Policy and Governance

Policy description

The Seymaz renaturation project is part of the cantonal program which aims at improving ecological and countryside quality and reducing flood risk by managing peakflows.

Land ownership

Mixed: key restored areas (Rouelbeau/Sionnet) on Canton of Geneva land; Pro Natura owns parcels; some communal plots (e.g., Choulex) and private agricultural riparian lands remain.

Policy targets

Improved Biodiversity

Runoff control

Increase Water Storage

Target remarks

Biodiversity and gene-pool conservation in riparia
Flood control and flood risk mitigation

Policy pressure

Directive	Relevant pressure
WFD identified pressure	4.1.2 Physical alteration of channel/bed/riparian area/shore of water body for agriculture
WFD identified pressure	4.3.1 Flow diversions/hydrological alteration - agriculture

Pressure remarks

Aimed pressures correspond to the pressures which have been selected in the list of WFD and Flood directives pressures, even if Switzerland does not depend on EU Directives.

Policy impact

Directive	Relevant impact
WFD identified pressure	Altered habitats due to hydrological changes
Floods Directive identified pressure	Property
Floods Directive identified pressure	Landscape
Floods Directive identified pressure	Rural Land Use

Impact remarks

Aimed impacts correspond to the pressures which have been selected in the list of WFD and Flood directives pressures, even if Switzerland does not depend on EU Directives.

Requirement directive remarks

Switzerland is not part of EU.

Policy challenges requirements

The project aims at improving rivers ecological and landscape quality and reducing flood risks. Those requirements are mentioned by a federal legislation (Law on rivers constructions in 1991 and ordonance on water protection in 1998) and aimed by the program implemented by Geneve State (Renaturation framework Action Plan in 1999).

Part of a wider plan

Oui

Wider plan

Wider plan type	Wider plan focus	Name	Comments
Local	Environment & Biodiversity	Renaturation framework Action Plan	The project aims at improving rivers ecological and landscape quality and reducing flood risks. Those requirements are mentioned by a federal legislation (Law on rivers amenagements in 1991 and ordonance on water protection in 1998) and aimed by the program implemented by Geneve State (Renaturation framework Action Plan in 1999).
—	Water	—	—

Public consultation

Oui

Consultation activities

Activity stage	Activity type
Design phase	Charte Seymaz
Implementation phase	—

Has contractual arrangements

Oui

Contractual arrangements

Arrangement type	Name	Comments
Contractual agreement	Contrats Nature	Farm owners and farmers have received financial compensation, either for selling their land or keeping it and managing it respecting a "nature contract". The payment was function of the number of concerned hectares. Moreover, punctual compensations have been done, for instance during works periods and for a loss of three year yields during when land was leveled. Farmers also beneficiated for tax advantages. The State also created a fund for regional agriculture promotion, beneficiating for land sales. The renaturation department transferred 1,9million CHF to this fund.

Impacts and Monitoring

Monitoring System

Monitoring parameters

Water flows are measured in different sites of Seymaz river (at least 3). Temperature and ecological status have been studies punctually.
Water quality is monitored:
- physic-chimical quality through parameters: nitrogen, phosphorous, metal, pesticides, organic carbon
- ecological quality through two parameters: benthic macrofauna and diatomees

Maintenance

Maintenance requirements

A management plan has been elaborated in 2007 to describe maintenance requirements for habitats protection and flood risk management.

Impact Assessment Methodology

Performance impact assessment method

Catchment outlet

Performance impact estimation information

Physic-chimical quality is measured every 6 years and ecological quality between every 1 to every 8 years.

Biophysical impact assessment method

Biophysical impacts are assessed by comparing previous and post state of habitats and flood risk.

Cost assessment method

Cost effectiveness of measure is assessed comparing the cost of the actual measure with the cost of the initial project which was planned to fight floods, supposing the impacts would have been similar.

Socio-economic Impacts

Direct benefits information

Benefits are:
- Flood security and protection: reduction of flood damages in urban areas (houses, school, roads...)
- creation of a touristic area for the inhabitants of Geneve canton. The area now benefits from a positive image which has a positive impact on tourism.
- landscape conservation

Ancillary benefits information

Indirect benefits are:
- benefit for farmers by selling products on their farm from this increasing number of visitors
- employment (agritourism, works)

Biophysical impacts: Hydrology

Information on retained water

Sionnet marshland have been restored; they can retain up to 800 000m3. Water is stored and released regarding period of the year, between flood and drought periods. This contributes to reduce runoff and flood risks in urban areas and to regulate water flow.

Information on increased water storage

800000m3

Ecosystem water supply

0

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

Seymaz renaturation have recreated a wetland habitat which acts as a refuge for fauna and is a resting place for migratory birds. Flora such as rubanier dressé, laîche faux souchet, scrofulaire auriculée, samole de Valerand and lagratiole officinale can now be observed in the wetland. Such species are priority in Switzerland and concerned by specific action palns. Farm plants such as bleuet, épiaire annuelle, véronique luisante, linaire élatine, linaire bâtarde, renoncule scélérate and bident triparti are also observed. Seymaz river is also recognized as a nesting site for amphibians.

It has become the 3rd site formigratory birds in Geneva.

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Positive impact-WQ improvement

Information on water quality overall

Water quality have improved after renaturation (from medium to good) but it still needs to be monitored. Between 2013 and 2019, chemical quality decreased mainly because of copper and phosphorus pollution. Biological quality kept improving.

Soil quality overall improvements

N/A info

Ecosystem erosion control

Oui

Biophysical impacts: Others

Ecosystem impact climate regulation

No information available

Lessons Learned

Key lessons

The project has enabled land use regulation through social solidarity and economic efficiency, taking local interests into account in addition to global interests (regarding floods and biodiversity). This can have facilitated the acceptation and success of its implementation.
Moreover, the measure happens to be more cost-efficient than previous projects of flood regulation.

Barriers

Barrier type	Barrier role	Comments
Attitude of relevant stakeholders	Main barrier	The importance of property rights, mostly farmers ones, and the difficulty to deal with land property.
Attitude of relevant stakeholders	Secondary barrier	The negotiation with farmers, highly impacted by the project and who were initially "against" a total renaturation project. Their involvement in the decision process, the negotiation of compensations and decisions such as the non-expropriation of farmers or the "drainage righ", had to be discussed and taken into account.
Attitude of relevant stakeholders	Secondary barrier	Previous conflicts that had occurred between farmers and nature organizations.
Attitude of relevant stakeholders	Secondary barrier	Non-expropriation has finally became a conflict factor.

Drivers

Driver type	Driver role	Comments
Past flooding events	Main driver	Land use constraints have been the initiator factor to the implementation of the measure, since frequent floods happened to occur on farmlands in the Seymaz basin itself, linked to the artificialisation of the river during the past centuries. Floods in the urban areas downstream were already a problem. Political context, legislation and existing funding sources have been a main factor leading the choice for the implementation of the NWRM, instead of "traditional" works for flood management.

Driver type	Driver role	Comments
Organisation committed to it	Secondary driver	—
Availability of subsidies	Secondary driver	—

Success factors

Success factor type	Success factor role	Comments
Existing institutional framework	Main factor	Main success factors have been: - the local political context, much more in favor of renaturation than other cantons (laws, fund...) - local arrangements such as the †œdrainage right†□ given t farmers - the high participation rate of farmers and other actors in the process decision and implementation (through Charte Seymaz group)
Specific incentives for stakeholder involvement	Secondary factor	—
Financing possibilities	Main factor	—
Public participation	Main factor	—

Cost effectiveness

The NWRM cost is around 74 millions CHF, or 5,5 millions CHP per year, whereas the initial project cost was 95 millions CHF.

Flexibility / Adaptability

Changing political context and local governance could have been a barrier to the implementation of the renaturation project. Another type of major land use and economic activity in the Seymaz river basin could have make the process easier or not. Compensations could have been higher for lands that can be built.

Transferability

Similar application can be proposed in other contexts where water retention has drastically decreased in the past and where a retention potential is known (ancient wetland for instance). Land use characteristics and economic activities of other basins highly impact the possibility of implementing such NWRM, and the decisions, compensations and local arrangements that can be made. This implementation highly depends on land property characteristics (rate, type of owners, land use possibilities…).
Necessary preconditions seem to be a participative decision process, involving the main impacted stakeholders (economically and regarding their property rights). The participative process, which can be considered as a success factor, is adaptable to other contexts. A favorable political context and financing possibilities is another precondition for the implementation of the NWRM.

Basin characteristics influence

The Seymaz basin includes an old marshland, which had been drought in the past centuries. Its renaturation enabled to use its natural storage potential which is necessarily higher than other types of lands potential.

Sources

Sources

La Seymaz

Les arrangements locaux et la durabilité de nouvelles activités rurales : le cas de la renaturation de la Haute-Seymaz (local arrangements and sustainability of new rural activities : the Haute-Seymaz renaturation case study)

Renaturation de la Seymaz

Synthèse du monitoring des rivières du canton de Genève