# *Towards Urban Flood Management*

## *Flood Prevention Measures as Part of Integrated Urban Development Strategies of the City of Graz / Austria*

***Municipal Development Days 2023***
***20th October 2023, Laško/SLO***

***Christian Nussmueller***
*City of Graz, Executive Office for Urban Planning, Development and Construction -*
*Unit for Climate Action and Funding Projects*

GRAZ

Source: City of Graz/H. Schiffer

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**Weblinks:**
City of Graz - Graz Streams Programme Folder (in German)

# Basic Conditions

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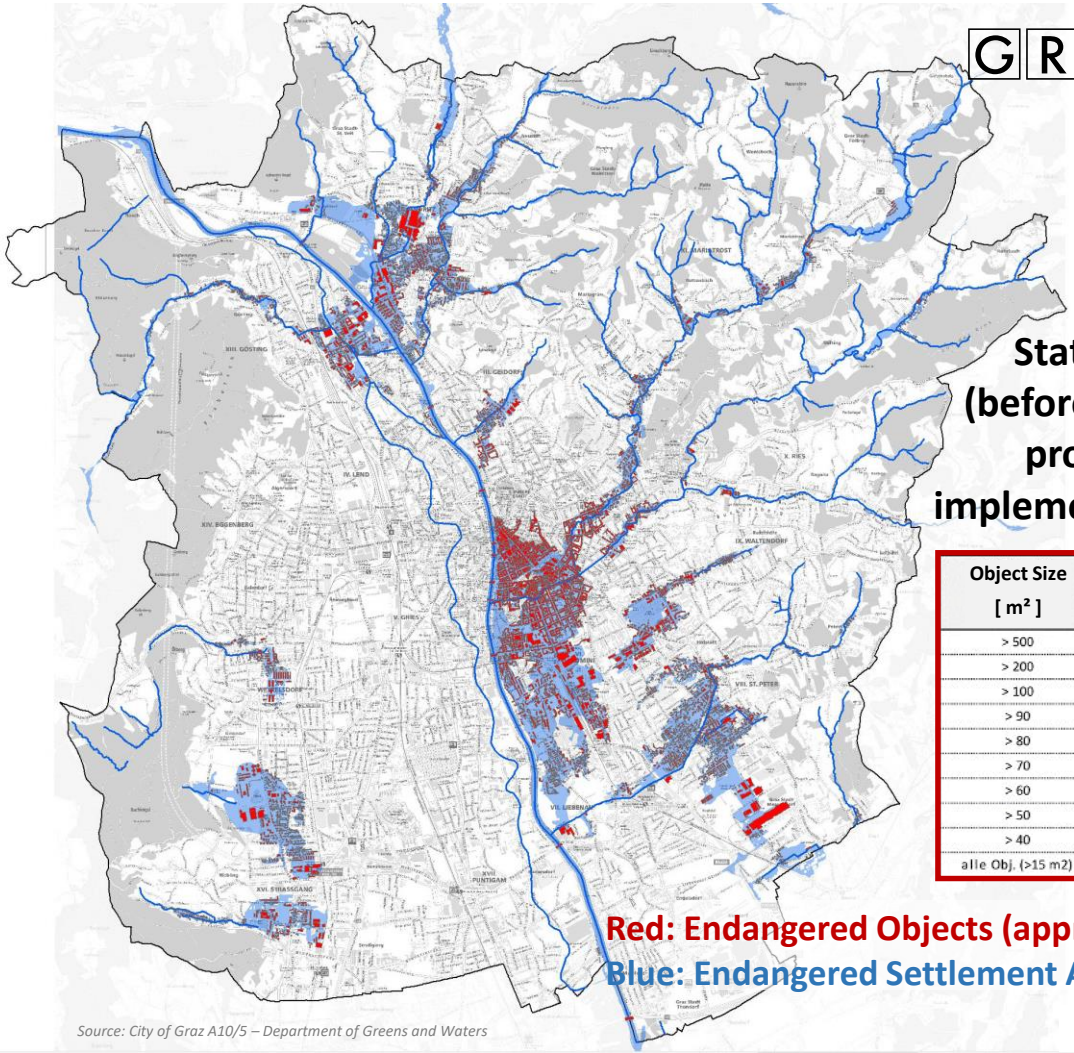
**53 Graz Streams in Numbers:**

270 km watercourse network
of which 125 km on city area

140 km² catchment area
of which 70 km² on city area

Mur River Section in Graz:
15,8 km



**Status: 2005 (before start of programme implementation)**

| Object Size [ m² ] | Number of Objects (cumulated) |
|---|---|
| > 500 | 612 |
| > 200 | 2295 |
| > 100 | 4124 |
| > 90 | 4437 |
| > 80 | 4713 |
| > 70 | 5034 |
| > 60 | 5355 |
| > 50 | 5604 |
| > 40 | 5889 |
| alle Obj. (>15 m2) | 6991 |

**Red: Endangered Objects (approx. 7.000)**
**Blue: Endangered Settlement Areas**

*Source: City of Graz A10/5 – Department of Greens and Waters*

# Historical Flood Events in Graz

1573: Grazbach

1654: Grazbach

1807: Several Streams of Graz

1827: Mur, 50% of Graz flooded

1913: Stifting-, Ragnitz- und Leonhardbach

1947: Streams of District of Andritz

1975: Schöcklbach and Mariatrosterbach

1989: Gabriachbach

1996: Gabriachbach

1998: Mariatroster- and Gabriachbach

1999: Thörlbach

21.08.2005: All Streams of Graz flooded

2008: Ragnitz- and Leonhardbach

2009: Districts of Andritz, Mariatrost and St. Peter

2010: Andritz, Straßgang, Wetzelsdorf

2011: Several Streams

2012: Petersbach

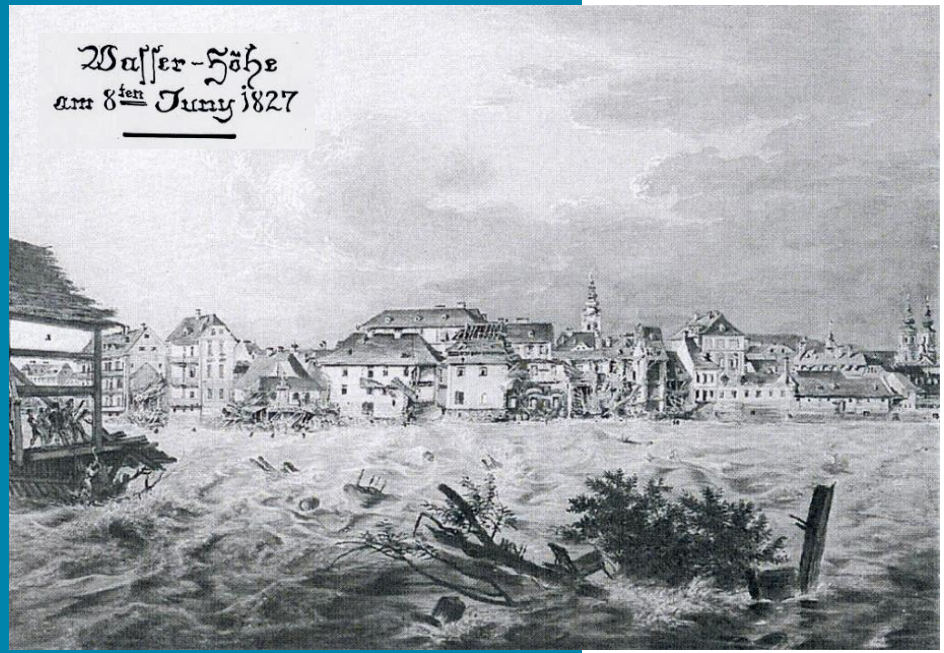
2013: St. Peter, Andritz, Gösting

2014: Mariatrosterbach, Schöcklbach

2018: Several Streams

2020: Thalerbach

# Historical Flood Events in Graz





**1827: Catastrophic Mur Flooding >> Systematic River Regulation >> Situation in 1891**

# Historical Flood Events in Graz


**1975: Mariatrosterbach**

# Historical Flood Events in Graz


**2005: Gabriachbach**

# Historical Flood Events in Graz


**2005: Andritzbach**

# Sectoral Programme Graz Streams

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GRAZER BÄCHE SACHPROGRAMM

## Since 2005: Programme of Measures

- Flood Analysis of the event of 21st August 2005
- Rainfall-Runoff Modelling / Hydrodynamic Modelling
- Detailed Surveying of Streams
- Feasibility Studies / integrated Flood Remediation Concept incl.
  - Flood Management
  - Ecological planning
  - Spatial planning
  - Urban Water Management
- Cost Estimate
- Prioritisation of Measures

# Sectoral Programme Graz Streams

2/2

GRAZER BÄCHE SACHPROGRAMM

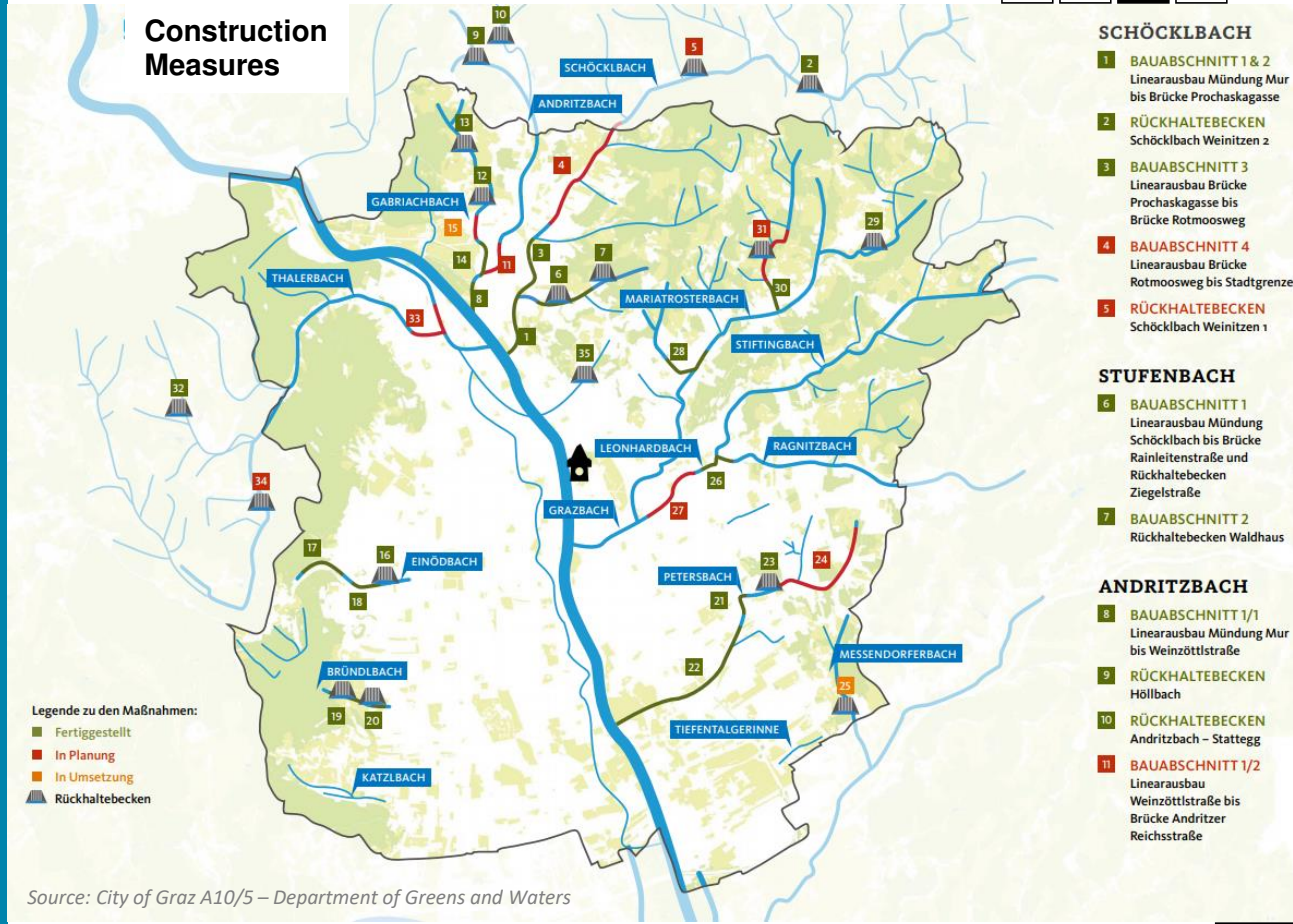
## Main Objectives

- **Protecting** endangered settlement areas against floods as far as possible (100 year flood)
- **Preserving** and extending existing inundation areas (retention basins)
- **Improving ecological status** of streams
- **Creating and improving recreational areas** adjacent to the streams (basins, to widen river beds)
- **Raising awareness** of streams again
- Strengthening the **closeness to nature** of the population of Graz

# Implementation Status 1/3

**Status of Implementation 2006 - 12/2022:**

- **21 projects on 12 streams**
- **16 new Retention Basins** (approx. 920,000 m³ Retention Volume)
- **15,5 km of Streambed Upgrading / Linear Measures**
- **Investment:** approx. **EUR 60 Million**
- **> 3,500 Buildings protected**




*Source: City of Graz A10/5 – Department of Greens and Waters*

# Implementation Status 2/3

GRAZER BÄCHE SACHPROGRAMM

**Example: Petersbach Retention Basin**

- Retention volume: 34.000 m³
- Construction time: 2 years
- Completion: 2020/21
- Costs: 10 Mio EUR

# Implementation Status 3/3

GRAZER BÄCHE SACHPROGRAMM

**Example: Petersbach Retention Basin (Details): overfulfilment of current technical standards**

# Administrative Organisation

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GRAZER BÄCHE SACHPROGRAMM

## Municipal Ressources of the City of Graz

- **Responsibility:** Department of Greens and Waters

  **Unit for Water Bodies and Flooding Affairs**
  (Head of Unit: Bernhard Egger-Schinnerl)
- **Team** of 5 persons:
  2 Academics, 2 Technicians, 1 Secretary
- Project **development stages**: Planning phase (to be prefinanced by municipality) - Financing phase - Implementation phase
- Project **implementations per year** manageable:
  1 - 2 qualitative large-scale projects
  (average project duration: 2,5a - cost: EUR 12 m.)
  Municipal Planning budget per year: EUR 200.000

# Administrative Organisation

2/4

GRAZER BÄCHE SACHPROGRAMM

## Multi-Level-Governance Project Group

- City of Graz (as developer), Provincial Government of Styria, Federal Hydraulic Engineering Administration (Bundeswasserbauverwaltung), The Federal Ministry of Agriculture, Forestry, Regions and Water Management, Forestry service for torrent and avalanche control;
- **Joint medium-term measure planning** / prioritisation (currently: 2022-2027)
- **Financing mechanism** for public flood prevention measures in Austria: Federal Water Constructions Funding Act (Wasserbautenförderungsgesetz 1985)
- **Financing share of City** of Graz until now: approx. 23%

# Administrative Organisation

3/4

## Additional Activities / Precautions in Graz

Municipal Directorate, **Security Management and Civil Protection**:

- Impact-oriented weather warnings for Graz
- Official communication processes / preparations: weather warnings, prepared closure orders for infrastructure, coordination with other authorities
- Hazard prevention: storm preparedness of the Graz fire brigades
- Flood action plan for fluvial flood events

# Administrative Organisation

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## Additional Activities / Precautions in Graz

- **Self-protection**:
  40 sites with sandbag depots for the civilian population


- **Emergency Response Plan for Heavy Rain Risks**
  (EU-funded Interreg-Pilot Project “Rainman” for selected areas)
  Local Partner: Dept. for Civil Protection and Municipal Fire Brigade

- **Association Civil Defence Styria** (Zivilschutz-App)

# Lessons Learned

1/2

- Situation in Austria: Municipalities have to be **proactive process drivers** (as project developers) for flood prevention measures!
- **Professional internal project management** skills essential
- Local **system of medium term prioritisation** of measures necessary (limited ressources)
- **Project duration** for retention basins and streambed upgrading: average 5 years (from start of planning until realization)
- **Less planning flexibility** espec. in urban areas compared to other planning areas (e.g. cycle path expansion)

# Lessons Learned

2/2

- **<u>Land redemption negotiations: Key process stage!</u>**
  - Highly professional approach and negotiating skills essential (e.g. Real Estate Departments)
  - Local knowledge + knowledge of local urban development processes
  - Fairness towards all stakeholders (e.g. land owners on both sides of the stream)
  - Political interventions counterproductive!
- Still existing **unsolved technical challenges** of various water discharges (degree of soil sealing)!
- Estimation of the **further implementation period** of the Sectoral Programme Graz Streams: +20-30a

# Najlepša hvala za pozornost!


***CONTACT DETAILS***

***Christian Nussmueller***

*City of Graz*

*Executive Office for Urban Planning, Development and Construction - Unit for Climate Action and Funding Projects*

*christian.nussmueller@stadt.graz.at*

*www.linkedin.com/in/christiannussmueller*

***Bernhard Egger-Schinnerl***

*City of Graz*

*Department of Greens and Waters - Head of Unit for Water Bodies and Flooding Affairs*

*bernhard.egger-schinnerl@stadt.graz.at*


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Source: Graztourismus/Harry Schiffer