

Klimaanpassung für historische Gärten

Risk assessment of extreme precipitation in heritage conservation areas as a part of the development of climate change adaptation strategies

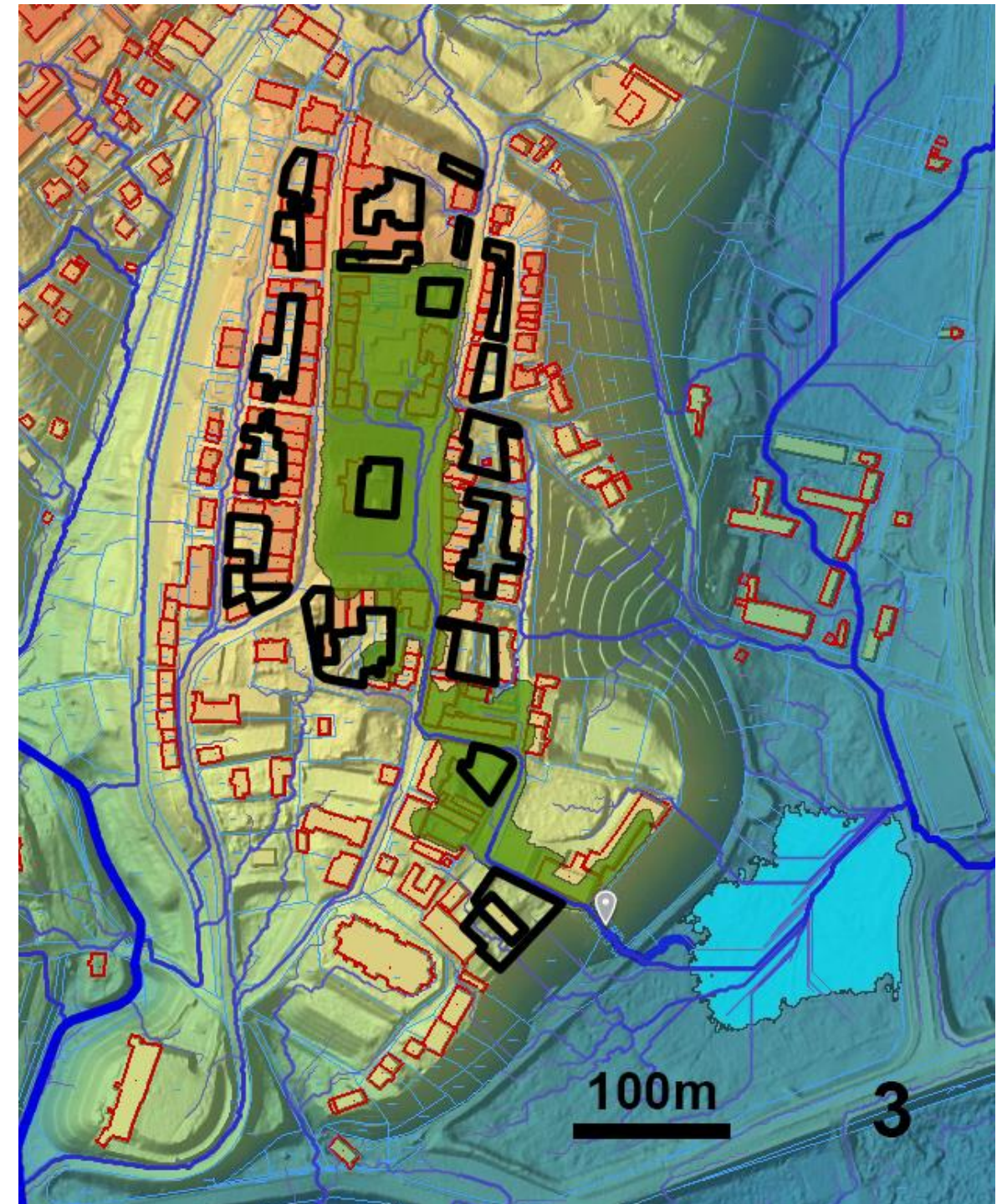


SZKOŁA GŁÓWNA
GOSPODARSTWA
WIEJSKIEGO

Joanna Dudek-Klimiuk, D.Sc.

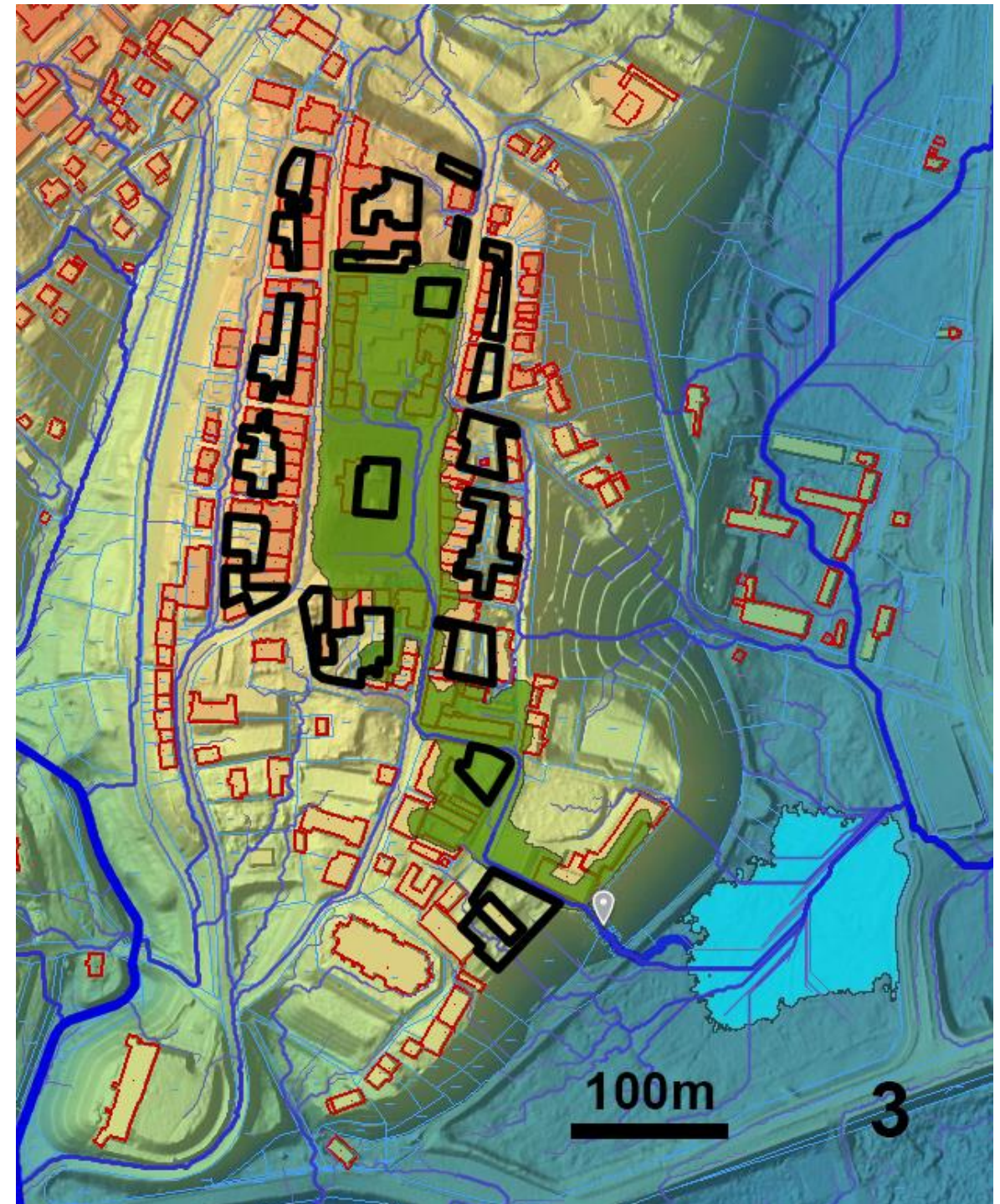
Barbara Warzecha M.Sc.

Bad Muskau, 22.06.2024



Agenda

1. Threats and risks to the monuments/
historic(al) sites
2. Selected competitions dedicated to
historic(al) sites
3. Surface runoff within the context of
heritage conservation areas



Threats and risks to the monuments/ historic(al) sites

- 1970s - water, soil and air pollution (environment)
- 1990s - times of post-socialist transformation
 - The most important turning point for carrying out construction/restoration works and comprehensive care of individual facilities was the **1990s - the period of sudden political, economic, and social changes in Poland**
 - Urban pressures, re-privatisation, lower control over works within historic buildings, parcelisation (subdivision), new materials (not always suitable for monuments)
- New threats - the last 10 years, a **clash of issues** in the context of historic(al) sites

Climate related threats

W A T E R

Floods

- Flooding and sudden downpours
- Changes in soil structure and ratio - increased risk of landslides, erosion, leaching
- Raising or sinking groundwater levels

Surface runoff

Biotic factors

- Invasive plants/pests
- Changing ranges of occurrence

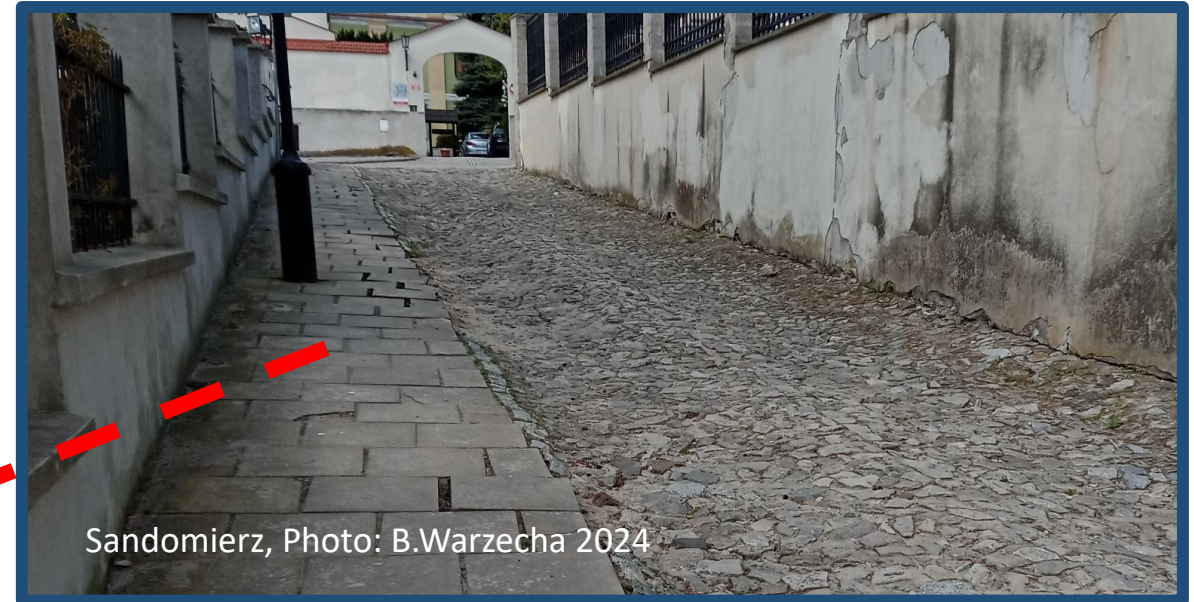
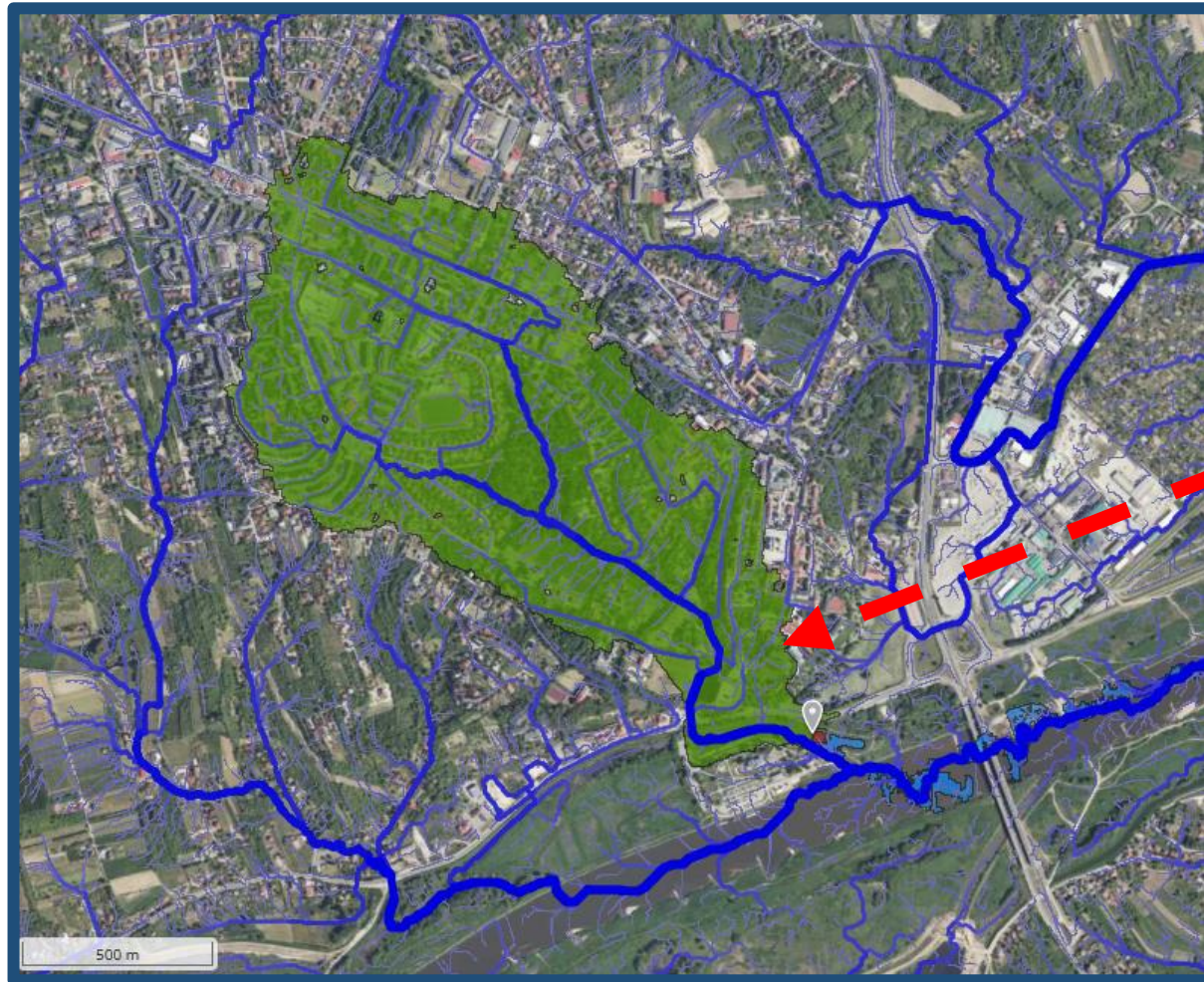
Temperature

- Increase in temperature (heat) and fire hazards,
- Droughts
- Changes in the length of the growing season

Climate related threats



Climate related threats



Sandomierz, Photo: B.Warzecha 2024

Surface runoff

- Action to be taken at the site scale,
- not forgetting the larger scale (water)

500

Further studies focus on this issue

Historic(al) gardens and parks - characteristics

- Each site is unique and requires an individual approach
- Places of special care and concern
- Historic parks are valuable for their historical values
- They are characterised by:
 - **Significantly less resistant to climate change**
 - Have a positive impact on mental health and can be an area for relaxation
 - Provide shade, coolness - influences, among other things, the temperature of the site and its surroundings

High historical
value

High
environmental
value

High cultural
heritage

Social needs

Mental health
benefits

Blue-green
infrastructure

Question 1: are there measures being taken in historic(al) park sites to mitigate the negative phenomena causing climate change?

Flexibility and resistance to crises

Adaptation to small changes (not: transformation)

Resiliency ?

Resource-oriented active feedback and opportunities for change

It should not be seen as a separate or different initiative



Selected competitions dedicated to historic(al) sites Research conducted in 2022

- One of the elements through which it is easiest **to diagnose whether the problem is noticeable and at what level**
- **On what scale** to perceive the problem: wider or nationally
- competitions among managers of historic sites (each competition has different objectives and criteria)
- **criteria related to climate change** are beginning to appear
- one of way **to educate** the visiting residents, visitors and managers (**stakeholders**)
- It can also be a **platform for the exchange of experience and good practice**



<https://www.waltons.com.na/competitions/>
http://2lyk-peir-athin.att.sch.gr/?page_id=11392



European Garden Heritage Network
(Europe): ***European Garden Awards***



Staatliche Schlösser und Gärten Baden-
Württemberg (Germany): ***Monument of the
Year***



Historic Houses (United Kingdom):
Garden of the year Award



National Heritage Institute (Poland):
Zadbany zabytek (Well-kept monument)

European Garden Heritage Network: *European Garden Awards*



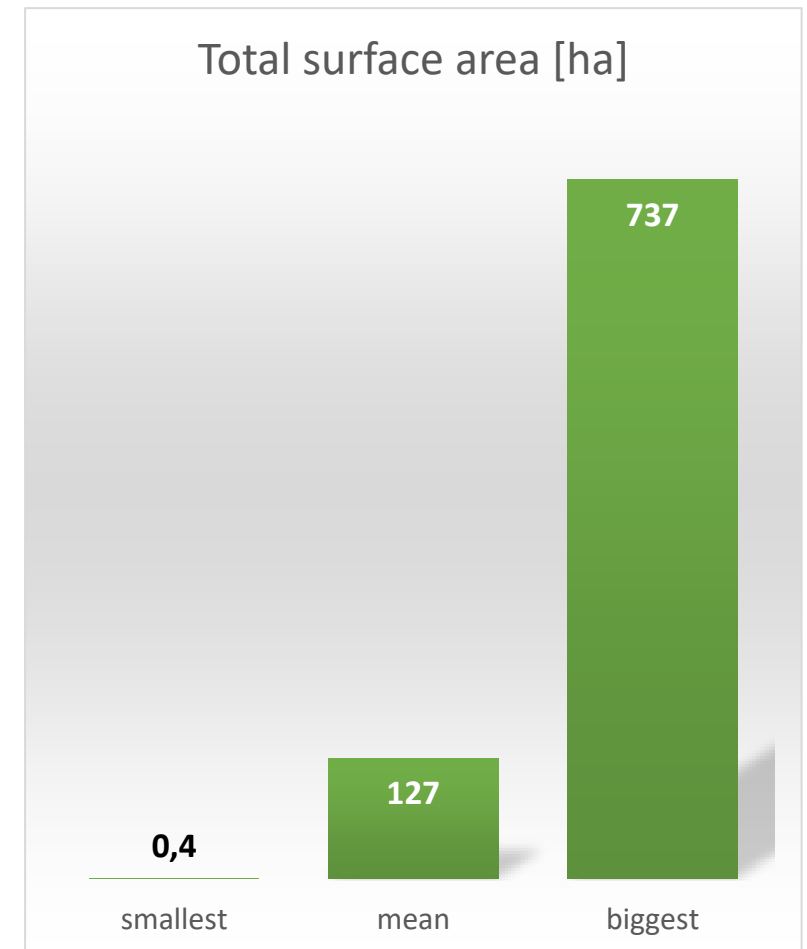
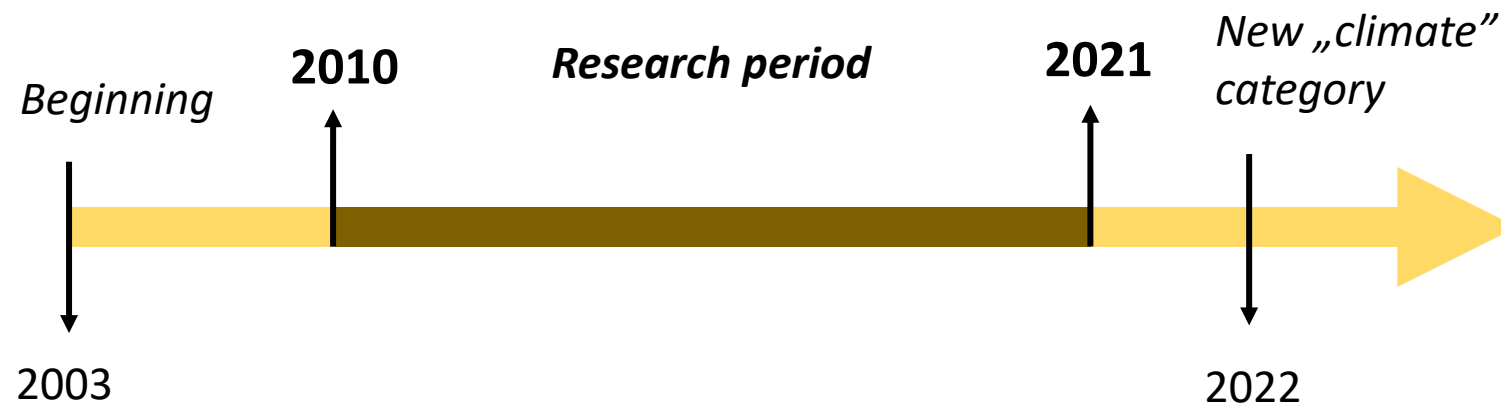
- **since 2003**
- total of around 200 parks and gardens from 15 European countries (as of 2022)
- nominations are submitted by members of the international jury, and from 2020/2021 also in the form of **Open Call** (sites do not have to be EGHN partners)
- **31 awarded parks and gardens**
- **number of the nominees annually/alltogether:** unknown
- **table of rules:** unavailable



European Garden Heritage Network: *European Garden Awards*



- Categories:
 - 2010-2021 “**Management or development of a historic park or garden**”
 - Since 2022: „**Climate mitigation measures in parks and gardens**”



European Garden Heritage Network: *European Garden Awards*



MANAGEMENT OR DEVELOPMENT OF A HISTORIC PARK OR GARDEN

Year	1 st prize	2 nd prize	2 nd prize
2021	Rundāle Palace, Pilsrundāle (Latvia)	Lowther Castle & Gardens, Penrith (United Kingdom)	Marqueyssac, Vésac (France)
2019	Jardins d'Étretat (France)	Vrtba Garden (Czech Republic)	Chatsworth (United Kingdom)
2018	Broughton Grange (United Kingdom)	Adare Manor (Ireland)	Kasteeltuinen Arcen (Netherlands)
2017	Peterhof, St. Petersburg (Russia)	The Gardens of Château de La Ballue (France)	De Nieuwe Ooster, Amsterdam (Netherlands)
2016	Hestercombe Gardens, Taunton (United Kingdom)	Schlosspark Ludwigslust (Germany)	Royal Botanic Garden Edinburgh (United Kingdom)
2015	Herrenhäuser Gärten, Hannover (Germany)	Parco Giardino Sigurta, Valeggio sul Mincio (Italy)	Painshill Park, Cobham (United Kingdom)
2014	The Lost Gardens of Heligan, Pentewan (United Kingdom)	Sanssouci, Potsdam (Germany)	Hedge House, Kasteel Wijre (Netherlands)
2013	Park Monserrate, Sintra (Portugal)	Summer Garden, St. Petersburg (Russia)	Gunnebo Slott and Gardens (Sweden)
2012	Egeskov Castle (Denmark)	Les Jardins de la Chatonniere (France)	Museum Garden Gaasbeek (Belgium)
2011	Villa Ottolenghi (Italy)	Chateau de la Bourdaisiere (France)	Orpheus at Boughton (United Kingdom)
2010	Trentham Estate – the New and Old Trentham Gardens (United Kingdom)	No prize	No prize



Jardins d'Etretat
(France)

<https://www.getyourguide.de>



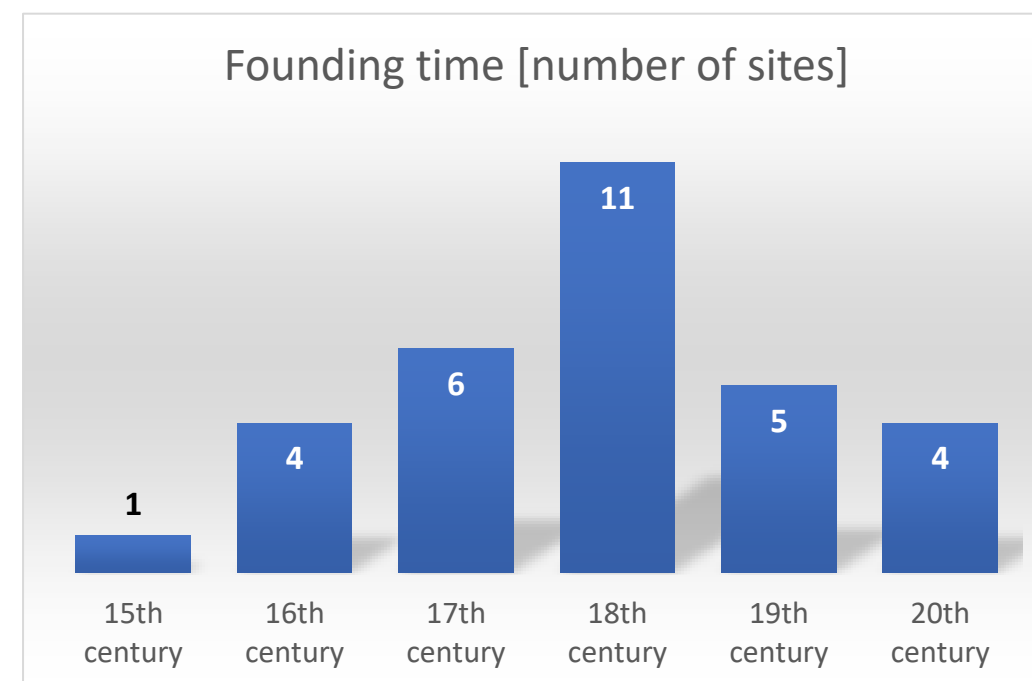
Rundāle Palace,
Pilsrundāle
(Lithuania)

<https://rundale.net/en>



Egeskov
Castle
(Denmark)

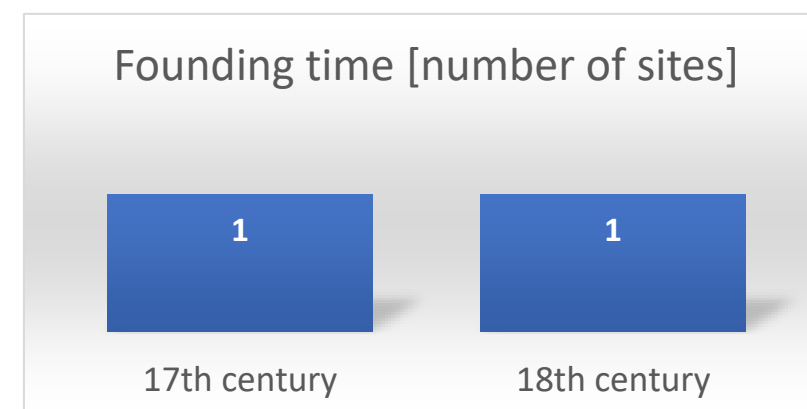
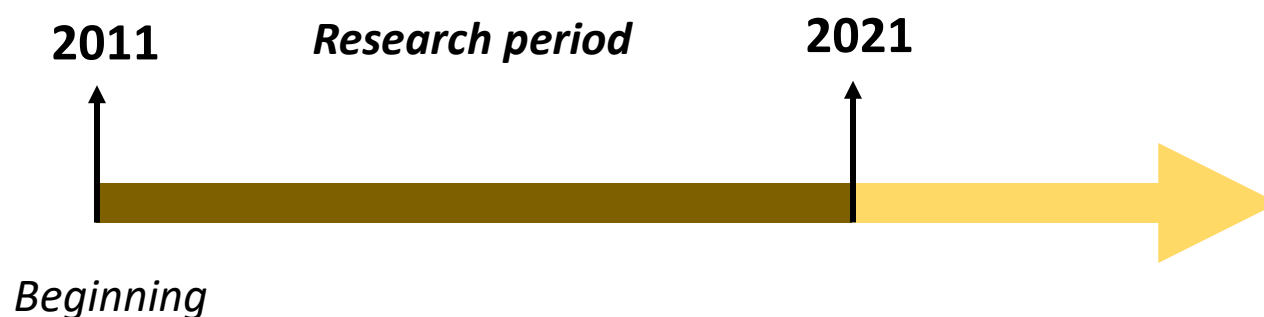
<https://egeskov.dk/en>



Staatliche Schlösser und Gärten Baden-Württemberg (Germany): *Monument of the Year*



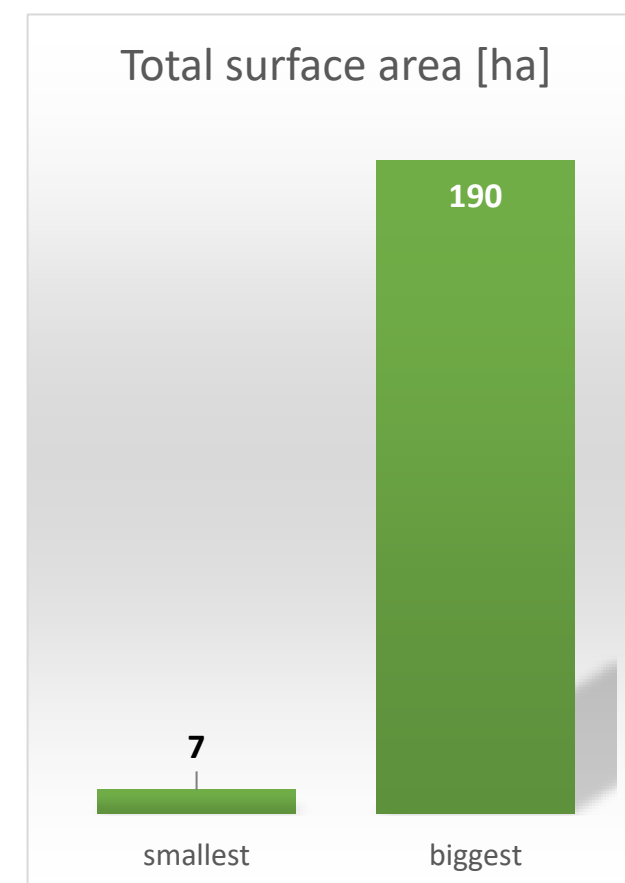
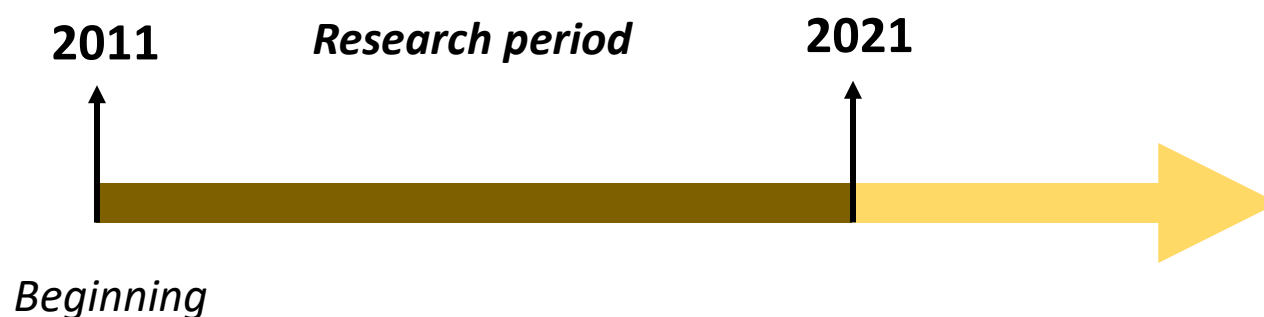
- **since 2011**
- bring together 62 monuments, including palaces, castles, gardens, monasteries and smaller buildings
- Monuments must be located in Baden-Württemberg and under state protection of monuments
- Annually, one prize is given from among all types of facilities and would be awarded “Monument of the Year” honours



Staatliche Schlösser und Gärten Baden-Württemberg (Germany): *Monument of the Year*



- **2 awarded parks and gardens**
- **Number of the nominees annually/alltogether:** unknown
- **Table of rules:** unavailable
- **Laudations:** unavailable





Schwetzingen, Photo: B.Warzecha 2023

Castle garden in Schwetzingen



Palace park in Weikersheim



Weikersheim,
Photo: B.Warzecha 2023

Historic Houses (United Kingdom): *Garden of the year Award*



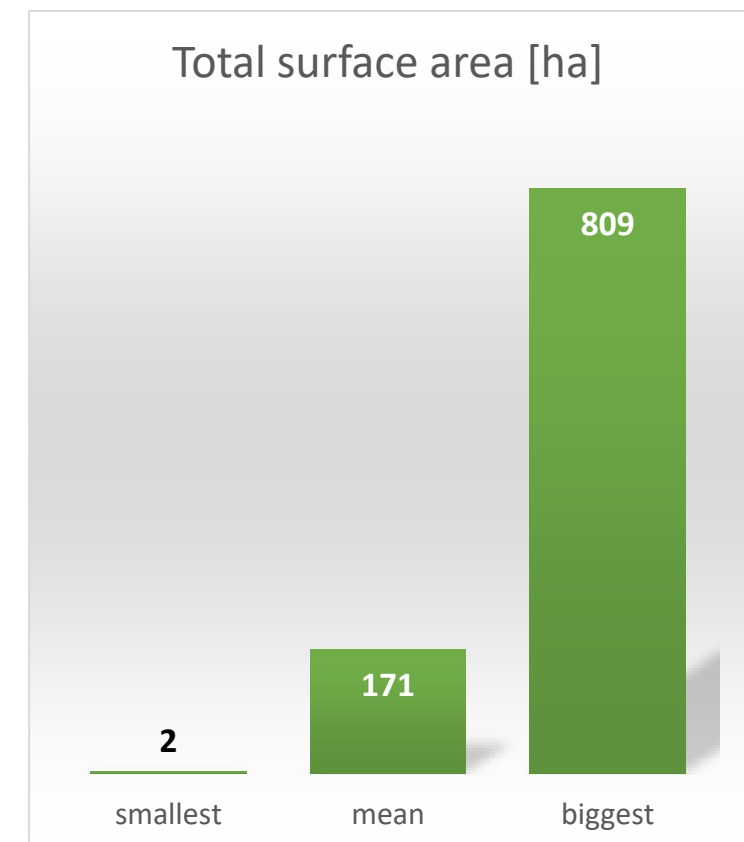
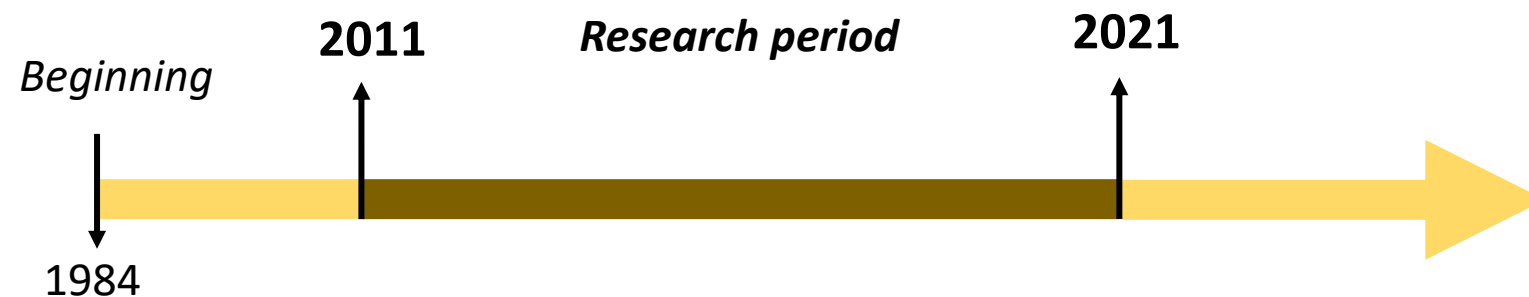
- **since 1984**
- **non-profit** association of **independent historic houses owners** based in Great Britain and Northern Ireland
- established to support the historical houses, their owners, and corporates (organisations, private persons, institutions, charities)
- Goals:
 - promote the property or
 - protect the interest of private ownership
- awarded garden or park must distinguish itself with an **outstanding horticultural appeal** and **public attractiveness**
- the winner would receive a **non-official title** of a prestigious “**nation’s favourite garden**”

CHRISTIE’S

Historic Houses (United Kingdom): *Garden of the year Award*



- **37 awarded parks** (in total, 1 annually)
- **Number of the nominees annually/alltogether:** unknown
- **Table of rules:** unavailable (internal *Categories* and *Grades*)
- The estates must be of the **highest historical** and **architectural importance** and/or connected to a **historical event or figure**
- Voting through the **online public poll**





<https://www.tatler.com/gallery/bowood-house-gardens-virtual-tour>

Bowood House



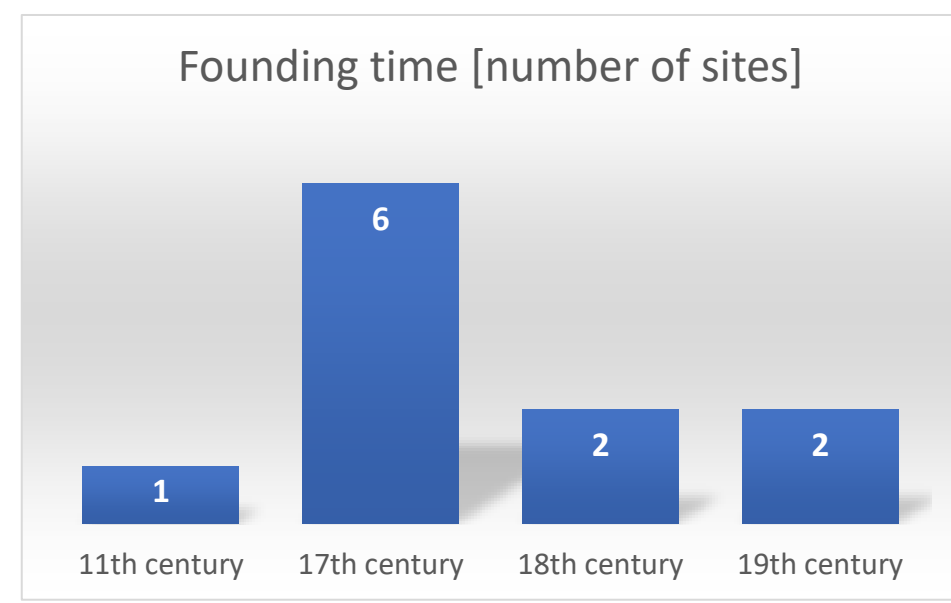
<https://visit.caerhays.co.uk/>

Caerhys Castle, Cornwall



<https://www.dalemain.com/>

Dalemain, Cumbria



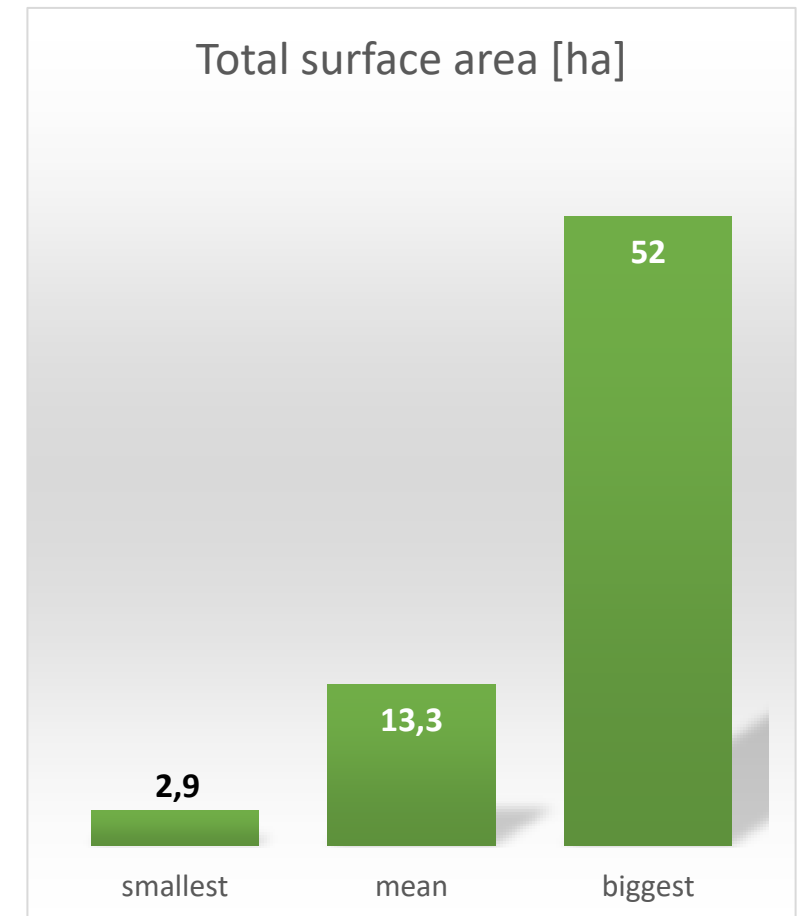
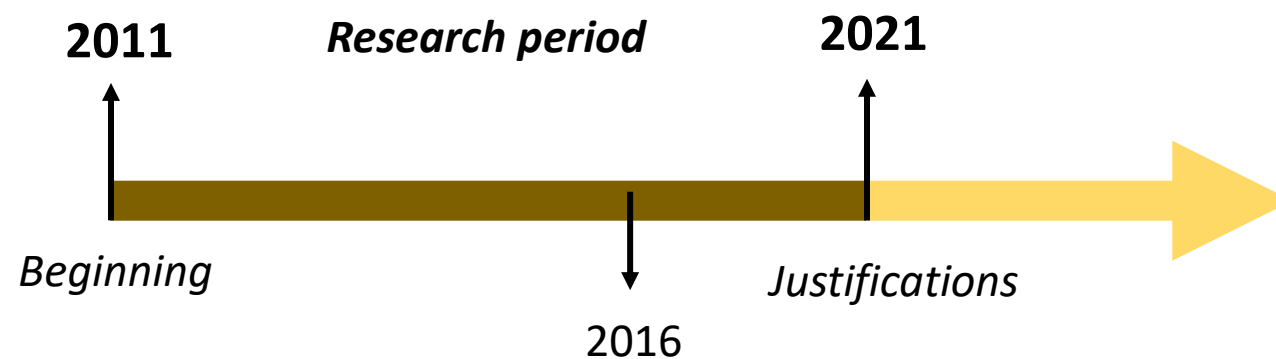
National Heritage Institute (Poland): *Well-kept monument*



- **since 2011 (NID)**
- **14 awarded parks**
- **Table of rules:** available 2011-2021
- granted to Polish immovable objects under the care of the General Conservator of Monuments of the Republic of Poland and the National Heritage Board of Poland
- application by the owner of the facility, the manager, or the relevant bodies of the Monuments Conservator's departments **at least five years after the completion** of renovation or adaptation works
- all winners receive a **diploma** along with a **laudation**
- Category: **Renovation of cultural space and landscape (including manors and palaces)**
- **The regulations do not contain provisions on measures to adapt to climate change and mitigate its negative effects**

National Heritage Institute (Poland): *Well-kept monument*

- Goals:
 - promoting the **care** of monuments,
 - promoting the **best models** of conservation, maintenance, and management of monuments in the field of properly made conservation, proper use, and renovation
- All these actions
 - should strengthen its **worth** and
 - must not adversely affect the **values** already possessed by the monument



National Heritage Institute (Poland): *Well-kept monument*

RENOVATION OF CULTURAL SPACE AND LANDSCAPE

Year	Award-winner	Honorable mention		
		1st prize	2nd prize	3rd prize
2021	Palace and park complex in Rakoniewice, Greater Poland Voivodeship	-	Palace park in Zielona Góra-Zatonie, Lubuskie Voivodeship	-
→ 2019	-	Manor and park complex in Chrząsne, Masovian Voivodeship	-	-
2018	-	-	-	-
2017	Palace and park complex in Dobrzyca, Greater Poland Voivodeship	-	Palace and park complex in Patrykozy, Masovian Voivodeship	-
2016	Manor and park complex in Kłóbka, Kuyavian-Pomeranian Voivodeship	-	Palace and park complex in Poddębice, Łódź Voivodeship	-
2015	-	Palace complex in Wielkopolyce, Opole Voivodeship	Park and palace complex in Warka-Winiary, Masovian Voivodeship	-
2014	-	-	-	Manor and park complex with a farm in Wiechlice, Lubusz Voivodeship
2013	Palace and park complex in Żmigród, Lower Silesian Voivodeship	-	-	-
2012	-	-	-	-
2011	-	Palace and park complex in Węgrzynowice, Łódź Voivodeship	Palace and park complex in Gułtowy, Greater Poland Voivodeship	-

~~2020~~



Palace and park complex in Rakoniewice

<http://www.rakoniewice.pl>



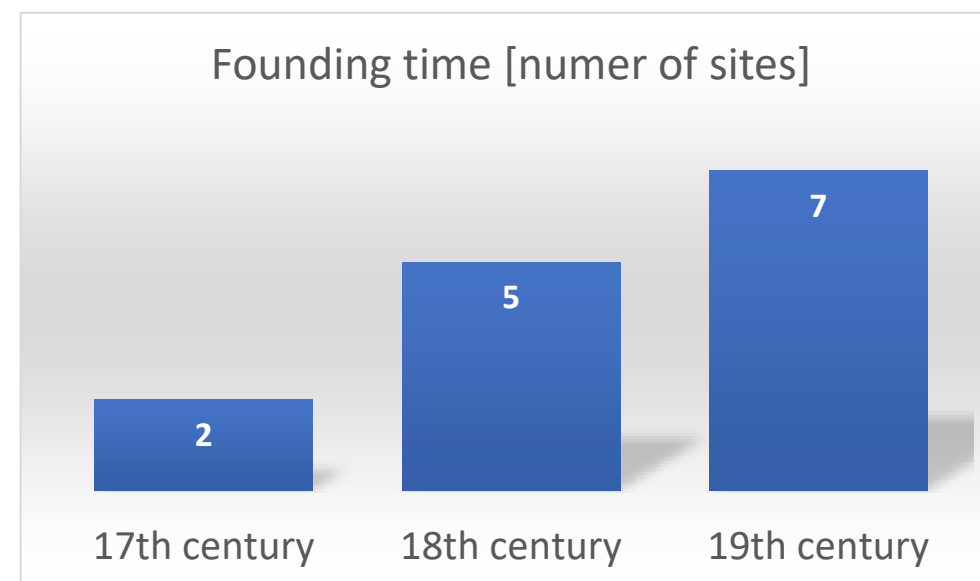
Palace and park complex in Dobrzyca

<https://hrabinaweltmeister.pl>



Palace and park complex in Żmigród

<https://www.zmigrod.com.pl>



ACRONYM

S pecific
M easurable
A ttainable
R ealistic
T ime-bound

IMPLEMENTATION

S imple
M otivating
A greed
R easonable
T ime-limited

- Peter Drucker, 1981,
Management of Objectives (MBO)
- George T. Doran, Robert Rubin,
- Paul J. Meyer

SMART solutions



Awarded in year	Historical Park or Garden	Pro-climate solutions	Pro-ecological solution	Other
2010	Trentham Estate (United Kingdom)	modern methods of education and innovation; nursery plant material;	-	art gallery botanical collections; inclusiveness and accessibility
2011	Chateau de la Bourdaisiere (France)	eco-conception of sustainability	-	educational activities
2011	Museum Garden Gaasbeek (Belgium)	modern methods of education and innovation	-	-
2012	Egeskov Castle (Denmark)	-	-	camping, botanical collections: roses
2013	Park Monserrate, Sintra (Portugal)	-	-	botanical collections: roses, rare botanical specimens
2013	Gunnebo Slott and Gardens (Sweden)	modern methods of education and innovation	traditional methods of landscape maintenance and its elements; ecologically grown products	under state legal protection as a cultural reserve: adaptation for conference purposes; farm
2014	Sanssouci, Potsdam (Germany)	-	-	entertainment
2014	The Lost Gardens of Heligan, Pentewan (United Kingdom)	modern methods of education and innovation	animal farm	farm, botanical collections: rhododendrons, fruit and vegetable trees; inclusiveness and accessibility
2016	Royal Botanic Garden Edinburgh (United Kingdom)	-	animal farm	botanical collections
2016	Hestercombe Gardens, Taunton (United Kingdom)	-	-	art gallery, land art
2017	The Gardens of Château de La Ballue (France)	-	-	cultural events
2019	Jardins d'Étretat (France)	-	-	park sculptures, botanical collections: rhododendrons and camellias
2021	Rundāle Palace, Pilsrundāle (Latvia)	-	-	organization of museum exhibitions, botanical collections: roses
2021	Lowther Castle & Gardens, Penrith (United Kingdom)	sustainable methods of caring for plant material and natural (self)regeneration of the facility	animal farm	entertainment, farm

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PRO-CLIMATE SOLUTIONS

Modern methods of education and innovation/
Eco-conception of sustainability/ Plant nursery



<https://www.hestercombe.com>

Hestecombe Gardens, Taunton, UK



<https://www.alamy.com/stock-photo/lost-gardens-of-heligan.html?sortBy=relevant>

Lost Garden of Heligan, Pentewan, UK
Gunnebo Slott and Gardens, Sweden



<https://gunneboslott.se/inlagg/nya-kokstradgarden/>

SMART solutions



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PRO-ECOLOGICAL SOLUTIONS

Traditional methods of landscape maintenance/
Ecologically grown food/ Farm/ Farmland



<https://visitsweden.com/what-to-do/nature-outdoors/the-gardens-of-sweden-a-botanists-dream/>

Gunnebo Castle, Sweden



Lost Garden of Heligan, Pentewan, UK

Dalemain, Cumbria, UK



https://www.visitcumbria.com/pen/dalemain/#google_vignette

SMART solutions

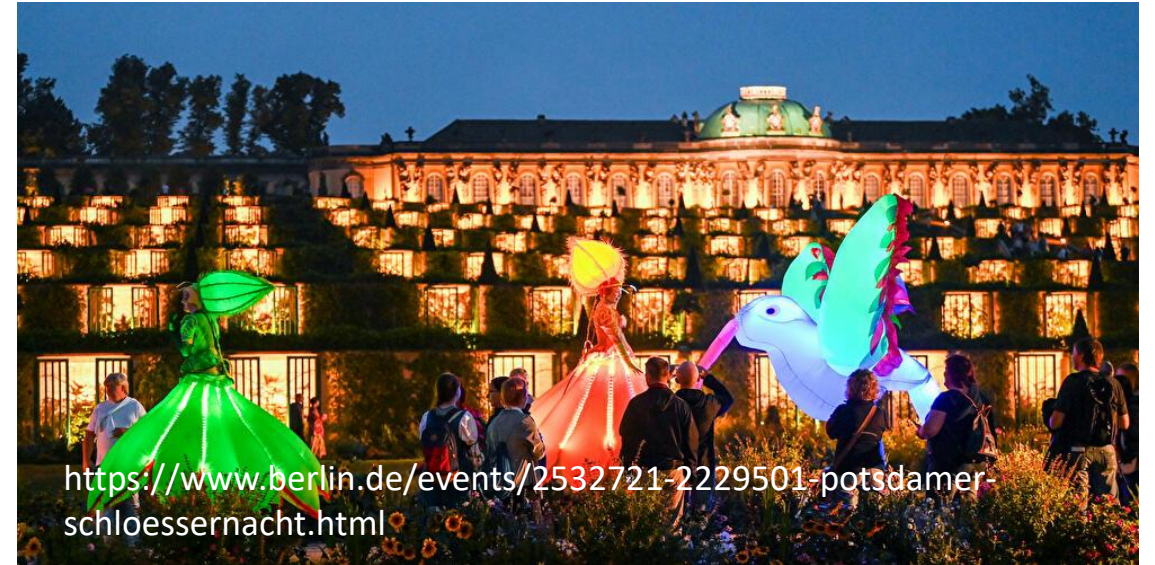


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OTHER SOLUTIONS

Botanical collections/ Cultural events/
Art gallery/ Theme shops

Sanssouci, Potsdam, Germany



Park Montserrat, Sintra, Portugal



Jardins d'Etretat, France



Hestecombe Gardens, Taunton, UK



<https://unsplash.com>

Strategic solutions – summary

- a very **cautious but constant approach** and persistent observation of the reactions of green sites
- the ideas introduced are more **long-term solutions** combined with **simultaneous observation** (even from the park's establishment time)

BUT

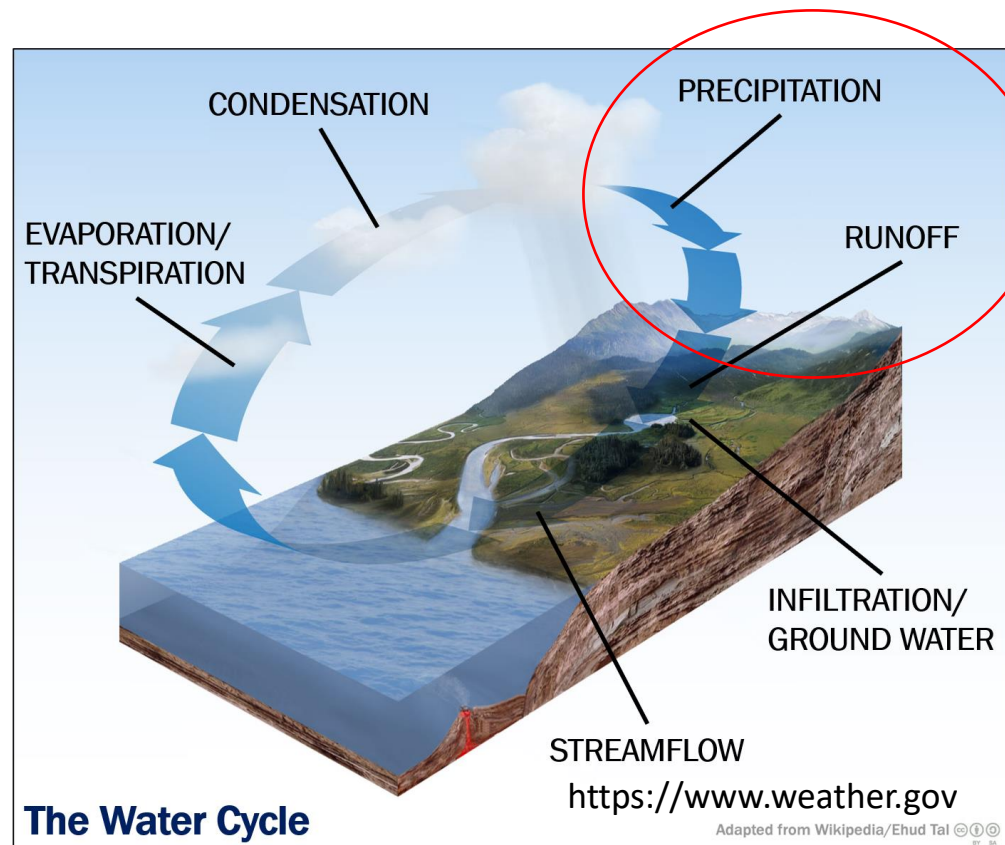
Question 2:

- a **historic(al) park or garden** is not an island - the site is set in an administrative-geographical-economic setting
- How to define the spatial extent of the influence zone of the negative surface runoff effects around a heritage site?
- **The problem of surface run-off has not been noticed/emphasised in the competitions**

Surface runoff

Runoff is precipitation that does not soak into the soil but instead moves on the Earth's surface toward streams.

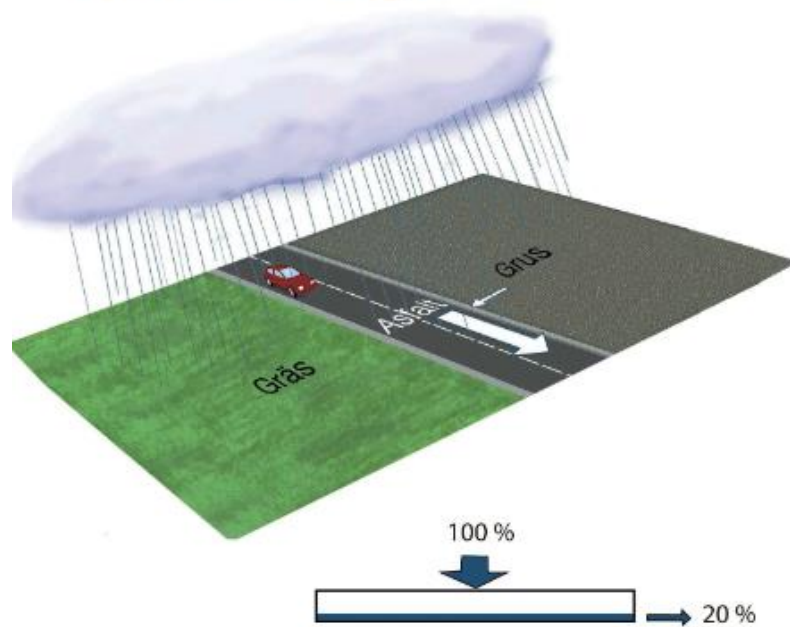
<https://www.weather.gov>



Surface runoff/ Flash flood

- There is no good definition of the term 'flash flood' for the urban environment
- The consequences of a downpour on the ground **depend largely on the duration of the rainfall**

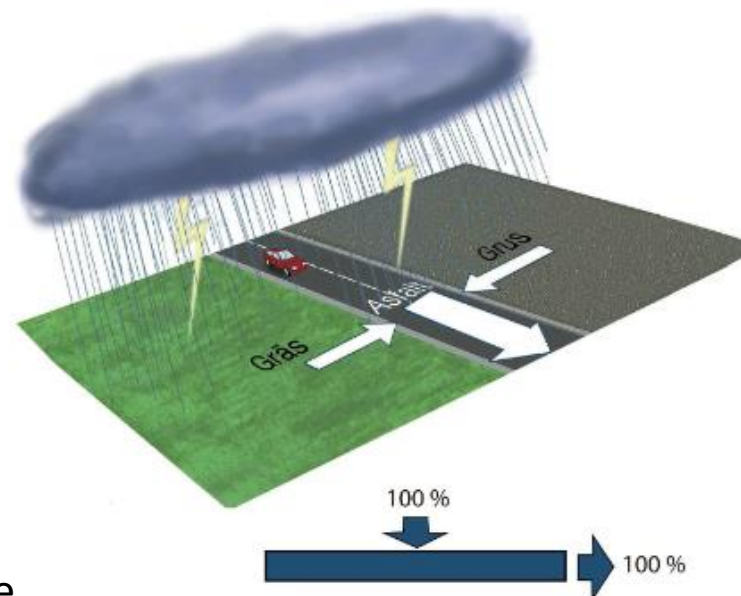
Normala regn



Figur 2. Avrinning från olika typer av ytor vid "normala regn" respektive extrema skyfall.

<https://www.svensktvatten.se>

Extrema skyfall

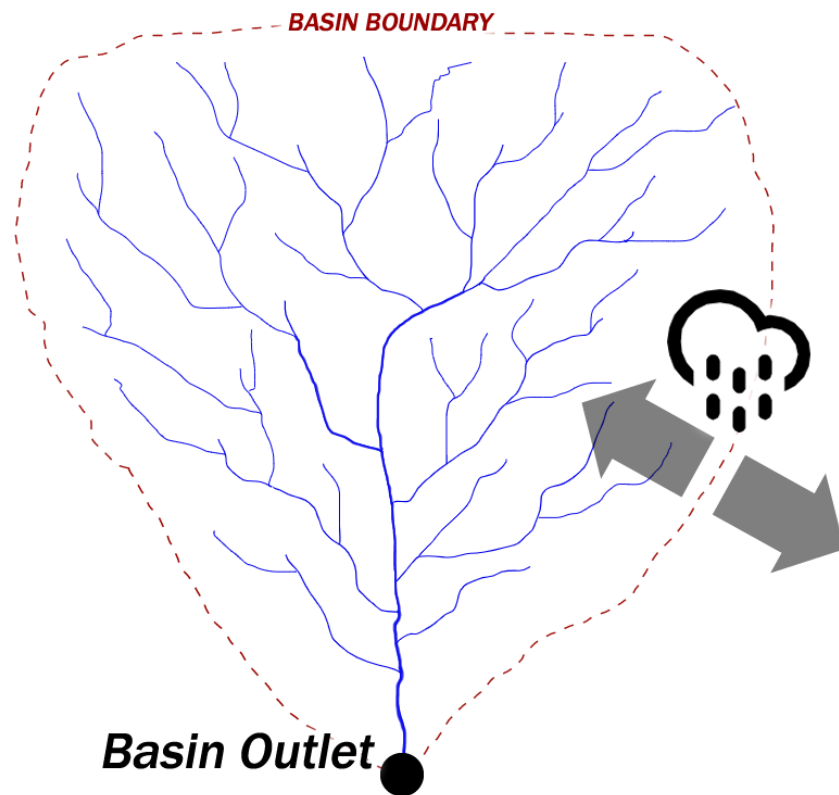


- **Flash flood:**
50,0 mm in 60 minutes or 10-years of rainfall (10%)
(Swedish Meteorological and Hydrological Institute)
- **Sehr starker Regen:**
>= 50,0mm in 60 minutes
(Deutscher Wetterdienst)

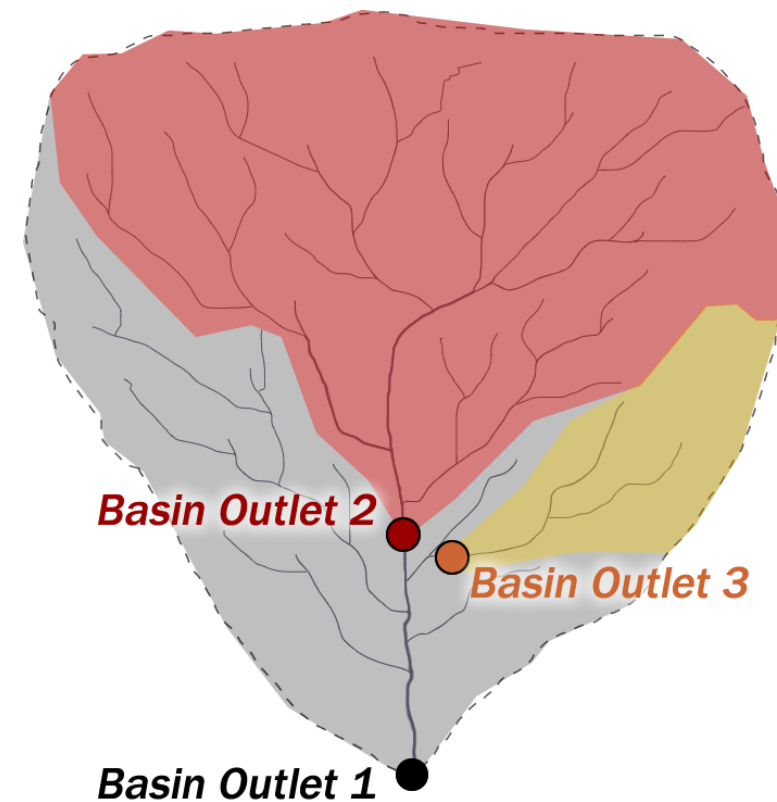
Watershed/ Catchment

- *the area from which water flows to form a stream (below, left)*
- *is defined by its outlet*

<https://www.weather.gov>



Adapted from Wikipedia/Eurico Zimbres 



Adapted from Wikipedia/Eurico Zimbres 

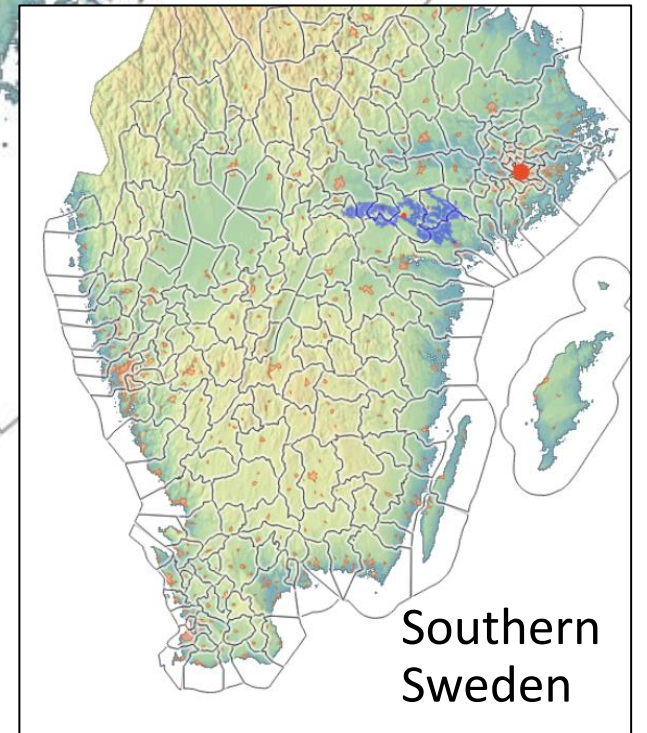
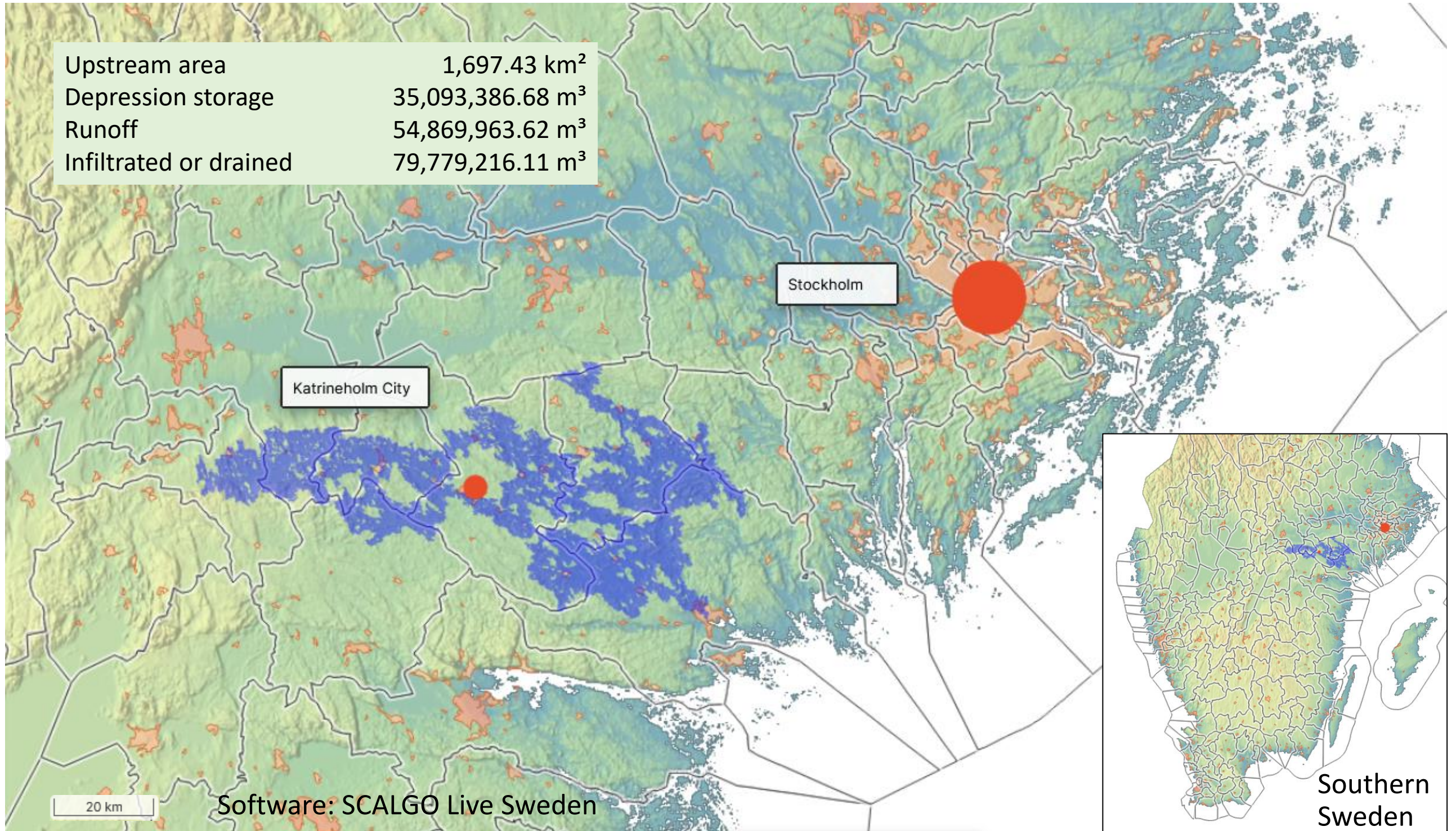
CASE STUDY: Katrineholm, Sweden

- Inhabitants:
34.324 (2023)
- City area:
11,79 km²
- Commune area:
1.189,5 km²
- Established:
19th century as a
Garden City

Photos: B.Warzecha, 2022



Upstream area	1,697.43 km ²
Depression storage	35,093,386.68 m ³
Runoff	54,869,963.62 m ³
Infiltrated or drained	79,779,216.11 m ³



Upstream area	623.89 km ²
Depression storage	9,886,094.54 m ³
Runoff	17,783,110.52 m ³
Infiltrated or drained	34,720,030.14 m ³

Katrineholm commune

Katrineholm City

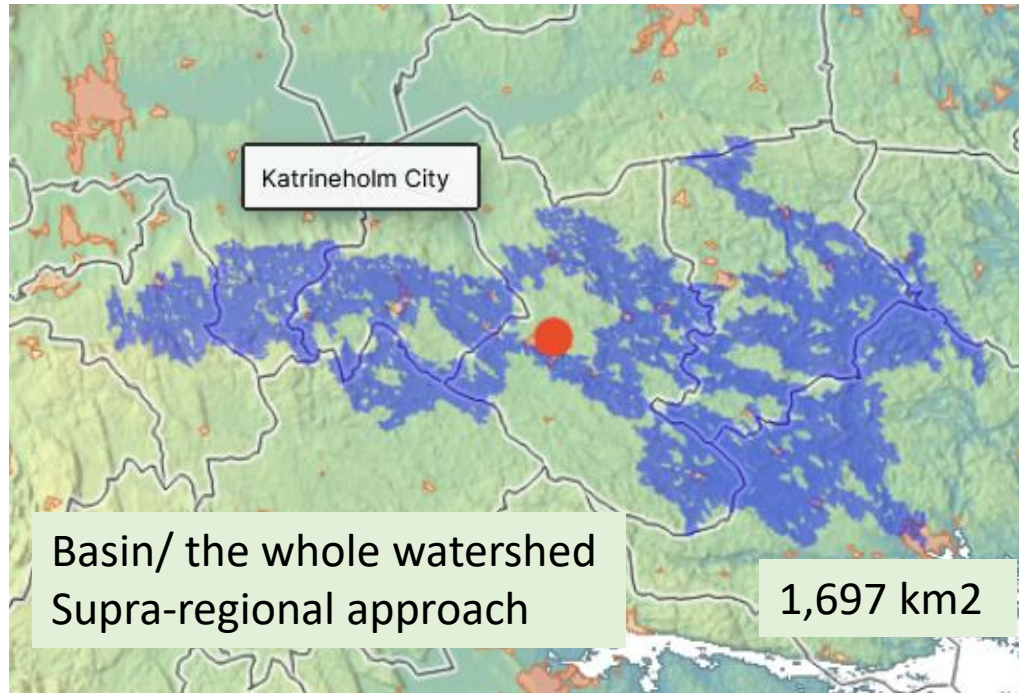
Ericssberg

Parameters:

- Intensity of rainfall (amount and time)
- Size of the catchment
- Land use/Land cover (LULC)
- Soil type (infiltration capabilities)
- Location in the basin

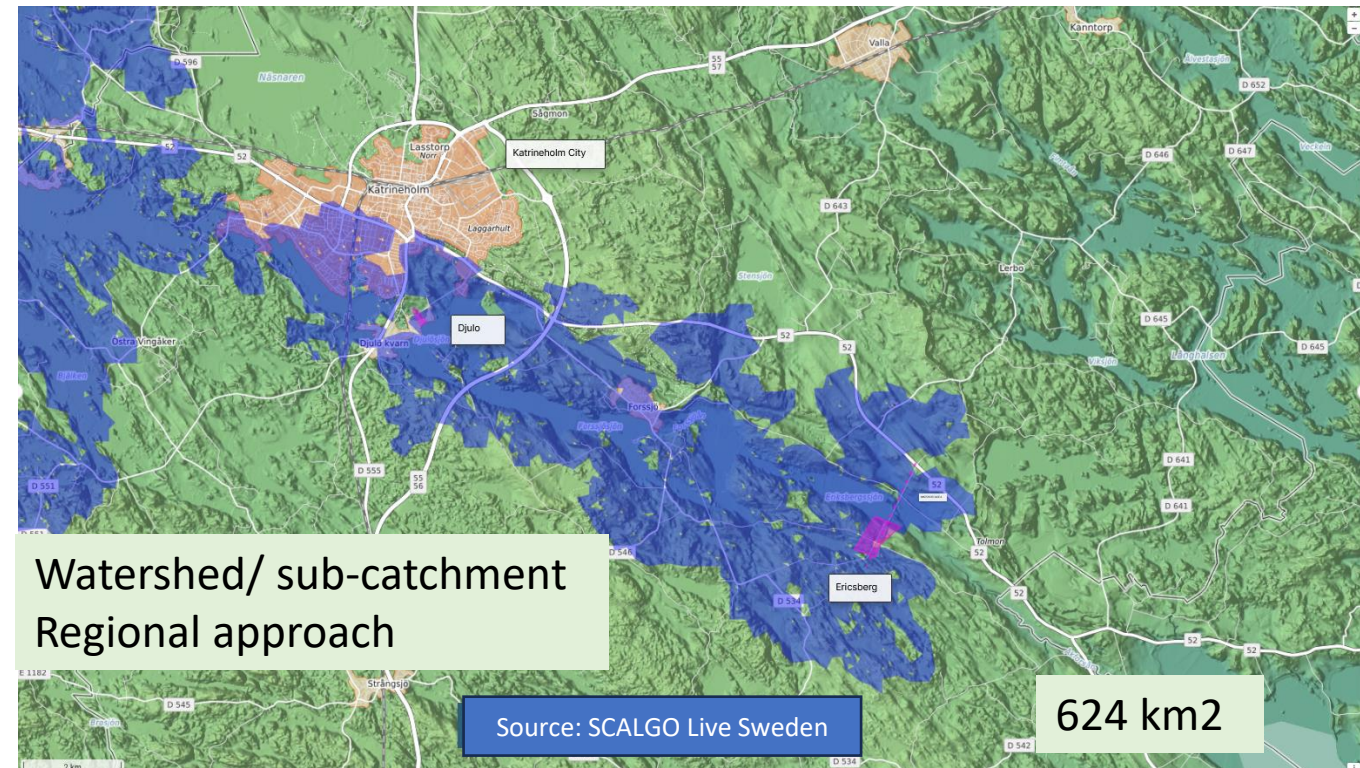
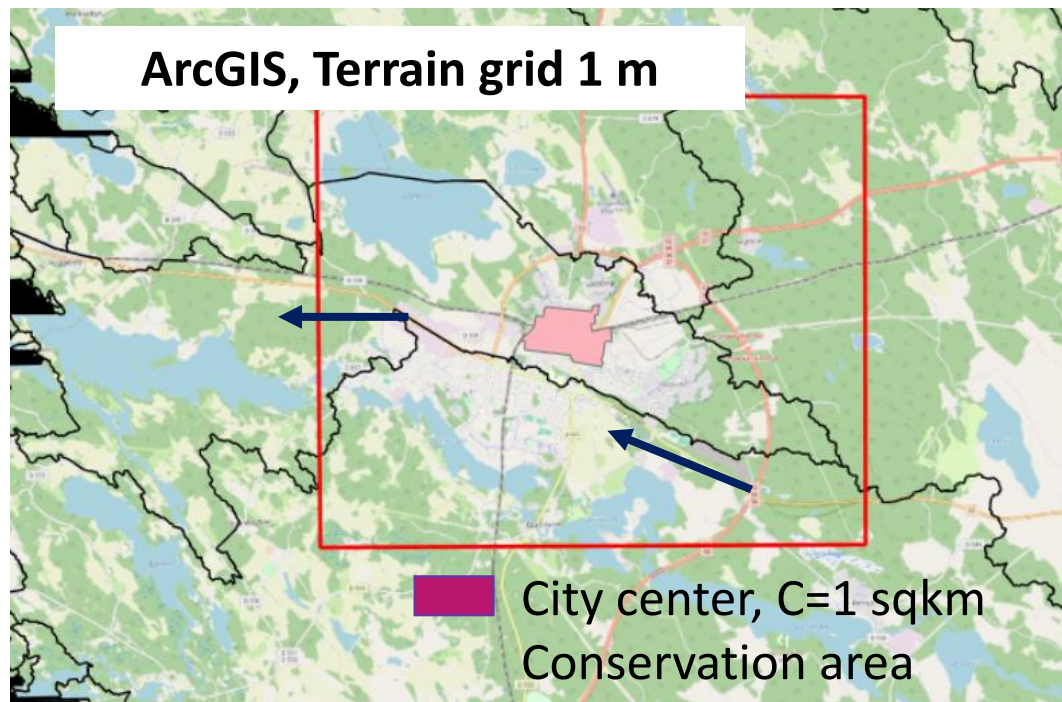
Source: SCALGO Live Sweden

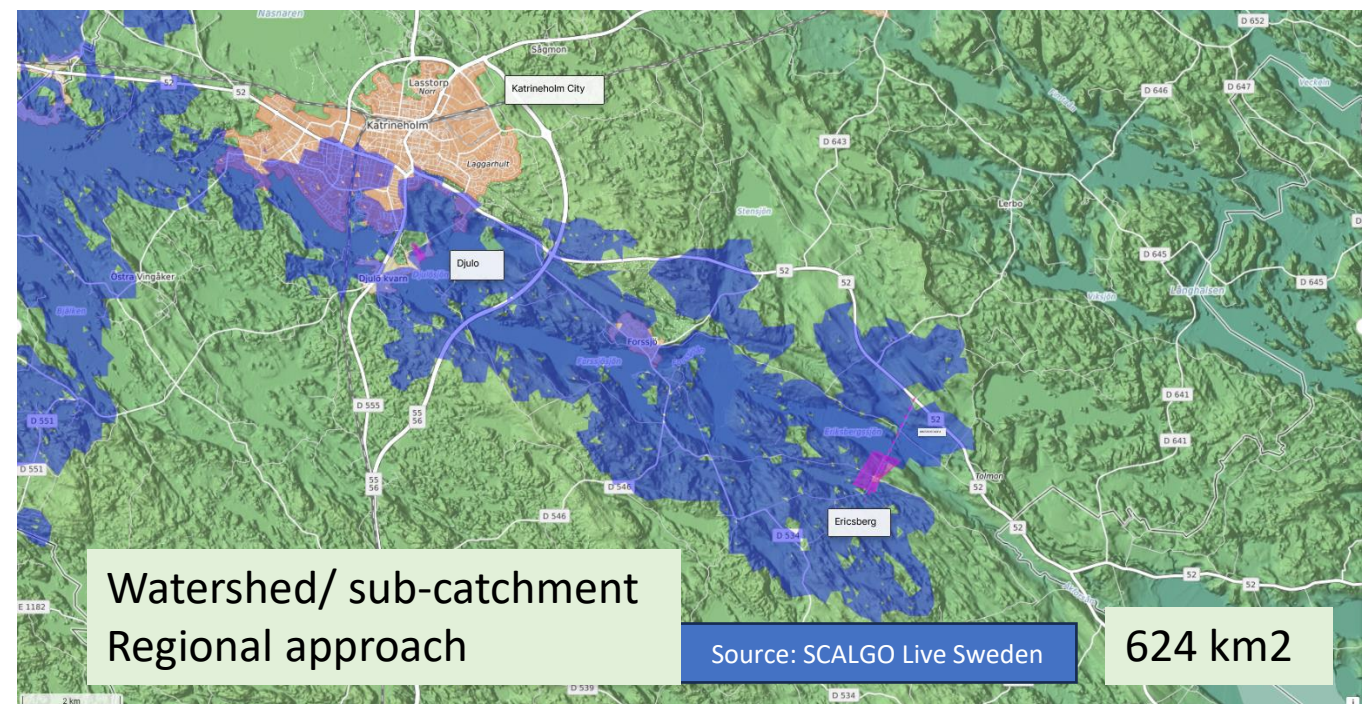
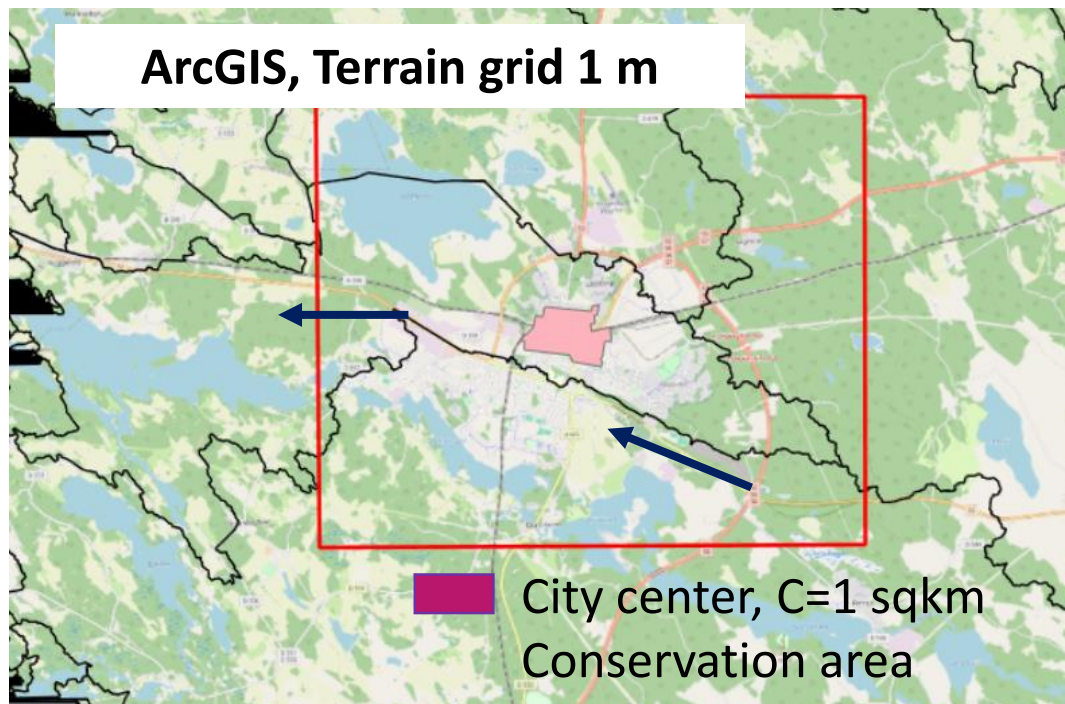
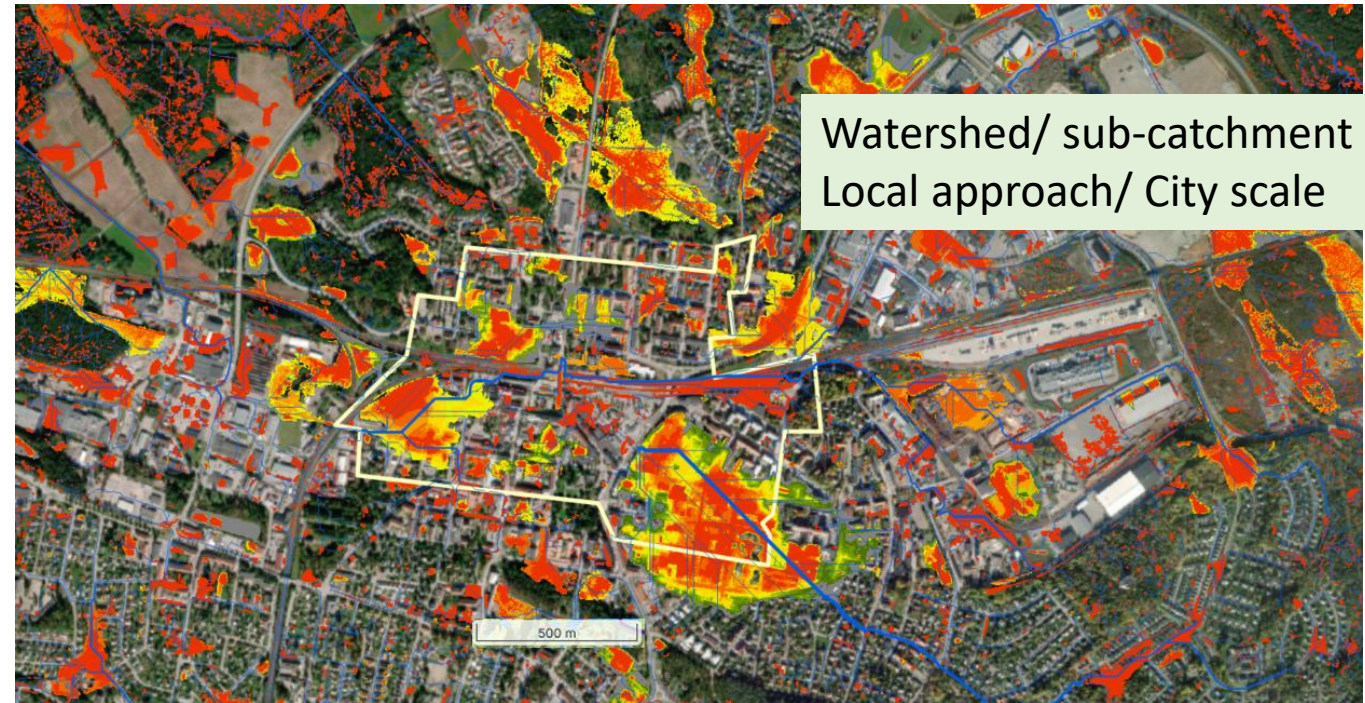
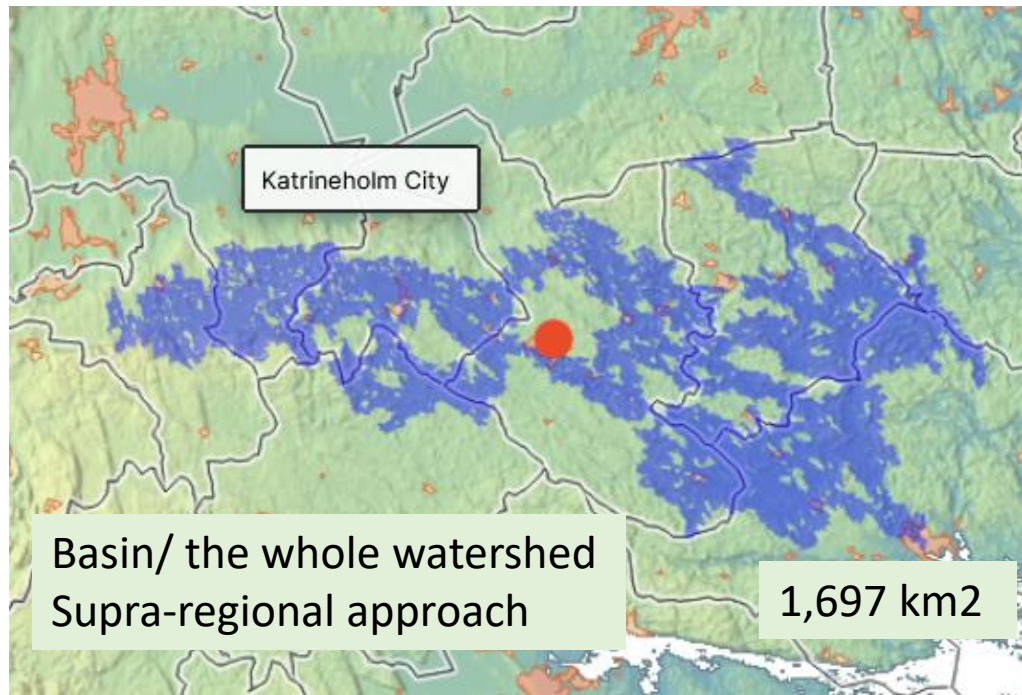
5 km



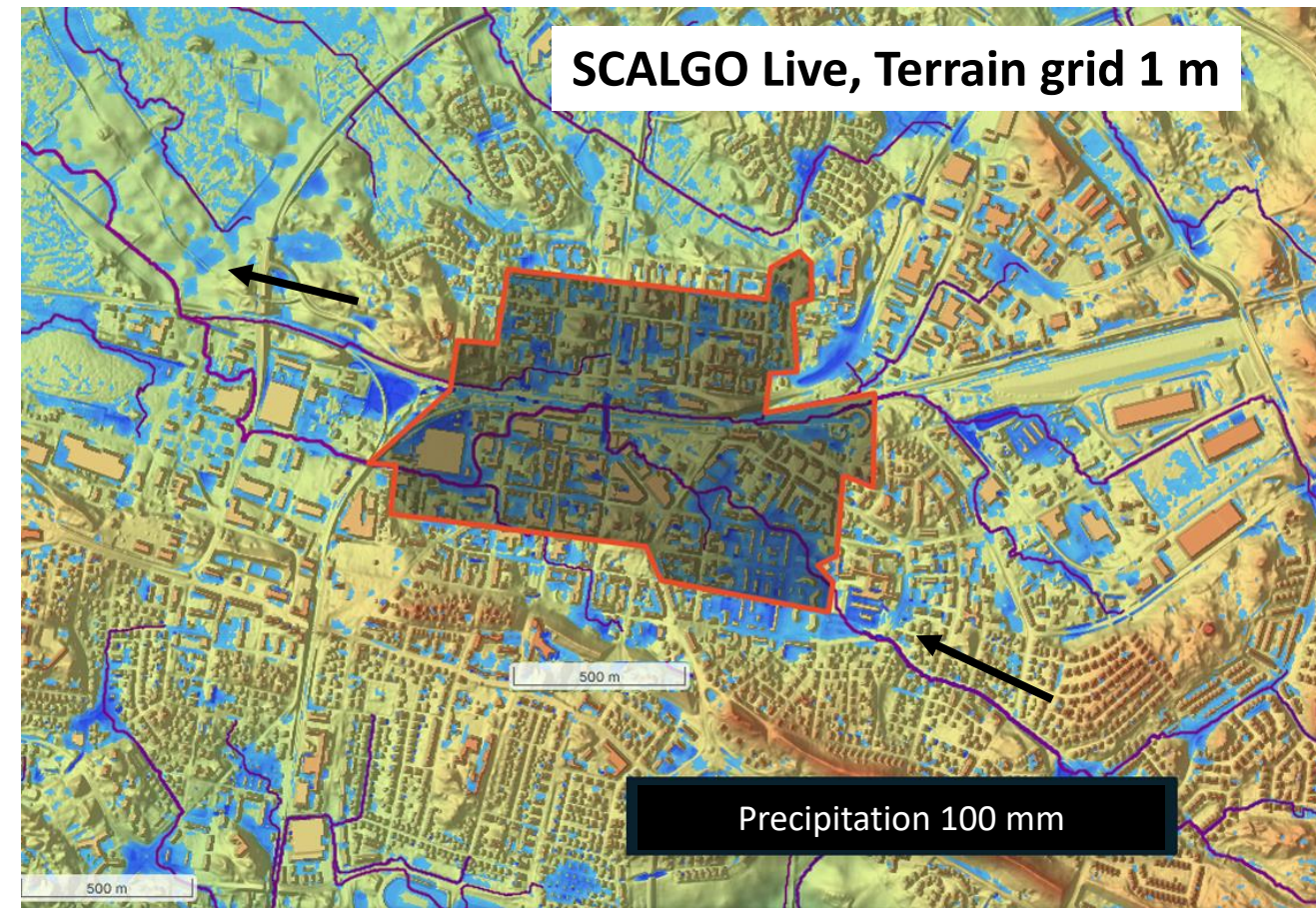
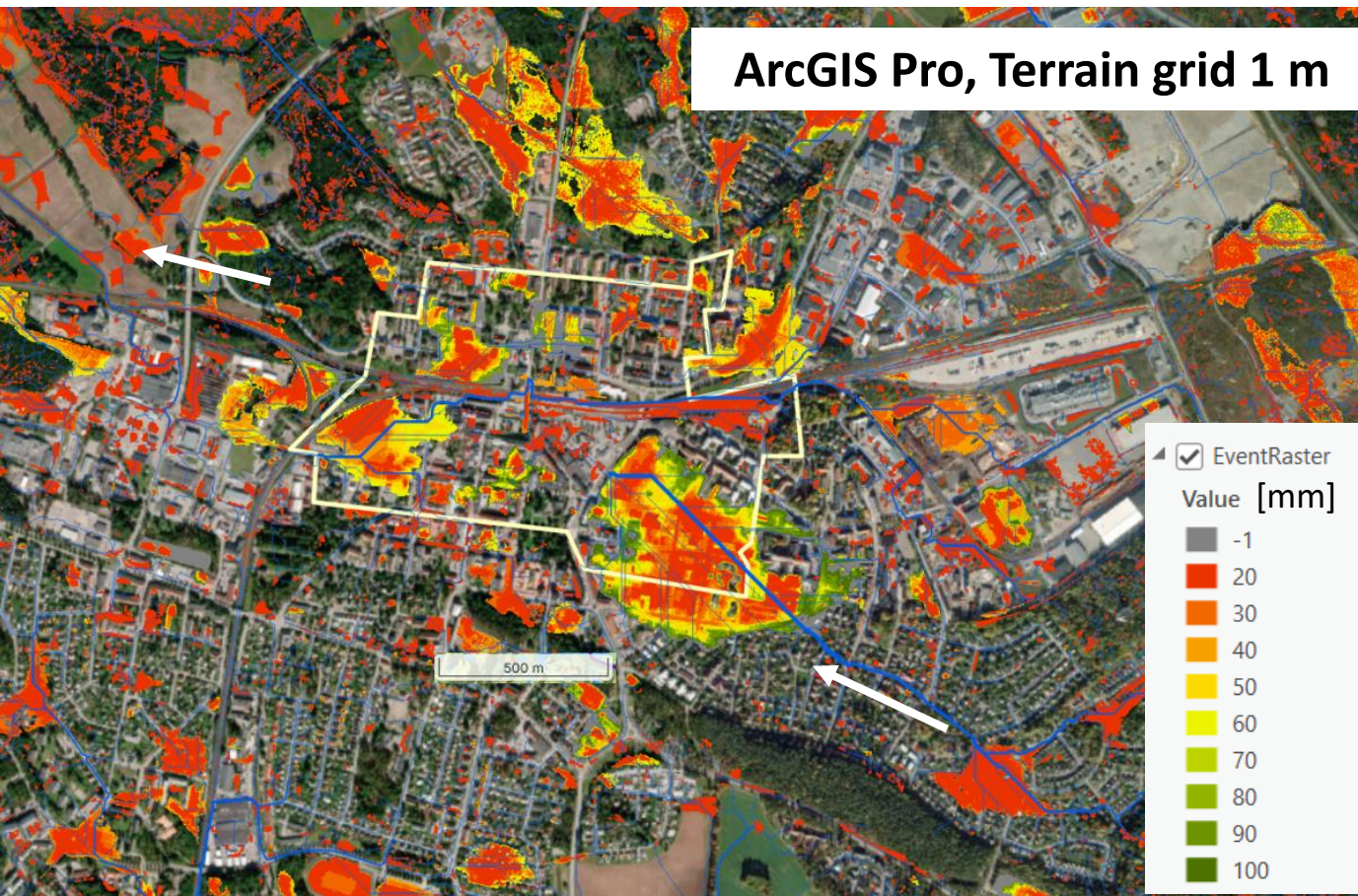
Regional (geographically) catchment:

- it is possible to activate specific elements affecting a smaller unit, **where these issues may be overlooked**
- identification of the need for a supra-local consensus that may not coincide with the different administrative units **located in the regional catchment area**





Indication of the local catchment and city center/ Conservation area

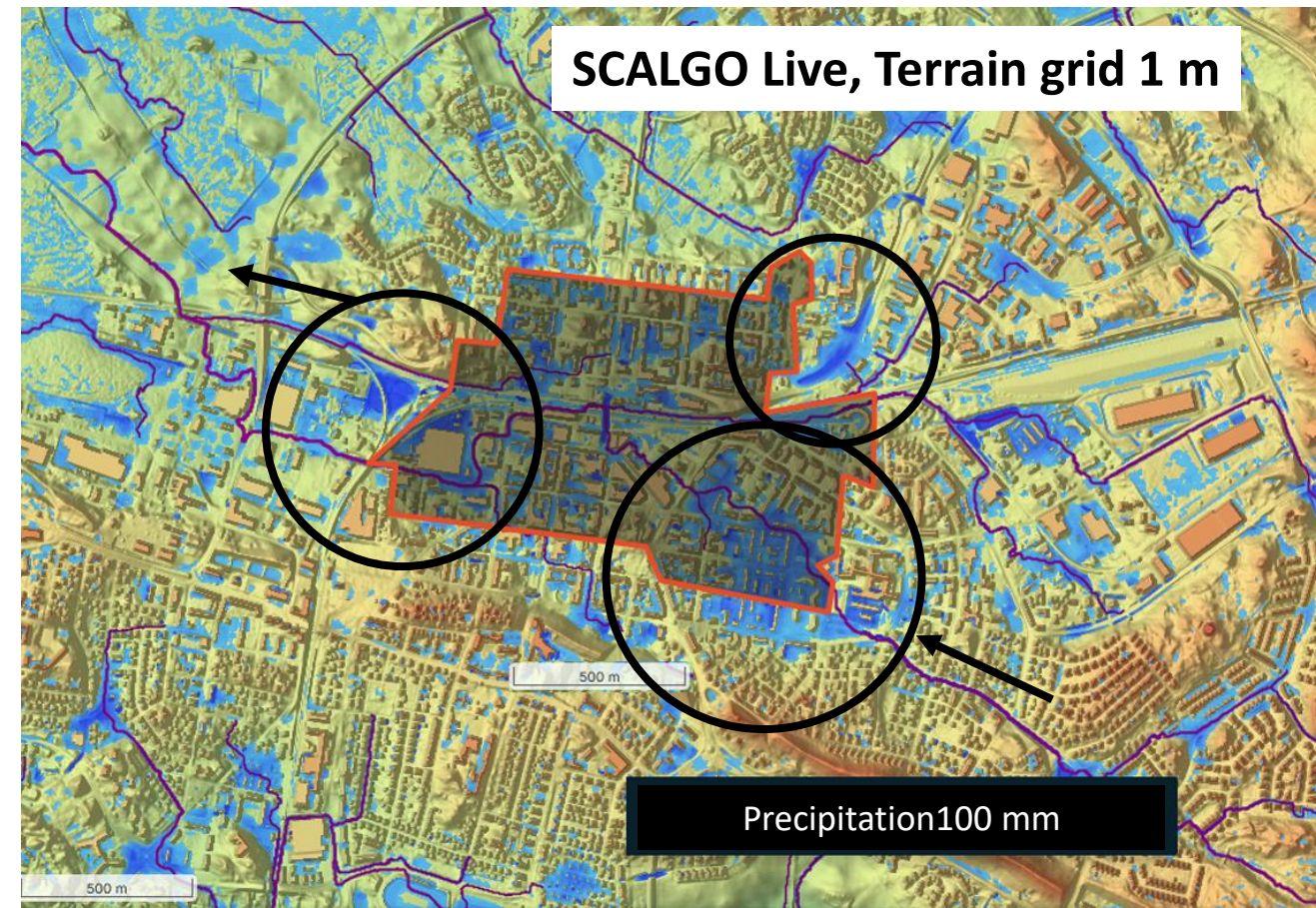
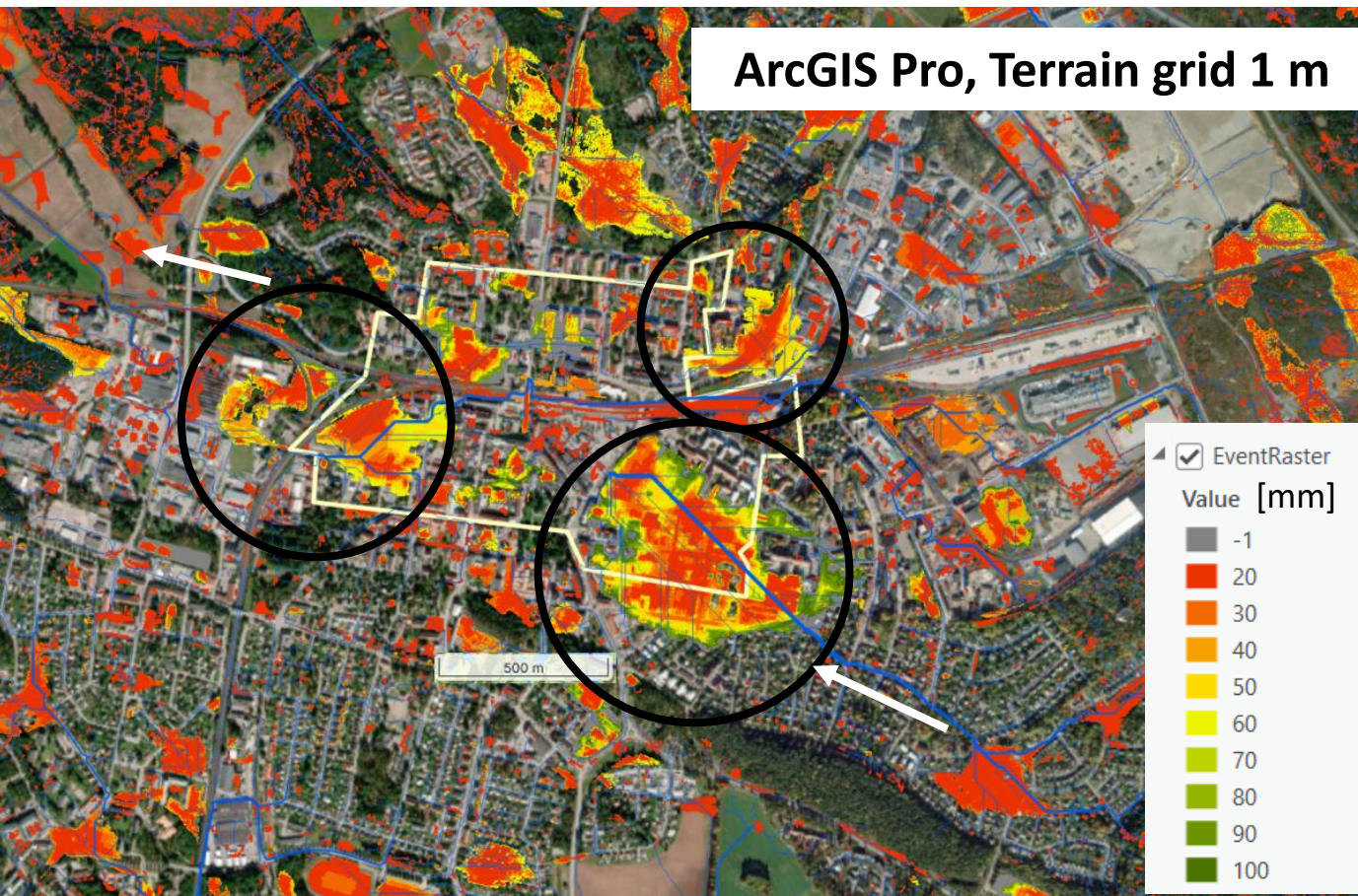


Surface runoff flow



City center, C=1 sqkm
Conservation area

Indication of the local catchment and city center/ Conservation area

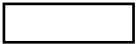





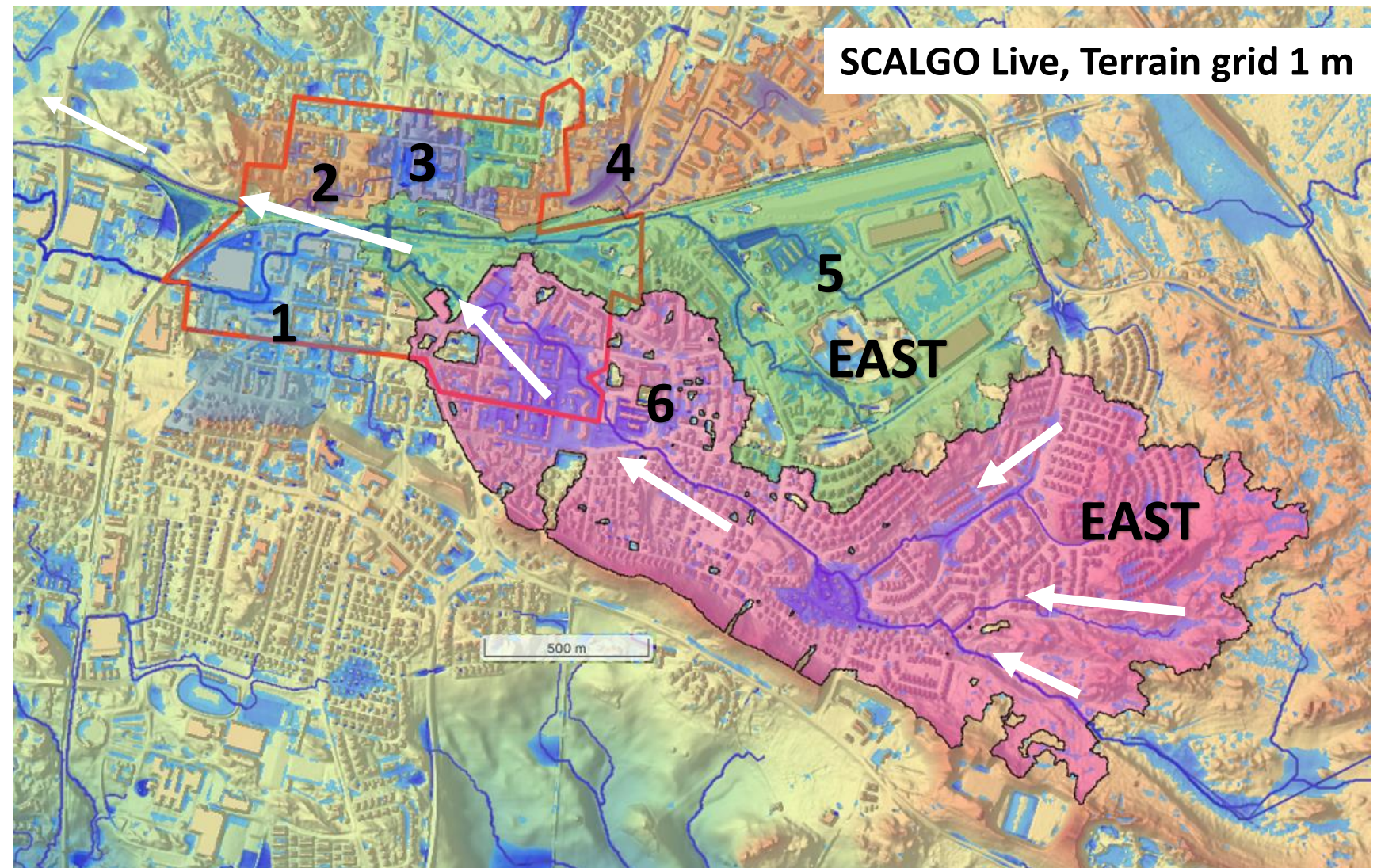
Surface runoff flow



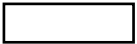




City center, C=1 sqkm
Conservation area

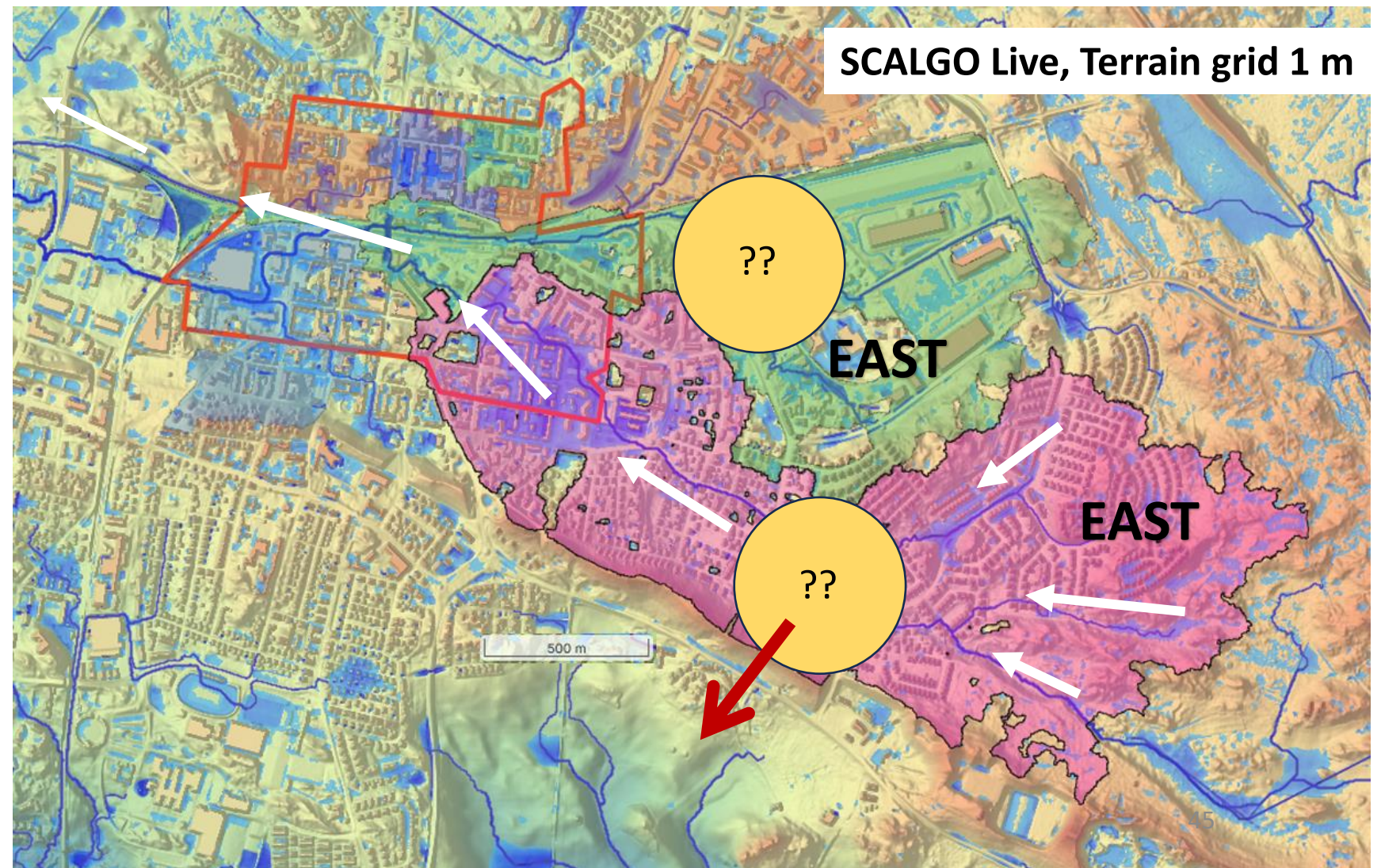
Indication of the local catchment and city center/ Conservation area

-  Local catchments 1-6
B=4 sqkm
-  City center C=1 sqkm
-  Conservation area
-  Surface runoff flow



Indication of the local catchment and city center/ Conservation area

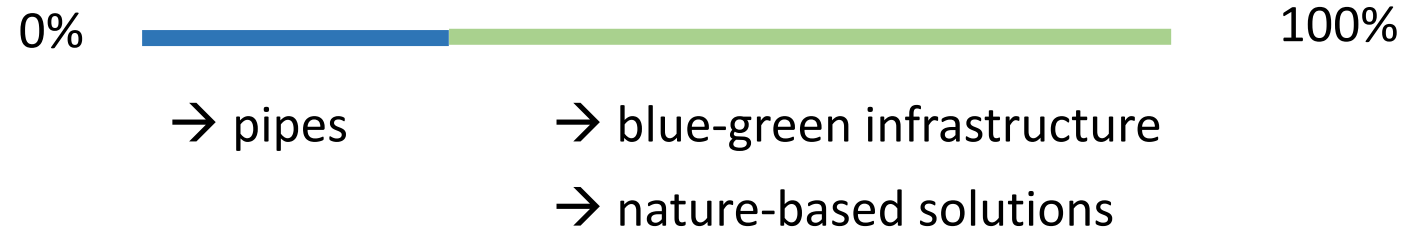
-  Local catchments 1-6
B=4 sqkm
-  City center C=1 sqkm
-  Conservation area
-  Surface runoff flow
-  Outflow



Scenarios of interventions needed (local scale)

About runoff:

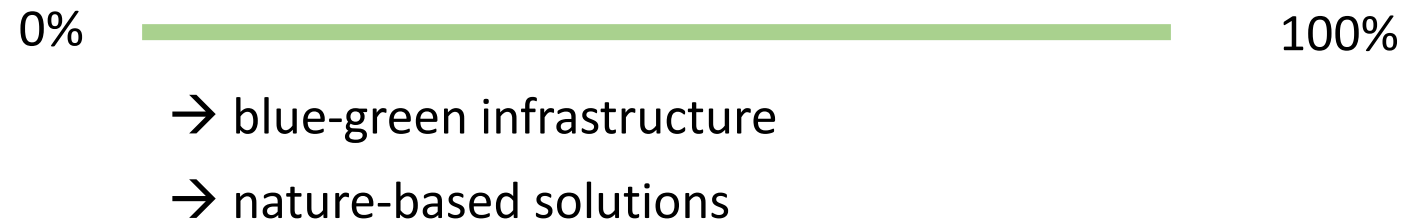
1. Partial redirection



2. Total redirection



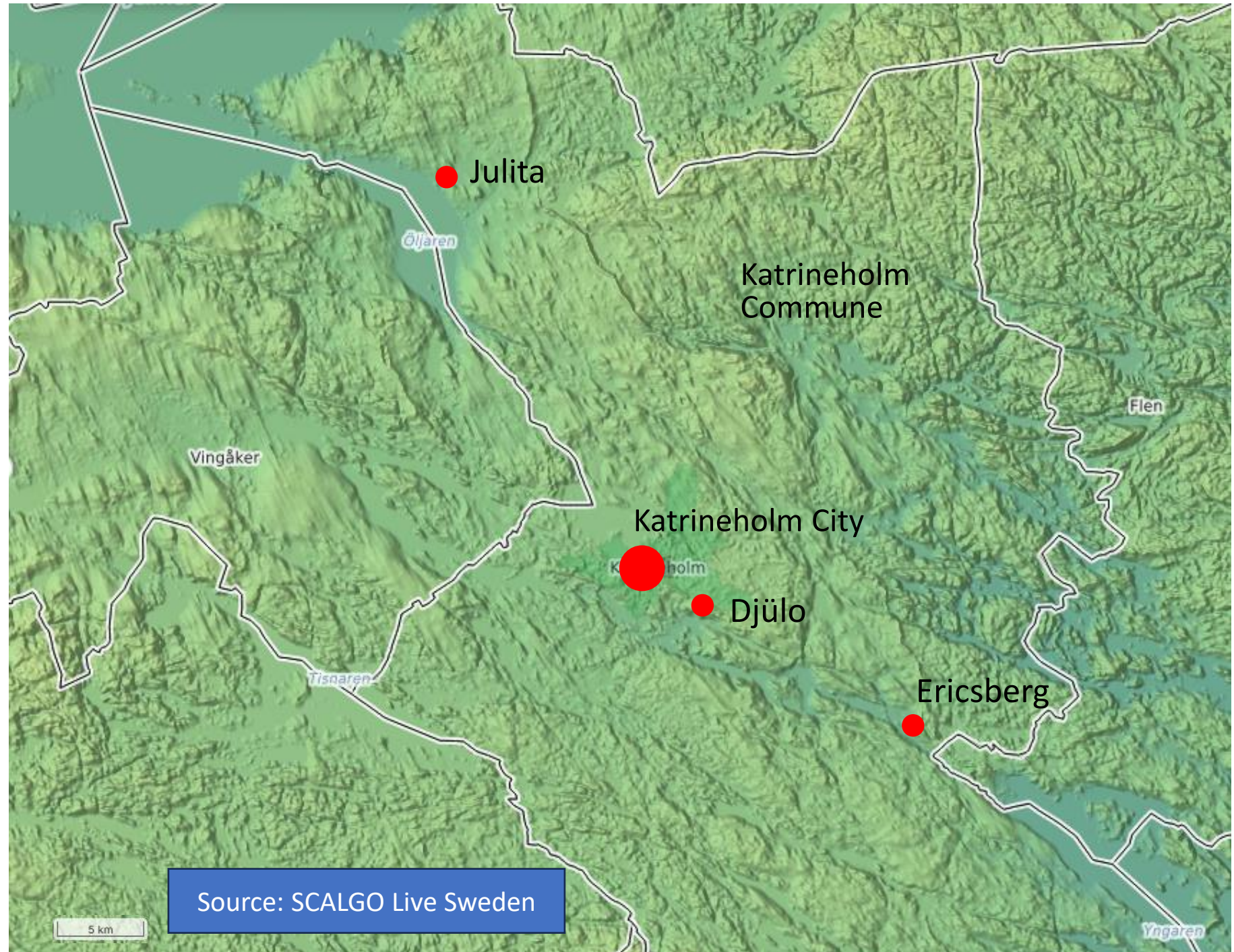
3. No redirection = retention (?)

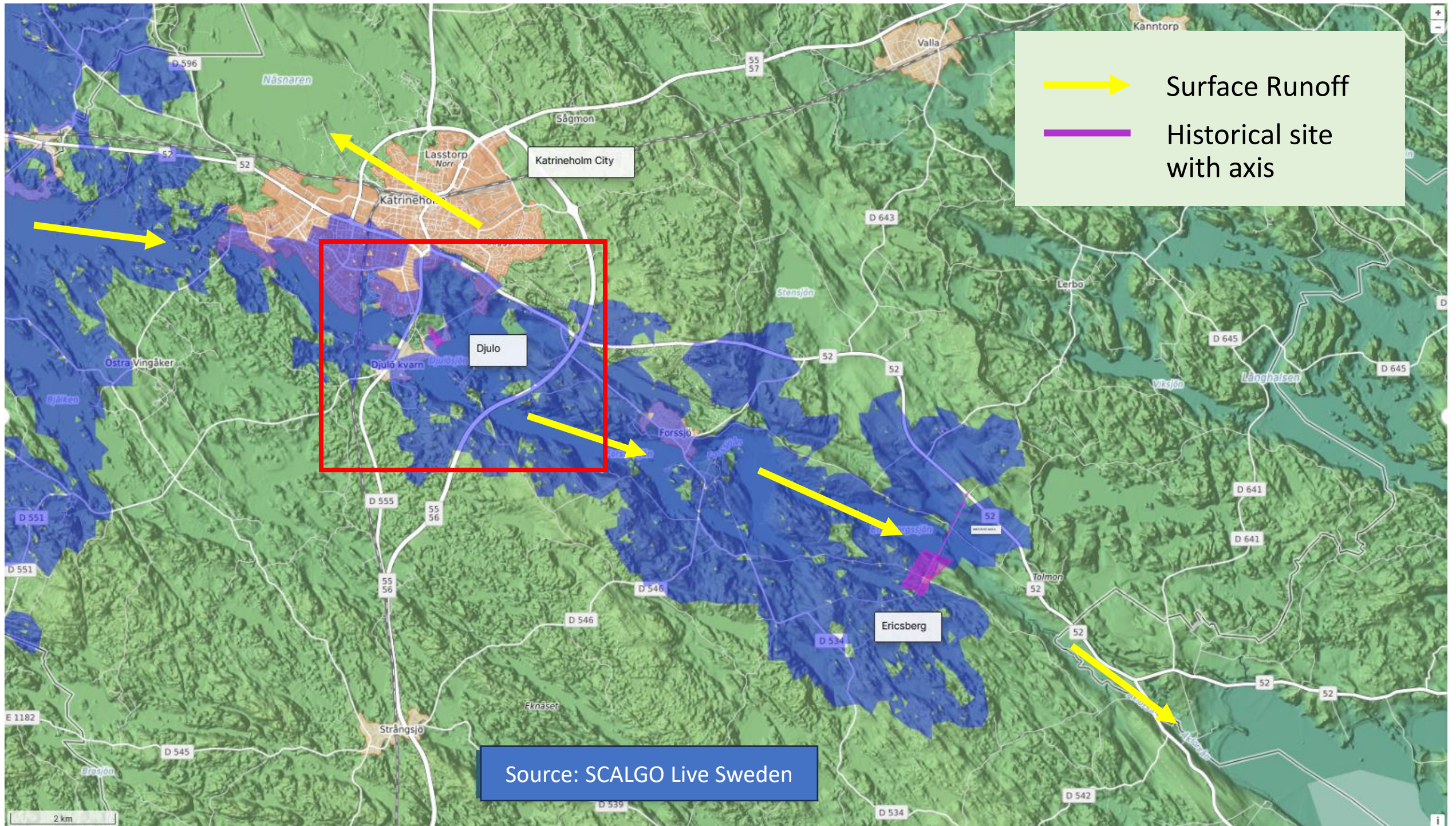


Cultural heritage vs Surface runoff


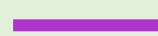
- Katrineholm Kummune borders
- Katrineholm City
- Historic site

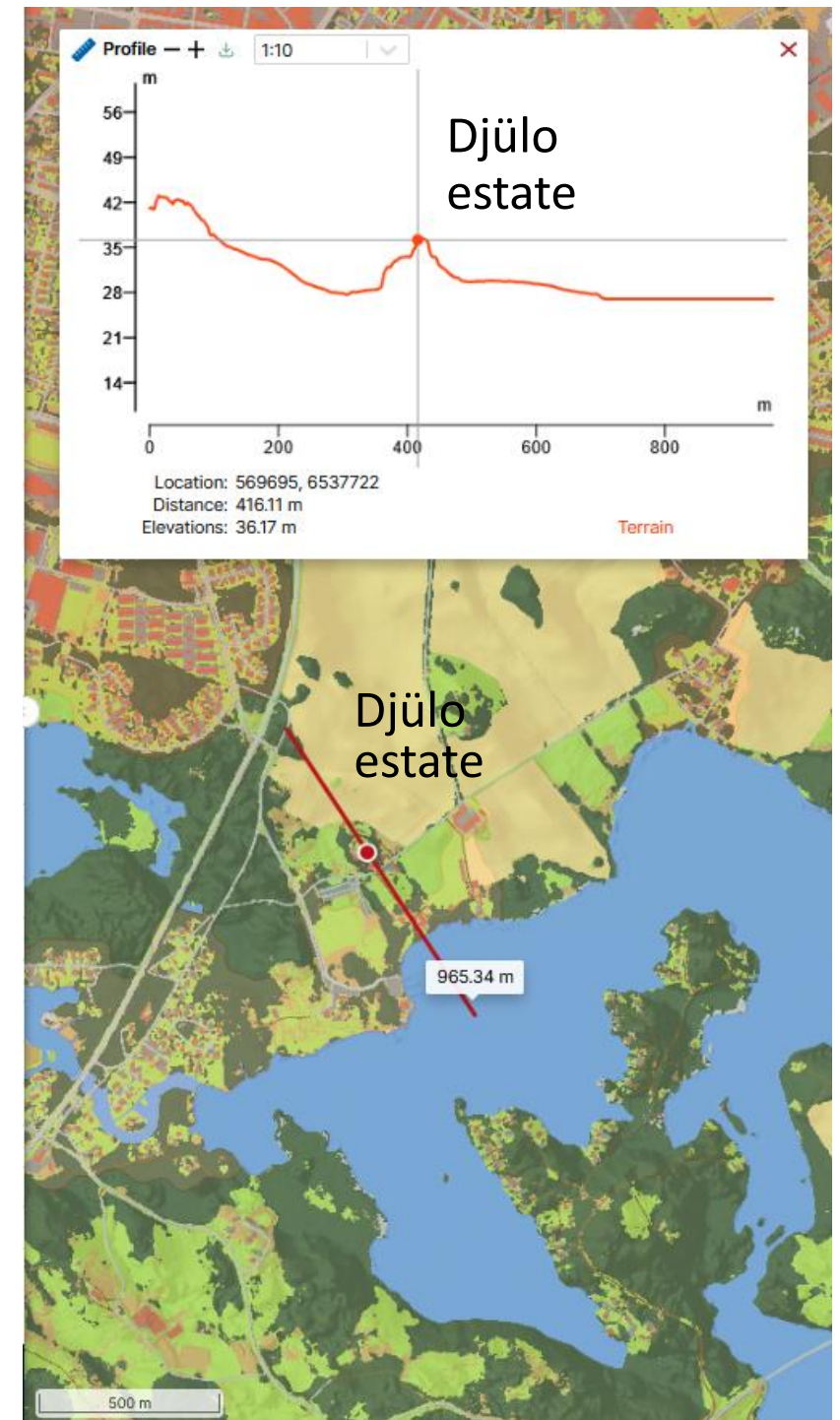
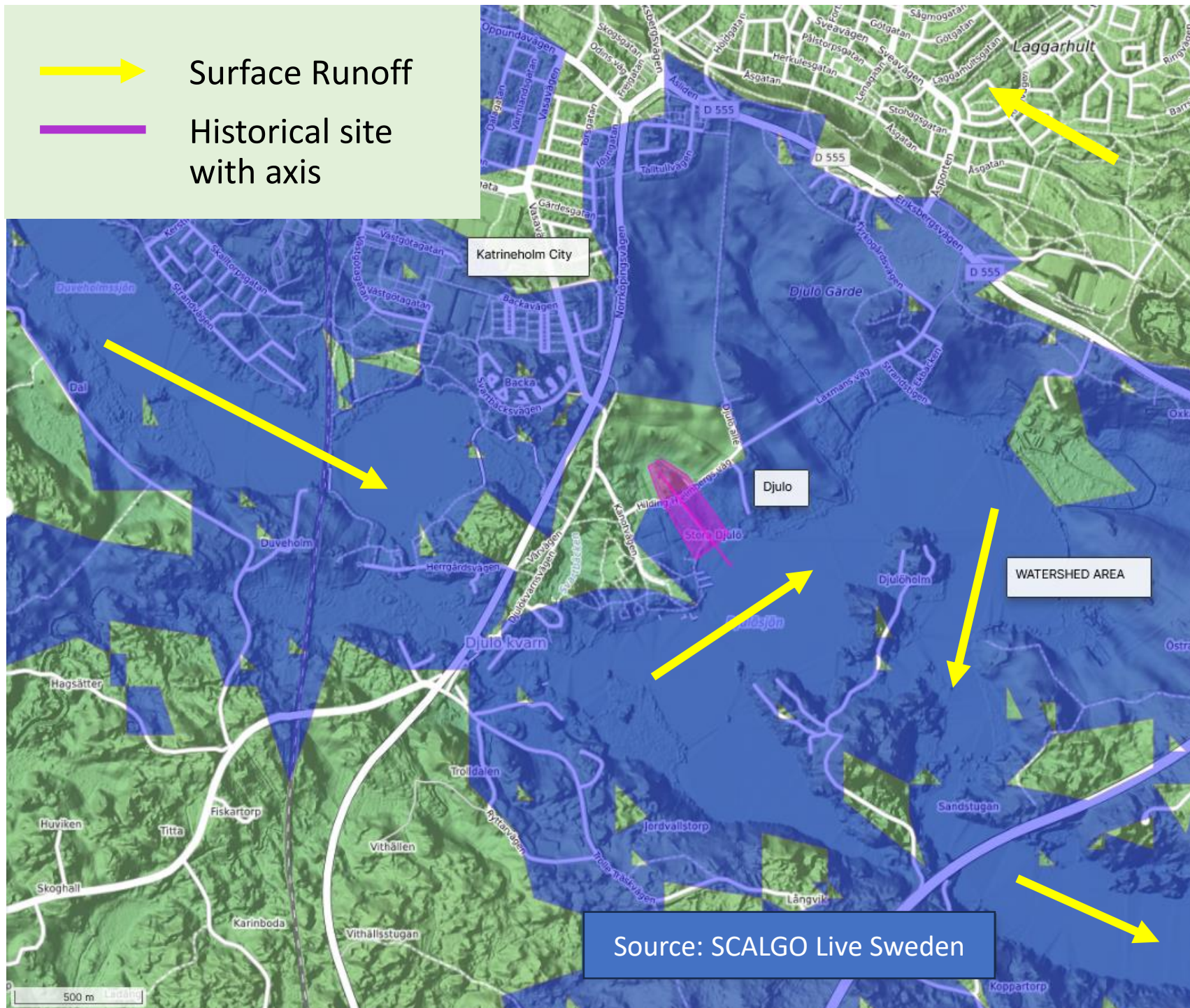
Own elaboration based on www.scalgo.com/live

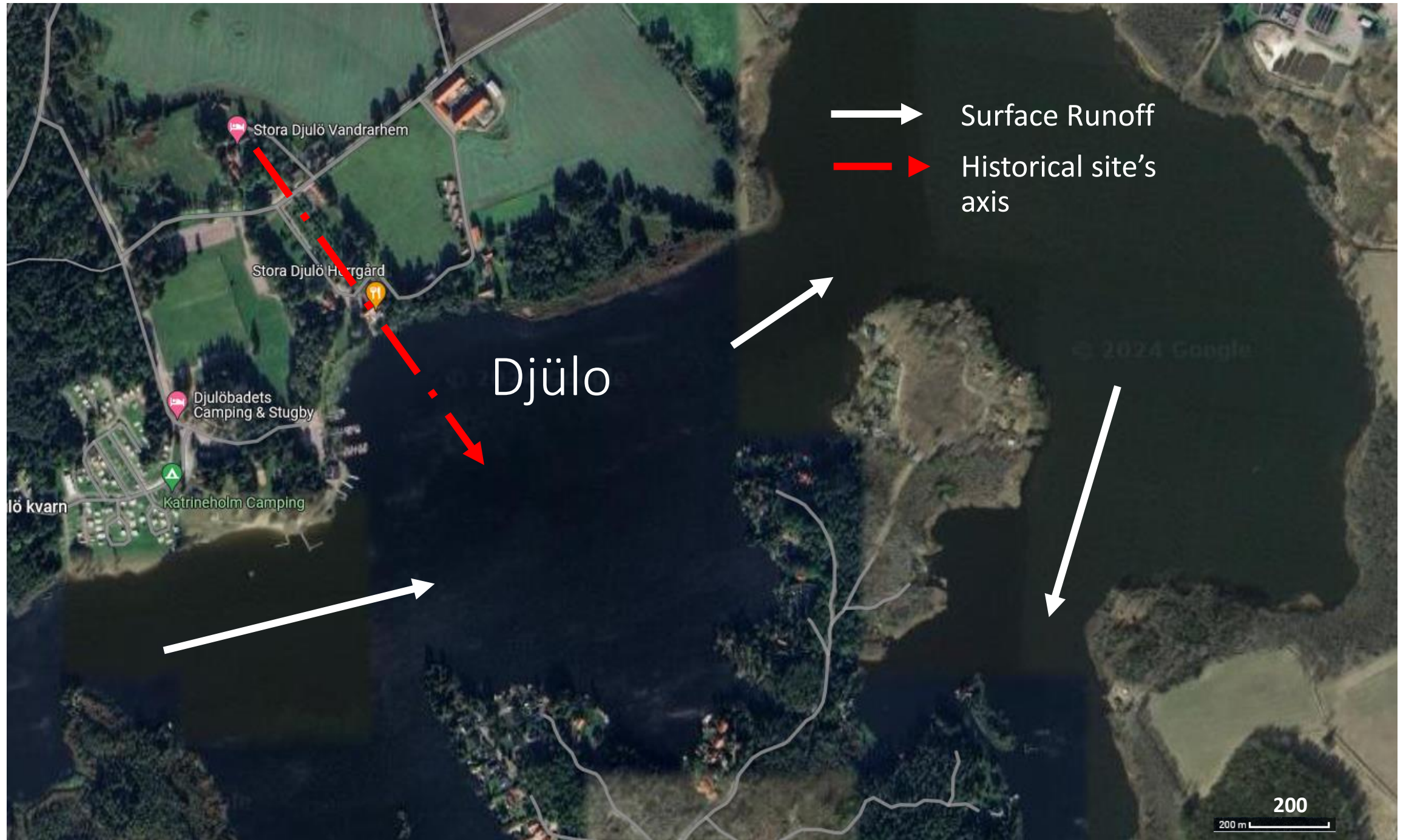


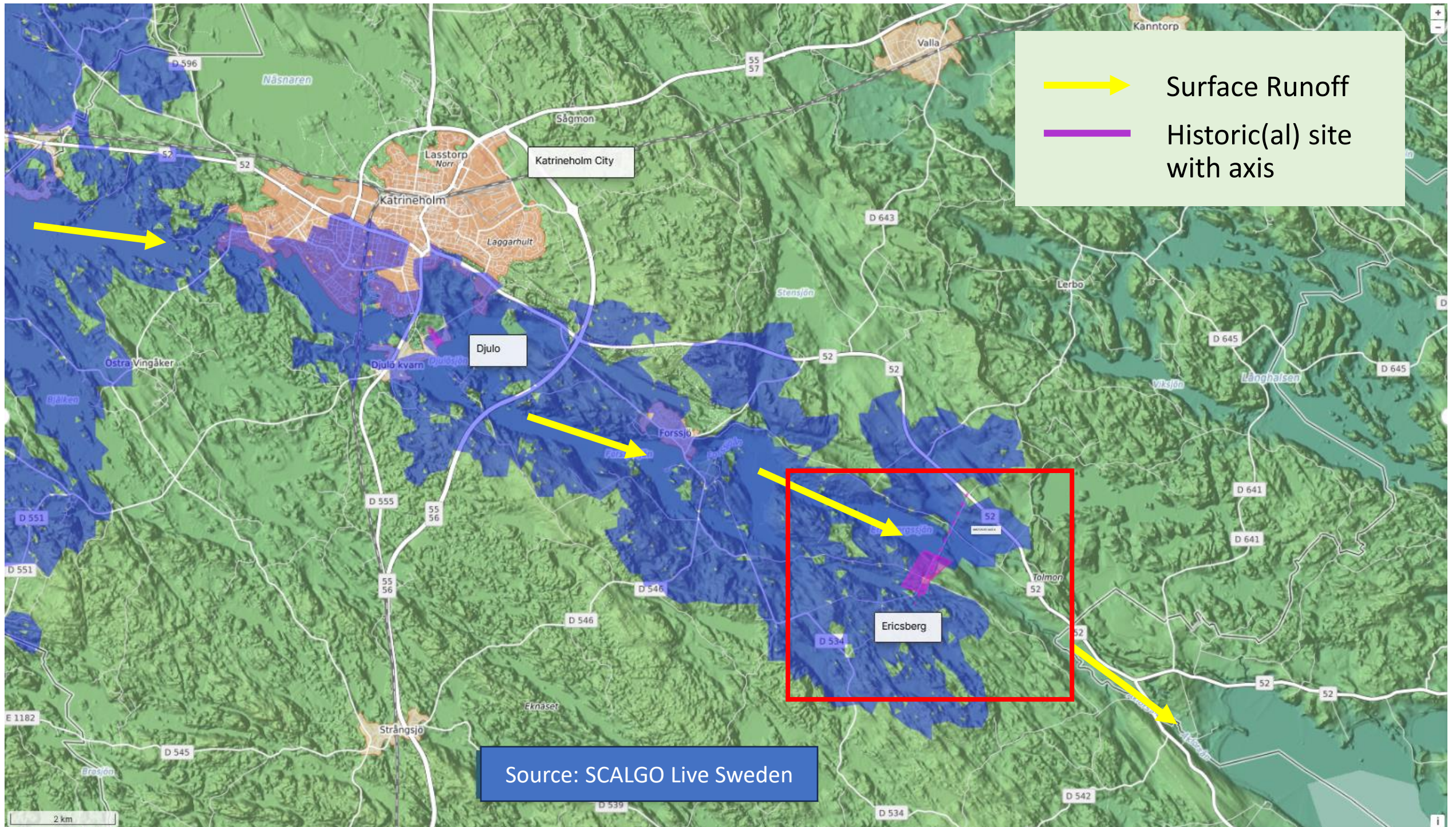


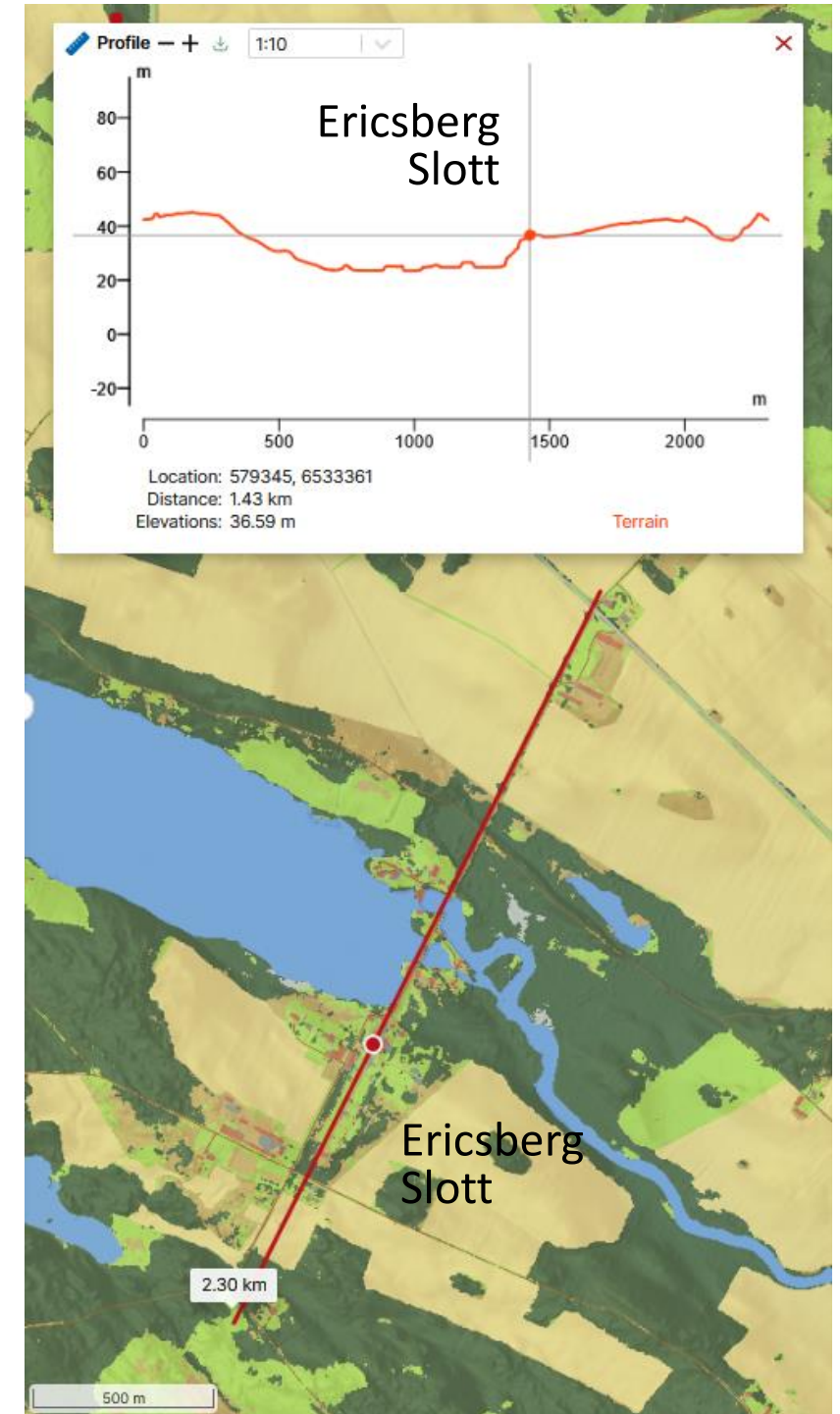
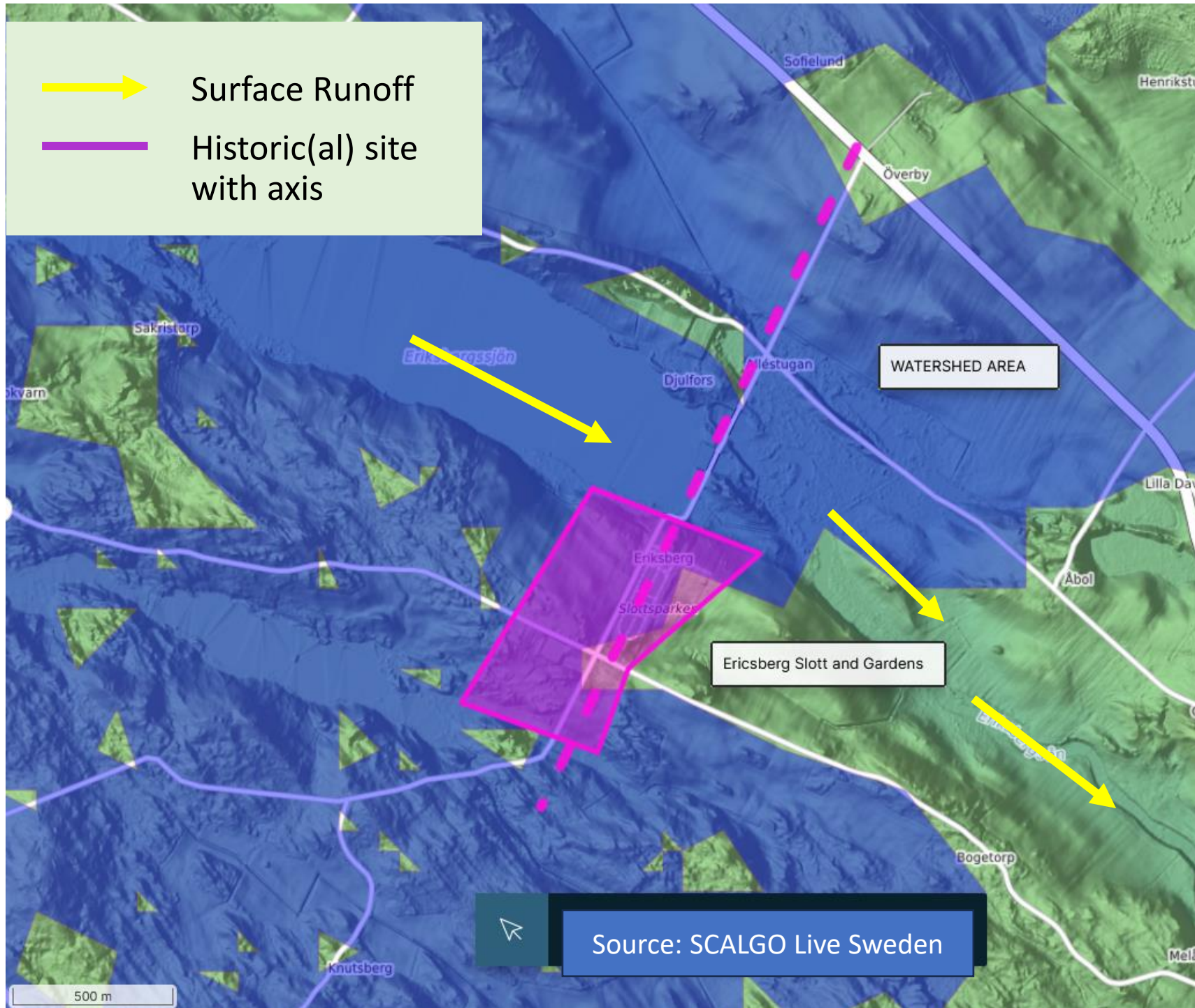
Source: SCALGO Live Sweden

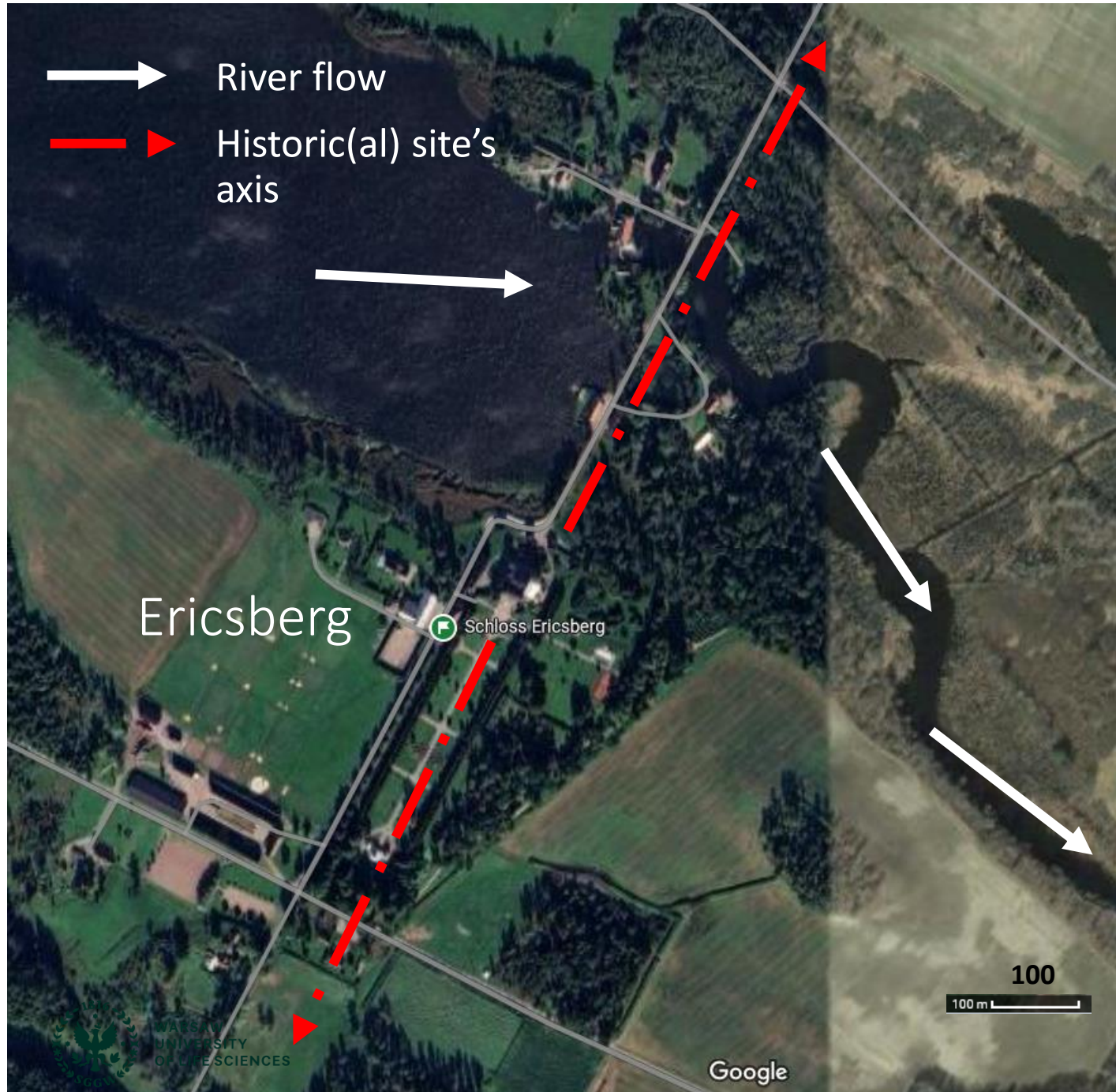
 Surface Runoff
 Historical site with axis











Summary – Surface runoff



- Depending on the **degree of urbanisation** in the immediate vicinity of the site, part of the rainwater may be channelled through the **storm sewer system**, supported by underground **storage reservoirs**
- **Regional catchment area** – enabling the **redirection** of excess water to areas with greater retention potential, **good relations and willingness** in economic and political relations required
- Cooperation and regional consensus needed
- Whether a site survives depends on the **goodwill of the community** and not just the managers

Question 1: are there measures being taken in historic(al) park sites to mitigate the negative phenomena causing climate change?

1. The sum of **good practices**, even small ones, can contribute to improving condition and **building resilience**
2. The level of development varies from country to country and from premise to premise. Sites can only focus on funding and organising adaptive practices once the **basic needs securing the facility** are in place
3. Not only good solutions and good intentions but decision makers of adjacent units through **education and competitions** can help to grow resiliency
4. **Bottom-up initiatives** can help to improve, adapt, and reach resiliency

Question 2:

- a **historic(al) park or garden** is set in an administrative-geographical-economic setting.
- How to define the spatial extent of the influence zone of the negative surface runoff effects around a heritage site?

1. Lack of willingness, commitment and knowledge on the part of decision-makers is a threat
2. Ignorance of local resources and expertise
3. Correct identification of problems and challenges - is the problem of the Surface runoff noticeable within the historic(al) sites?
4. **Education should be part of the strategy**
5. **Competitions are a platform for the exchange of experience and good practice**
6. **Surface runoff within the historical parks and gardens is still to be researched**

The problem of surface run-off has not been noticed/emphasised in the competitions

Read more:

Dudek-Klimiuk, J., & Warzecha, B. (2023). Smart historical gardens. *Landscape Online*, 98, 1114. <https://doi.org/10.3097/LO.2023.1114>

Warzecha B., Dudek-Klimiuk J. (2023). Stormwater runoff management in Sandomierz, as an example of medium-sized European city, using SCALGO Live. *Journal of Water and Land Development*, 59, 148451. DOI: 10.24425/jwld.2023.148451

Thank you for your attention!

Danke für Ihre Aufmerksamkeit!

