

Flash flood simulation based on Sosnowiec city

Introduction

Progressing climate change contributes to significant changes in the natural environment, including disturbances in the water cycle in nature

How to prevent flash floods?

- Supporting natural infiltration and retention of rainwater
- Increasing the capacity of retention reservoirs and ensuring drainage infrastructure
- Creating green & blue infrastructure

What is a flash flood?

This is a flood that begins within three to six hours, caused by heavy rainfall or a failure of hydrotechnical equipment

What makes them worse?

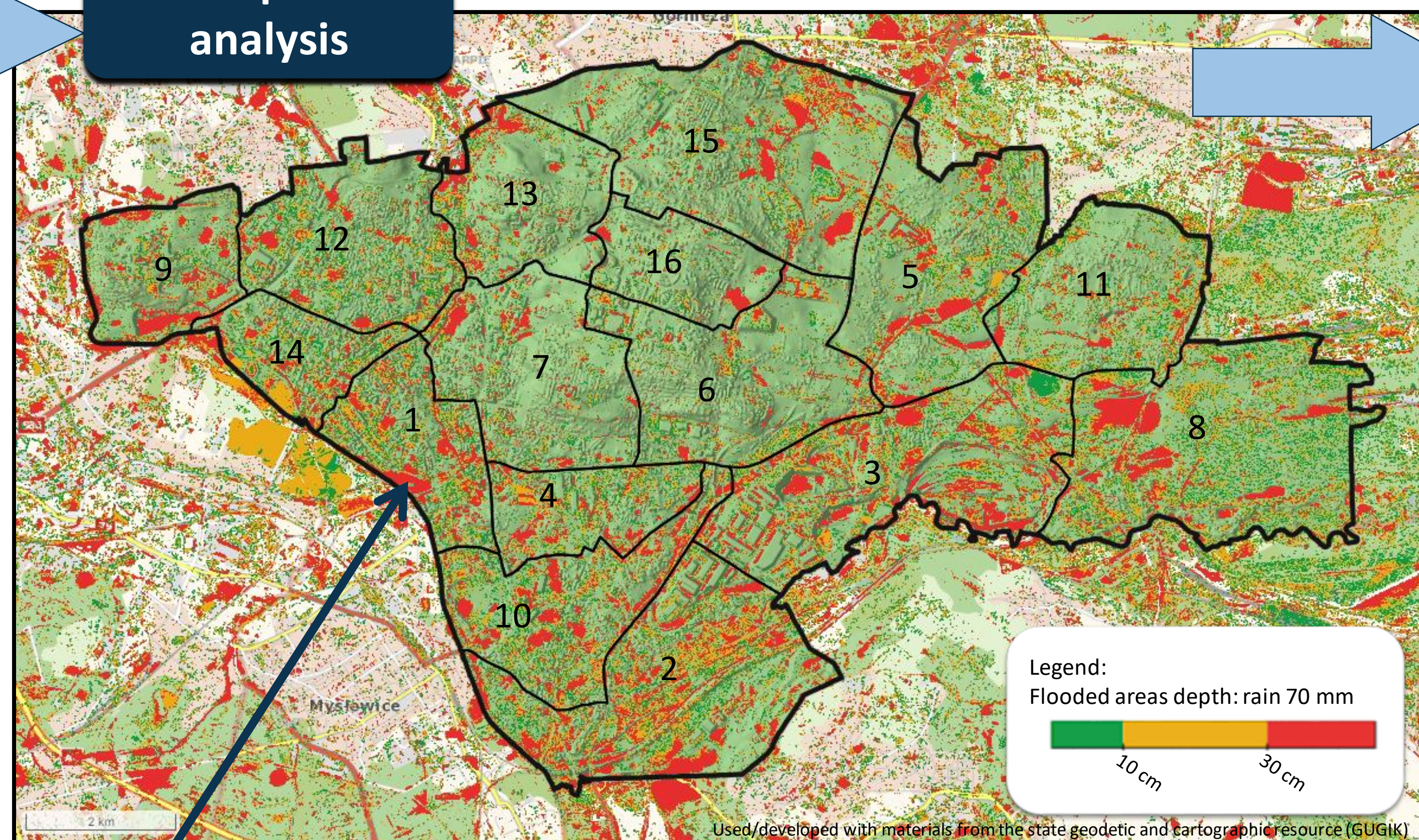
- A large amount of surfaces made with impermeable materials, like concrete, asphalt, sidewalks & buildings.
- Neglected drainage infrastructure
- Lack of funds and ignorance of investors
- Location – river flood areas, mining damage
- Climate changes

Computer analysis

Methods used:

Meteorological data

date	duration	mm
1.2.2022	20h 46m	10,28
17.2.2022	1h 19m	10,61
31.3.2022	18h 13	14,58
25.5.2022	4h 26m	24,98
5.7.2022	16h 24m	16,57
14.7.2022	2h 50m	13,88
30.7.2022	15h 1m	17,83
13.8.2022	3h 31m	26,89
19.8.2022	1h 2m	10,51
21.8.2022	5h 12m	21,82
22.8.2022	11h 29m	30,3
28.8.2022	4h15m	74,83
8.9.2022	7h 23m	29,54
5.12.2022	17h 4m	13,12
10.1.2023	12h 10m	11,98
3.2.2023	18h 49m	13,75
18.2.2023	22h 27m	16,81
16.5.2023	11h 31m	31,15
17.5.2023	9h 13m	15,93
9.6.2023	5h 50m	23,8
23.6.2023	31m	12,97
26.6.2023	5h 57m	11,65
1.7.2023	3h 18m	11,78
17.7.2023	1h 44m	13,9
26.7.2023	9h	13,6
6.8.2023	6h 25m	29,91
17.8.2023	32m	15,09
26.8.2023	1h 8m	16,06
13.9.2023	4h 38m	10,78
21.10.2023	14h 42m	19,48
24.10.2023	7h 5m	11,14
27.10.2023	10h 10m	13,39
2.12.2023	16h 33m	10,86

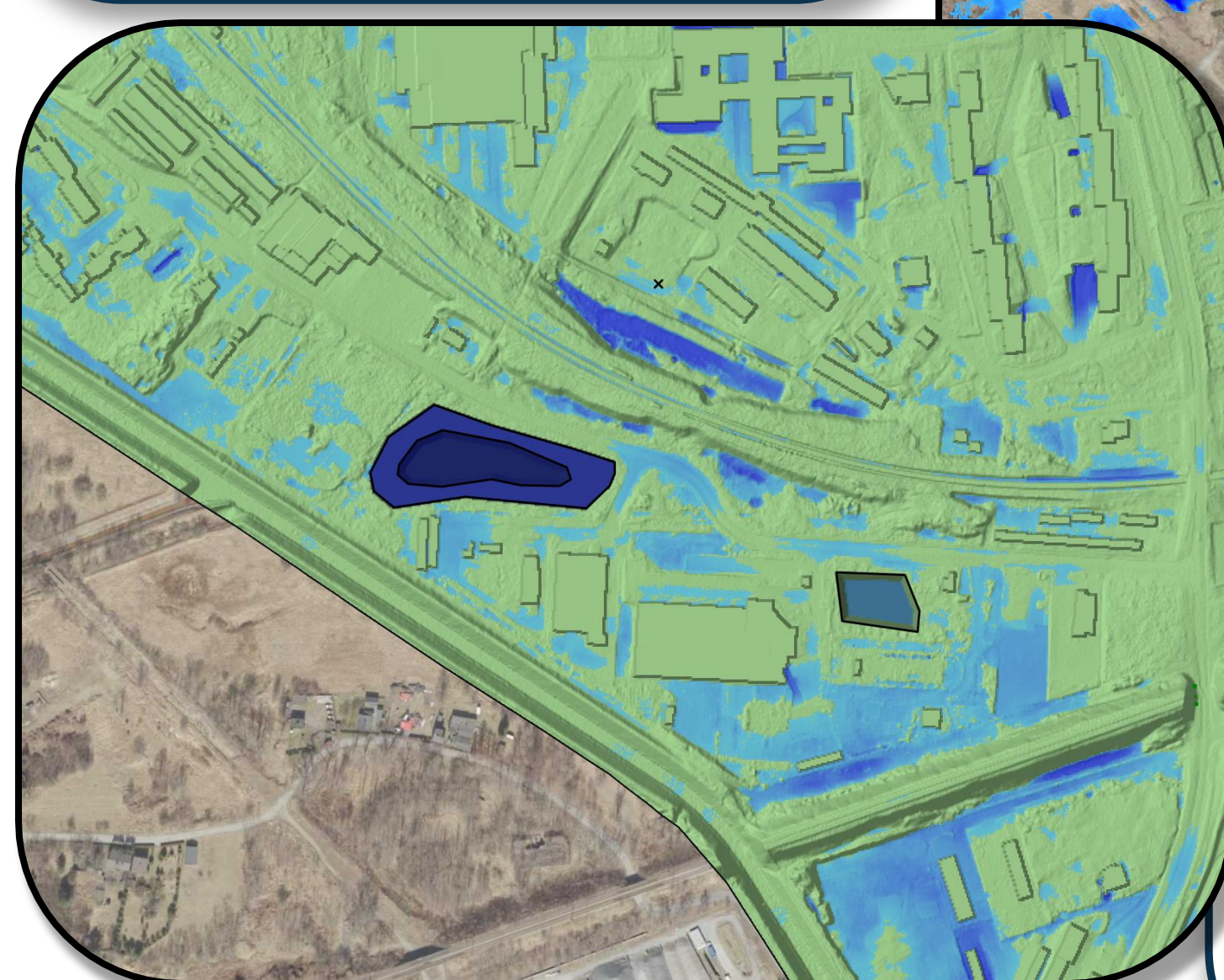


Spatial analysis Using Scalgo Live And QGIS software

For Sosnowiec priority to adapt is shown in districts 1, 2, 3, 8, 14.

District 1

Knowing areas more susceptible for flooding in case of quick or prolonged rainfall, engineering solutions can be implemented



In this example, to collect rainwater two small reservoirs and one subsurface basin were created to successfully drainage this area

	% flooded surfaces during 10 mm rain	% flooded surfaces during 30 mm rain	% flooded surfaces during 70 mm rain
1	12,94	18,02	22,93
2	12,77	20,04	26,01
3	12,34	18,17	22,7
4	10,71	15,43	18,76
5	10,27	13,19	15,02
6	6,46	8,15	8,96
7	6,7	9,08	9,45
8	13,03	18,02	20,85
9	8,33	12,94	17,4
10	11,86	17,54	22,59
11	8,22	10,36	11,27
12	9,88	13,42	14,54
13	6,67	9,65	11
14	13,22	20,25	23,18
15	6,59	9,27	11,3
16	4,33	5,79	7,12
average	9,65	13,71	16,44