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**SYNERGY OF EDUCATIONAL, SCIENTIFIC, MANAGEMENT AND INDUSTRIAL COMPONENTS FOR CLIMATE
MANAGEMENT AND CLIMATE CHANGE PREVENTION / CLIMAN**

The experience of implementing training according to the climate management system in the educational and professional program of higher education and the results of the climate management center at Lviv Polytechnic University

National Seminar on Dissemination of Best Practices "Experience of Implementation of Climate Management Training in the Educational and Professional Program of Higher Education and Results of Climate Management Centers"



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Main tasks of the Climate Management Center

4.1 Creation of CMC

- 4.1.1 Development of the concept of the Center
- 4.1.2 Selection of personnel for work at the Center
- 4.1.3 Development of the action plan
- 4.1.4 Development of regulations on Center functioning
- 4.1.5 Official registration of the Center

4.2 Organization of training

- 4.2.1 Organizational measures for training, training program for Center employees
- 4.2.2 Training on the Center's activities and stakeholders' engagement and support at all stages of the implementation of climate business projects and climate startups
- 4.2.3 Training in mechanisms of interaction with local and state authorities, as well as society in promoting climate control activities
- 4.2.4 Training on Promotion Tools
- 4.2.5 Evaluation Reports

4.3 Development and update of CMC website

- 4.3.1 Development of the website of the Center
- 4.3.2 Update of the Center

4.4 Development of the “road map” for the interaction of all stakeholders

- 4.4.1 Cooperation with the Ministry of Education and Science
- 4.4.2 Cooperation with the Ministry of Ecology
- 4.4.3 Cooperation with leading energy companies, industrial enterprises and transport companies
- 4.4.3 Cooperation with local authorities
- 4.4.4 Cooperation with environmental auditing and consulting companies in the field of climate control at the national and international level to promote the idea of climate entrepreneurship
- 4.4.5 Cooperation with environmental public organizations and society
- 4.4.6 Dissemination of information on the benefits of climate change prevention, adaptation and mitigation among key stakeholders



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Work Plan of the Climate Management Center for the 1st year

#	Activities	No of weeks	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
4.	Establishment of the Climate Management Center (CMC)													
4.1.	Creation of CMC	6		3=X	1=X	2=X								
4.2.	Organization of training	–												
4.3.	Development and update of CMC website	10		1=X	1=X	1=X	1=X	1=X	1=X	1=X	1=X		1=X	1=X
4.4.	Development of the “road map” for the interaction of all stakeholders	15			1=X	1=X	2=X	2=X	2=X	1=X	1=X	1=X	2=X	2=X



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Work Plan of the Climate Management Center for the 2nd year

#	Activities	No of weeks	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
4.	Establishment of the Climate Management Center (CMC)													
4.1.	Creation of CMC	–												
4.2.	Organization of training	8	4=X	2=X	2=X									
4.3.	Development and update of CMC website	11	1=X	1=X	1=X	1=X	1=X	1=X	1=X	1=X		1=X	1=X	1=X
4.4.	Development of the “road map” for the interaction of all stakeholders	17	1=X	1=X	1=X	1=X	2=X	2=X	2=X	1=X	1=X	1=X	2=X	2=X



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Work Plan of the Climate Management Center for the 3rd year

#	Activities	No of weeks	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
4.	Establishment of the Climate Management Center (CMC)													
4.1.	Creation of CMC	–												
4.2.	Organization of training	–												
4.3.	Development and update of CMC website	12	1=X	1=X	1=X	1=X	1=X	1=X	1=X	1=X	1=X	1=X	1=X	1=X
4.4.	Development of the “road map” for the interaction of all stakeholders	19	2=X	2=X	1=X	1=X	2=X	2=X	2=X	1=X	1=X	1=X	2=X	2=X

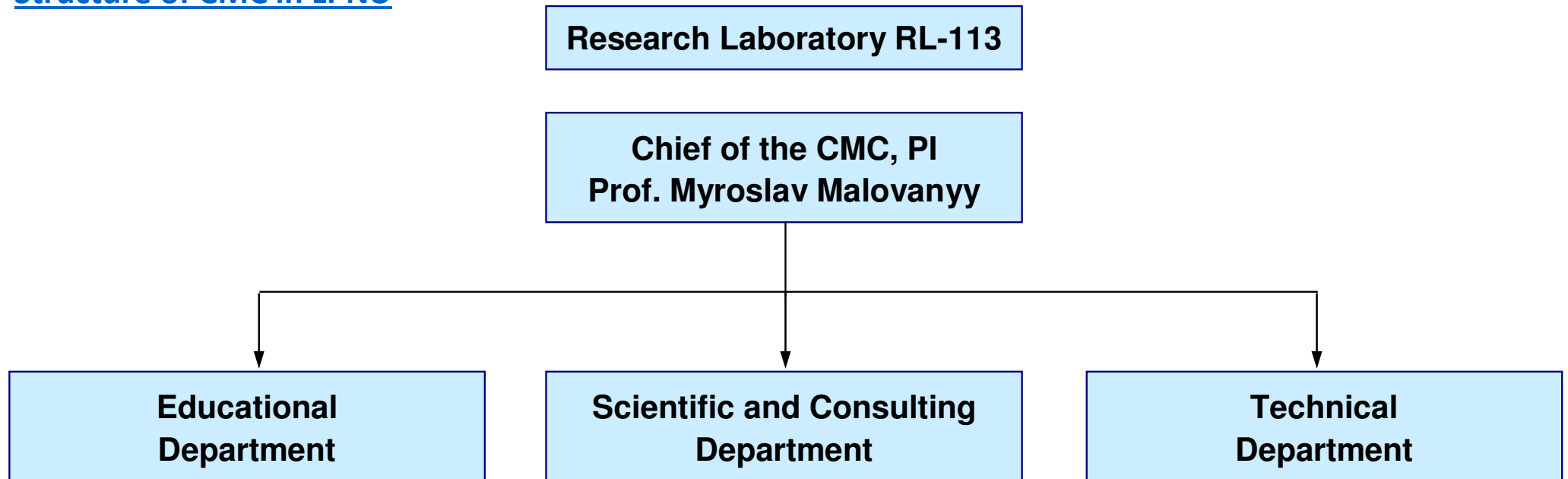


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Structure of the Climate Management Center in Lviv Polytechnic National University

Structure of CMC in LPNU

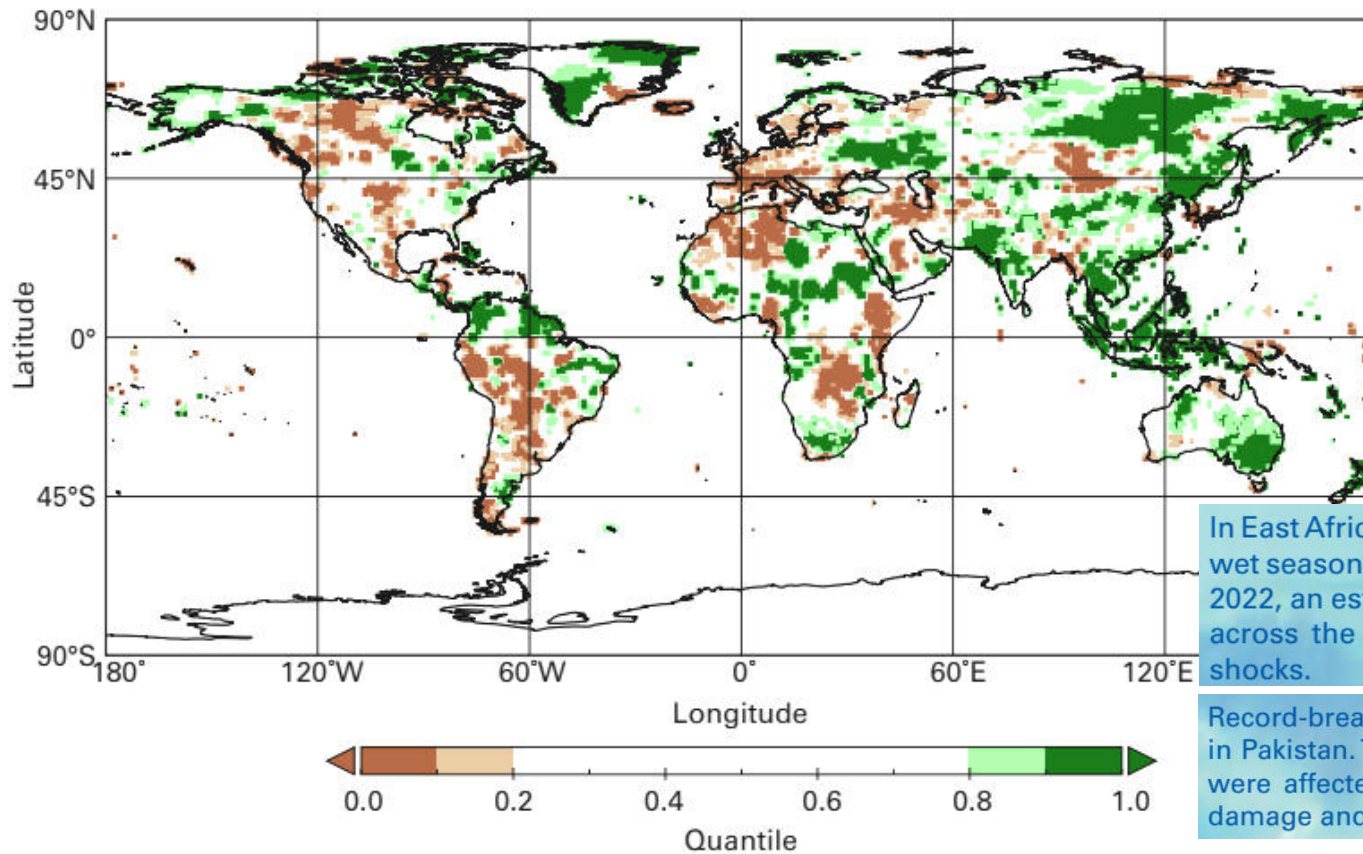




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Main focus – long-term precipitation trends in Lviv as well as in other Ukrainian cities incl. Kyiv and Odesa

Annual precipitation in 2022, as percentiles of reference values for the period from 1951 to 2000: driest in brown, wettest in green

In East Africa, rainfall has been below average in five consecutive wet seasons, the longest such sequence in 40 years. As of August 2022, an estimated 37 million people faced acute food insecurity across the region, under the effects of the drought and other shocks.

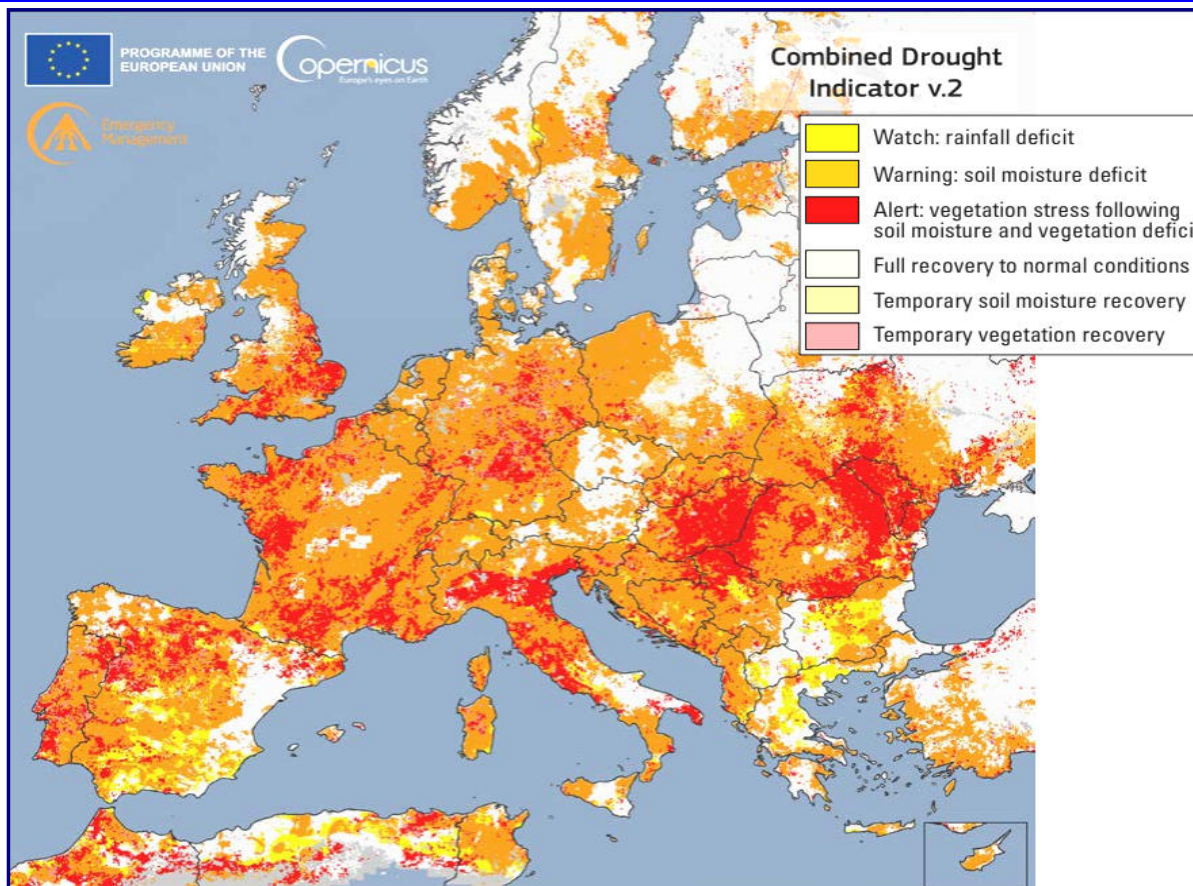
Record-breaking rain in July and August led to extensive flooding in Pakistan. There were at least 1 700 deaths, and 33 million people were affected, while almost 8 million people were displaced. Total damage and economic losses were assessed at US\$ 30 billion.



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European drought – Copernicus Emergency Management Service Combined Drought Indicator for 1–10 August 2022.

Yellow areas are under a “watch” state indicating a rainfall deficit, orange areas are under a “warning” state indicating a soil moisture deficit and red areas are under an “alert” state indicating vegetation stress following soil moisture and rainfall deficits.

Source:

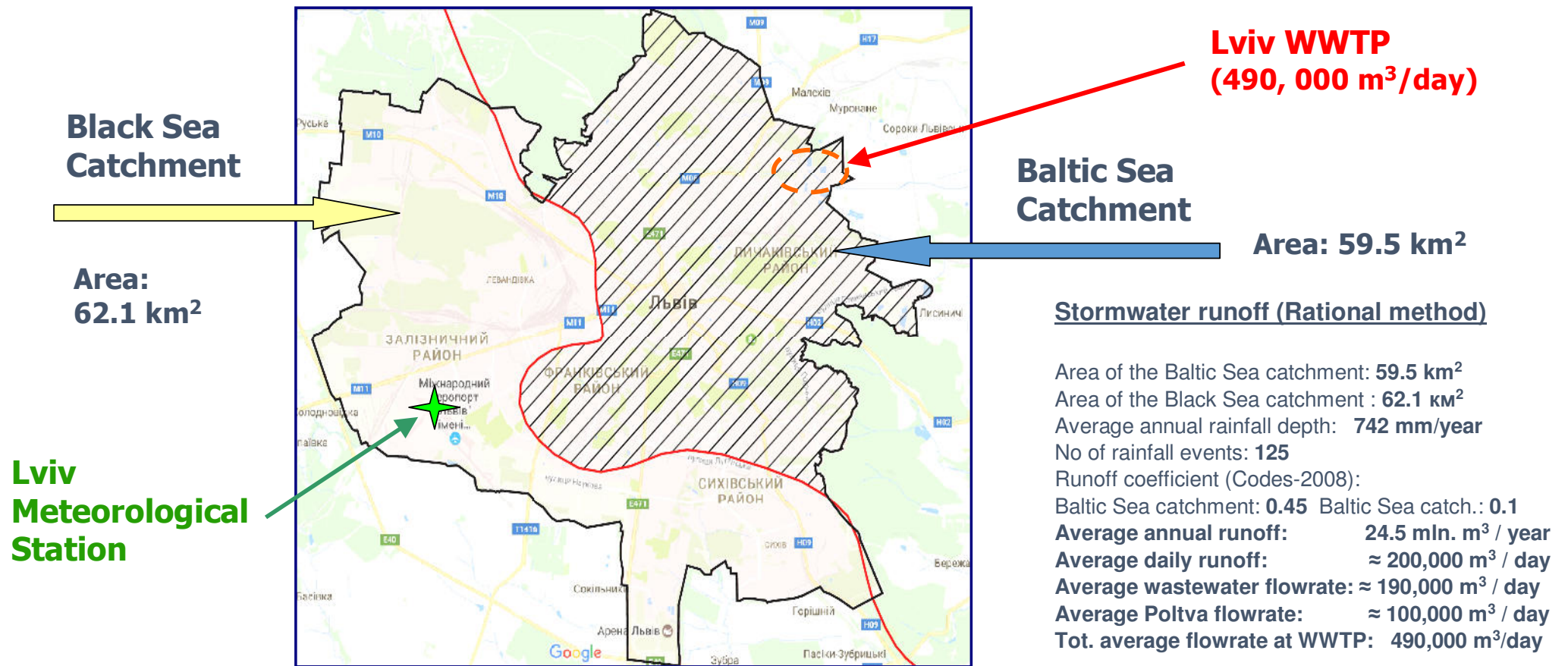
https://edo.jrc.ec.europa.eu/documents/news/GDO-EDODroughtNews202208_Europe.pdf,
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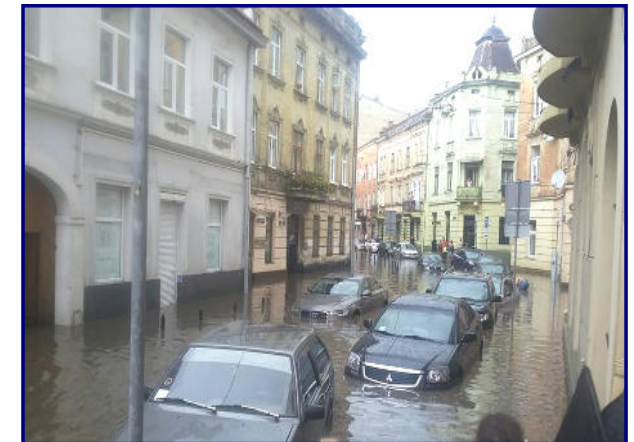


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**Flooding in Lviv
(17.08.2018)**





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**Flooding in Lviv,
Torfiana Str.,
(05.07.2022)**



**Main sewer
destruction
(reinforced concrete
channel 6x4 m, built
in early 1970th)**



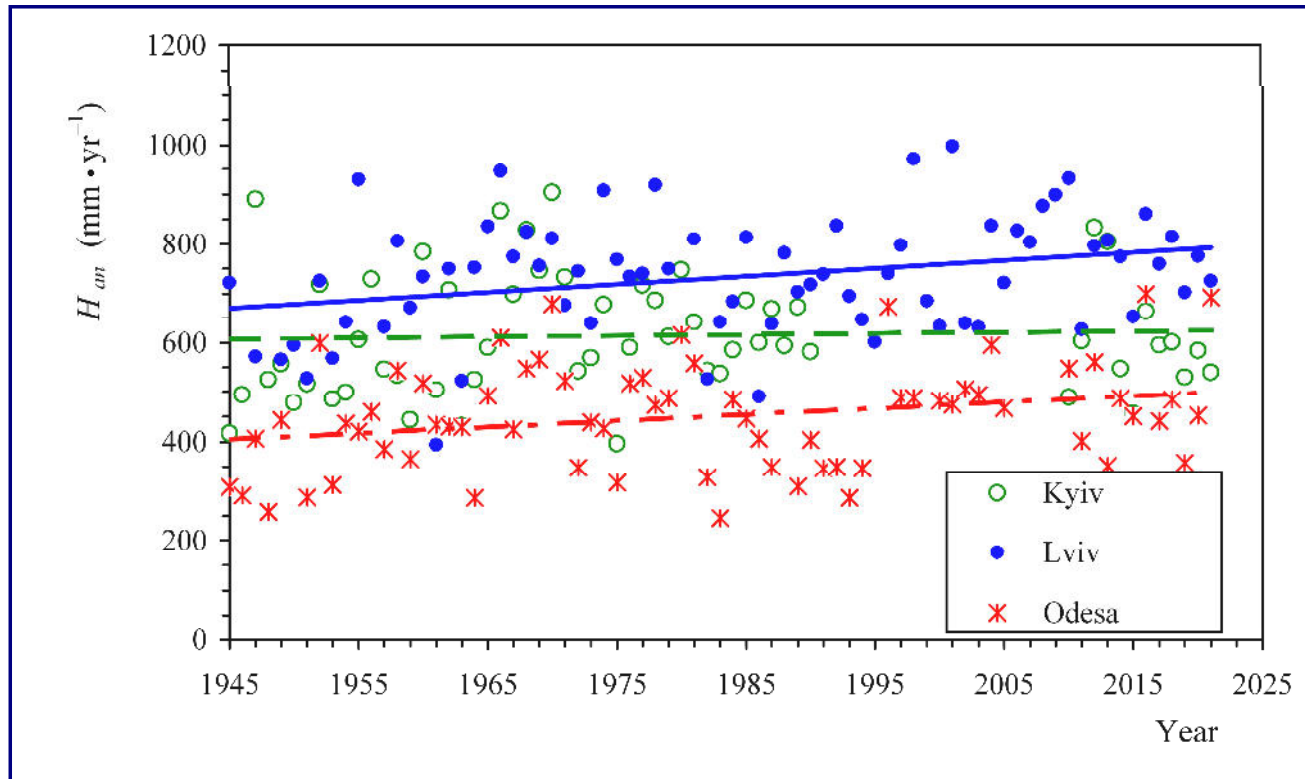


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Annual precipitation layers for Kyiv, Lviv and Odesa in 1945–2021



Kyiv:

$$H_{an} = 608 + 0.220(Y - 1945) \quad (1)$$

Lviv:

$$H_{an} = 670 + 1.608(Y - 1945) \quad (2)$$

Odesa:

$$H_{an} = 405 + 1.247(Y - 1945) \quad (3)$$

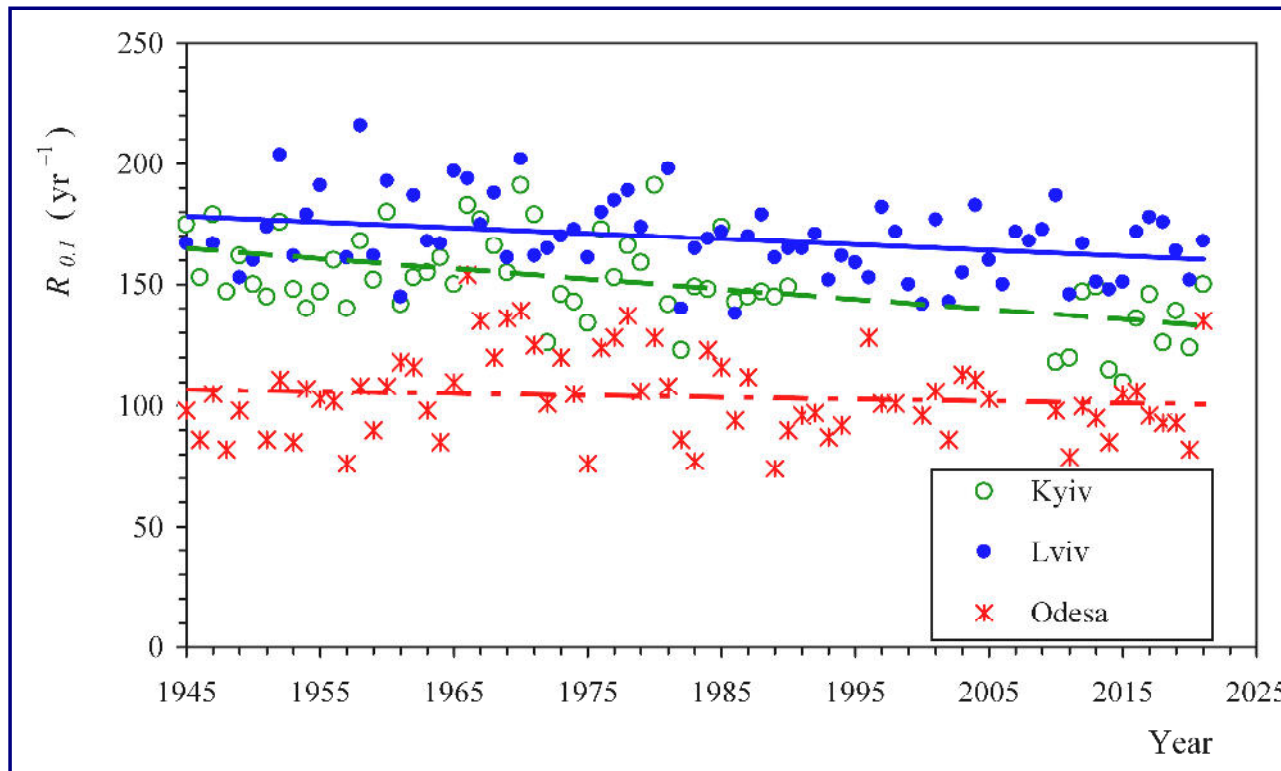


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Annual number of wet weather days in Kyiv, Lviv and Odesa in 1945–2021



Kyiv:

$$R_{0.1} = 166 - 0.421(Y - 1945) \quad (4)$$

Lviv:

$$R_{0.1} = 179 - 0.235(Y - 1945) \quad (5)$$

Odesa:

$$R_{0.1} = 107 - 0.081(Y - 1945) \quad (6)$$

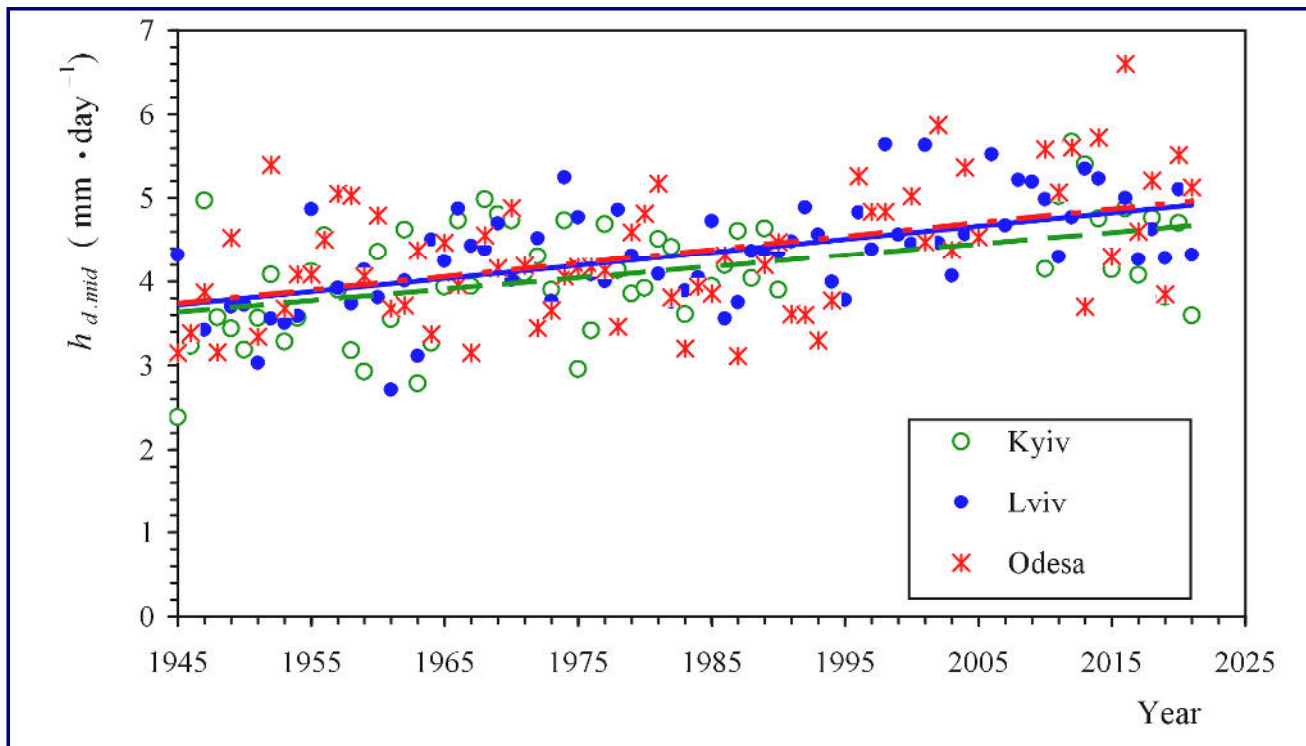


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Average daily rainfall depths in Kyiv, Lviv and Odesa in 1945–2021



Kyiv:

$$h_{d.mid} = 3.62 + 0.0138(Y - 1945) \quad (7)$$

Lviv:

$$h_{d.mid} = 3.72 + 0.0157(Y - 1945) \quad (8)$$

Odesa:

$$h_{d.mid} = 3.74 + 0.0163(Y - 1945) \quad (9)$$

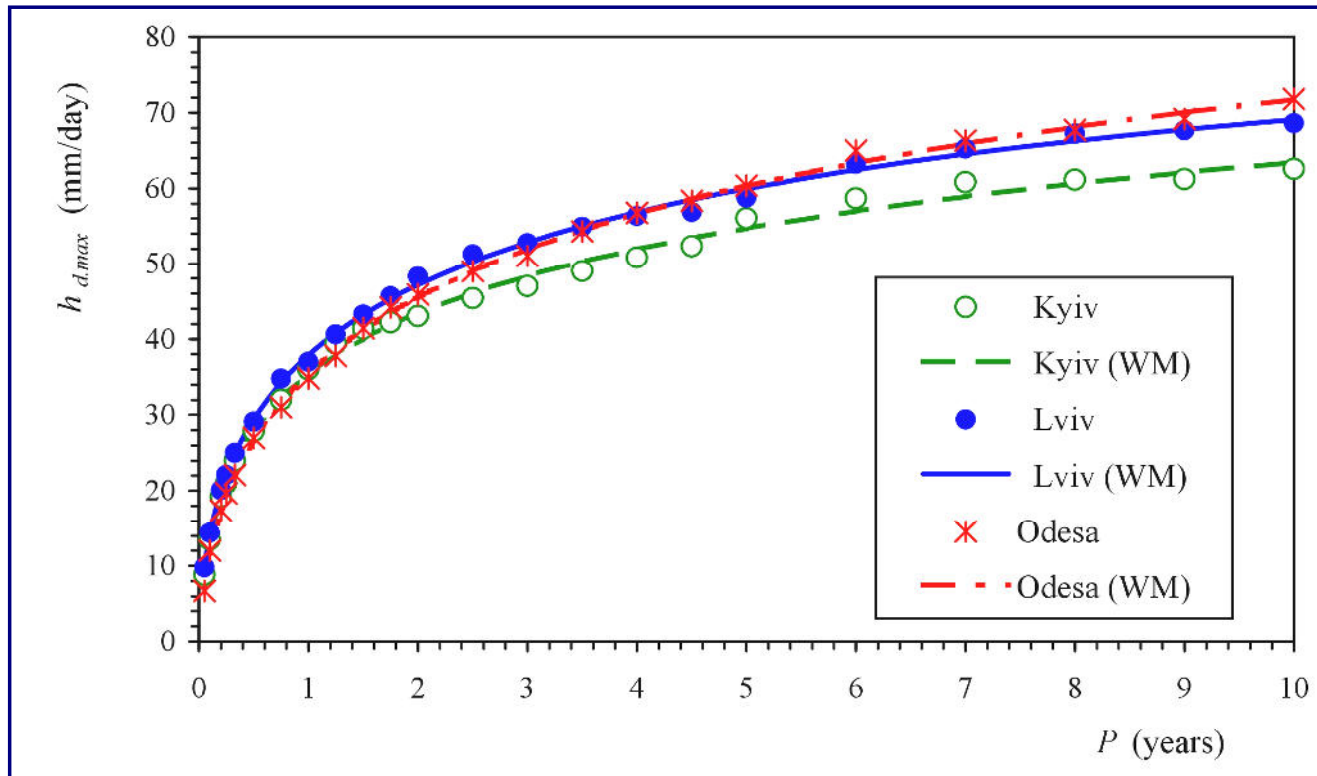


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Maximum daily rainfall depths in Kyiv, Lviv and Odesa in 1945–2021



Kyiv: (10)

$$h_{d,max} = 106.9 - 127.0 \exp(-0.576P^{0.27})$$

Lviv: (11)

$$h_{d,max} = 88.7 - 95.5 \exp(-0.631P^{0.40})$$

Odesa: (12)

$$h_{d,max} = 101.2 - 108.5 \exp(-0.500P^{0.416})$$



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Main stakeholders

Central authorities of Ukraine:

Ministry of Education and Science of Ukraine

Ministry of Environmental Protection and Natural Resources of Ukraine

Local authorities:

Lviv Regional Military (State) Administration, Department of Ecology and Natural Resources

Lviv City Council

Business entities:

Lviv Communal Enterprise 'Lvivvodokanal'

Lviv Communal Enterprise 'Green City'

Environmental public organizations and society:

NGO All-Ukrainian Environmental League

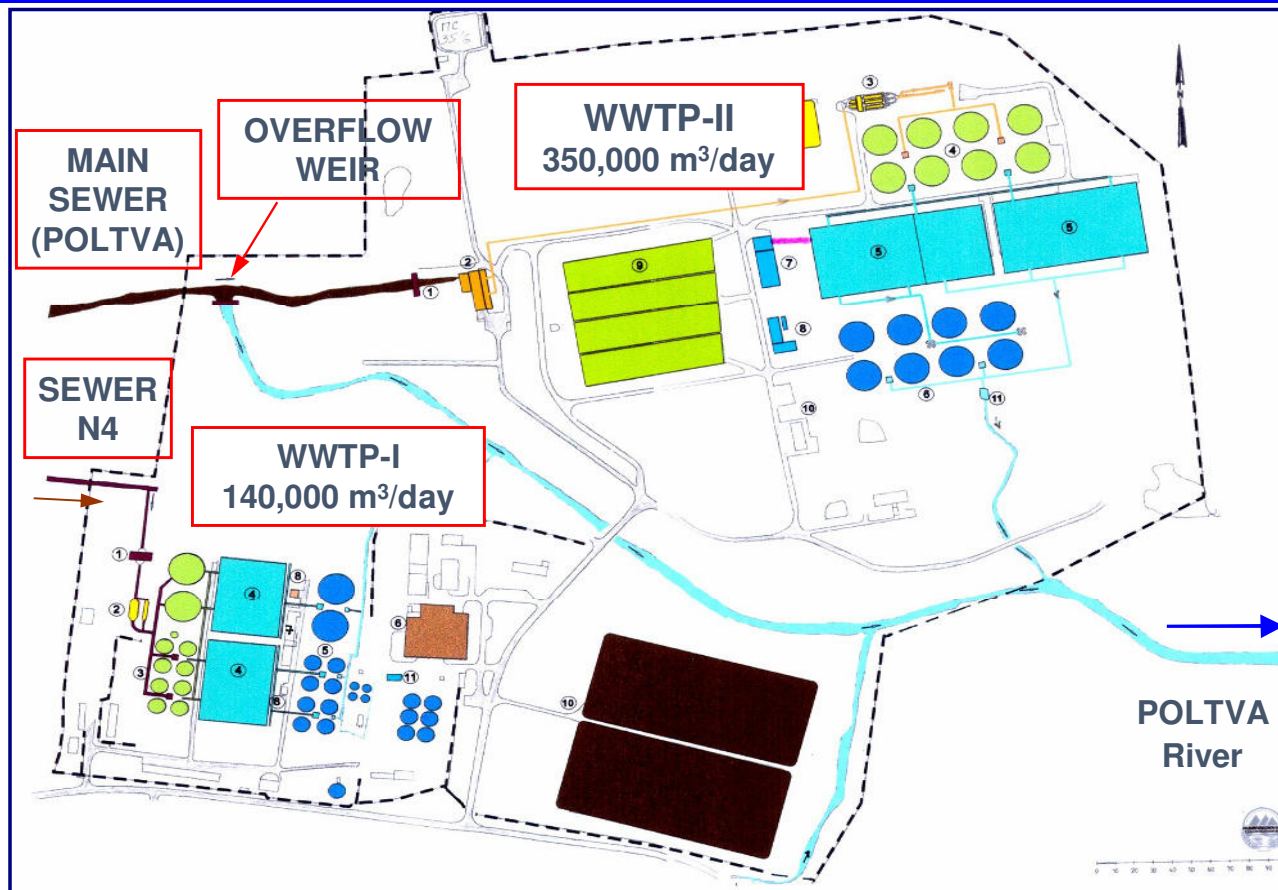
NGO Lviv Agrarian Chamber



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Lviv Wastewater Treatment Plant

WWTP-I is in operation since 1963 (1st stage) and since 1965 (2nd stage)
Capacity: 140,000 m³/day

WWTP-II is in operation since 1976 (3rd stage) and since 1988 (4th stage)
Capacity: 350,000 m³/day

Total Capacity: 490,000 m³/day



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**Poltva river in 1880th
(Lviv, Mitskevych Square)**





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**Main sewer (Poltva river) at
Sakharova-Zarytskykh Str.**

**Width: 2.65 m
Depth: 2.65 m**





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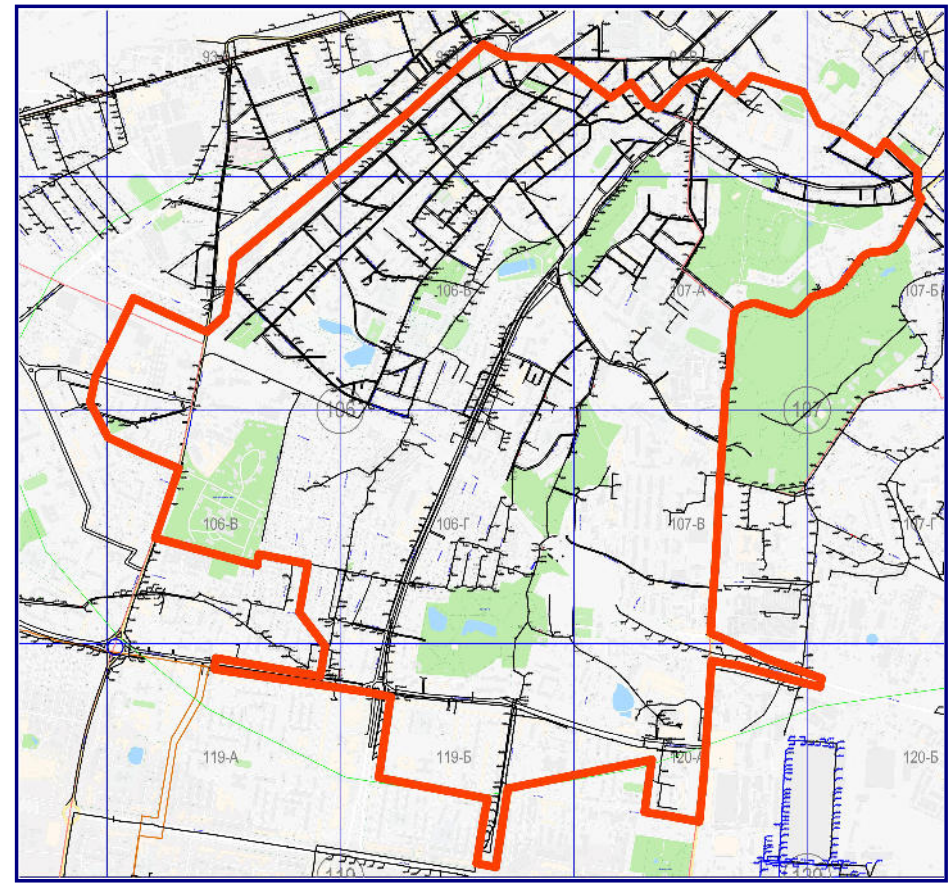
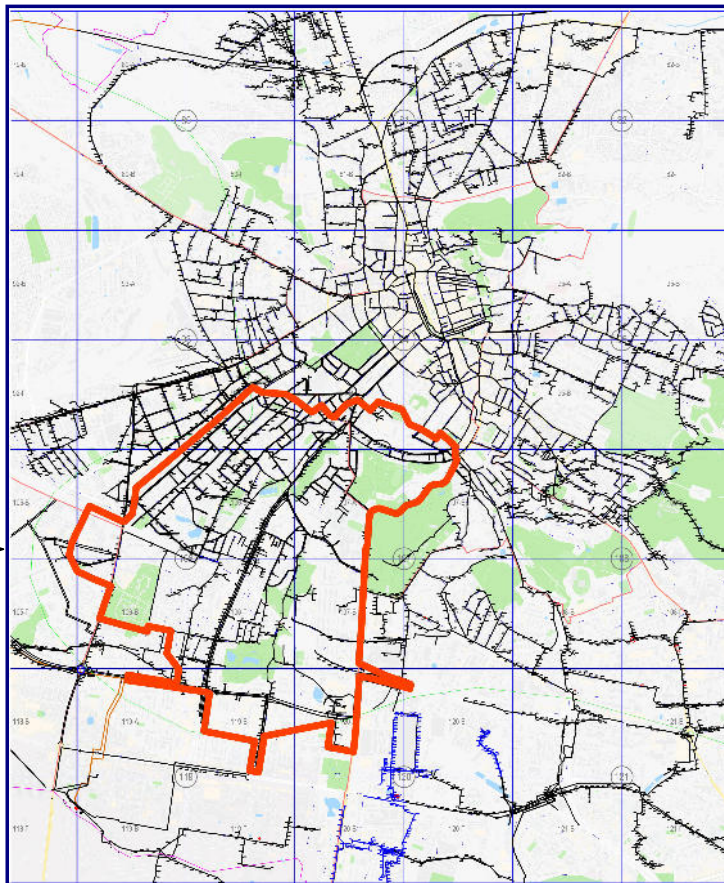


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E-Map of Lviv
Sewerage
Network

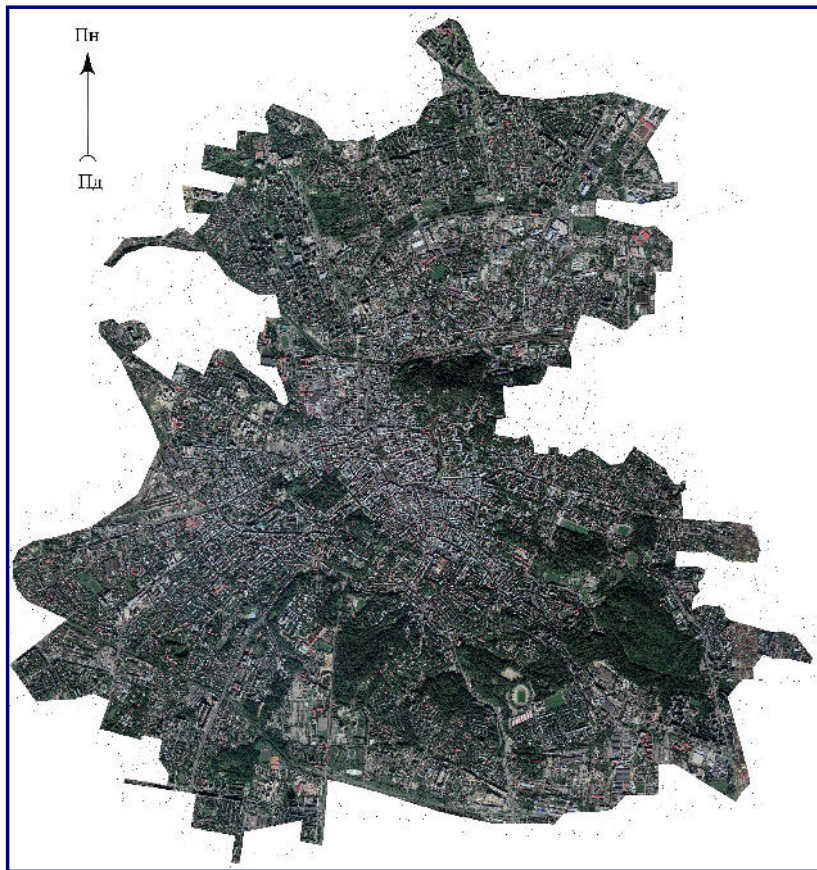




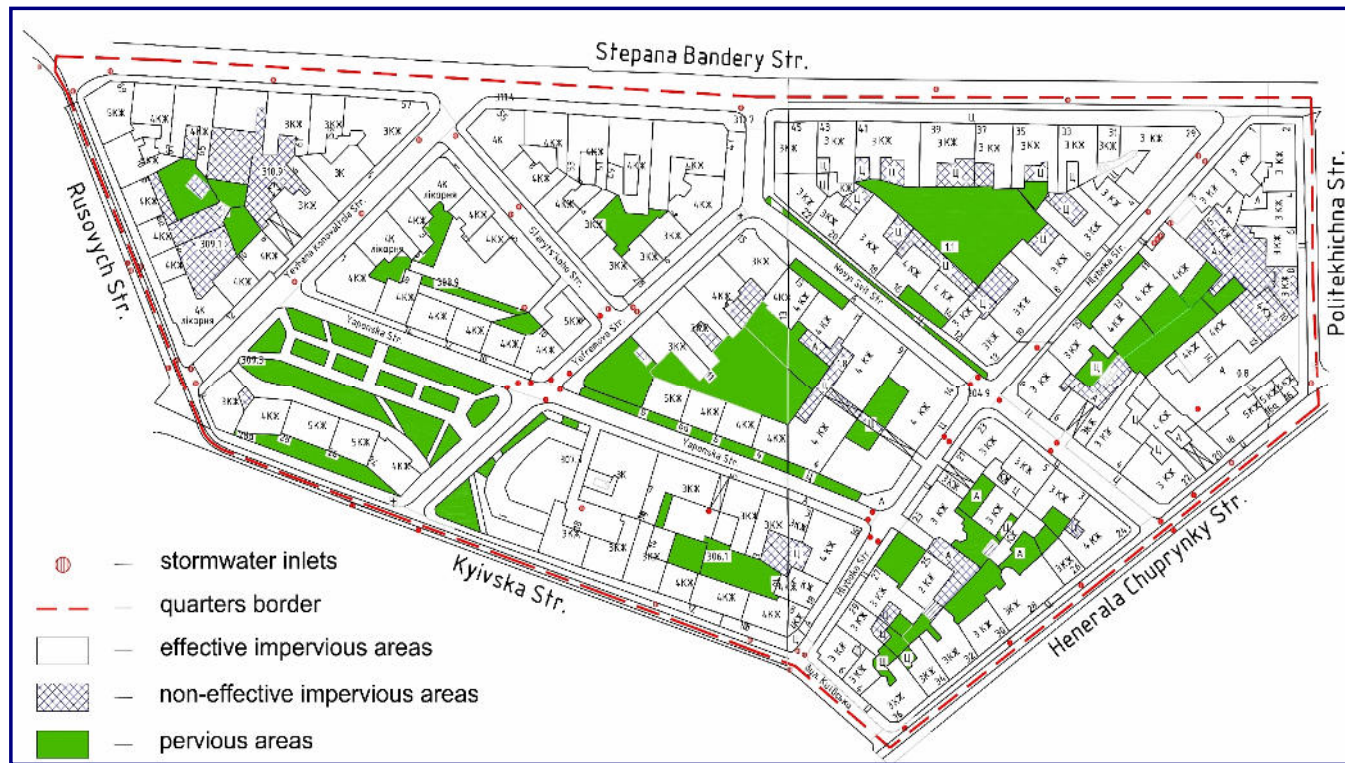
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Total and Effective Imperviousness of the Baltic Sea Catchment

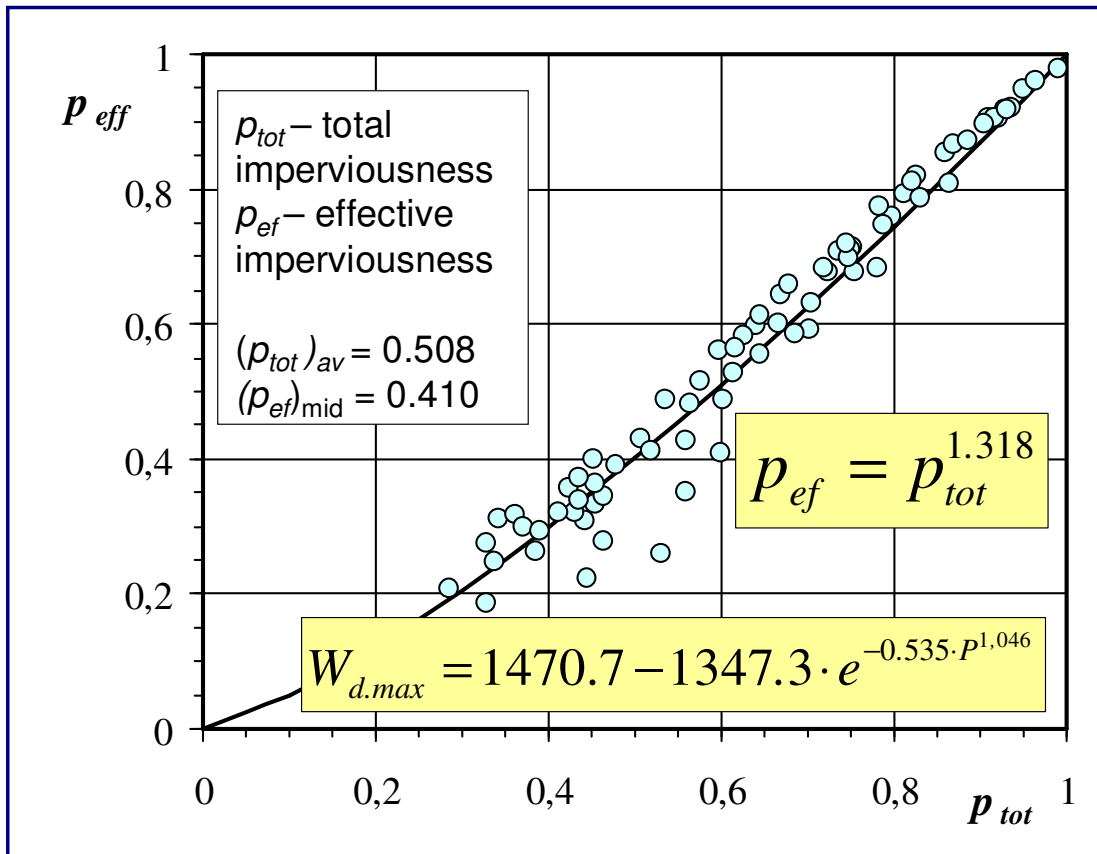




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Maximum daily stormwater runoff at inlet of Lviv WWTP

P, years	$h_{d,max}$, mm	$W_{d,max}$, thous. m ³ /day	Relative errors	
			+ δW_{max} , %	- δW_{max} , %
0.1	14.85	182,42	2.34	2.31
0.2	20.13	252,74	2.49	2.46
0.25	22.27	285,55	2.50	2.47
0.33	25.25	334,84	2.50	2.47
0.5	30.41	428,96	2.45	2.42
1	42.24	680,06	2.30	2.27
1.5	50.45	877,57	2.20	2.17
2	56.23	1026,0	2.13	2.11
3	63.46	1220,8	2.06	2.04
4	67.43	1331,8	2.03	2.01
5	69.69	1396,1	2.01	1.99



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Feasibility Study of the Lviv Main Sewer Reconstruction (2022)

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ "ЛЬВІВСЬКА ПОЛІТЕХНІКА"
79013, м. Львів, вул. Ст. Бандери, 12, тел. (032) 258-20-25



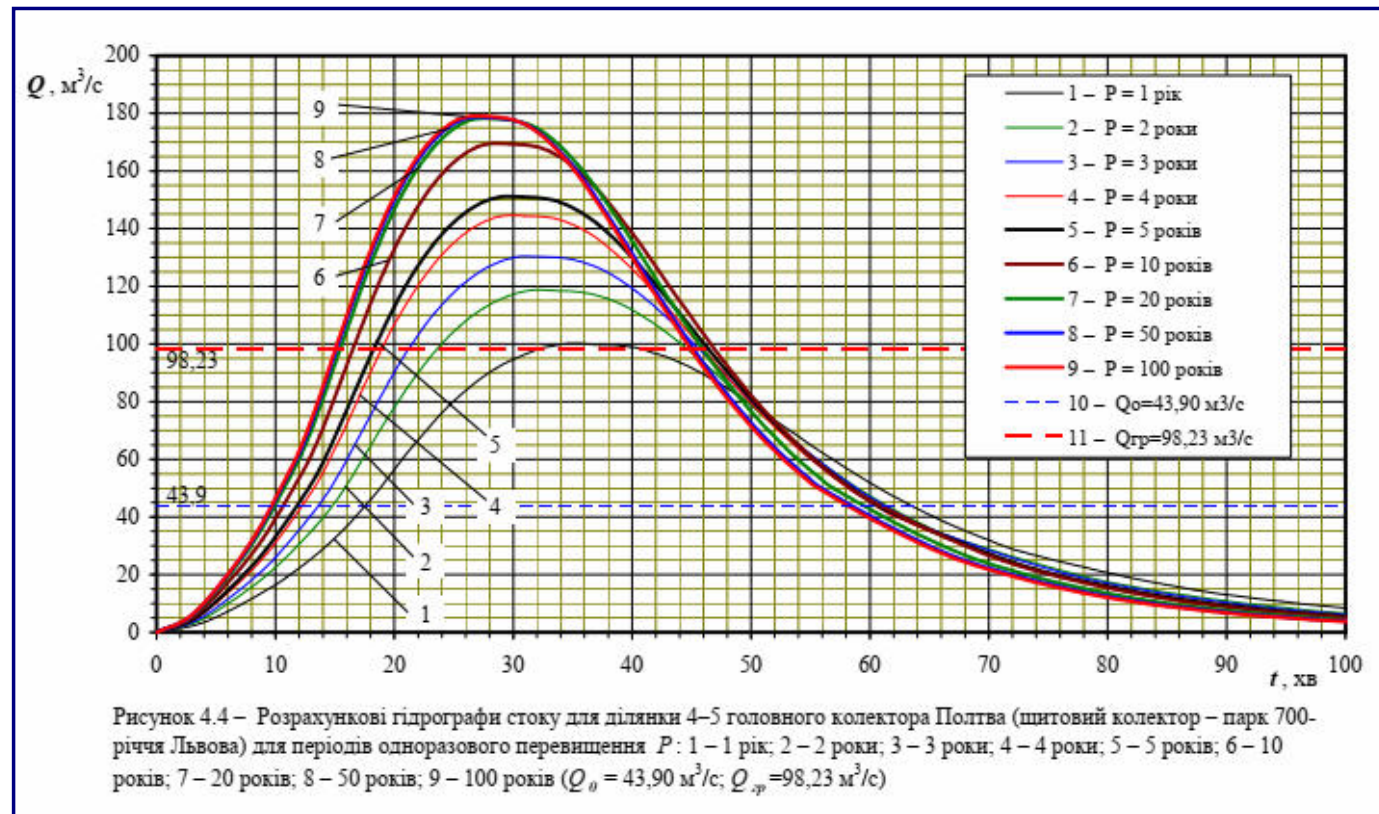
ЗАТВЕРДЖУЮ
Проректор з наукової роботи

Іван ДЕМИДОВ
2022 р.

ЗВІТ

ПРО НАУКОВО-ДОСЛІДНУ РОБОТУ

"Реконструкція головного колектора м. Львова (р. Полтва) на ділянці від вул. Хімічної – вул. Торф'яна до Львівських КОС-П (гідравлічні розрахунки та моделювання гідрографів)"





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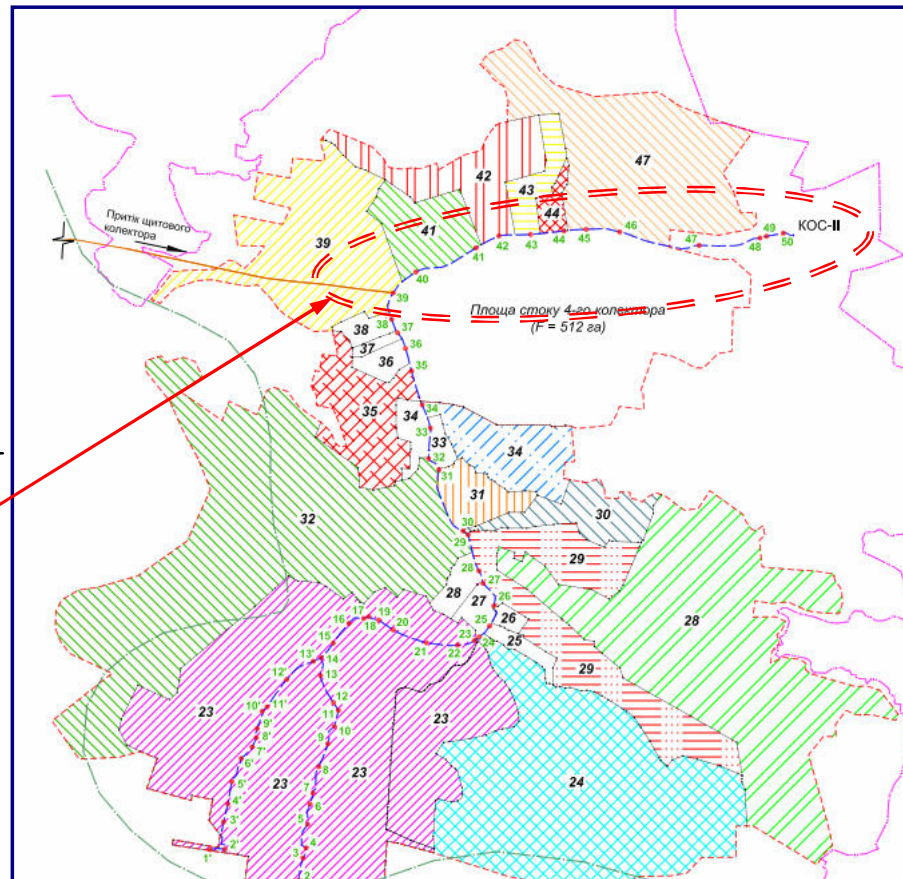


Technical Department of the CMC in LPNU

Feasibility Study of the Lviv Main Sewer Reconstruction (2022)

Areas of Subcatchments of the Baltic Sea Catchment

Sections of the main sewer under the reconstruction



Експлікація площ басейна стоку головного каналізаційного колектора м. Львова станом на 2022 рік та на перспективу

Номер перепливу	Номер вузла	Станом на 2022 рік		На перспективу		
		Площа бічна, га	Площа сумарна, га	Площа бічна, га	Площа сумарна, га	
	23	156,6	717,5	156,6	717,5	
	24	456,1	1173,6	456,1	1173,6	
	25	12,4	1186,0	12,4	1186,0	
	26	6,4	1192,4	6,4	1192,4	
	27	13,2	1205,6	13,2	1205,6	
	28	527,0	1732,6	717,5	1923,1	
	29	177,6	1910,2	177,6	2100,7	
	30	57,7	1967,9	57,7	2158,4	
	31	38,7	2006,6	38,7	2197,1	
	32	606,4	2613,0	825,6	3022,7	
	33	9,6	2622,6	9,6	3023,3	
	34	97,3	2719,9	97,3	3129,6	
	1	35	89,0	2808,9	121,2	3250,8
	2	36	14,0	2822,9	14,0	3264,8
	3	37	5,3	2828,2	5,3	3270,1
	3а	38	12,8	2841,0	12,8	3282,9
	4	39	561,7	3402,7	764,7	4047,6
	5	40	5,0	3407,7	5,0	4052,6
	5а	41	65,0	3472,7	65,0	4117,6
	5б	42	96,8	3569,5	131,8	4249,4
	6	43	31,5	3601,0	31,5	4280,9
	6а	44	12,8	3613,8	12,8	4293,7
	9	47	264,4	3878,2	360,0	4653,7

Умовні позначення:

- 40 - ізольований головний каналізаційний колектор
- ізольований щитовий каналізаційний колектор
- межі басейна стоку головного колектора
- адміністративні межі м. Львова
- лінії головного європейського вододілу



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WP4.4 – Road Map for the interaction with stakeholders

Project EuropeAid/140209/DH/SER/UA

Strengthening the Capacity of Regional and Local Administrations for Implementation and Enforcement of EU Environmental and Climate Change Legislation and Development of Infrastructure Projects

Start of the Project: 15.07.2020 Duration: 36 months

Project Beneficiaries: Ministry of Ecology and Natural Resources of Ukraine, Ministry of Community and Territorial Development of Ukraine

Lviv region is chosen as one of 3 pilot regions in Ukraine to realize tasks of the EU Project 140209/DH/SER/UA

Component 1: Assistance the strengthening of the administrative capacity for implementation and enforcement of new legislation aligned with the EU legislation in the areas of EIA, SEA on regional and local level in Ukraine

Component 2: Support local civil society and business in increasing awareness for implementation of the legislation aligned with the EU legislation

Component 3: Development of regional climate adaptation strategies with implementation plans

Component 4: Development of Regional Waste Management Plans in 3 pilot regions

Component 5: Development of priority waste management investment projects' preparation in 3 pilot regions

Component 6: Design and implementation of stakeholder involvement and communication awareness plan



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THANK YOU!