



24HR01 CROATIA
Support to Reduce Water Loss within the
Reform of the Water Sector – Phase 2
Development of NRW Reduction Action
Plan for Utilities

2026 DANUBE WATER
FORUM

May 20-22, 2026, in Sofia, Bulgaria



Funded by
the European Union

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WATER LOSS PROJECT

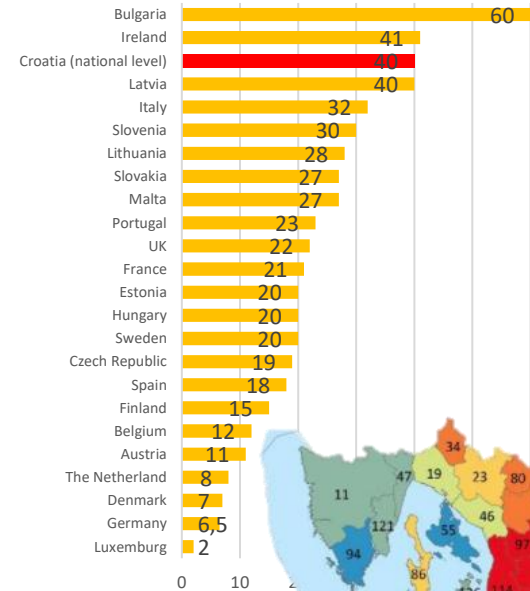
- ❑ 24HR01 CROATIA - Support to Reduce Water Loss within the Reform of the Water Sector – Phase 1&2 (2022-2026)

Objective: **Improve the institutional capacity** of relevant public authorities and PWSPs to reduce excessive losses from water supply systems. This will **contribute to increased operational efficiency and financial sustainability** of the Croatian water services sector and enhance **water security and resilience** of service provision more broadly.

- ❑ Implemented **activities are intended to cover all areas that have an impact on water loss** reduction and also aim to **raise awareness** of the importance of long-term implementation of all actions.

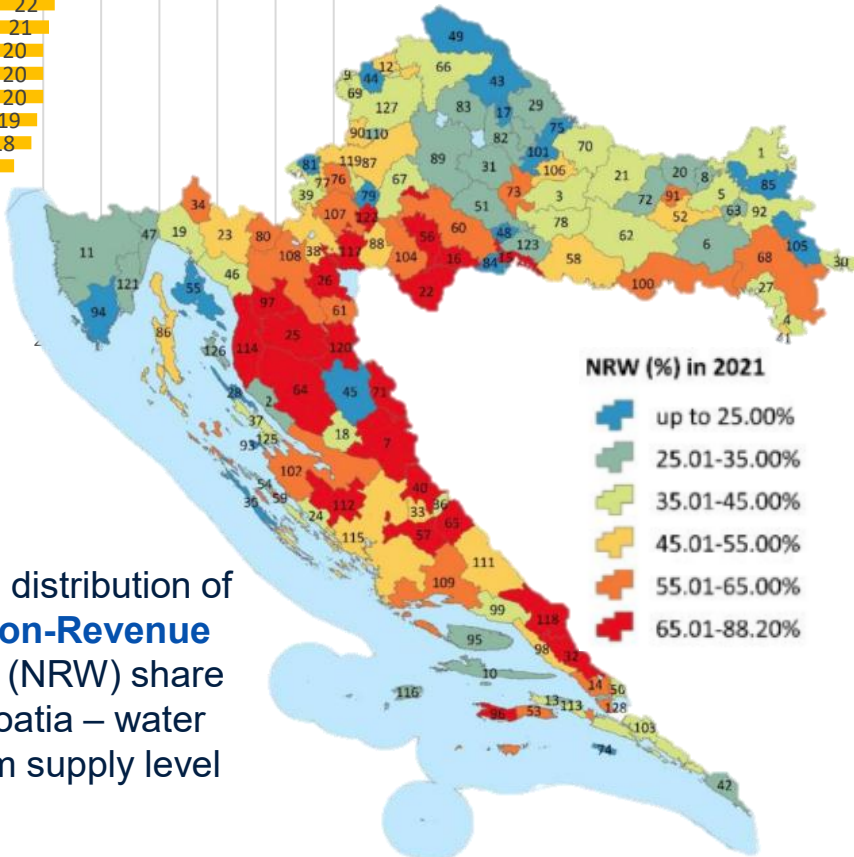
WHY PROJECT?

Real Losses (Leakage) %



Croatia: No. 3 in terms of real water losses in the EU

Spatial distribution of the **Non-Revenue Water (NRW)** share in Croatia – water system supply level



- **Connection rate** to water supply systems ~ **90%**
- Total water delivered to final users (**billed**) around **250 mill. m³/year**, total water **supplied** amounted to **480 mill. m³/year**
- Average rate of **Non-revenue Water (NRW)** around **50%**, varying between ~ 25% up to around ~ 80% per PWSP
- Impacts of **climate change** on water availability and demand
- Requirements **new EU Drinking Water Directive**
- Obligations from EU **National Recovery and Resilience Plan (NRRP)** for Croatia

Why does the sector struggle with NRW reduction?

Lack of understanding extent, sources and cost of NRW

- Quantifying NRW and its components
- Calculating performance indicators
- Turning volumes of lost water into monetary values

Lack of Capacity

- Requires range of skilled staff
- Managers and professional engineers
- Street crews, technicians, plumbers

Missing Management Focus

- Requires time, constant dedication, staff and funding
- More interesting engineering activities than to fix buried pipes
- Unpopular decisions might have to be made

Enabling Environment and Incentives

- NRW must not be considered in a vacuum but within broader sectorial context
- What are incentives for managers and staff of the program

Phase 2

- Project period: June 2024. – June 2026.
- Financed by European Commission, DG REFORM
- Focus on Utility action plans (ULRPAP)

- Project period: April 2022 – November 2023
- Financed by European Commission, DG REFORM
- Focus on National Action Plan (NLRAP)

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PHASE 1 - KEY PROJECT OUTPUTS (2022-2023)

- Output 1: Stocktaking report
- Output 2: Draft National Loss Reduction Action Plan
- Output 3: Tools and training material for water loss reduction
- Output 4: Knowledge base and indicators for utility performance evaluation
- Output 5: Recommendations for National Monitoring Body
- Output 6: **Final draft National Loss Reduction Action Plan (NLRAP)**



Project outputs publicly available on the website of the Ministry of Economy and Sustainable Development

[https://mingor.gov.hr/o-ministarstvu-1065/djelokrug/uprava-vodnoga-gospodarstva-i-zastite-mora-2033/gubici/potpора-smanjenu-gubitka-vode-u-okviru-reforme-vodnog-sektora-u-republici-hrvatskoj/9374](https://mingor.gov.hr/o-ministarstvu-1065/djelokrug/uprava-vodnoga-gospodarstva-i-zastite-mora-2033/gubici/potpورا-smanjenu-gubitka-vode-u-okviru-reforme-vodnog-sektora-u-republici-hrvatskoj/9374)



PHASE 2 - KEY PROJECT OUTPUTS (2024-2026)

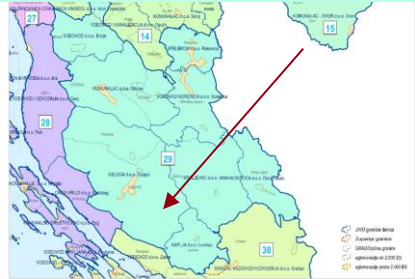
- Output 1: Template for individual ULRAP
- Output 2: DMA Guidance Manual
- Output 3: Plan of activities for the establishment of a national benchmarking system
- Output 4: Analysis of the current state of the regulatory accounting for the PWSP
- Output 5: Proposal for the establishment of a National Water Loss Reduction Training Centre and knowledge exchange program
- Output 6: Chart, Accounts, Procedures for Regulatory accounting
- **Output 7: Direct support to 4 utilities of different size for the preparation of individual ULRAPs and establishment of DMA zones**



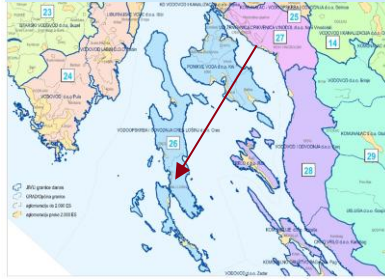
SA 15 - PETRINJA



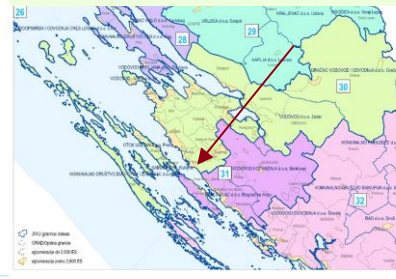
SA 29 - GOSPIĆ



SA 26 - KRK



SA 30 - ZADAR



ULRAPs – CONTENTS

1 - BASELINE ASSESSMENT

- Basic data about PWSP/service area
- Public water supply systems
- Existing GIS and register of the condition of water supply infrastructure
- Organizational structure and technical capacities of leakage detection team
- Current state and practice of Non-Revenue Water (NRW) management
- Risks associated with limitations in available water volumes and climate change

2 - WATER LOSS MANAGEMENT PLAN

- Methodology applied
- Measures and prioritization of measures
- Effects of measures
- Water balance calculation
- Calculation of water loss indicators

3 - SOURCES OF FINANCING AND TIME PLAN

- Sources of financing
- Effect on the price of water and affordability
- Time plan
- Assessment of plan implementation risks

4 - IMPLEMENTING THE PLAN

- Establishment of organizational structure
- Establishment of a water loss management team
- Establishment of a GIS team Plan to establish/update DMAs
- Plan to update hydraulic model
- Plan of activities to implement measures

5 - INDICATORS TO MONITOR PLAN IMPLEMENTATION

ANNEX. ACTIVITIES IMPLEMENTED FOR THE PURPOSE OF PREPARING THE ACTION PLAN (GIS & MODELS)

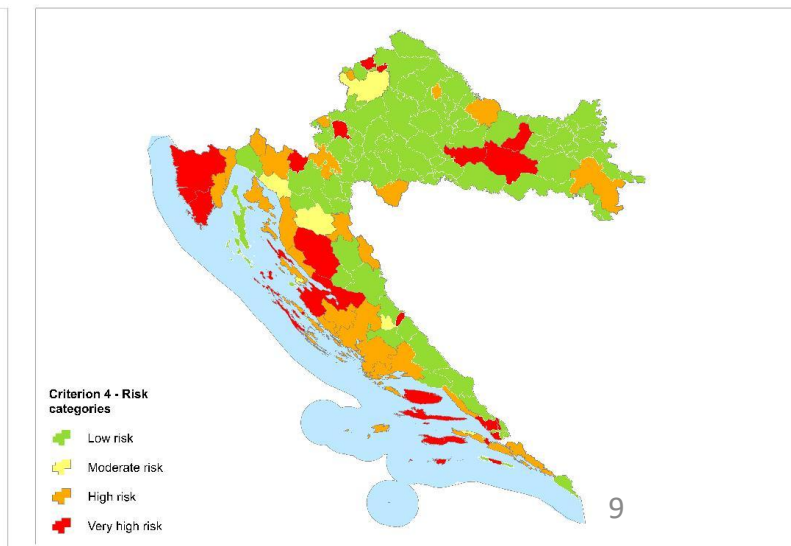
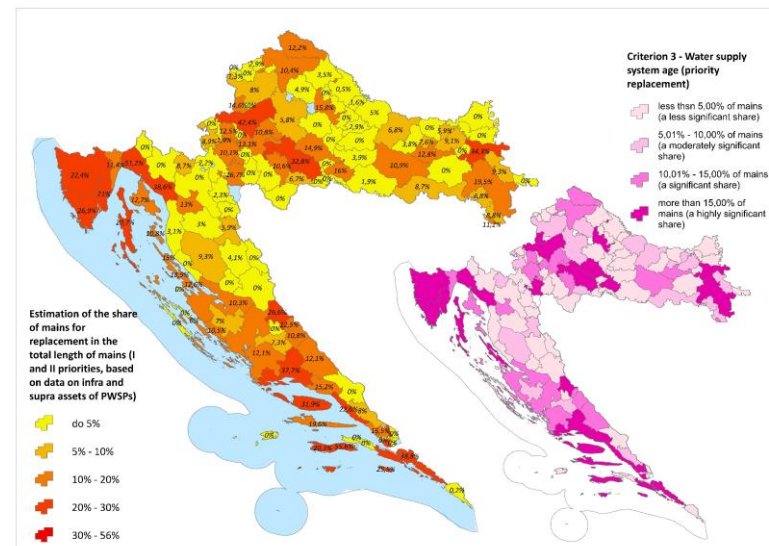
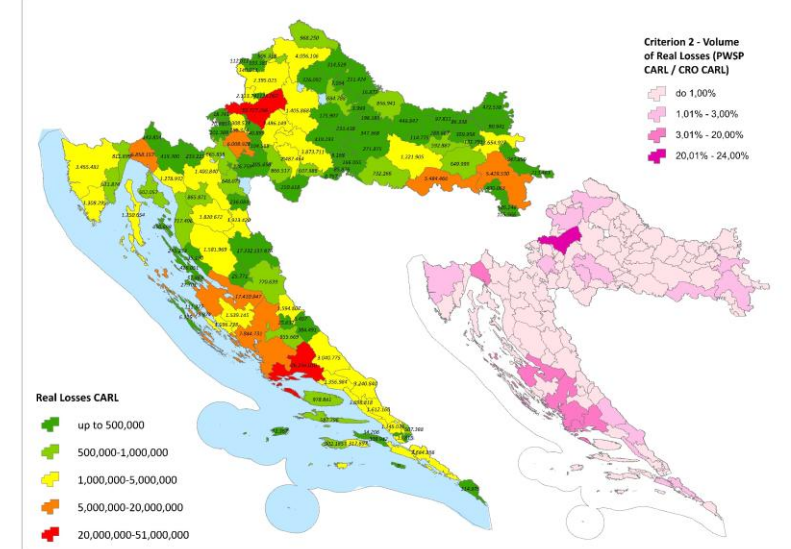
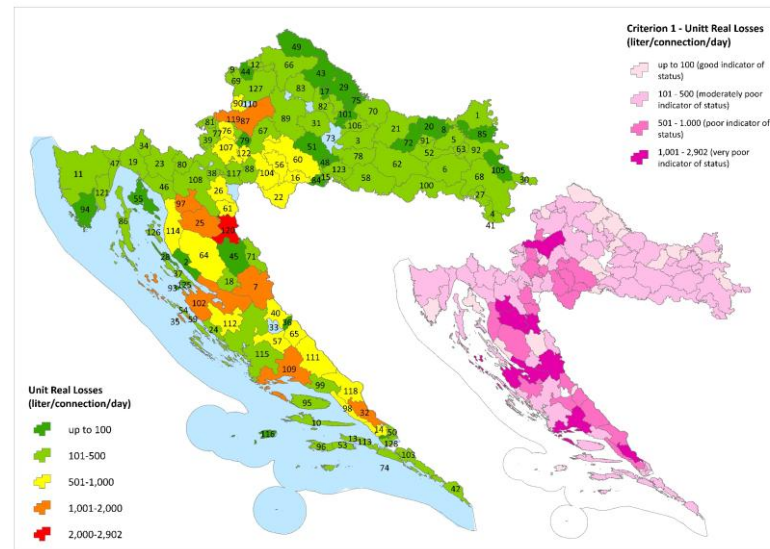
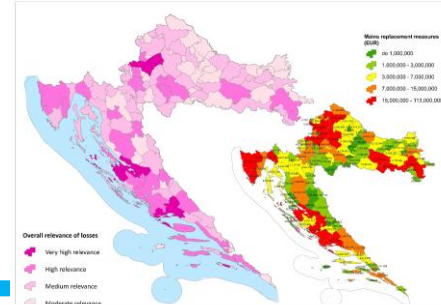
- GIS - General module - to know one's own system (mains, structures, connections, materials, age, profiles, etc.)
- Development/Update of calibrated mathematical models to update the proposed DMAs and calculate the basic components of water loss indicators

ULRAP Preparation is linked to Activity 1 – „ULRAP Template” and Activity 2 - “Good Practice Manual: DMA ESTABLISHMENT AND MANAGEMENT” for the calculation of the water balance, DMA zoning and presentation of results

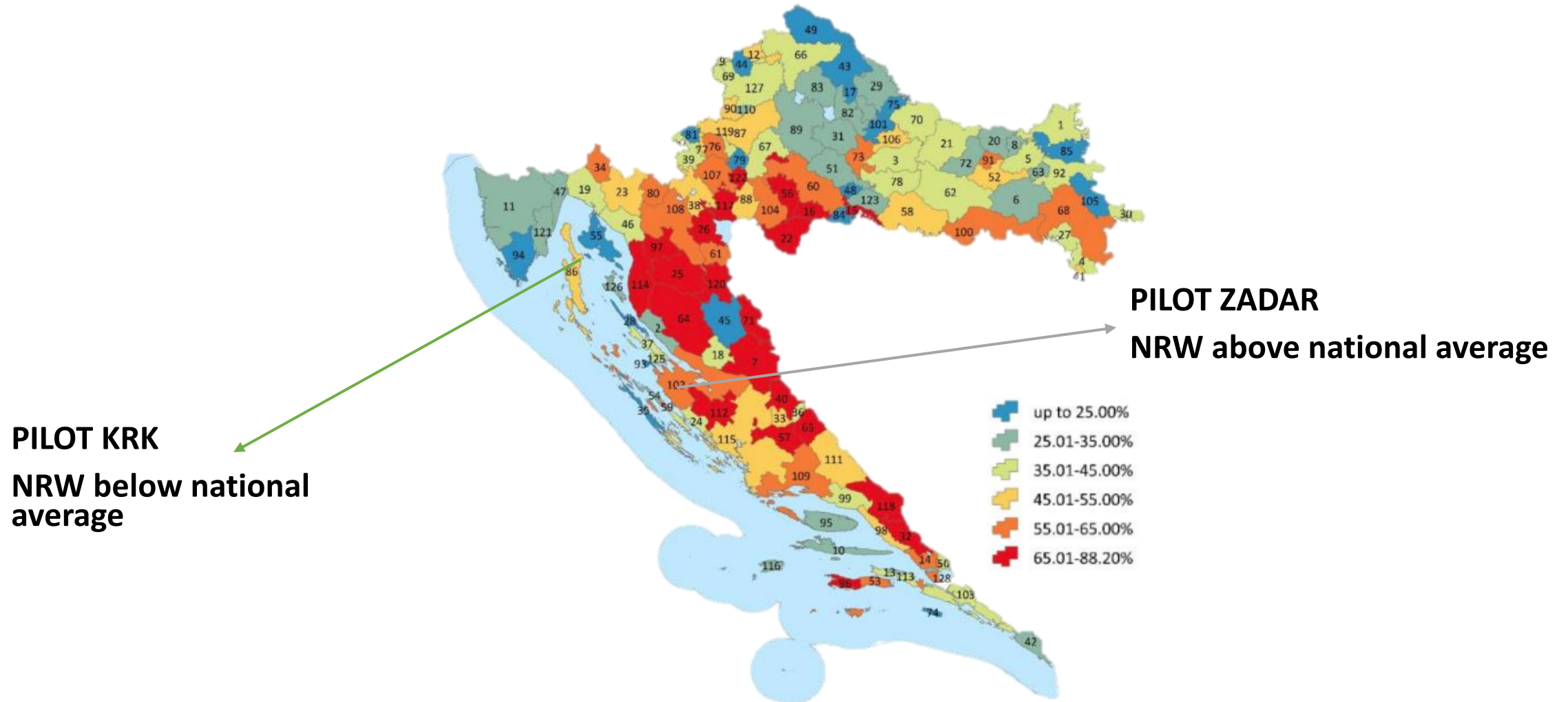
APPLIED METHODOLOGIES (NLRAP&ULRAP)

Measures & Prioritization

- It is necessary to implement all the foreseen **measures** (in the scope/amounts adjusted to the priority on the national level, as well as to the needs of individual PWSPs or service areas).
- Relevance of the losses** were assessed using 4 weighted criteria:
 - Criterion 1 - Unit Real Losses
 - Criterion 2 - Volume of PWSPs Real Losses
 - Criterion 3 - Water supply system age
 - Criterion 4 - Risks associated with limitations in available water volumes and climate change



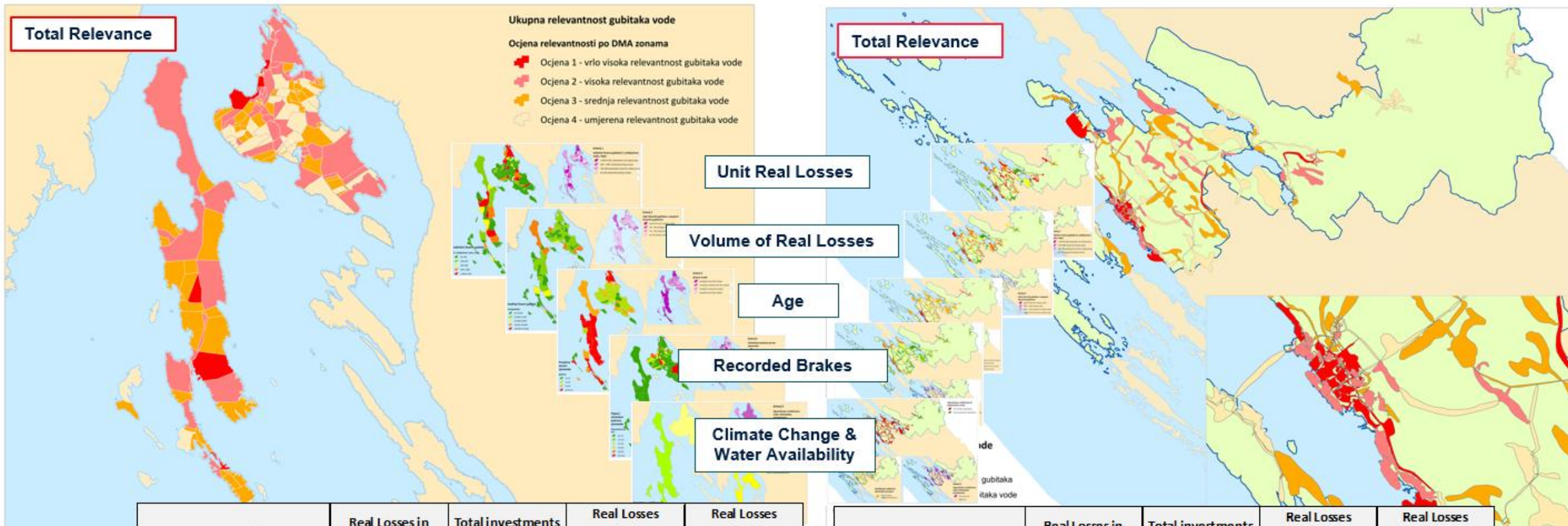
ULRAPs – 2 PILOT



ULRAP – ANALYSIS ON PWSP/SERVICE AREA & DMA LEVEL

KRK – Water Loss Relevance per DMA

ZADAR - Water Loss Relevance per DMA

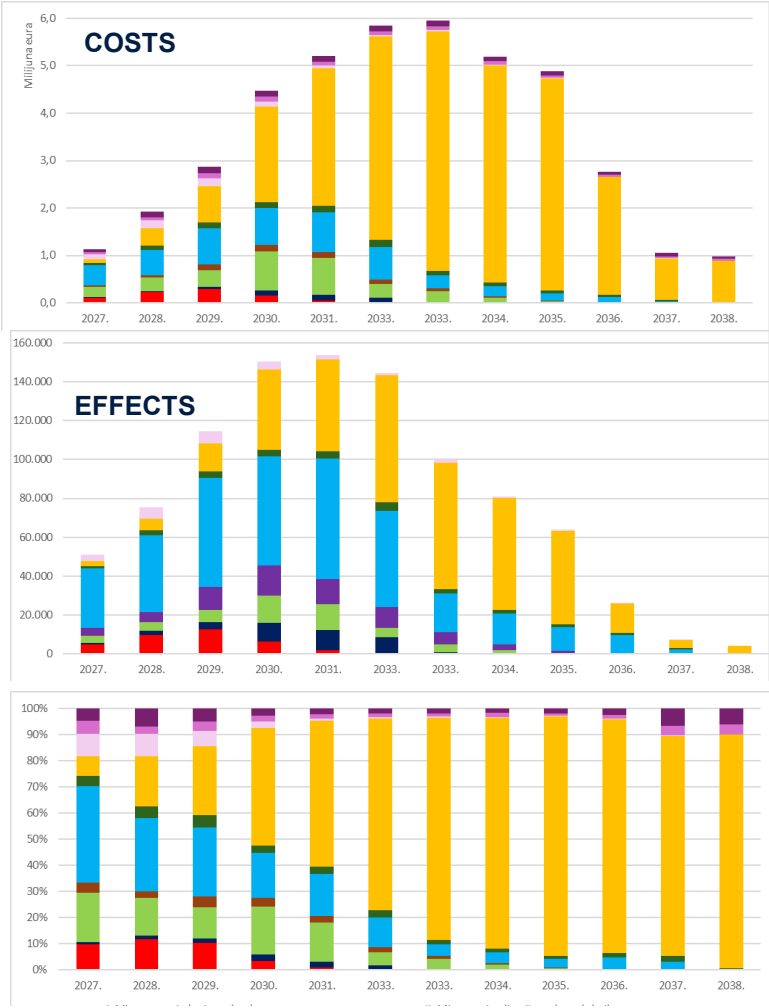


Water Loss Relevance	Real Losses in 2025 (m3/year)	Total investments (euro)	Real Losses reduction (m3/year)	Real Losses reduction (%)
Very high loss relevance	781.178	14.382.054	503.967	65%
High loss relevance	625.855	18.322.767	315.486	50%
Medium loss relevance	243.370	6.645.287	102.801	42%
Moderate loss relevance	118.403	2.921.217	49.870	42%
Total	1.768.807	42.271.325	972.123	55%

Water Loss Relevance	Real Losses in 2025 (m3/year)	Total investments (euro)	Real Losses reduction (m3/year)	Real Losses reduction (%)
Very high loss relevance	13.011.599	25.940.306	7.676.844	59%
High loss relevance	8.466.957	25.539.707	4.656.827	55%
Medium loss relevance	3.826.935	27.208.337	1.913.468	50%
Moderate loss relevance	1.294.605	15.220.685	543.734	42%
Total	26.600.097	93.909.037	14.790.872	56%

ULRAP – ANALYSIS ON PWSP/SERVICE AREA & DMA LEVEL

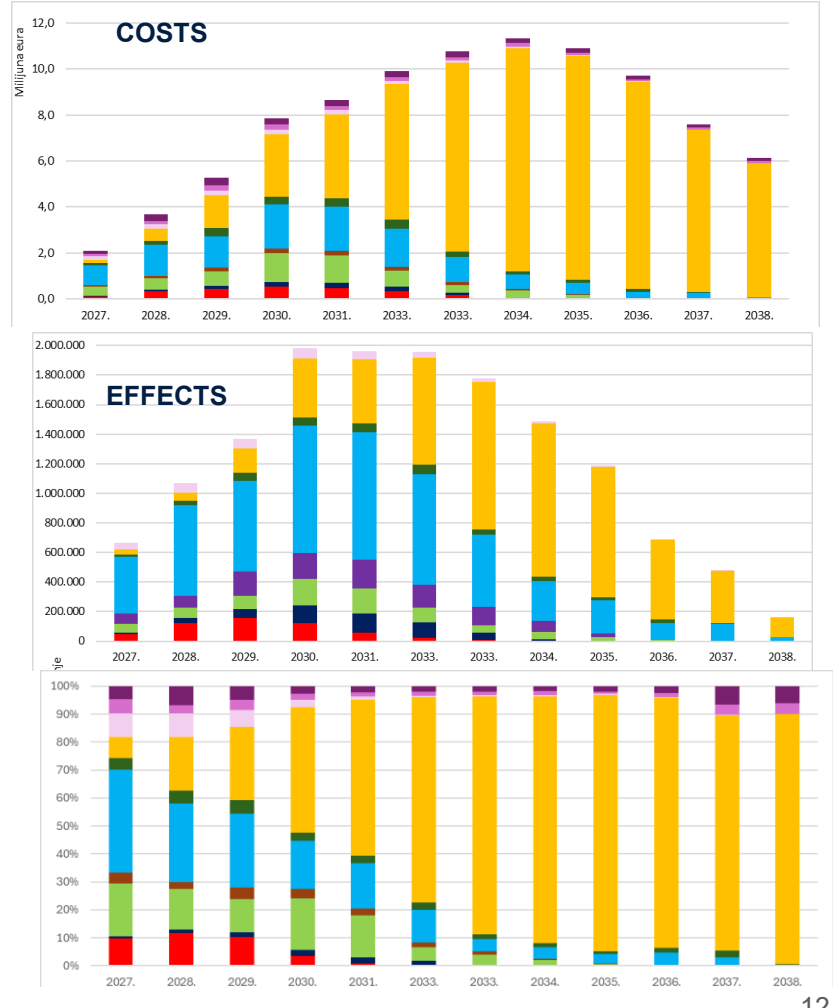
KRK – Measures & Effects



% COSTS in Total Costs per Year

- I. System data improvement measures
- II. Water supply system optimization measures
- III. Measures to divide the system into DMAs
- IV. System pressure control and management measures
- V. Active leakage control measures
- VI. Measures to address apparent losses
- VII. Planning and mains replacement measures
- VIII. Institutional strengthening measures
- IX. Analysis and reporting measures
- X. Technical (external) assistance to PWSPs to implement the measures

ZADAR – Measures & Effects



% COSTS in Total Costs per Year

ULRAPs – 2 PILOT PROJECTS

KRK – NRW below national average

The implementation of the comprehensive plan of measures worth **42,3 million euros** will take **12 years** (2027-2038), by which time it is estimated to achieve **reduction of Real Losses by 55,10%** or:

Category	Today	After (2038)
Real Water Loss, m3/year	1.800.000	800.000
Real Loss Level, %	25,30%	13,10%
NRW Level, %	30,44%	18,49%
ILI Indicator	2,39	1,16
CRLI Indicator	31,91	15,43
Indicator l/connection/day	168	82
Indicator m3/km/hour	0,25	0,12

ZADAR – NRW above national average

The implementation of the comprehensive plan of measures worth **93,9 million euros** will take **12 years** (2027-2038), by which time it is estimated to achieve **reduction of Real Losses by 55,60%** or:

Category	Today	After (2038)
Real Water Loss, m3/year	26.600.000	11.700.000
Real Loss Level, %	68,89%	49,17%
NRW Level, %	69,85%	55,77%
ILI Indicator	20,49	9,10
CRLI Indicator, l/day	270,32	120,01
Indicator l/connection/day	1.648	731,83
Indicator m3/km/hour	1,85	0,82

Due to the financing needs (around 3 billion euros on national level) and financial gap (few models presented in the ULRAP), EU funds, Loans and government funds are expected.

ULRAP – PREPARATION EXPERIENCE

- The level of information/data, **cooperation** during ULRAPs preparation is significantly **higher in PWSPs with lower levels of losses**, but, the **established methodology** & implemented project activities **enabled** the **preparation of ULRAPs** with a sufficient level of reliability.
- **Knowledge and awareness** of the need to reduce water losses has **grown significantly in the last few years**, which was especially felt during the numerous workshops held within the framework of the Project, Phase 1&2.
- The **implementation** of water loss reduction measures **is influenced by the linking of water loss indicators** with the **required** level of **operational efficiency and financial sustainability** of PWSPs (established by regulations):
 - determining the price of water services (new methodology)
 - calculation of fees for water use
 - determination of performance indicators and achievement of target values (benchmarking and performance of activities)
 - PWSPs business plans preparation
- In terms of technical and financial **capacities** of PWSPs, in the **last decade mainly focused on UWWTD compliance**, but those capacities **should gradually be redirected** and additionally strengthened **to improve water supply**, i.e. reduce water losses, considering mainly the conditions of the water supply systems **but also the requirements of the DWD Recast**).
- A particular **contribution of the Project is the applicability of the elaborated methodology** for water loss reduction outside the borders of Croatia.

Thank you for your attention !



Project carried out with funding by the European Union in cooperation with the European Commission's DG REFORM
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