ОПШТИНА СВЕТИ НИКОЛЕ

Climate Resilience Strategy

Municipality of Sveti Nikole

North Macedonia

Action Plan | Investment Plan

March 2026

TABLE OF CONTENTS

List of tables

List of Charts

List of figures

Acknowledgments

The Climate Resilience Strategy of the Municipality of Sveti Nikole is the result of an inclusive and institutionally supported process that brought together local government, public institutions, civil society organizations, educational institutions, risk management services, and the citizens themselves.

We express our special gratitude to Mayor **Dejan Vladev**, whose full political support, openness, and trust allowed the process to be carried out smoothly, transparently, and with a clear institutional mandate. His support was crucial for ensuring cross-sectoral cooperation and the active participation of all relevant municipal departments.

A particularly significant contribution was made by the municipal officials who actively participated in all workshops, analysis processes, and co-creation sessions. They were not just participants, but the drivers of the process—defining development paths, proposing specific activities and measures, reviewing and verifying all proposals in the Action Plan, and contributing to their realistic and applicable formulation. Their expertise, institutional knowledge, and responsibility enabled the strategy to be realistic, financially aligned, and integrated into existing municipal mechanisms.

The citizens of Sveti Nikole played a significant role through participation in surveys and consultations, contributing to the definition of the vision and priorities for climate resilience. Students, parents, and teaching staff from educational institutions actively supported the process by sharing visioning questionnaires and engaging in public awareness activities.

In the area of risk management and preparedness, contributions were made by the Territorial Firefighting Unit, also important support from the communal and forestry sectors was provided. Red Cross participated in the field of health and well-being, and technical support regarding the environment was provided from the Ministry of Environment and Physical Planning The community engagement process was supported by non-governmental organizations – Women's Organization of the Municipality of Sveti Nikole, Women's Civic Initiative and Scouting Squad "Goce Delchev", ensuring a responsible and inclusive approach.

The strategic and technical preparation of the documents was supported by **Pavlina Zdraveva** (Climate Change Expert), **Petar Atanasov** (Policy and Measure Development Expert), and **Olimpija Hristova Zaevska** (Financial Expert), who provided essential contributions to the analysis, formulation of measures, and investment planning.

The process was facilitated and technically supported by the **Association of Citizens SmartUp – Social Innovation Lab Skopje**, an organization specializing in public sector innovation.

This collective dedication contributed to the creation of a strategy based on strong institutional partnership, inclusiveness, and mutual responsibility. The development of this document and the implementation of the capacity-building program were made possible with the support of the **Pathways2Resilience (P2R)** team and **EIT Climate-KIC**, whose strategic leadership and resources were essential to the success of this process.

Abbreviations and acronyms

Acronym	Description
CSO	Civil Society Organization
EV	Electric Vehicle
GHG	Greenhouse gases
GDP	Gross Domestic Product
GHG	Green house gases
ILDP	Integrated Local Development Plan
LEAP	Local Environmental Action Plan
LED	Local Economic Development
LVI	Climate Change Livelihood Vulnerability Index
NARDS	National Strategy for Agriculture and Rural Development
NECP	National Energy and Climate Plan
P2R	Pathways2Resilience
SSDF	Strategy for Sustainable Development of Forestry
STEEP	Social, Technological, Economic, Environmental, Political
WMP	Waste Management Plan

Glossary

Term	Short definition
Adaptation	The practice of identifying options to adapt to climate change and evaluating them in terms of criteria such as availability, benefits, costs, effectiveness, efficiency, and feasibility.
Climate action	Climate action means stepped-up efforts to reduce greenhouse gas emissions and strengthen resilience and adaptive capacity to climate-induced impacts, including: climate-related hazards in all countries; integrating climate change measures into national policies, strategies and planning; and improving education, awareness-raising and human and institutional capacity with respect to climate change mitigation, adaptation, impact reduction and early warning
Climate-smart agriculture	Climate change multiplies and alters the challenges of achieving sustainable agricultural growth for food security, and this has important implications for investment strategies. Climate-smart agriculture (CSA) is an approach that helps to transform and reorient agricultural systems to ensure food security in a changing climate.
Co-creation	Collaborative design or decision-making involving stakeholders from different sectors and communities.
Just resilience	Ensuring that climate adaptation is fair, inclusive, and benefits vulnerable and marginalized groups.
Mitigation	Climate change mitigation consists of actions to limit the magnitude or rate of long-term global warming and its related effects.
Multi-level governance	Coordination of climate action across local, regional, national, and EU levels.
Pathways2Resilience Baseline assessment	A starting-point evaluation that captures current conditions, risks, and capacities for planning future actions.
Pathways2Resilience self-assessment	A structured tool that helps regions and municipalities evaluate their capacity for climate resilience across key dimensions such as governance, finance, knowledge and data, skills, and community engagement—identifying strengths, gaps, and priorities for future action within the Pathways2Resilience programme.

Resilience	In this document, 'resilience' refers to the capacity of Sveti Nikole's community, ecosystems, and institutions to anticipate, prepare for, respond to, and recover from climate-related impacts — while maintaining essential functions and enabling sustainable development.

Disclaimer

The content of this report reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

1. INTRODUCTION

Across Europe and the Western Balkans, the impacts of climate change are becoming increasingly visible through more frequent heatwaves, extreme rainfall and growing pressure on water, food and energy systems. Despite ongoing adaptation efforts, the pace and scale of change have not kept up with the rising needs, widening the gap between climate risks and local preparedness.

Sveti Nikole is no exception. With a strong agricultural base and a population already experiencing the effects of climate change, the municipality has faced intensifying heatwaves, irregular precipitation and pressures on its water and agricultural systems. These challenges have directly affected food security, economic stability, and the well-being of local communities. Without decisive and sustained action, these impacts are expected to deepen over the next 25 years.

Recognizing the urgency of the situation, municipal officials, supported by the civil society organization (CSO) "SmartUp – Social Innovation Lab", have joined the EU-funded Pathways2Resilience initiative. Coordinated by Climate-KIC and funded by the European Union, this program empowers European regions and communities, including Sveti Nikole, to co-design and implement locally driven Climate Resilience Strategies.

Sveti Nikole's Climate Resilience Strategy provides a framework for long-term adaptation planning, investment prioritization and institutional strengthening. Its goal is to ensure sustainable livelihoods, safer communities and more resilient ecosystems.

1.1 LOCAL PROFILE

The Municipality of Sveti Nikole is situated in the central-eastern part of North Macedonia, within the Vardar Planning Region. It covers an area of 480 km^2 and includes 34 settlements, 32 of which are permanently inhabited. The administrative center is the town of Sveti Nikole. The municipality borders several others (Probištip, Kumanovo, Petrovec, Veles, Lozovo, Štip and Karbinci) positioning it as a key node in regional development. The region experiences a mix of continental and Mediterranean climates, with an average annual temperature of 12.9°C and annual precipitation of 468 mm. The area receives over 2,300 hours of sunshine per year, offering strong potential for solar energy development.

Sveti Nikole is home to approximately 15,320 residents (50% women), with 11,728 living in the urban center. The municipality is experiencing demographic decline, with a shrinking and aging population, 30% of residents are over 60 years old, while only 18% are under 19. Outmigration, particularly among youth, is driven by limited employment opportunities and underdeveloped infrastructure. The local economy is dominated by agriculture, which contributes nearly 39% of the municipal GDP. Other significant sectors include trade (22.6%) and food processing.

Climate analysis based on long-term data from the Štip meteorological station (the closest station referent to Sveti Nikole) reveals a clear warming trend (see Annex 1 for more details). The decade 2011–2020 stands out as the warmest across all seasons, particularly summer. The year 2024 was the hottest on record, and 2012 experienced 10 heatwaves lasting a total of 79 days (almost three months). The vegetation period has also extended, reaching 346 days in 2009, suggesting near year-round growing conditions that offer some agricultural opportunities but also signal ecological shifts and increased risks from pests, diseases and water stress. These trends make Sveti Nikole increasingly vulnerable to heat stress, drought and land degradation. Precipitation patterns are changing. Although annual rainfall totals have declined, especially in recent years (notably 2000, 2019, 2022 and 2023), extreme rainfall events (>40mm) have intensified. Snowfall has also diminished, contributing to drought conditions, reduced water availability and heightened wildfire risk.

Wind data for Sveti Nikole is currently fragmented and insufficient for long-term climate planning. Three stations provide measurements: Štip (data from 2010), Štip-Mustafino (closer to Sveti Nikole but set up for cargo airport purposes) and Amzabegovo/Sveti Nikole (most relevant but only has data from 2023). Additional

data and specialized analysis are needed to develop wind roses for planning shelterbelts, wildfire prevention and waste dispersion control.

Wildfires have surged in frequency and intensity. In 2024, over 200 fires were recorded in Sveti Nikole, burning more than 160 hectares. These fires damaged fields, forests, homes and farm buildings. The largest fire in August 2023 affected 120 hectares and required over 70 responders. Between 2012 and 2022, forest fires caused an estimated 34 million MKD in damages, figures that likely underestimate the true cost, as they exclude ecosystem losses and long-term impacts on productivity and carbon sequestration. Because natural resources such as trees and forest ecosystems are often assigned zero monetary value, the full cost of climate-related disasters remains hidden. As climate risks intensify, future assessments must account for ecosystem loss, carbon storage and biodiversity.

Floods have also caused substantial damage, particularly in 2010, 2013 and 2015, with total losses estimated at nearly 40 million MKD. The 2013 floods affected 159 homes, agricultural land, roads, bridges, water supply systems and the municipality's main water well. These events disrupted daily life and agricultural productivity, yet current damage assessments often focus only on physical assets, overlooking long-term impacts on public services, environmental systems and community resilience.

Climate projections for North Macedonia indicate a strong link between rising temperatures and greenhouse-gas (GHG) emissions. Without strong efforts to reduce GHG emission, average annual temperatures could increase by up to 3.4°C by the end of the century, greatly intensifying heatwaves, droughts and heavy rainfall and further exacerbating vulnerabilities in Sveti Nikole. The national Long-term Strategy on Climate Action highlights the need for enhanced adaptation measures aligned with EU climate goals to limit warming to below 2°C, ideally 1.5°C. For municipalities like Sveti Nikole, this requires prioritizing climate-resilient infrastructure, sustainable land and water management, and community-based adaptation to safeguard ecosystems, livelihoods and public health.

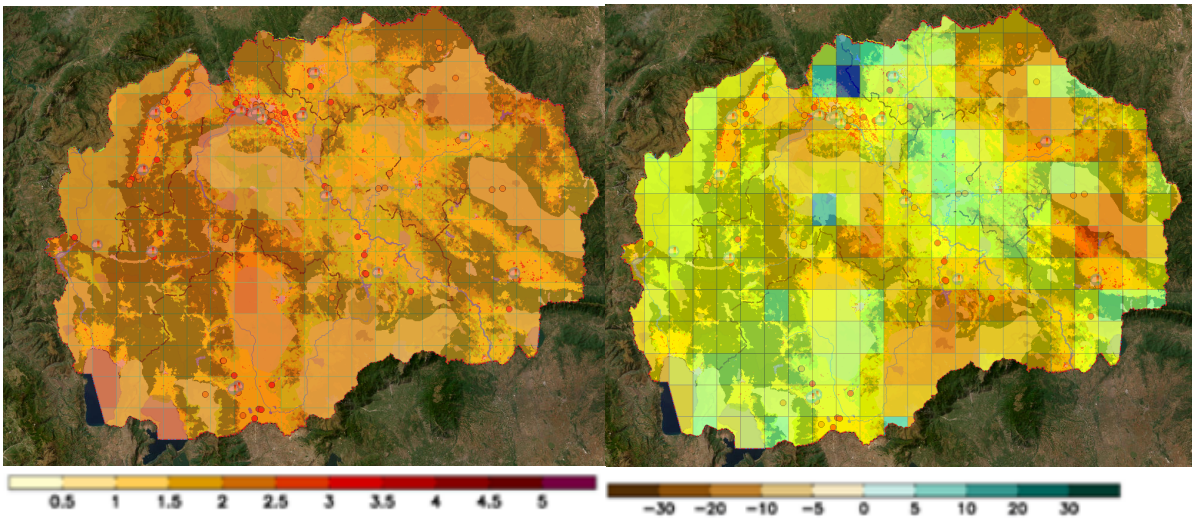


Figure 1. Pessimistic climate change scenarios for North Macedonia: Increase in average maximum temperatures in degrees Celsius (left) and decrease of precipitation on annual level in % (right)

The Livelihood Vulnerability Index (LVI) [1] ranks Sveti Nikole 33rd in the country, showing moderate vulnerability caused mainly by high sensitivity and exposure related to agriculture and water stress, while its adaptive capacity is relatively stronger thanks to past investments (see Annex 2 for more details).

[1] Developed as part of North Macedonia's Fourth National Communication on Climate Change (Ministry of Environment and Physical Planning, 2023). Link.

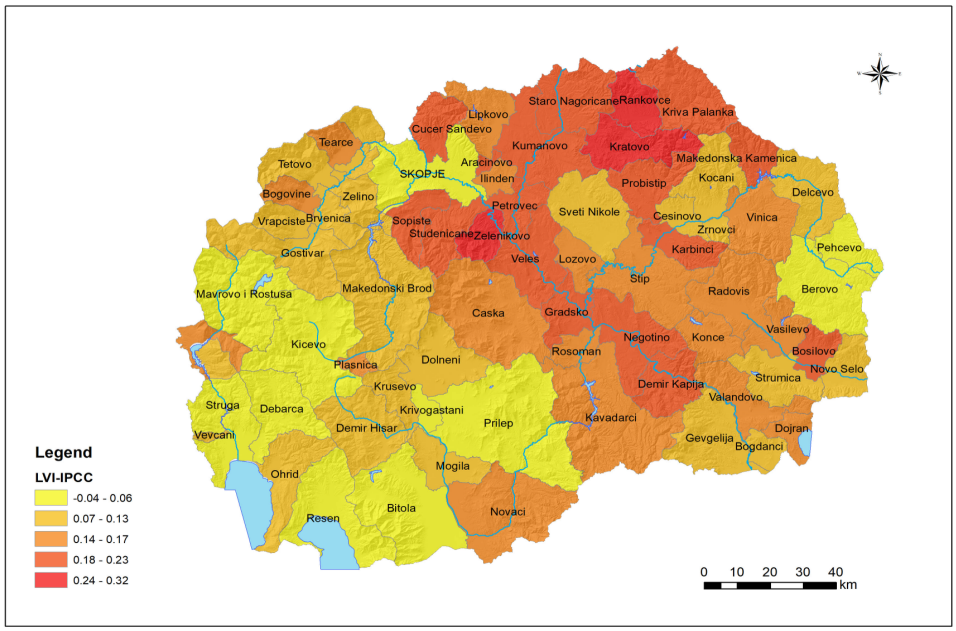


Figure 1. Vulnerability of municipalities to climate change (adaptive capacity, sensitivity and exposure)

The Pathways2Resilience self-assessment and the Baseline Assessment add to this picture by showing that institutional readiness is still low, with limited coordination, weak governance structures and low technical capacity for climate adaptation, climate finance, risk modelling and emergency response. Together, these results show that Sveti Nikole has manageable current vulnerability but important institutional gaps that require focused action to strengthen resilience.

Before exploring the barriers, the shared vision, and the behaviors aimed to change through this Strategy, it is important to pause and recognize what makes Sveti Nikole special. Beyond the climate challenges described above, the municipality is defined by strong community bonds, a deep connection to its agricultural landscape, and a sense of belonging that residents consistently highlight as core to their identity. The image shows why citizens of Sveti Nikole love living in their municipality.

Why Residents Love Sveti Nikole

1. Safety and Tranquility

A peaceful, quiet, and safe town — a place where people feel stable and secure, far frum the fast pace of big cities.

2. Personal Connection and Belonging

Many see Sveti Nikole as their home — the town where their families, friends, and memories create a sense of warmth and togetherness.

3. Proximity and Accessibility

"Everything is close" — the compact size of the town makes everyday life easy and convenient, with no need for a car.

4. Community and Atmosphere

Citizens emphasize warmth, friendship, and unity as the town's greatest values, Sveti Nikole is considered an ideal place for raising children.

5. Urban Advantages and Characteristics

Its favorable location, historica| significance, and care for public spaces (parks, playgrounds) contribute to a pleasant living environment.

Sveti Nikole is a town of peace, closeness, and human warmth — small, but big at heart.

1.2 PRIORITIES

This section outlines the strategic priorities that will guide Sveti Nikole's climate resilience efforts over the next five years. Developed through the Pathways2Resilience initiative, this strategy is not a general development plan, it is a focused framework for climate adaptation, risk reduction and inclusive resilience-building. It responds directly to local climate vulnerabilities and aligns with broader policy frameworks at the regional, national and EU levels.

At the **local level**, Sveti Nikole faces rising climate pressures—droughts, floods, wildfires and extreme temperatures—affecting agriculture, infrastructure and public health. Key **local priorities** include **energy-efficient public buildings and rooftop solar (8.4 million MKD), water and wastewater upgrades (15 million MKD), riverbank reinforcement and drainage systems (45 million MKD), improved waste management (2 million MKD), and sustainable urban and economic development (10 million MKD)**. Community investments such as the new kindergarten, sports facilities and expanded wastewater treatment further strengthen local resilience.

At the **regional level**, the Vardar Planning Region Development Program supports Sveti Nikole through **transport upgrades and EV charging (30 million MKD), public-building energy efficiency (8 million MKD), flood protection and early-warning systems (10 million MKD)**, as well as **irrigation modernization, organic farming and recycling infrastructure (27 million MKD)**. These **regional priorities** reinforce agricultural resilience and environmental management.

At the **national level**, North Macedonia's climate and development policies provide strong enabling conditions for local action. The main **national priorities** guiding Sveti Nikole include **clean energy transitions, municipal energy planning, climate-smart agriculture, sustainable forestry, waste-sector reforms and expanded early-warning systems**, supported through the National Development Strategy, Long-Term Climate Strategy, NDCs, NECP, and updated Energy and Energy Efficiency Laws. National co-financing further supports **solar installations, building retrofits, irrigation modernization, waste infrastructure and adaptation projects**.

At the **EU level**, accession unlocks financing for major **EU-aligned priorities** such as **renewable energy, energy efficiency, flood protection, waste systems, sustainable transport, modern agriculture and green jobs**, accessible through IPA III, WBIF, the EU Green Deal/JTM, IPARD III and the Economic & Investment Plan. Sveti Nikole's potential access to EU support is estimated at **€60 million**, including the €40 million regional waste facility and other eligible projects.

In the **private sector**, climate-relevant investment is expanding, with key **private-sector priorities** including **renewable energy (e.g., the €61 million Bogoslovec Wind Park), rooftop solar, energy-efficient technologies, organic farming, eco-tourism and circular-economy initiatives**. New residential development (e.g., Liska) and the municipality's Investor Profile Tool further attract sustainable investment and strengthen public-private partnerships.

2. VISION

2.1 CO-CREATED VISION

The vision below was co-created through a participatory process with citizens, municipal departments, civil society, and the City Council. During the workshops, participants developed specific visions across four thematic areas - Physical Space and Mobility, Infrastructure, Energy Efficiency and Citizen Inclusion - which together form the municipality's shared vision for a resilient Sveti Nikole.

By 2035, Sveti Nikole is a clean, green and safe city with accessible public spaces and efficient urban mobility. Modern water, waste and energy systems ensure sustainable infrastructure and reduce environmental risks. Green belts, parks and renewable-energy use make the city healthier and more resilient to climate impacts. Citizens of all ages are active participants in community life, supported by inclusive social services and guided by shared responsibility for a better future.

The vision is further defined by four thematic components that describe the future of Sveti Nikole across its core resilience priorities:

- **Physical Space & Mobility**: Citizens move freely on safe pedestrian and cycling paths, without parked cars blocking sidewalks. Traffic is well-organised through one-way streets and regulated parking, making movement through the city easier. Parks and green areas are maintained and shaded, offering not only recreation for all generations but also natural cooling solutions that help reduce urban heat stress and strengthen resilience to rising temperatures caused by climate change.
- **Infrastructure**: Streets are clean with an improved waste-management system. Water supply, drainage and flood-protection infrastructure are modernised, supported by early-warning and fire-prevention systems. Restored shelterbelts protect the city from erosion and wind, contributing to a healthier environment and reducing vulnerability to extreme weather events such as floods, wildfires and strong winds.
- **Energy Efficiency**: The community invests in insulation upgrades, renewable-energy production (especially solar) and storage, as well as sustainable heating and cooling systems that reduce dependence on fossil fuels. These measures directly support **climate mitigation and adaptation**, helping Sveti Nikole lower emissions and prepare for energy-related climate risks.
- **Citizen Inclusion**: Citizens are socially responsible and actively engaged in community development. A day-care centre for children and an adapted elderly-care home provide services for vulnerable groups, fostering solidarity and social cohesion. These inclusive services ensure that climate resilience efforts protect those most at risk, including children, the elderly and low-income households during heatwaves, floods and other climate-related hazards.

2.2 PARTICIPATORY PROCESS

A participatory series of workshops brought together municipal representatives, civil society, youth and community groups to envision possible climate-resilient futures for Sveti Nikole by 2035. Using scenario-building, STEEP analysis and backcasting, participants explored how different levels of investment in climate adaptation and citizen engagement could shape the municipality's development. These two dimensions formed the basis for four alternative futures that illustrate how Sveti Nikole might evolve depending on its preparedness, community involvement and response to emerging climate challenges. The scenario development process engaged over 50 stakeholders across 10 workshops, combining data analysis,

community input and institutional validation to ensure that the visions reflect both local priorities and real-world constraints.

Scenario 1 (preferred) – "Together Resilient" (Proactive investment + Active citizens)
In 2035, Sveti Nikole is recognised as a regional leader in inclusive and proactive climate adaptation. Citizens, businesses and institutions co-design green corridors, sustainable mobility and smart irrigation systems. Young people contribute to data and innovation platforms, while **older** generations share traditional knowledge. Municipal budgets reflect long-term adaptation plans, supported by donor and private investment. Every neighbourhood implements locally tailored resilience actions (such as awareness campaigns, community training and coordination during emergencies) supported by a dedicated **Municipal Resilience Officer**, a permanent position within the local administration ensuring alignment, knowledge sharing and continuity. Schools promote sustainability, and local businesses operate within circular economy principles. Social equity is prioritised, with targeted support for vulnerable groups.

Scenario 2 – "Slow Adaptation" (Reactive investment + Active citizens)
In this future, resilience is driven mainly by citizens rather than institutions. Community groups organise awareness workshops, install rainwater tanks and manage cooling centres during heatwaves. Farmers share drought-resistant seeds and teachers integrate climate literacy into schools. Despite strong civic spirit, institutional support remains inconsistent and underfunded. Some neighbourhoods progress, while others lag behind due to insufficient infrastructure or regulation. Citizens remain motivated but grow frustrated with slow institutional response.

Scenario 3 – "Inconsistent Gains" (Proactive investment + Passive citizens)
The municipality invests in infrastructure, expanding drainage systems, solar-powered lighting, and energy-efficient buildings, but citizen engagement is limited. While physical systems improve, social cohesion and awareness remain weak. Vulnerable groups receive limited benefits and adaptation efforts are mostly top-down. The city becomes cleaner and more modern, yet citizens feel detached from the process, perceiving resilience as an administrative, rather than collective, effort.

Scenario 4 – "Reactive Adaptation" (Reactive investment + Passive citizens)
This is the least desirable scenario. Sveti Nikole faces increasingly severe climate events - longer heatwaves, droughts, and wildfires- while institutions remain unprepared. Infrastructure deteriorates and community engagement is minimal. Citizens view climate risks as inevitable and beyond their influence. Migration increases, public health worsens and social inequalities deepen.

		Citizen Engagement →	
		Active Citizens	**Passive Citizens**
Level of Investment in Climate Adaptation →	**Proactive Investment**	**Scenario 1 – "Together Resilient"** Inclusive, forward-looking, and collaborative adaptation. Municipalities and citizens co-invest in sustainable infrastructure, renewable energy and local resilience centres.	**Scenario 3 – "Inconsistent Gains"** Infrastructure investments advance, but community participation remains limited. Adaptation is technical rather than social, producing uneven benefits.
	Reactive Investment	**Scenario 2 – "Slow Adaptation"** Citizens drive adaptation through grassroots action and solidarity, while institutional response remains slow and underfunded.	**Scenario 4 – "Reactive Adaptation"** Institutions and citizens respond only after crises. Limited preparedness leads to escalating risks, losses and migration.

Table 1. Climate change adaptation scenario matrix

2.3 LOCAL CHAMPIONS AND AMBASSADORS

More than **40 local champions and ambassadors** from across municipal departments, political leadership, public utilities, emergency services, education, civil society, health and environmental institutions actively contributed to the Resilience Lab Sveti Nikole process. Their engagement, ranging from political support and technical expertise to data sharing, community outreach and operational coordination, ensured that the Strategy reflects real local needs and institutional capacities. This diverse group, including the Mayor, Council members, municipal administration, firefighting units, public enterprises, schools, NGOs and women's and youth organizations, played a key role in co-creation workshops, validation sessions and data-driven planning. Together, they provide a strong foundation of commitment and collaboration that will support Sveti Nikole's long-term climate-resilience journey. The table below summarizes the list of committed local champions and ambassadors, including their scope and type of contribution. A full list of active stakeholders is presented in Annex 4.

Political and Governance Stakeholders				
Name	Position	Organization	Type of Commitment	Scope of Support
Ivica Arsov	Head of Department for Local Economic Development and Public Activities	Municipality of Sveti Nikole	Coordination Knowledge Sharing	Leads coordination of the resilience strategy, facilitates cross-departmental collaboration, and ensures alignment with local development plans.
Ivana Dimitrova	Social care advisor	Municipality of Sveti Nikole	Coordination Knowledge Sharing	Contributes data and insights on vulnerable groups and social inclusion measures in climate adaptation planning.
Liljana Arsovska	Advisor Inspector – Authorized Environmental Inspector	Municipality of Sveti Nikole	Knowledge Sharing Resources	Ensures environmental compliance of local projects and supports integration of environmental protection standards in adaptation actions.
Zlatko Malinov	Associate for mechanical installations	Municipality of Sveti Nikole	Participation Coordination	Supports administrative and operational coordination of project-related municipal activities.
Jonche Stojanov	Assistant Head of the Sector for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land	Municipality of Sveti Nikole	Knowledge Sharing Coordination	Contributes expertise in urban planning and environmental management, supporting integration of resilience criteria in spatial planning documents.
Elena Pesheva	Head of the Department for Communal Works	Municipality of Sveti Nikole	Knowledge Sharing Coordination	Contributes expertise in coordinating municipal infrastructure projects and streamlining communal services to enhance local resilience.

Table 2. Political and governance actors

3. CLIMATE RESILIENCE OBJECTIVES

CHALLENGE STATEMENT

The Municipality of Sveti Nikole faces a complex set of climate-related challenges, including heatwaves, droughts, floods, wildfires, strong winds and shifting precipitation patterns. These hazards are intensifying due to long-term warming trends, reduced water availability and more frequent extreme weather events. The impacts are particularly severe for agriculture, the backbone of the local economy, as well as for infrastructure, ecosystems and public health.

Root causes include outdated water and wastewater systems, inefficient energy use, erosion-prone land and limited early warning and emergency response capacity. A major barrier is the lack of institutional capacity and technical knowledge within local institutions working on climate-related issues, which limits the ability to plan and implement effective adaptation measures. Socio-economic factors such as demographic decline, youth outmigration and disparities between men and women further compound vulnerability. Without targeted adaptation, these risks threaten to undermine the municipality's resilience goals and long-term socio-economic progress.

The ideal outcome is a climate-resilient Sveti Nikole, where infrastructure is upgraded and future-proofed (climate change proofed), ecosystems are protected, livelihoods are secure and communities are empowered to anticipate, adapt to and recover from climate impacts. This outcome is not only technical, it is also social. It envisions a municipality where citizens actively participate in shaping and implementing climate actions and where young people choose to stay, contribute and fight for the future of their community. It reflects the 2035 vision co-created by Sveti Nikole's residents during the participatory workshops.

PRIMARY ADAPTATION OBJECTIVES

While all six adaptation priorities outlined below are considered important for the long-term resilience of Sveti Nikole, the municipality has chosen to focus on three key areas during this implementation period:

- **Water Security, Wastewater management and Drought Resilience**;
- **Energy Efficiency, Renewable Energy and storage**; and
- **Waste Management**.

This prioritization reflects the urgency of addressing water shortages, improving energy performance in public infrastructure and mitigating environmental risks associated with inadequate waste management. These areas were selected based on their immediate impact on public health, economic stability and climate resilience, as well as the availability of funding and technical support to enable timely implementation. Nonetheless, the municipality remains committed to the broader set of priorities, and if opportunities arise (such as new funding, partnerships, or urgent needs) the strategy and its focus areas will be revisited and revised accordingly.

1. Water Security, Wastewater management and Drought Resilience

Sveti Nikole often faces water shortages that affect agriculture and public health. Therefore, this strategy focuses on expanding water supply systems in rural areas and upgrading irrigation to help farmers use water more efficiently. It also includes fixing old water pipelines and replacing asbestos pipes to improve water safety and reliability. In addition, the municipality plans to expand its wastewater treatment facilitiess. These actions aim to ensure equitable access to clean water, reduce environmental pollution and enhance resilience to prolonged droughts and seasonal water stress.

2. Energy Efficiency, Renewable Energy and Storage

High energy consumption and inadequate insulation in public buildings, put pressure on both the environment and the municipal budget. Therefore, this strategy envisages retrofitting of municipal facilities, expansion of rooftop solar systems and investments in battery storage to capture and utilize excess electricity. Additionally, the transition to energy-efficient public lighting will further reduce operational costs and emissions. Citizens and local businesses are also key actors in this transition. Through actions such as improving home insulation, installing solar panels, and adopting energy-efficient appliances, residents can significantly reduce their energy use and costs. Financial support is available through mechanisms like the Green Economy Financing Facility (GEFF), which offers accessible funding for households and small enterprises to invest in sustainable energy solutions. These actions align with national and EU decarbonization goals and reduce dependence on fossil fuels.

3. **Waste Management**

Inadequate waste collection, illegal dumping and limited recycling infrastructure pose environmental and public health risks in Sveti Nikole. Therefore, this strategy promotes a circular economy approach, including improved waste separation, composting and enforcement of environmental regulations. These actions aim to reduce waste ending up in landfills or being illegally dumped and prevent flood-related blockages.

4. Sustainable Agriculture and Land Management

Agriculture is a key part of Sveti Nikole's economy, but it's becoming more vulnerable to climate change. Problems like soil degradation, extreme weather, and water shortages are affecting farmers. This strategy supports climate-smart farming, crop diversification, and soil protection to improve food security and rural incomes. Frequent strong winds in the area cause erosion and loss of topsoil, so windbreaks and agroforestry are important tools for better land management.

5. Disaster Risk Reduction, Public Health and Infrastructure Resilience

The municipality faces floods, wildfires, strong winds and heatwaves that damage buildings and disrupt services. Hot summers and long heatwaves are especially dangerous for older people and other vulnerable groups. Therefote, this strategy suggests investments in early warning systems, cooling areas, shaded public spaces and improved emergency response. Upgrades like stronger riverbanks and improved drainage will help protect against floods and erosion, while also making the town more resilient to climate change.

6. Inclusive and Climate-Responsive Urban Development

Urban areas face growing pressure from heatwaves, poor air quality and limited green space. Therefore, this strategy promotes the integration of green infrastructure, sustainable mobility and public space improvements to enhance liveability and reduce climate-related health risks

4. ADAPTATION PATHWAYS

The following adaptation pathways translate the municipality's climate vision into actionable steps, evaluating the performance of each sequence, highlighting feasibility limits and offering mitigation measures. Together, they help chart a clear, evidence-based course for strengthening Sveti Nikole's resilience over time.

Pathway sequence	Performance against criteria	Adaptation limits	Selected (yes / no)	Mitigation of negative effects
Water Security & Drought Resilience → Water pipeline replacement → Rainwater harvesting systems → Wastewater treatment expansion	High performance on water system resilience, public health, and drought adaptation	Funding constraints; technical capacity in rural areas	Yes	Use phased implementation; Leverage IPA III and national co-financing; Promote citizen awareness
Energy Efficiency & Renewable Energy → Rooftop solar installations → Battery storage systems → LED public lighting retrofit → Building insulation retrofits	Strong performance on energy savings, emissions reduction, and grid resilience.	Initial investment costs; Skilled workforce availability.	Yes	Use GEFF and Energy Efficiency Fund; Promote local training and ESCO models.
Waste Management & Circular Economy → Composting facility development → Illegal dump site clean-up → Support for reuse/recycling businesses	High performance on waste reduction, circularity, and job creation.	Market development; Public awareness.	Yes	Launch awareness campaigns; Offer incentives for small businesses; Enforce regulations.
Urban Climate Resilience & Public Health → Cooling areas and shaded public spaces → Early warning systems → Public drinking water stations	Strong performance on health, safety, and social equity.	Space availability; maintenance and outreach.	Yes	Prioritize vulnerable neighborhoods; Integrate with health services and schools.
Urban green infrastructure (with fire-resistant and drought-tolerant species) → Shelterbelt restoration → Initiate and sustain formal cooperation with universities across disciplines (such as forestry, civil engineering, mechanical engineering, environmental sciences) → Engage students in applied projects (e.g. rainwater capture, circular economy products, erosion control)	High performance on biodiversity, wildfire prevention, erosion control, innovation, and capacity building	Land availability; long-term maintenance; coordination with academic institutions	Yes	Sign MoUs with universities; integrate student projects into municipal planning; Co-develop pilot initiatives with academic mentors; Align with national education and innovation programs.
Nature-Based Solutions & Ecosystem Resilience → Urban green infrastructure (with fire-resistant and drought-tolerant species)	High performance on biodiversity, wildfire	Land availability; long-term maintenance.	Yes	Use native species; Involve forestry and meteorological experts

→ Shelterbelt restoration → Cooperation with universities and student engagement in applied projects	prevention, and erosion control.			or universities; Integrate with land-use plans.
Citizen Engagement & Capacity Building → Community training and awareness programs	Strong performance on inclusion, behavioral change, and governance	Participation levels; Post-project continuity.	Yes	Institutionalize programs via schools and NGOs; Appoint Resilience Officer.

Table 3. Adaptation pathways for strengthening the resilience of the Municipality of Sveti Nikole

5. INNOVATION PORTFOLIO

The Innovation Portfolio represents the complete set of innovation actions developed through participatory processes involving municipal departments, utilities, civil society, the private sector and local communities. These actions, 45 short-term and 20 medium/long-term, form the building blocks of the Portfolio. The municipality assessed readiness for actions in three urgent priorities (Water, Energy, Waste/Circular) based on criteria such as feasibility, governance, financing, permitting, resourcing, and project planning. The resulting Innovation Portfolio ensures:

- A mix of low-risk, proven solutions
- Coverage across different strategic objectives
- Representation of short-, medium- and long-term impacts
- Integration of technological and nature-based innovations

This structure allows the Municipality of Sveti Nikole to advance priority actions while maintaining a balanced, diversified and future-oriented pipeline of climate resilience initiatives.

Priority		Explanation	Portfolio Alignment
Water Security, Wastewater Management and Drought Resilience			No-regret measures and activities, rapid-response initiatives
	Water Security & Drought Resilience	This pathway begins with the replacement of aging and asbestos water pipelines, a critical short-term measure to improve water safety and reliability. It then progresses to the installation of rainwater	A1: Replacement of old, asbestos pipes A2: Reducing water losses and improving water supply efficiency A3: Installation of a line crusher for hard materials A4: Construction of a Sewage treatment plant

		harvesting systems, enhancing drought resilience and supporting urban greening. Finally, the expansion of wastewater treatment facilities ensures broader coverage and environmental protection.	A5: Raising public awareness about saving water resources
	Urban Climate Resilience & Public Health	To protect vulnerable populations from heat waves and extreme weather, this pathway introduces cooling areas and shaded public spaces, early warning systems, and public drinking water stations. These measures are essential for enhancing health and safety across neighborhoods.	A1: Creating Urban Cooling Areas A2: Construction of a public parking lot with photovoltaics A3: Placing benches next to canopies and canopies in strategic locations
	Nature-Based Solutions & Ecosystem Resilience	This pathway includes the expansion of urban green infrastructure using fire-resistant and drought-tolerant species, alongside shelterbelt restoration to combat erosion and wind damage. It supports long-term ecological stability and biodiversity, while also contributing to drought resilience and land rehabilitation, linking it to both water security and waste management priorities.	A1: Creating a Green Cadastre of the Municipality of Sveti Nikole A2: Urban and Landscape Greening Strategy A3: Programme for establishment and maintenance of greenery A4: Project-technical documentation for the design and construction of greenery A5: Study for the location of new forest belts A6: Afforestation with indigenous and diverse tree species
Energy Efficiency, Renewable Energy and Storage			No-regret measures and activities, policy reform, infrastructure upgrades, nature-based solutions
	Energy Efficiency & Renewable Energy	This pathway starts with rooftop solar installations on public buildings, followed by the deployment of battery storage systems to enhance energy resilience. Retrofitting public lighting with LED systems and improving building insulation are medium-term actions that reduce energy consumption and emissions.	A1: Preparation of an Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) with measures from the Pathways2Resilienceclimate resilience strategy included in it A2: Promotional campaign to raise awareness among citizens about the importance of energy efficient systems A3: Renovation of public buildings using energy efficient (EE) technologies A4: Establishing partnership with the private sector A5: Installation of "white roofs" on public buildings A6: Installation of solar panels on public buildings A7: Establishing an Energy Storage System

			A8: Adding the municipality of Sveti Nikole into the GIS Solar Cadastre database
	Urban Green Infrastructure & Academic Collaboration	This sequence adds formal cooperation with universities and student engagement in applied projects such as rainwater capture and erosion control. It fosters innovation and capacity-building.	A1: Reconstruction and arrangement of green areas and creation of green zones A2: Green Urban Planning A3: Partnership for Climate Change Adaptation
Waste Management			No-regret measures and activities, policy reform, infrastructure upgrades, climate information services
	Waste Management & Circular Economy	This pathway focuses on developing municipal composting facilities, cleaning up illegal dump sites, and supporting small businesses engaged in reuse and recycling. These actions aim to reduce waste that ends up dumped or in landfills, environmental risks and stimulate green job creation.	A1: Cleaning up the "wild" (non-standard) landfills and converting those areas into places that will be used by the public A2: Procurement of vehicles for cleaning streets and other surfaces A3: Waste selection
	Citizen Engagement & Capacity Building	This pathway centers on community training and awareness programs to foster inclusive governance and behavioral change. It is a foundational element for sustaining resilience beyond the project lifecycle.	A1: Resilience officer A2: Campaign on the importance of waste selection and promotion of educational tools A3: Information and educational campaign: Select to receive

Table 4. Priorities and alignment of climate resilience initiatives – Municipality of Sveti Nikole

6. REGIONAL CAPACITY

The P2R self-assessment places the Municipality of Sveti Nikole in the “low readiness” category across all phases of the Regional Resilience Journey (overall score: 1.13 / 10). The lowest performance is in Phase 3 – Design Pathways (0.42), indicating limited experience with integrated adaptation planning and long-term prioritisation.

The analysis highlights five critical RMC areas that must be strengthened to enable future implementation of the Climate Resilience Strategy:

1. Cross-sectoral coordination - Coordination between municipal departments and public enterprises remains inconsistent, limiting integrated planning and information flow.
2. Data integration and risk analysis - Data relevant to climate risks are dispersed, not standardised, and seldom used for decision-making.
3. Technical and operational capacity - Only a small number of staff possess skills related to climate adaptation, climate finance, or monitoring systems.
4. Stakeholder and community participation - Engagement activities exist but are not systematic or embedded in formal municipal processes.
5. Learning and adaptive review - The municipality lacks structured mechanisms for monitoring progress, evaluating pilot measures, and adjusting plans based on evidence.

Together, these gaps indicate that significant capacity strengthening will be necessary before the municipality can move toward implementation of the adaptation pathways identified in the strategy. The following key enabling conditions describe the areas that need to be strengthened to enable future implementation of the Climate Resilience Strategy.

Knowledge and data	
Role in implementation	To operationalize the strategy, the municipality must move beyond fragmented data practices and establish an integrated system for climate, socio-economic, and infrastructure data. Partnerships with regional and national institutions can support this effort.
Gaps	• Fragmented data sources and inconsistent data quality across departments. • Absence of an integrated municipal system for collecting and analysing climate and socio-economic data. • Limited capacity for GIS use and data visualisation. • Lack of regular data-update protocols and open-data procedures.
Opportunities	✓ Activity from the Short-term delivery plan: **"Resilience" folder** (The Resilience Folder is a networked online folder that uses basic technology to ensure the accessibility and transparency of policies, plans or data. The shared folder "Resilience" in the municipality of Sveti Nikole will be updated with current information at precisely defined periods) ✓ Activity from the Short-term delivery plan: **Education for local stakeholders** (Education of responsible persons in the municipality through physical and online visits of workshops and seminars in/from EU countries and study visits to municipalities in neighbouring countries)

Table 5. Knowledge and data: Key requirement for implementing the Climate Change Resilience Strategy

Capabilities and skills	
Role in implementation	Building the right technical and operational skills is essential for preparing climate projects, using data effectively, coordinating stakeholders, and managing adaptation processes. Strengthened capabilities would enable municipal staff to translate strategic pathways into practical actions and ensure continuity beyond project-based initiatives.
Gaps	• Limited number of staff with expertise in climate adaptation, monitoring, and finance. • Absence of structured and recurring capacity-building programmes

	• No dedicated resilience-focused function within the municipal administration • Lack of dedicated municipal budget to support resilience-related activities and specialized roles. • Limited access to national technical-assistance and training programmes
Opportunities	✓ Activity from the Short-term delivery plan**: Resilience officer -** a responsible person in the municipality who will be responsible for supporting and monitoring the implementation of this Strategy and Action Plan, in order for the municipality and its residents to more easily prepare for, cope with and recover from risks, crises and the consequences caused by climate change ✓ Activity from the Short-term delivery plan: **Access to training programs and technical support** - Increasing access of responsible people from the Municipality of Sveti Nikole to training programs and technical support through membership in national and international databases, forums, and newsletters

Table 6. Capacities and skills: Key requirement for implementing the Climate Change Resilience Strategy

Behavioural change	
Role in implementation	Behavioural change across municipal staff, institutions, local businesses, and residents is critical for embedding resilience thinking into everyday decisions. Encouraging proactive engagement, cross-department collaboration, and community awareness helps ensure adaptation is recognised as a shared responsibility rather than a short-term project.
Gaps	• Adaptation is still perceived mainly as project-based rather than ongoing practice. • Limited incentives for inter-departmental cooperation and proactive citizen engagement. • Irregular communicaiton for and awarenes-raising activities. • Low integration of behavioural considerations in municipal service delivery
Opportunities	✓ Activity from the Mid- and long-term delivery plan: **Improving communication** (holding meetings between responsible persons from different departments in the municipality on a regularly established (quarterly) level in order to improve communication and share good / successful practices between departments in the municipality. Building team spirit in local government through team-building activities in order to improve internal communication in the municipality and the communication with the residents of the municipality)

Table 7. Behavioral change: Key requirement for implementing the Climate Change Resilience Strategy

Experimentation, strategic learning and reflective adjustment	
Role in implementation	Experimentation and learning enable the municipality to refine its approach over time. Small-scale testing, monitoring frameworks, and reflective practices help identify effective measures, adjust pathways, and support long-term decision-making in a changing climate.
Gaps	• No formal mechanism for monitoring and evaluating adaptation measures. • Limited documentation and sharing of good practices. • Few opportunities for reginal peer learning or exchange • Insufficient resources dedicated to experimentation, evaluation and innovation.
Opportunities	✓ Activity from the Mid- and long-term delivery plan: **Building the capacities of the municipality** (building the capacities of employees in the municipality of Sveti Nikole through their attendance at national and international trainings, workshops and seminars in the areas of: - climate change adaptation - monitoring and evaluation - budgeting and financing - capacity building programs)

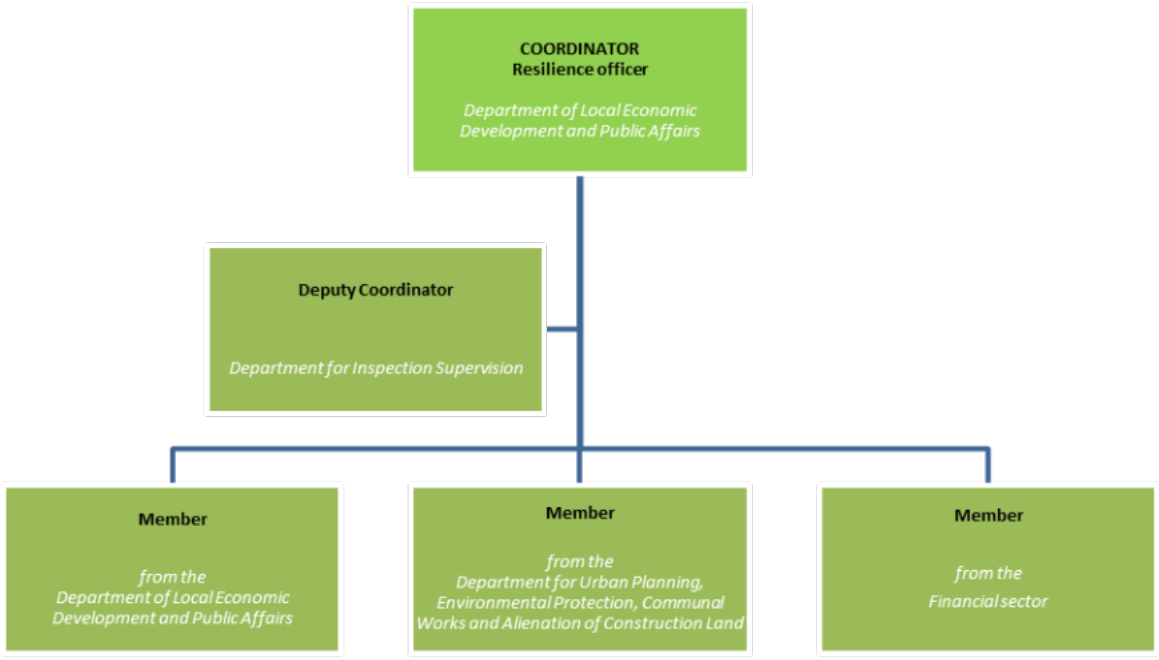
Table 8. Experimentation, strategic learning and reflective adaptation: Key requirement for implementing the Climate Change Resilience Strategy

7. GOVERNANCE

The implementation of the Climate resilience strategy for the Municipality of Sveti Nikole and this Action Plan needs strong political support and mandate, administrative coordination and active role of managers / heads of the municipal sectors and departments. The successful implementation of the strategy and this action plan needs a formalized body or mechanism for coordination, not ad-hoc project management. That is why the responsible people from the Municipality plan to form a Coordination Body that will include responsible people from the following departments / sectors:

- Department of Local Economic Development and Public Affairs (2 members, one of which will be the Coordinator of the Body – Resilience Officer)
- Department for Inspection Supervision (Deputy Coordinator)
- Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land
- Financial sector

COORDINATION BODY



Graph 1. Coordinating Body for the Implementation of the Climate Change Resilience Strategy

The detailed roles and responsibilities of the entities and persons involved in the implementation of the Action plan can be presented in the following way:

Roles	Responsible entity	Contact person	Core/support role?	Detail responsibilities
Program Owner	Local Self-government of Sveti Nikole	Mayor of the Municipality	Support role	- Overall ownership of the climate resilience action plan - Providing political leadership and strategic direction

Implementation of the Action Plan	**Resilience Officer** / **Sector/Department Leads** (LED, Finances, Water, Infrastructure, Waste, Health, Energy)	Resilience Officer (TBD) / Ivica Arsov	Core role	- Set priorities, timelines, and performance targets - Coordination of all measures as a single portfolio - Alignment of sectoral activities with the budget - Translate the Action Plan into sector-specific actions - Integrate resilience measures into sector plans and budgets - Oversee project execution within their sector
Finance & Budgeting	Department of Local Economic Development and Public Affairs / Financial sector	Member of the Coordination Body from the Financial sector	Support role	- Secure funding (public, private, donor, blended finance) - Linking strategic priorities to the annual and medium-term budget - Allocate budgets and track expenditures - Ensure financial compliance and sustainability - Visibility of climate priorities in budget lines
Yearly work programmes and plans of the Municipal sectors / departments	**Sector/Department Leads** (LED, Finances, Water, Infrastructure, Waste, Health, Energy)	Current heads of each sector / department	Core role	- Alignment of annual sector / department work plans and programmes with the Strategy and the Action Plan - Adjustment and revision throughout the year - Using the Strategy and the Action Plan as a reference document in planning
Communications & Stakeholder Engagement	Department of Local Economic Development and Public Affairs	Ivana Dimitrova	Support role	- Communicate goals, progress, and results - Manage public awareness and stakeholder buy-in - Support transparency and accountability
Monitoring, Evaluation & Learning (MEL)	**Coordination Body** for implementation of the Strategy	Ivica Arsov Ivana Dimitrova	Core role	- Monitoring progress and cross-sectoral coordination - Define indicators and success metrics - Track implementation progress and resilience outcomes - Feed lessons learned back into planning and adaptation

Table 9. Roles and responsibilities of the entities in implementing the Action Plan

8. MONITORING, EVALUATION AND LEARNING

Effective Monitoring, evaluation, and learning (MEL) will ensure that the Climate Resilience Strategy is implemented effectively and remains aligned with its 2035 vision. The MEL system will track progress on priority adaptation pathways, measure compliance with guiding principles, and assess whether high-level outcomes are achieved. It will provide clear performance metrics for water security, energy efficiency, waste management, social inclusion, and governance, enabling timely adjustments and evidence-based decision-making. The Municipality of Sveti Nikole will operate a structured monitoring system integrated into a central resilience database, with annual data collection and reporting across indicators for water security, energy efficiency, waste management, mobility, public spaces, and social inclusion. The system will use GIS mapping, digital dashboards, and standardized templates, supported by partnerships with the Regional Crisis Management Center, Public Utility Komunalec, national meteorological institutions, universities, NGOs, and schools. Data quality will be ensured through cross-departmental verification, annual audits, and technical support from municipal IT staff and external experts. High-level outcomes from the Theory of Change will be monitored through structured indicators and annual review sessions:

	Desired Outcome	**Monitoring Approach**	**Metrics**
Physical Space & Mobility	Safe, green and accessible public spaces with improved mobility.	GIS mapping of upgraded sidewalks, cycling paths and green corridors; Municipal reports on traffic and mobility improvements.	• Kilometers of upgraded sidewalks and cycling paths *(Baseline: 0; Target: 10 km by 2030)* • Number of green corridors and shelterbelts built/restored *(Baseline: 0; Target: 3 by 2030)* • Number of cooling/shaded public spaces established (Baseline: 0; Target: cooling areas in all neighborhoods).
Water & Infrastructure Systems	Modernized water, drainage and wastewater systems that reduce climate risks.	Infrastructure audits; GIS mapping; Quarterly progress reports from public utilities.	• % of households with reliable water access (Baseline: 95% rural, 99% urban; Target: ≥96% both) • % of asbestos pipes replaced (Baseline: 15,278 m; Target: 20%) • Wastewater treatment volume (target: 600,000 m^3) • Number of early-warning systems installed for floods and fires (Baseline: 546,041 m^3; Target: 600,000 m^3).
Energy Efficiency & Buildings	Reduced energy consumption and increased renewable energy use in public buildings.	Energy audits; Municipal reports; Installation verification.	• % of municipal buildings retrofitted (Target: 66%) • Number of solar installations (Target: 8) • Installed solar capacity (Baseline: 435 kW; Taget: +20%) • % of solar energy stored and reused (Baseline: 0; Target: ≥30% by 2035).
Citizen Engagement & Social Inclusion	Active citizen participation and improved services for vulnerable groups.	Participation records; Operational status checks; Annual equity audits.	• Number of participatory forums held annually (Target: ≥1) • % of citizens engaged in resilience initiatives (Target: ≥30%)

			• Operational status of new day-care and elderly centers (Target: 1 each) • % of vulnerable households supported (Target: ≥30%).

Table 10. Monitoring, evaluation and learning: Desired outcomes, approaches and indicators

The learning component ensures that monitoring results directly inform the implementation and governance of the Climate Resilience Strategy through structured feedback loops linking data, decision-making and stakeholder engagement. Each year, the municipality will hold Annual Review Sessions to consolidate monitoring findings and assess progress across the four thematic areas, using results to adjust adaptation pathways, project sequencing and budgets. These will be followed by Stakeholder Workshops with NGOs, schools, the Red Cross, private sector actors and academic institutions to validate results and co-create solutions, ensuring transparency and inclusion. Learning will also occur through regional peer exchange within the Vardar Planning Region, where municipalities share good practices, challenges and joint innovations through structured workshops and review sessions. All insights will be documented in an annual Resilience Progress Report presented to the City Council and published online, creating an ongoing cycle where data drives decisions, decisions drive action, and actions generate new learning.

9. NEXT STEPS

The next steps of the Climate Resilience Strategy will focus on getting the Strategy officially approved by the Municipal Council in early 2026, which will give it full political support and activate the proposed governance arrangements, including the Climate Resilience Working Group and a new Resilience Officer. After adoption, the municipality will work on improving coordination between departments, building staff skills in climate planning and data management, and creating a centralised system to fix current gaps in information. At the same time, the municipality will need to better understand long-term funding needs and prepare to apply for national, EU and other financial programmes. These actions will help Sveti Nikole build the systems, skills and resources needed to start implementing the Strategy and move towards its 2035 climate-resilience goals.

10. ACTION PLAN

10.1 SHORT-TERM DELIVERY PLAN (1-5 YEARS)

Action name	Associated category	Sector	Location	Timing	Target	Responsible organisation	Responsible person	Key metrics	Mainstreaming approach
Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience									
Replacement of old, asbestos pipes	Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Public services	Urban and rural areas of Sveti Nikole	2026-2030	Replacing old, asbestos and metal water pipes to improve safety, maintain the water quality, and improve the reliability of the drinking water system	JKP Komunalec	Department for Mechanization and Maintenance	- 4000 meters of asbestos pipes replaced - 20% of asbestos pipes replaced	Included in: - The Work Program of JKP Komunalec - Annual Work Program of the Municipality of Sveti Nikole - LED Strategy of the Municipality of Sveti Nikole
Reducing water losses and improving water supply efficiency	Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Public services	Urban and rural areas of Sveti Nikole	2026-2027	Reducing water losses by recording and closing "illegal" water connections or installing water meters on them; Renovation / replacement of water pumps	JKP Komunalec	Department for Mechanization and Maintenance	- 10 "illegal" water connections detected annually - renovation/ replacement of 1 water pump annually -reconstruction of pumping stations Ambulanta and Jugotutun	Included in: - The Work Program of JKP Komunalec
Installation of a Wastewater Grinder for hard materials	Primary adaptation objective 1: Water Security, Wastewater management	Public services	Urban and rural areas of Sveti Nikole	2026-2027	Wastewater pretreatment	JKP Komunalec	Department for Mechanization and Maintenance	1 Wastewater Grinder for hard materials installed	Included in: - The Work Program of JKP Komunalec

	and Drought Resilience								
Construction of a Sewage treatment plant	Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Public services	Urban and rural areas of Sveti Nikole	2026-2030	Protecting public health and the environment by removing harmful pollutants from the wastewater, before it is discharged or reused.	Municipality of Sveti Nikole (local self-government) and JKP Komunalec	Department for collection, transportation and disposal of solid waste	1 Sewage treatment plant built and put into operation.	To be included in: - The Work Program of JKP Komunalec - Annual Work Program of the Municipality of Sveti Nikole - LED Strategy of the Municipality of Sveti Nikole
Raising public awareness about saving water resources	Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Community engagement	Urban and rural areas of Sveti Nikole	2026-2030	Implementing a digital campaign to raise awareness about the impact of climate change on droughts and floods, as well as opportunities for protection and reduction of negative impacts	Municipality of Sveti Nikole (local self-government) and JKP Komunalec	Department of Communal Affairs and Non-governmental sector in Sveti Nikole	- Implemented Digital campaign - At least 500 views of the social media post content	Included in: Local Environmental Action Plan of the Municipality of Sveti Nikole
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage									
Preparation of an Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) with measures from the Climate resilience strategy included in it	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Policy creation	Urban and rural areas of Sveti Nikole	2026-2027	Preparation of a strategic document for the municipality of Sveti Nikole - Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) with measures from the Pathways2Resilience climate resilience strategy included in it	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs	- Developed Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) - Developed Action Plan for the Implementation of the Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029)	Included in: - Annual Work Program of the Municipality of Sveti Nikole - LED Strategy of the Municipality of Sveti Nikole

Adding the municipality of Sveti Nikole into the GIS Solar Cadastre database	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Community engagement	Urban and rural areas of Sveti Nikole	2026-2027	Adding the municipality of Sveti Nikole to the GIS Solar Cadastre database (qgiscloud.com) Preparing an Analysis for the Municipality of Sveti Nikole	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs	- uploaded information about the municipality of Sveti Nikole to the GIS Solar Cadastre - prepared Analysis of the municipal potential	To be included in: - Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) - Annual Work Program of the Municipality of Sveti Nikole -LED Strategy of the Municipality of Sveti Nikole
Promotional campaign to raise awareness among citizens about the importance of energy efficient systems	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Community engagement	Urban and rural areas of Sveti Nikole	2026-2027	Implementation of a promotional campaign to raise awareness among citizens about the importance of energy efficient systems	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs Department of Communal Affairs and Non-governmental sector in Sveti Nikole	- social media pages created (Facebook and Instagram) - 3 different promotional flyers created and distributed in schools - promotional video created and published on the municipality's website and the social media pages	Included in: - Local Ecological Action Plan of the Municipality of Sveti Nikole
Renovation of public buildings using energy efficient (EE) technologies	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Public services	Urban areas of Sveti Nikole	2027-2030	Renovation of public buildings using EE technologies (facades, windows, doors, roofs) in order to create energy-efficient institutions and reduce electricity consumption	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs	- Energy scanning of public buildings - 8 public buildings renovated using energy efficient technologies - 60% reduction in energy consumption in municipal buildings	To be included in: Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029)
Establishing partnership with the private sector	Primary adaptation objective 2: Energy	Public services	Urban and rural areas of Sveti Nikole	2027-2029	Establishing a partnership with the private sector to create jobs in the field of EE	Municipality of Sveti Nikole (local	Department of Local Economic Development	- signed Memorandums of Partnership with at least 5 companies	To be included in: Energy Efficiency Program for the

	Efficiency, Renewable Energy and storage					self-government)	and Public Affairs and Department of Communal Affairs	from the municipality - created at least 25 new jobs	Municipality of Sveti Nikole (2027-2029)
Installation of "white roofs" on public buildings	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Public services	Urban areas of Sveti Nikole	2028-2030	Installing "white roofs" on public buildings and / or bleaching the roofs of relatively new buildings with white collor, in order to reduce electricity costs	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs	- "white roofs" installed on 7 public buildings: 1 high school, 5 primary schools and 1 kindergarten	To be included in: Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029)
Green Urban Planning	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Community engagement	Urban and rural areas of Sveti Nikole	2028-2030	Introducing the population and local government employees with the goals of Green Urban Plans through an educational campaign and training for preparation of a Green Urban Plan	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs And Department of Urban Planning	- Implemented educational campaign - Implemented training on Green Urban Planning - Signed Memorandums of Partnership with the Faculty of Forestry Sciences, Landscape Architecture and Eco-Engineering, within the Ss. Cyril and Methodius University in Skopje	To be included in: - Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
Partnership for Climate Change Adaptation	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Community engagement	Urban and rural areas of Sveti Nikole	2028-2030	Signing of Memorandums for Cooperation between the Municipality, institutions and the private sector for exchanging information on various climate aspects and situations on the ground and joint representation to donors that give grants for	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs And Department of Urban Planning	- Signed Memorandums for Cooperation with at least 2 Universities - Signed Memorandums for Cooperation with at least 5 Companies	To be included in: - Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) - LED Strategy of the Municipality of Sveti Nikole (2029-2033)

					adaptation to climate change			- Submitted at least 2 project applications for climate change adaptation	
Creating Urban Cooling Areas	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Community engagement	Municipality of Sveti Nikole	2028-2030	Urban cooling zones are urban spaces that are cooler than their surroundings due to the use of strategies such as increased vegetation, reflective surfaces, and water features, thus helping to reduce the "urban heat island" effect	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs And Department of Urban Planning	- Determined locations for "cooling areas" in all settlements of Sveti Nikole - Setting of 3 "cooling areas" annually	To be included in: - Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
Installation of solar panels on public buildings	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Regulation	Urban areas of Sveti Nikole	2029-2030	Installation of solar panels on public buildings according to already prepared plans of Municipality of Sveti Nikole, in order to reduce electricity costs	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs And Department of Urban Planning	Solar panels installed on 8 public buildings: - Municipal Building - Cultural Center - Fire Station - Kindergarten clone 1 and clone 2 - Cyril and Methodius Primary School - Goce Delchev Primary School - Dame Gruev Primary School	To be included in: - Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
Reconstruction and arrangement of green areas and creation of green zones	Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Public services	Urban areas of Sveti Nikole	2029-2030	Reconstruction and arrangement of green areas (walking paths, playgrounds, fitness zones and sports fields) and creation of green zones throughout the urban part of Sveti Nikole	Municipality of Sveti Nikole (local self-government)	Department of Communal Affairs And Department of Urban Planning	- 1 new green area built with drought-tolerant vegetation - 2 existing green areas reconstructed - 5 green zones created	To be included in: - Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) - DUP / GUP of the Municipality of Sveti Nikole - LED Strategy of the Municipality of Sveti Nikole (2029-2033)

Primary adaptation objective 3: Waste Management									
Cleaning up the "wild" (non-standard) landfills and converting those areas into places that will be used by the public	Primary adaptation objective 3: Waste Management	Public services	Urban and rural areas of Sveti Nikole	2026-2028	Protecting human health and environment through the removal or neutralization of hazardous waste and preventing pollution of air, soil and water resources from non-standard landfills, as well as converting those areas into places that will be used by the public (installation of gazebos, benches, swings)	JKP Komunalec	Department for collection, transportation and disposal of solid waste	- 9 (non-standard) illegal landfills cleaned up - 9 such areas repurposed into places that will be used by the public	Included in: - The Work Program of JKP Komunalec - Annual Work Program of the Municipality of Sveti Nikole
Procurement of vehicles for cleaning streets and other surfaces	Primary adaptation objective 3: Waste Management	Public services	Urban areas of Sveti Nikole	2026-2027	Maintaining clean urban environments through the removal of waste, dirt, and garbage to improve aesthetics, public health, and safety	JKP Komunalec	Department for collection, transportation and disposal of solid waste	- 2 vehicles for cleaning streets and other surfaces purchased and put into use	Included in: - The Work Program of JKP Komunalec
Campaign on the importance of waste selection and promotion of educational tools	Primary adaptation objective 3: Waste Management	Community engagement	Urban and rural areas of Sveti Nikole	2026-2030	Implementation of a campaign to educate the population about the importance of waste selection and promotion of educational tools (social media profiles, flyers, videos, etc.) for waste selection	JKP Komunalec	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land Non-governmental sector in Sveti Nikole (NGO Women's Organization - Sveti Nikole GIZ-Civic Initiative of Women	- prepared and published social media pages (Facebook and Instagram) - 5 different promotional flyers/posters prepared and distributed in schools - educational campaign and promotion of the prepared posters/flyers in cooperation with teachers during classes, directly to students	Included in: - LED Strategy of the Municipality of Sveti Nikole

							Scouting Squad "Goce Delchev")	- promotional video prepared and published on the municipality's website and on social media	
Waste selection	Primary adaptation objective 3: Waste Management	Public services	Urban and rural areas of Sveti Nikole	2026-2030	Procurement and putting into place of waste selection bins Starting a waste selection system (bins for plastic, glass, paper and organic waste)	JKP Komunalec	Department for collection, transportation and disposal of solid waste	- Waste selection system established - Waste selection bins installed at at least 5 locations in the municipality - 1 returnable vending machine installed - Memorandum of Cooperation signed with PAKOMAK	To be included in: - The Work Program of JKP Komunalec - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
Information and educational campaign: Select to receive	Primary adaptation objective 3: Waste Management	Community engagement	Urban and rural areas of Sveti Nikole	2026-2030	Implementation of an information and educational campaign after the establishment of a waste selection system: reduction of water bills and garbage collection for companies that will allow the installation of waste selection bins in their facilities Establishing cooperation with waste collection companies in order to install vending machines for plastics, to obtain discounts in markets for people who select	JKP Komunalec	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land Non-governmental sector in Sveti Nikole (NGO Women's Organization - Sveti Nikole GIZ-Civic Initiative of Women Scouting Squad "Goce Delchev")	- Implemented Information and educational campaign: Select to receive	Included in: - LED Strategy of the Municipality of Sveti Nikole

Table 11. Short-term implementation plan for the three highest priority areas (1-5 years)

Action name	Associated category	Sector	Location	Timing	Target	Responsible organisation	Responsible person	Key metrics	Mainstreaming approach
Primary adaptation objective 4: Sustainable Agriculture and Land Management									
Involving and encouraging the local population in / for horticultural landscaping and urban agriculture activities	Primary adaptation objective 4: Sustainable Agriculture and Land Management	Community engagement	Urban and rural areas of Sveti Nikole	2027-2029	Initiating the involvement of volunteers for landscaping and maintenance of the areas. Establishing urban gardens in the primary schools and kindergartens on the territory of the Municipality of Sveti Nikole	Municipality of Sveti Nikole (local self-government) and ZZ Eko-Ilinden	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land	- At least 10 volunteers involved - 4 newly built green spaces - 2 new urban gardens in schoolyards or kindergarten yards	Included in: Local Environmental Action Plan of the Municipality of Sveti Nikole
Educational Campaign	Primary adaptation objective 4: Sustainable Agriculture and Land Management	Community engagement	Urban and rural areas of Sveti Nikole	2029-2030	Implementation of an educational campaign to protect the population and livestock from pests	Municipality of Sveti Nikole (local self-government) and ZZ Eko-Ilinden	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land	- created social media pages (Facebook and Instagram) - 3 different promotional flyers created and distributed in schools	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience									
Creating a Green Cadastre of the Municipality of Sveti Nikole	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and	Policy creation	Urban and rural areas of Sveti Nikole	2026-2027	The Green Cadastre is an information system that integrates data on land, vegetation, and agricultural production, to support sustainable land management and policies	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs and Department for	Created Green Cadastre of the Municipality of Sveti Nikole	Included in: Local Environmental Action Plan of the Municipality of Sveti Nikole

	Infrastructure Resilience						Urban Planning, Environmental Protection, Communal Works		
Urban and Landscape Greening Strategy	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Community engagement	Urban and rural areas of Sveti Nikole	2027-2028	The Urban and Landscape Greening Strategy planning that fosters economic growth and development, while ensuring that natural resources continue to provide essential resources and ecological services.	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs and Department for Urban Planning, Environmental Protection, Communal Works	Created Urban and Landscape Greening Strategy	Included in: Local Environmental Action Plan of the Municipality of Sveti Nikole
Programme for establishment and maintenance of greenery	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Community engagement	Urban and rural areas of Sveti Nikole	2027-2028	The Programme for establishment and maintenance of greenery is a planned, systematic approach to the establishment and care of vegetated areas (green spaces, green infrastructure) to ensure their long-term functionality.	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs and Department for Urban Planning, Environmental Protection, Communal Works	Created Programme for establishment and maintenance of greenery	Included in: Local Environmental Action Plan of the Municipality of Sveti Nikole
Project-technical documentation for the design and construction of greenery	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and	Community engagement	Urban and rural areas of Sveti Nikole	2027-2029	The project-technical documentation for the design and construction of greenery is a comprehensive set of records and instructions that translates the design vision into a	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs and Department for	Created Project-technical documentation for the design and construction of greenery	Included in: Local Environmental Action Plan of the Municipality of Sveti Nikole

	Infrastructure Resilience				construction plan and is key to ensuring quality, managing costs, and complying with regulations.		Urban Planning, Environmental Protection, Communal Works		
Resilience officer	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Regulation	Urban and rural areas of Sveti Nikole	2026-2030	A resilience officer is a responsible person in the municipality who will be responsible for supporting and monitoring the implementation of this Strategy and Action Plan, in order for the municipality and its residents to more easily prepare for, cope with and recover from risks, crises and the consequences caused by climate change	Municipality of Sveti Nikole (local self-government) Directorate for Protection and Rescue and Regional Crisis Management Center Sveti Nikole	Department of Local Economic Development and Public Affairs and Territorial Fire Department Sveti Nikole	- Appointed Resilience Officer within the local self-government of the municipality of Sveti Nikole (part of the Coordination Body for implementation of the Strategy) - Entering a regular monthly update for the measures in the action plan in the reslabsvnikole platform	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033) - e-assessment of the municipality for risks and crises
"Resilience" folder	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Regulation	Urban and rural areas of Sveti Nikole	2026-2030	The Resilience Folder is a networked online folder that uses basic technology to ensure the accessibility and transparency of policies, plans or data. The shared folder "Resilience" in the municipality of Sveti Nikole will be updated with current information at precisely defined periods	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs Department for Urban Planning, Environmental Protection, Communal Works Resilience officer	- Created "Resilience" folder - Created Procedure (document) for work with and upload in the Resilience folder - Access to the folder by at least 10 people from the municipality of Sveti Nikole (Local Government)	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033)

								- At least 2 new documents uploaded every three months	
Study for the location of new forest belts	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Regulation	Rural areas of Sveti Nikole	2026-2029	Preparation of a Study for the location of new forest belts and windbreaks with plantations resistant to climate change and fires, in order to reduce the effects of the previous (unplanned) logging and supplement and strengthen the existing belts	"Shumarstvo" - Sveti Nikole in collaboration with the Faculty of Forestry Sciences, Landscape Architecture and Eco-Engineering, within the Ss. Cyril and Methodius University in Skopje	"Shumarstvo" - Sveti Nikole	Prepared Study for the location of new forest belts	To be included in the Annual Work Program of "Shumarstvo" - Sveti Nikole
Afforestation with indigenous and diverse tree species	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Community engagement	Urban and rural areas of Sveti Nikole	2029-2030	Afforestation (with indigenous) tree species in areas severely affected by fires or unplanned logging, to restore forest cover, stabilize soils and promote biodiversity	"Shumarstvo" - Sveti Nikole	"Shumarstvo" - Sveti Nikole	- Afforestation of at least 3 areas seriously affected by fires or logging in Sveti Nikole - Planted at least 1000 trees annually	To be included in the Annual Work Program of "Shumarstvo" - Sveti Nikole
Project "My Tree"	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Community engagement	Urban and rural areas of Sveti Nikole	2029-2030	Implementation of a campaign to raise awareness about the importance of reforestation through a project that allows each family to register, "adopt" a tree provided by the municipality, which will be planted at a location selected by the municipality, so the	"Shumarstvo" - Sveti Nikole and Municipality of Sveti Nikole (local self-government)	"Shumarstvo" - Sveti Nikole Department of Local Economic Development and Public Affairs Non-governmental sector in Sveti Nikole (NGO	- At least 100 families (households) involved annually - At least 100 trees planted annually in the municipality	To be included in the Annual Work Program of "Shumarstvo" - Sveti Nikole and LED Strategy of the Municipality of Sveti Nikole (2029-2033)

					family can contribute to its further maintenance		Women's Organization - Sveti Nikole GIZ-Civic Initiative of Women)		
Project: "Lend a hand"	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Community engagement	Urban and rural areas of Sveti Nikole	2029-2030	The project will prepare residents for the extreme weather conditions. The municipality, in cooperation with the Red Cross and First Aid will organize educational meetings with people from vulnerable categories (elderly people, people with disabilities, chronically ill people, single people and people living in isolated areas) to which advice and instructions are conveyed on how to deal with the upcoming season. In addition, responsible personnel will conduct regular checks and visits to these people, ensuring timely intervention and support when needed	Municipality of Sveti Nikole (local self-government) PHI Health Center - Sveti Nikole and the Red Cross	Department of Local Economic Development and Public Affairs Municipal Red Cross Organization Women's Organization - Sveti Nikole GIZ-Civic Initiative of Women	- at least 100 visits per year - at least 50 people from risk groups included	To be included in LED Strategy of the Municipality of Sveti Nikole (2029-2033)
Support for families from vulnerable categories	Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience	Community engagement	Urban and rural areas of Sveti Nikole	2029-2030	Inclusion of families from vulnerable categories in local and national support programs	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs Women's Organization - Sveti Nikole GIZ-Civic	- 30% of beneficiaries of municipal support schemes are from vulnerable groups	To be included in LED Strategy of the Municipality of Sveti Nikole (2029-2033)

							Initiative of Women Municipal Red Cross Organization		
Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development									
Local Urban Mobility Plan	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Community engagement	Urban and rural areas of Sveti Nikole	2026-2027	Development of a Local Urban Mobility Plan within the framework of the "CityMOVE" project	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs	- Prepared Local Urban Mobility Plan	Included in the project: "CityMOVE" - a project funded by the Interreg VI-B IPA Adriatic Ionian IPA ADRION 2021-2027 Programme
Workshops with stakeholders	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Community engagement	Urban areas of Sveti Nikole	2026-2030	To strengthen inclusiveness and transparency, stakeholder workshops will annually monitor the implementation of the Climate Resilience Strategy. These workshops will include representatives from NGOs, schools, the Red Cross, private sector representatives from the academic institutions. Their role will be to validate findings, share community perspectives and co-create solutions to the identified challenges	Municipality of Sveti Nikole (local self-government)	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land Territorial Fire Department Sveti Nikole Regional Crisis Management Center Sveti Nikole Women's Organization - Sveti Nikole GIZ-Civic Initiative of Women Scouting Squad "Goce Delchev"	- at least 5 Stakeholder Workshops implemented - at least 20 responsible people from relevant stakeholders present at each of the workshops	To be included in LED Strategy of the Municipality of Sveti Nikole
Access to training	Primary adaptation	Public services	Urban and rural areas	2026-2030	Increasing access of responsible people from	Municipality of Sveti Nikole	Department of Local	- Signing up of the municipality in at	To be included in LED Strategy of the

programs and technical support	objective 6: Inclusive and Climate-Responsive Urban Development		of Sveti Nikole		the Municipality of Sveti Nikole to training programs and technical support through membership in national and international databases, forums, and newsletters	(local self-government)	Economic Development and Public Affairs	least 3 international databases, forums, newsletters that provide access to training programs and technical support - Signing up of the municipality of Sveti Nikole in at least 3 EIT platforms and / or similar networks for cooperation, networking, exchange of experiences - Participation in at least 1 training program from the databases, forums, newsletters of responsible people from the municipality on an annual basis - Participation of at least 5 persons from the municipality in training programs related to the topics of the Strategy in accordance with the Annual Training Plan of the municipality	Municipality of Sveti Nikole

								- Organization of at least 1 training per year for employees from the municipality on topics such as adaptation, water management, waste, etc. - Submission of at least 1 project application by the municipality for technical support every 24 months	
Construction of bicycle paths	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Regulation	Urban areas of Sveti Nikole	2027-2029	Construction of bicycle paths at locations in the city (next to schools / public institutions) in accordance with the prepared Elaborate for one-way traffic	Municipality of Sveti Nikole (local self-government)	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land	- Constructed 2 bicycle paths in Sveti Nikole	Included in the Work Program of the Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land
Bicycle race in the municipality of Sveti Nikole	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Community engagement	Urban and rural areas of Sveti Nikole	2026-2027	Organization of a bicycle race in the municipality of Sveti Nikole within the framework of the "CityMOVE" project	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs and NGO sector in Sveti Nikole	- Organized bicycle race in Sveti Nikole - At least 50 participants in the bicycle race	Included in the project: "CityMOVE" - a project funded by the Interreg VI-B IPA Adriatic Ionian IPA ADRION 2021-2027 Programme
"Car-Free Day"	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Community engagement	Urban and rural areas of Sveti Nikole	2026-2027	Implementation of a promotional event: "Car-Free Day" in the municipality of Sveti Nikole within the framework of the "CityMOVE" project	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs	- Organized promotional event "Car-Free Day" - At least 100 participants at the event	Included in the project: "CityMOVE" - a project funded by the Interreg VI-B IPA Adriatic Ionian IPA ADRION 2021-2027 Programme

							and NGO sector in Sveti Nikole		
Traffic project and Traffic elaborations	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Regulation	Urban areas of Sveti Nikole	2026-2027	Preparation of a Traffic project and Traffic elaborations for the Municipality of Sveti Nikole	Municipality of Sveti Nikole (local self-government)	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land	- Prepared Traffic project and Traffic elaborations	Included in the Work Program of the Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land
Placing and installing physical barriers to restrict/prohibit the movement of people and vehicles in a certain area	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Regulation	Urban areas of Sveti Nikole	2026-2027	Placing physical obstacles (pencils/poles) to restrict/prohibit the movement of people and vehicles in a certain area	Municipality of Sveti Nikole (local self-government)	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land	Physical barriers placed at 4 locations	Included in the Work Program of the Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land
Day care center for children	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Regulation	Urban areas of Sveti Nikole	2026-2028	Finalization of location and preparation of technical documentation for the construction of a Day Care Center for Children	Municipality of Sveti Nikole (local self-government)	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land and Department of Local Economic Development and Public Affairs	- Established Day care center for children	Included in LED Strategy of the Municipality of Sveti Nikole
Placing benches next to canopies	Primary adaptation	Public services	Urban and rural areas	2027-2030	Placing benches next to canopies and canopies	Municipality of Sveti Nikole	Department for Urban	- At least 25 benches installed	Included in the Work Program of the

and canopies in strategic locations	objective 6: Inclusive and Climate-Responsive Urban Development		of Sveti Nikole		in strategic locations to meet the needs of the population and provide shade.	(local self-government)	Planning, Environmental Protection, Communal Works and Alienation of Construction Land	next to canopies at various locations - At least 15 canopies installed	Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land
Education for local stakeholders	Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development	Public services	Urban and rural areas of Sveti Nikole	2027-2030	Education of responsible persons in the municipality through physical and online visits of workshops and seminars in/from EU countries and study visits to municipalities in neighbouring countries	Municipality of Sveti Nikole (local self-government)	Department of Local Economic Development and Public Affairs	- Implementation of a training: Raise GIS and data use capacity - Participation in at least 2 online workshops and seminars per year - Physical presence in at least 1 workshop and seminar per year - At least 1 study visit outside R. N. Macedonia every 2 years	To be included in LED Strategy of the Municipality of Sveti Nikole

Table 12. Short-term implementation plan for the second group of three priority areas (1–5 years)

10.2 MID- AND LONG-TERM DELIVERY PLAN AND PROJECT PIPELINE (5 YEARS+)

#	Project Name	Sector	Location	Summary	Total cost (EUR)	Action type (No regret, climate smart, adaptive management)	Stage of development	Delivery start and end dates	Envisaged budget period	Revenue Streams?	Economic benefits (and co-benefits)	Type and level of financial returns? (Market rate, below market rate, N/A)	EUSF Taxonomy aligned?	Financing Model in place?	Where to find further information?
Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience															
1	Improving the water supply system	Public services	Urban and rural areas of Sveti Nikole	Preparation of an Analysis for the inclusion of new and existing wells in the water supply system	10.000,00	adaptive management	Readiness for preparation of an Analysis	2030 - 2032	2030 - 2032	YES	YES	Market rate	YES	NO	To be included in the Work Program of JKP Komunalec
2	Reconstruction of the chlorine station	Public services	Urban and rural areas of Sveti Nikole	Automation of the chlorination process and additional setting of flow meters and turbidimetry. Replacement of outdated equipment with a new modern automated chlorine station. Replacement from analogue to motorized process meters of	40.000,00	adaptive management	Readiness for preparation of an Analysis	2030 - 2031	2030 - 2031	NO	YES	N/A	N/A	NO	To be included in the Work Program of JKP Komunalec

				quantitative parameters										
3	Installation of ultrafiltration as the final stage of water production	Public services	Urban and rural areas of Sveti Nikole	Water purification in conditions of heavy rain can be difficult and limits production capacity. To be 100% compliant with regulations to improve treatment and reduce environmental impact, it requires automatic management and control	40.000,00	adaptive management	Readiness for preparation of an Analysis	2030 - 2032	2030 - 2032	NO	NO	N/A	N/A	NO	To be included in the Work Program of JKP Komunalec
4	Installation of a water meter at the outlet of the filter station	Public services	Urban and rural areas of Sveti Nikole	Determining purchased raw water and water used for processing into drinking water, with the aim of improved records of produced water	10.000,00	no regret	Ready for implementation	2030 - 2032	2030 - 2032	NO	YES	N/A	N/A	NO	To be included in the Work Program of JKP Komunalec
5	Procurement of a specialized sewage vehicle	Public services	Urban and rural areas of Sveti Nikole	Collection, transportation and safe disposal of liquid and solid waste materials (such as sewage, sludge and industrial liquids) from residential, commercial and industrial	50.000,00	no regret	Procurement readiness	2030 - 2032	2030 - 2032	NO	YES	N/A	YES	NO	To be included in the Work Program of JKP Komunalec

				areas to designated treatment or disposal facilities											
6	Establishing a rainwater harvesting system	Regulation	Urban areas of Sveti Nikole	Installation of roof and surface systems to capture rainwater for further reuse	150.000,⁰⁰	climate smart	Readiness for preparation of an Analysis	2030 - 2035	2030 - 2035	NO	NO	N/A	N/A	NO	To be included in - The Work Program of JKP Komunalec - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
7	Establishing protocols	Regulation	Urban areas of Sveti Nikole	Establishment of: - Protocol and regulations for connections and repair of water supply network defects - Maintenance protocol (recording of the condition of facilities, timely repair, ensuring decent working conditions) - Protocol for dealing with risks, alarms, crisis management	10.000,⁰⁰	no regret	Readiness for preparation of an Analysis	2030 - 2033	2030 – 2033	NO	NO	N/A	N/A	NO	To be included in the Work Program of JKP Komunalec
8	Start of the rehabilitation of the Right Main Canal from HS Bregalnica	Public services	Urban and rural areas of Sveti Nikole	The Right Main Canal is 98 km long and supplies water to 20,000 ha of land. It currently suffers huge water losses	2.500.000,⁰⁰	adaptive management	Readiness for implementation (currently in the process of preparing technical documentation)	2030 - 2035	2030 - 2035	NO	YES	Market rate	YES	NO	To be included in - The Work Program of JKP Komunalec - LED Strategy of the Municipality of Sveti Nikole

				and the first phase would rehabilitate a 5 km length from Svetinikolska River to the village of Crnilishte.										(2029-2033)
9	Technical documentation for a drinking water treatment plant	Regulation	Municipality of Sveti Nikole – locally	Preparation of technical documentation for the construction of a new drinking water treatment plant	25.000,⁰⁰	adaptive management	Readiness to start preparing technical documentation	2033 - 2035	2033 - 2035	YES	YES	Market rate	YES	NO	To be included in the LED Strategy of the Municipality of Sveti Nikole (2029-2033)
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage														
1	Installation of photovoltaics and hot water collectors	Regulation	Urban areas of Sveti Nikole	Installation of photovoltaics and hot water collectors in public institutions, kindergartens, schools	150.000,⁰⁰	no regret	Readiness for preparation of a detailed Analysis and initial activities with setting up	2030 - 2035	2030 - 2035	NO	YES	Market rate	YES	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033) - Energy Efficiency Program for the Municipality of Sveti Nikole (2030-2032)
2	Construction of a public parking lot with photovoltaics	Regulation	Urban areas of Sveti Nikole	Construction of a public parking lot with photovoltaics on the roof structure in order to reduce the problem of lack of parking spaces and save electricity for public lighting	50.000,⁰⁰	climate smart	Readiness for preparation of a detailed Analysis	2030 - 2035	2030 - 2035	YES	YES	Market rate	YES	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033) - Energy Efficiency Program for the Municipality of Sveti Nikole (2030-2032)

3	Establishing an Energy Storage System	Regulation	Urban areas of Sveti Nikole	The main purpose of an energy storage system (ESS) is to collect and store energy for later use, balancing supply and demand, improving grid security, and reducing costs	75.000,00	adaptive management	Readiness for preparation of an Analysis	2033-2038	2033-2038	YES	YES	Market rate	YES	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033) - Energy Efficiency Program for the Municipality of Sveti Nikole (2030-2032)
Primary adaptation objective 3: Waste Management															
1	Composting	Public services	Urban and rural areas of Sveti Nikole	Transforming organic waste into a nutrient-rich soil amendment. Reduces greenhouse gas emissions, improves soil health by increasing nutrients and water retention, and creates free, high-quality fertilizer for gardens and yards	100.000,00	climate smart	Readiness for preparation of an Analysis	2030 - 2035	2030 - 2035	NO	YES	Market rate	YES	NO	To be included in the LED Strategy of the Municipality of Sveti Nikole (2029-2033)

Table 13. Medium- and long-term implementation plan and project list (5+ years) for the three highest priority areas

#	Project Name	Sector	Location	Summary	Total cost (EUR)	Action type (No regret, climate smart, adaptive management)	Stage of development	Delivery start and end dates	Envisaged budget period	Revenue Streams?	Economic benefits (and co-benefits)	Type and level of financial returns? (Market rate, below market rate, N/A)	EUSF Taxonomy aligned?	Financing Model in place?	Where to find further information?
Primary adaptation objective 4: Sustainable Agriculture and Land Management															
1	Promoting sustainable agriculture	Community engagement	Rrural areas of Sveti Nikole	Organizing campaigns to raise public awareness about the harmful effects of pesticides and inorganic fertilizers	*10.000,00	no regret	Ready for implementation	2030 - 2035	2030 - 2035	NO	YES	N/A	N/A	NO	Local Environmental Action Plan of the Municipality of Sveti Nikole
Primary adaptation objective 5: Disaster Risk Reduction, Public Health and Infrastructure Resilience															
1	Afforestation with fire-resistant vegetation	Community engagement	Rrural areas of Sveti Nikole	Planting vegetation that is less prone to fire risk, e.g. introducing broadleaf species into forests dominated by conifers. This may also include planting fire-resistant crops and using hedges and other natural barriers to slow the spread of fire	30.000,00	climate smart	Ready for implementation	2030 - 2035	2030 - 2035	NO	NO	Market rate	N/A	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033) - Local Environmental Action Plan of the Municipality of Sveti Nikole
2	Green infrastructure, green fire belts and buffer zones	Community engagement	Rural areas of Sveti Nikole	Strategically planted belts of low-flammability vegetation types that act as buffer zones around urban areas and the critical infrastructure	30.000,00	climate smart	Readiness for preparation of an Analysis	2030 – 2035	2030 - 2035	NO	NO	Market rate	N/A	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033) - Local Environmental

															Action Plan of the Municipality of Sveti Nikole
Primary adaptation objective 6: Inclusive and Climate-Responsive Urban Development															
1	Improving communication	Public services	Urban and rural areas of Sveti Nikole	Holding meetings between responsible persons from different departments in the municipality on a regularly established (quarterly) level in order to improve communication and share good / successful practices between departments in the municipality. Building team spirit in local government through team-building activities in order to improve internal communication in the municipality and the communication with the residents of the municipality	*30.000,00	adaptive management	Ready for implementation	2030 – 2035	2030 - 2035	NO	NO	N/A	NO	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
2	The best landscaped yard	Community engagement	Urban and rural areas of Sveti Nikole	Introducing awards for the best-maintained yard among citizens, public institutions and the private sector	*15.000,00	adaptive management	Ready for implementation	2030 - 2035	2030 - 2035	NO	NO	Market rate	N/A	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033)
3	Retirement home	Community engagement	Municipality of Sveti Nikole	Selection of location and preparation of technical documentation for the construction of a retirement home	20.000,00	no regret	Readiness to start preparing technical documentation	2030 - 2035	2030 - 2035	NO	NO	Market rate	N/A	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033)

4	Building the capacities of the municipality	Public services	Urban and rural areas of Sveti Nikole	Building the capacities of employees in the municipality of Sveti Nikole through their attendance at national and international trainings, workshops and seminars in the areas of: - climate change adaptation - monitoring and evaluation - budgeting and financing - capacity building programs	*60.000,00	adaptive management and climate smart	Ready for implementation	2030 - 2035	2030 - 2035	NO	NO	N/A	NO	NO	To be included in: - LED Strategy of the Municipality of Sveti Nikole (2029-2033)

**** The amount applies to the entire planned implementation period of the measure/activity.***

Table 14. Medium- and long-term implementation plan and project list (5+ years) for the second group of three priority areas

11. INVESTMENT PLAN

Total revenues and expenditures of Sveti Nikole in the past 5 years

The budget of Municipality of Sveti Nikole has grown steadily, with realized total revenues increasing by approximately 27% from 2021 to 2024. The 2025 plan projects a 23% jump from 2024 realized levels. Execution rates for total revenues improved from 75% in 2021 to 89% in 2024, indicating better collection and management. Expenditures follow a similar pattern, with social services (education, kindergartens) dominating due to block transfers (block grants). There is a 14% growth in per capita realized revenues from 2021-2024. The budget for 2026 was adopted in December 2025 and is also presented below (Table 15).

N/A Not available (1 EUR = 61,5 MKD)

Year	Revenues (Total Budget)	Realized Rev. (Total Budget)	Execution % (Basic)	Expenditures (Total)	Realized Exp. (Total)	Execution % (Total)
2021	460,555,291	343,384,631	73%	460,555,291	339,255,472	74%
2022	454,407,538	391,662,090	81%	454,407,538	391,309,848	86%
2023	440,861,284	412,303,057	80%	440,861,284	387,059,535	88%
2024	489,378,469	436,611,610	81%	489,378,469	441,078,432	90%
2025	535,535,968[10]		N/A	585.234.300	N/A	N/A
2026	580,460,223	N/A	N/A	618,286,680	N/A	N/A

Table 15. Sveti Nikole Revenues Basic Budget and Expenditures (MKD)

As an illustration, in terms of the structure of municipal budget revenues and expenditures which are similar across years, in 2025, there is a heavy reliance on central government transfers (73%), with own taxes focusing on property and communal fees. In 2025, the Municipality does not plan to borrow, similar for 2026 based on the draft 2026 budget.

The expenditures for 2025 are categorized by economic type and programs/competencies. Social sectors dominate due to delegated responsibilities. Over half allocated to salaries, reflecting staff-intensive services like education. Capital investments (18%) focus on infrastructure, up from historical trends where execution was lower. The average annual growth of the total expenditures is around 9%.

Fiscal trends and performance (2021–2025)

From 2021 to 2025, the Municipality of Sveti Nikole has demonstrated steady fiscal expansion. Realized total budgets increased by approximately 27% between 2021 and 2024, primarily driven by central government

transfers, especially in education. The 2025 plan projects a further 23% rise. Budget execution rates have also improved significantly, rising from 73–75% in 2021 (impacted by COVID-19) to 81–90% in 2024, reflecting enhanced administrative efficiency and fiscal discipline. On a per capita basis, the 2025 allocation amounts to roughly 569 EUR per resident (based on a 61.5 MKD/EUR exchange rate), emphasizing essential public services.

The municipality remains heavily reliant on external central government transfers, which have historically accounted for 70–80% of revenues and are projected at 73% for 2025. This dependence introduces vulnerabilities to national policy shifts and economic volatility. In contrast, own-source revenues—from taxes and fees—have consistently underperformed, with execution rates of 73–83%, possibly due to collection inefficiencies or economic stagnation in this rural area. This pattern mirrors broader challenges in North Macedonia, where local governments face limited fiscal decentralization.

Central government transfers are expected to increase in 2026, particularly for road reconstruction, though the draft budget projects a deficit of 43,450,000 MKD (706,504 EUR).

Expenditures are predominantly focused on delegated social sectors, with education and social protection absorbing over 70% of outlays, including recurrent costs like salaries (55%). This leaves limited room for other areas, with capital investments planned at 18% in 2025, targeting infrastructure such as roads, water systems, and schools.

The 2026 draft budget maintains a similar structure, emphasizing capital investments in road reconstruction and extension, along with one project for expanding the water sewage system. While capital expenditures are increasing, the dominance of recurrent costs may hinder innovative or risk-oriented investments, potentially limiting long-term resilience.

Fiscal balance, debt status, and borrowing capacity

Sveti Nikole's budgets have been designed for balance, but actual implementation has shown minor imbalances, such as slight revenue deficits in 2024, alongside ongoing risks from revenue collection inefficiencies. Notably, the municipality maintains a debt-free stance, enhancing its creditworthiness and avoiding interest burdens. For 2026, the draft budget includes no planned borrowing, a deposit of 53,000,000 MKD (871,788 EUR), and debt repayment obligations of 9,550,000 MKD (155,284 EUR). However, resistance to borrowing persists due to its small size and low fiscal capacity.

Estimated borrowing capacity stands at about EUR 350,578.48 for short-term and EUR 471,976.10 for long-term as of 2025, which has not been used. This debt-free position provides a solid foundation for cautious stability and growth, though structural dependencies constrain autonomous fiscal activities. This means that, the borrowing capacity of the municipality is determined by the overall budget size of the municipality, which in turn depends mostly from central government transfers that vary from year to year. Namely, in North Macedonia, municipal borrowing is governed by the Law on Financing of the Units of Local Self-Government, with short-term loans capped at 30% of the previous fiscal year's realized revenues for managing temporary liquidity needs, while long-term debt is limited to 100% of the prior year's current revenues and annual debt service to 30% thereof. Borrowing objectives include short-term for cash flow shortages and long-term primarily for capital investments like infrastructure, refinancing debts, or addressing natural disasters, with prohibitions on funding current expenditures.

Municipalities like Sveti Nikole are cautious with borrowing therefore, as they have limited budgets and no great predictability with their capital expenditures, as each year they receive central government transfers, or have grants or concessional loans on-landed via the Ministry of Finance. Thus, typical own commercial borrowing is typically avoided.

Bottlenecks in mobilizing climate resilience finance

Sveti Nikole's fiscal position and systemic barriers at the local level in North Macedonia create key bottlenecks for accessing climate resilience finance. High dependency on transfers limits flexibility for allocating funds to climate-specific initiatives, such as flood- or drought-resistant agriculture—essential amid regional risks like rising temperatures, reduced rainfall, heatwaves, and wildfires. Low own-revenue execution further restricts the ability to co-finance grants or build reserves for matching requirements from donors like the Green Climate Fund (GCF) or EU programs. Capacity gaps, including limited expertise in project development and bureaucratic hurdles, also impede applications—a common issue for Western Balkan local governments.

Despite inclusion in resilience workshops, the absence of dedicated climate line items in the budget indicates underdeveloped integration of adaptation into local planning. However, a budget tagging exercise could identify "hidden" climate-related initiatives, establish a baseline, and track progress. Additionally, the planned 2025 resource center for municipalities could support tax collection and budget optimization, helping address these challenges.

Opportunities for mobilizing climate resilience finance

Despite constraints, opportunities exist for Sveti Nikole to secure climate resilience finance, leveraging its debt-free status and environmental competencies through EU pre-accession instruments and international partnerships. As part of an EU candidate country, North Macedonia's municipalities can access Instrument for Pre-Accession Assistance (IPA) funds, which prioritize green initiatives in urban planning and environmental protection—areas under Sveti Nikole's responsibility. The GCF's support for North Macedonia's National Adaptation Plan (NAP), implemented by UNDP, is envisioned to provide grants for resilience against hazards like droughts and floods, with recent proposals focusing on community capacities. Regional programs, such as Pathways2Resilience (where Sveti Nikole is developing climate pathways) and the Balkan Climate Adaptation Futures project, offer technical assistance and funding for multi-hazard risks across 40 European regions, benefiting over 53 million people. Furthermore, by aligning with UNDP collaborations and just transition funds, the municipality could diversify revenues through green investments, transforming infrastructure projects into climate-smart ones while preserving fiscal prudence. Strategic negotiations for central government transfers and donor funding could further integrate adaptation priorities.

These fiscal trends highlight the need for targeted costs analysis and existing funding review in the following sections.

COSTS OF CLIMATE CHANGE AND NEAR-TERM INVESTMENT NEEDS

Estimation of costs for climate chance resilience building and adaptation measures is not readily available in North Macedonia. The country is working currently on developing a National Adaptation Plan which should also encompass climate budget tagging and estimating costs of climate (in)action.

For the purposes of this investment plan, and to be able to extrapolate some estimates for investment planning purposes, the baseline analysis for this investment plan gathered and analyzed available data, encompassing all hazards. It is important to note that while the estimates for cost of climate change are broader, the investment plan and strategy of the municipality prioritizes three areas based on its stakeholder engagement and the fact that for some interventions, greater central government involvement is necessary such as the disaster risk management.

Wildfires have surged in frequency and intensity. In 2024, over 200 fires were recorded in Sveti Nikole, burning more than 160 hectares. These fires damaged fields, forests, homes and farm buildings. The largest fire in August 2023 affected 120 hectares and required over 70 responders. Between 2012 and 2022, forest fires caused an estimated 34 million MKD in damages—figures that likely underestimate the true cost, as they exclude ecosystem losses and long-term impacts on productivity and carbon sequestration.

Crucially, the **destruction of natural resources** (such as trees, greenery and forest ecosystems) is often assigned zero monetary value, despite their long-term environmental and economic importance. This gap in damage assessment limits understanding of the full cost of climate-related disasters. As climate change intensifies, it is essential to include ecosystem loss, carbon storage and biodiversity in future evaluations. The scale and frequency of these events underscore Sveti Nikole's growing vulnerability to extreme heat and dry conditions.

Floods have also caused substantial damage, particularly in 2010, 2013 and 2015, with total losses estimated at nearly 40 million MKD. The 2013 floods affected 159 homes, agricultural land, roads, bridges, water supply systems and the municipality's main water well. These events disrupted daily life and agricultural productivity, yet current damage assessments often focus only on physical assets, overlooking long-term impacts on public services, environmental systems and community resilience.

Without targeted adaptation, these risks threaten to undermine the municipality's resilience goals and long-term socio-economic progress.

Financial impacts of historic weather events

The municipality does not have system/practice in place to collect data on losses/payments upon disasters. All data go to Canter for Crisis Management (CMC) while the Municipality can obtain them only upon official request (often without success in obtaining data).

When a disaster happens, the typical disaster response process includes the municipality forming a commission that estimates the damages and cost of damages, submits a report to the Government – Center for Crisis Management. Based on experience, typically only 10-12%[11] of the damages are covered to the population that has suffered a particular damage. At the same time, engaging with the municipality, some of the adaptation measures they regularly do is cleaning river basins.

ased on data gathered from the municipality, without adaptation, Sveti Nikole could face cumulative climate-related losses.

CLIMATE RISKS AND COSTS OF INACTION

North Macedonia is at the beginning of assessing climate adaptation costs, as the National Climate Adaptation plan has not been drafted, while preparations have started in 2025 supported by UNDP and the Green Climate Fund. Therefore, there in insufficient data to estimate climate risk cost of inaction accurately, especially at the municipal level.

Alternatively, some estimations can be suggested, based on the World Bank's Country Climate and Development Report (CCDR) for North Macedonia released in October 2024.[12] According to the CCDR, the costs of inaction regarding climate adaptation are substantial:

- **Economic damages** could reach **4% of GDP by 2050** due to climate change impacts
- The country has already experienced **US$667 million in losses** over the past 20 years from climate-related disasters including floods, torrential rains, and heat waves
- Without adaptation measures, North Macedonia faces **US$6.4 billion in required investments** over the next decade to protect people and property
- The report highlights that natural hazards disproportionately affect vulnerable sectors, particularly agriculture, where small family farms suffer from droughts and hail due to inadequate irrigation, hail protection, and insurance.

Based on the climate hazards data for the Pathways2Resilience project and Investment Plan and national data, Sveti Nikole faces disproportionate climate risks due to its geographical position in eastern North Macedonia and agricultural dependence. To reiterate, the main climate risks in Sveti Nikole include **intensified heatwaves, droughts, floods, and wildfires.**

Sveti Nikole faces acute climate vulnerability due to its agricultural dependence and position in eastern North Macedonia's drought-prone region. Without adaptation, the municipality risks losing approximately **EUR 10.8 million annually** by 2040 (equivalent to 15% of its economic output), with agriculture bearing the heaviest burden. The calculations below are based on World Bank CCDR scaling to municipal GDP, assuming 4% national GDP loss by 2050 prorated to Sveti Nikole's agricultural dependence.

Climate Risk	Current Impact	Projected Annual Cost (2040)	Key Vulnerable Groups
Drought	Reduced crop yields, water scarcity	EUR 5.2 million	Small family farmers (85% of agricultural sector)
Heat Stress	Labor productivity loss, health impacts	EUR 1.8 million	Outdoor workers, elderly, children
Flooding	Infrastructure damage, soil erosion	EUR 2.7 million (per major event)	Rural settlements, road networks
Wildfires	Land degradation, air quality issues	EUR 1.1 million	Forest areas, public health
Total annual cost		**EUR 10.8 million**	

Table 16. Projected Annual Costs of Inaction by 2040

Sector	Current Vulnerability	Cost of Inaction by 2040	Critical Risk Multipliers
Agriculture	15% crop failure during drought years	EUR 5.2 million annually (23% of agricultural share of GDP)	• 85% of economy dependent on agriculture • Limited irrigation infrastructure • Small family farms lack resources
Water Resources	Seasonal water shortages	EUR 1.6 million annually (infrastructure stress + health impacts)	• Ovche Pole basin hydrology changes • 18% projected water availability reduction by 2100 • Aging infrastructure
Infrastructure	Damage from extreme weather	EUR 2.1 million annually (roads, energy grid)	• Rolling terrain increases erosion risk • Limited maintenance capacity • Increasing storm intensity
Public Health	Heat-related illnesses	EUR 1.9 million annually	• Aging population vulnerability • Limited healthcare capacity • Outdoor worker exposure
Total annual costs by 2040		**EUR 10.8 million annually**	

Table 17. Sector-Specific Impact Analysis

However, a targeted investment of **EUR 12 million over the next decade** could prevent these losses, yielding a benefit-cost ratio of 4:1. This aligns with national data showing that every Euro invested in adaptation yields 2-10 Euros in benefits.

Investment Category	Required Investment (2025-2035)	Projected Benefits	Cost -Benefit Ratio
Modernized irrigation systems	EUR 5.2 million	Reduced crop losses, water security	1:4
Early warning systems	EUR 1.8 million	Reduced disaster response costs, lives saved	1:7
Green infrastructure for flood control	EUR 3.5 million	Infrastructure protection, reduced erosion	1:3
Heat action planning & cooling centers	EUR 1.5 million	Reduced healthcare costs, productivity gains	1:4
TOTAL	EUR 12.0 million	EUR 41.0 million	1:3

Table 18. Cost-benefit Analysis: Adaptation vs. Inaction

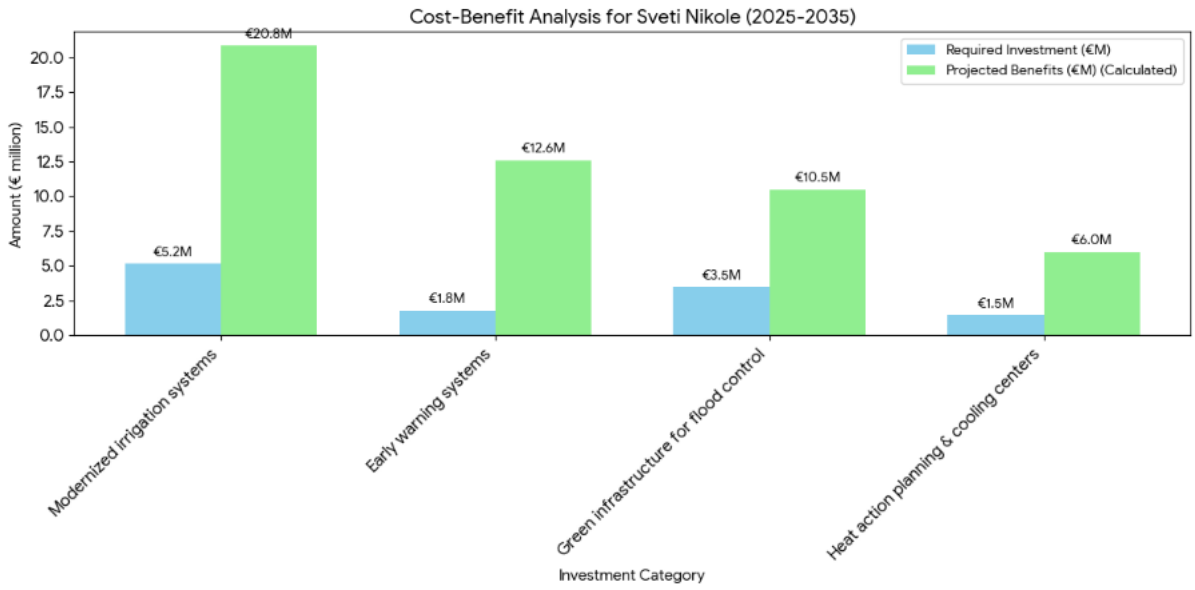


Figure 3. Cost-benefit of long-term climate resilience investments

Critical risk multipliers for Sveti Nikole include:

- Microclimate intensification of regional drought patterns
- Limited financial capacity of small family farms (85% of agricultural sector)
- Compounding effects across interdependent sectors (water scarcity → agricultural losses → economic decline)

The municipality's strategic location in the Ovche Pole basin creates both challenges and opportunities - while the terrain increases vulnerability to erosion and hydrological changes, it also offers potential for nature-based solutions that could serve as regional models for climate adaptation in agricultural communities.

Existing sources of investment in Municipality of Sveti Nikole

The Municipality of Sveti Nikole has historically secured funding from a diverse array of sources, including national agencies such as the Agency for Financial Support of Agriculture and Rural Development, Bureau for Regional Development, and Ministries of Transport, Environment, and Education; international organizations like the EU (through IPA, Interreg, and Adrion programs), UNDP, Swiss Agency for Development and Cooperation (SDC), World Bank (MSIP loans), and US Embassy; as well as bilateral partners (e.g., Greece cross-border cooperation) and private donors (e.g., Operation Florian, OKTA). Funding types predominantly include grants (often EU or national), mixed financing combining municipal budgets with grants or donations, loans (e.g., World Bank MSIP at 3% interest with grace periods), and occasional private donations or technical assistance. These sources have supported projects from 2015 onward, with grants being the most common for infrastructure and environmental initiatives, while loans are used for larger capital investments.

Investments have focused on areas critical to climate resilience, such as water supply and sewerage systems (e.g., reconstruction in villages like Mustafino and Crnilishte), wastewater treatment plants (e.g., Bioreal project), flood recovery (e.g., bridge reconstruction post-2015 floods), energy efficiency (e.g., photovoltaic

systems, building retrofits, and heating installations), environmental planning (e.g., Local Environmental Action Plans, air quality monitoring), and green infrastructure (e.g., public green areas, pedestrian paths, and waste management facilities). Other relevant projects include road reconstructions to improve accessibility during extreme weather, archeological site paths with eco-tourism potential, and firefighting equipment enhancements for wildfire and flood response. Amounts range from small-scale (e.g., MKD 30,000 for council meetings) to large (e.g., EUR 1.3 million for wastewater plants), with a emphasis on rural development and sustainable urban upgrades.

Many projects are completed or ongoing (e.g., 2015-2024 initiatives like sewerage networks and energy programs), while others are in planning or application stages for 2025 (e.g., pending grants for fecal sewerage in Kadrifakovo at MKD 23 million, filter station reconstruction at MKD 103 million, and EU-funded regional waste facilities). Future efforts, such as the EIT Climate-KIC Resilience Lab (2025-2026) and ERASMUS+ projects, indicate a shift toward strategic climate resilience planning, with applications submitted to ministries and donors signaling proactive pursuit of additional grants for resilience-building. Summary of the existing investment sources are available in the Annex.

Additional strategic sources and instruments

Additional sources

As a small municipality in North Macedonia with limited fiscal capacity for capital investments, Sveti Nikole can leverage number of financial sources for climate adaptation based on prior or currently available dedicated funding for municipalities. This included own sources of revenue, central government transfers, donations from bi-lateral donors, concessional borrowing, grants from donors, technical assistance, EU facilities but also global funds such as the Green Climate Fund and the Climate Investment Fund.

The Municipality of Sveti Nikole can utilize grants from domestic sources like property taxes, communal fees, and ministerial allocations projected at over MKD 273 million in 2025, alongside targeted donations from UNDP for initiatives in water supply, energy efficiency, and flood protection. International loans from entities such as the World Bank (up to EUR 25 million via MSIP2), EU programs like IPA, and development banks like EIB/AFD (up to EUR 150 million) offer concessional financing with technical assistance for resilient infrastructure including sewerage and renewable energy. Crowdfunding provides adaptable models from the 2021 "Co-creating Crowdfunding Models" handbook, suitable for green spaces and photovoltaic projects in alignment with local laws on obligations and securities. A "Resilient Sveti Nikole" donation campaign could raise funds for flood-resilient parks along the Svetinikolska River, with municipal matching up to MKD 500,000 and citizen rewards like named trees or tax-deductible certificates. The loans model, inspired by Solar Roofs in Krizhevci, enables residents to lend via platforms for solar installations on public buildings, with 5-7 year repayments from energy savings tied to projects like the 2024 UNDP photovoltaic initiative. The equity/shares model, based on Low Carbon Hub in Oxfordshire, involves forming cooperatives to issue shares for shared ownership in waste management facilities, with dividends reinvested in resilience efforts such as the 2025-2026 Resilience Lab. The bonds model theoretically allows issuing green municipal bonds under local financing laws to fund infrastructure like renewables, though it's underdeveloped in North Macedonia with limited success in attempts like Shtip's EUR 4 million effort.

ACTION PORTFOLIO – SELECTED PRIORITY INVESTMENTS

Based on dedicated engagement with stakeholders in Sveti Nikole (describe in detail in the Strategy and Action Plan), a long and short list of actions were identified as priority for Sveti Nikole climate resilience.

Action Category	Action Name	Maturity Score	Total cost (EUR)	Financial Benefits	Social Benefits	Environmental/Climate Benefits	Potential sources of financing	Next steps
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Preparation of an Energy Efficiency Program for the Municipality of Sveti Nikole (2027-2029) with measures from the Pathways2Resilience climate resilience strategy included in it	27	10,000	Long-term cost savings through optimized energy use in municipal operations, potentially reducing energy bills by 15-25% (estimated annual savings of 5,000-10,000 EUR based on similar municipal programs).	Enhanced community awareness and capacity building, creating 2-3 temporary jobs in planning and consultation.	Lowered carbon emissions (up to 10% reduction in municipal footprint) and better resource management. Avoided climate-related costs include preventing future energy shortages during heatwaves or droughts, potentially saving 20,000-50,000 EUR in emergency measures over 5 years.	-UNDP (Technical Assistance); -Swiss SDC; -City Climate Finance Gap Fund; -EU IPA (via DBNM); -GIZ (German development cooperation) -Ministry of Energy, Mining and Mineral Resources	Approach donors such as the Swiss SDC's Skopje office for program development aid,
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Installation of solar panels on public buildings	26	75,000	Energy cost reductions of 20-40% for equipped buildings (estimated annual savings of 10,000-20,000 EUR after payback period of 5-7 years).	Job creation (5-10 installation and maintenance roles) and improved energy access for public services like schools.	Reduced fossil fuel dependency and CO2 emissions cuts of 50-100 tons annually. Avoided climate-related costs involve mitigating power outages from extreme weather, saving 15,000-30,000 EUR in backup energy expenses over a decade.	UNDP; -National Energy Efficiency Fund; -EBRD GEFF; - DBNM (EU IPA lines); -EIB; -AFD; - Green Climate Fund; - Climate Investment Fund; -OKTA; - Ministry of Energy, Mining and Mineral Resources	- Apply to the National Energy Efficiency Fund via their website, providing energy audits, as a domestic source with high accessibility for municipalities. - Approach the Ministry of Energy, Mining and Mineral Resources for alignment with national renewable priorities.

Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Renovation of public buildings using energy efficient (EE) technologies	26	100,000	25-35% reductions in heating/cooling costs (annual savings of 15,000-25,000 EUR post-renovation).	Healthier indoor environments, reducing illness-related absences in schools and offices by 10-20%.	Lower energy consumption and emissions (100-200 tons CO2 avoided yearly). Avoided climate-related costs encompass protection against heat extremes, preventing 30,000-60,000 EUR in future repairs from weather damage over 10 years.	UNDP; -National Energy Efficiency Fund;	- Request technical assistance from UNDP's office, submitting building inventories, drawing from ongoing public finance and energy projects. - Apply to the National Energy Efficiency Fund with detailed applications, as a key domestic mechanism for EE renovations. Coordinate with the Ministry of Education and Science for school-focused funding, leveraging ERASMUS+ and past renovations.
Primary adaptation objective 3: Waste Management	Procurement of vehicles for cleaning streets and other surfaces	21	75,000	Operational efficiency gains, reducing manual labor costs by 20-30% (savings of 10,000-15,000 EUR annually).	Cleaner public spaces, improving community health and reducing litter-related hazards.	Better waste collection, cutting pollution and methane emissions from debris. Avoided climate-related costs include preventing flood blockages from uncleaned streets, saving 20,000-40,000 EUR in cleanup after heavy rains over 5 years.	Own sources or other donors	. - Contact private donors like OKTA for CSR contributions, highlighting 2024 firefighting equipment donation success. - Engage Operation Florian via their UK channels for vehicle support, leveraging the 2019 fire vehicle donation.
Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Installation of a line crusher for hard materials	21	45,000	Reduced maintenance costs for waste processing (savings of 5,000-10,000 EUR per year).	Safer waste handling, minimizing worker injuries.	Efficient material recycling, reducing landfill use by 15-25%. Avoided climate-related costs involve better management of flood-prone debris, preventing 10,000-20,000 EUR in emergency responses during storms.	Ministry of Environment ; -EU IPA ; -EU WBIF ; - Ministry of Transport	- Monitor EU IPA calls, prioritizing due to past Bioreal wastewater success. - Contact the Ministry of Transport for co-financing, providing budgets, given frequent water infrastructure support. -
Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Replacement of old, asbestos pipes	20	80,000	Lower repair costs and water loss reductions (annual savings of 10,000-15,000 EUR).	Safer drinking water, reducing health risks from asbestos exposure.	Improved water quality and reduced contamination. Avoided climate-related costs involve enhanced drought resilience, saving 20,000-50,000 EUR in water scarcity	EU IPA / Interreg / Adrion; - World Bank (MSIP); - Bureau for Regional Development - Agency for Agriculture and Rural Development	- Submit to Bureau for Regional Development for grants, aligning with 2016-2023 water system projects. - Contact World Bank MSIP team for loans, preparing documents, given ongoing 2015-2028 street and water commitments. - Explore EU IPA/Interreg/Adrion via EU

						measures over a decade.		Delegation, leveraging 2016 Bioreal wastewater experience.
Primary adaptation objective 3: Waste Management	Cleaning up the "wild" (non-standard) landfills and converting those areas into places that will be used by the public	20	30,000	Land value increase for repurposed sites (potential revenue of 5,000-10,000 EUR from public use).	Community recreation spaces, boosting local well-being.	Reduced soil and water pollution. Avoided climate-related costs include preventing methane releases during floods, saving 10,000-25,000 EUR in environmental remediation.	Ministry of Environment and Physical Planning; - EU IPA (regional waste depot); UNDP; -Swiss SDC; -Bureau for Regional Development	- Monitor EU IPA for regional waste depot funding through EU Delegation, leveraging pending 2025 CWMF tender. - Request UNDP assistance, citing 2023-2024 public finance and waste projects. - Engage Swiss SDC for support
Primary adaptation objective 3: Waste Management	Campaign on the importance of waste selection and promotion of educational tools	20	30,000	Long-term waste management savings (5,000-10,000 EUR annually from better recycling).	Educated citizens and community engagement.	Reduced landfill waste by 10-20%. Avoided climate-related costs involve lower emissions from waste, preventing 8,000-15,000 EUR in climate mitigation efforts.	Ministry of Environment and Physical Planning; - Ministry of Local Self-Government; UNDP; - Swiss SDC; -EU ReLOaD3; -EU IPA / Interreg; -GIZ	- Submit to UNDP's office for partnership, using online forms, given 2023-2024 digital tool and education successes. - Apply to the Ministry of Environment and Physical Planning for awareness grants, aligning with national waste strategies. - Engage Swiss SDC via local programs for educational funding, building on historical grants. - Contact EU ReLOaD3 coordinators - Approach GIZ for capacity-building, citing regional municipal development modules.
Primary adaptation objective 3: Waste Management	Information and educational campaign: Select to receive	20	20,000	Improved recycling efficiency (annual savings of 3,000-7,000 EUR in waste handling).	Behavioral changes and youth involvement.	Diverted waste from landfills (5-15% reduction). Avoided climate-related costs include reduced flood risks from clogged drains, saving 5,000-10,000 EUR in cleanups.	Ministry of Environment and Physical Planning; - Ministry of Local Self-Government; UNDP; - Swiss SDC; -EU IPA / Interreg	- Apply to UNDP for campaign support, drawing from ongoing public finance initiatives. - Submit to the Ministry of Environment and Physical Planning for grants, aligning with waste selection priorities. - Engage Swiss SDC through workshops for small grants, leveraging past community forums. - Contact EU ReLOaD3 managers for funding, citing 2025 local democracy emphasis. - Approach the Ministry of Local Self-Government for co-

								funding, integrating with development strategies.
Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Raising public awareness about saving water resources	20	10,000	Reduced municipal water bills (2,000-5,000 EUR savings annually).	Community empowerment and habit changes.	Conserved water resources. Avoided climate-related costs include mitigating drought impacts, saving 10,000-20,000 EUR in emergency supplies.	UNDP; -Swiss SDC; -EU IPA / Interreg; -EU ReLOaD3 (Regional Programme on Local Democracy); - US Embassy programs; - Operation Florian; - City Climate Finance Gap Fund	- Submit campaign proposals do bilateral donors (e.g. Slovenian Embassy, Slovak Aid) to UNDP's portal, building on water-related partnerships. - Engage Swiss SDC for awareness grants, citing historical environmental support. - Apply to EU ReLOaD3 via coordinators, leveraging citizen participation focus. - Contact the US Embassy in Skopje for small grants- Explore EU IPA/Interreg calls on EU Delegation site for cross-border education.
Primary adaptation objective 3: Waste Management	Waste selection	19	75,000	Revenue from recyclables (5,000-10,000 EUR annually).	Job creation in sorting (3-5 roles).	Reduced pollution and resource recovery. Avoided climate-related costs include lower greenhouse gas emissions, saving 15,000-30,000 EUR in carbon mitigation.	Ministry of Environment and Physical Planning; - EU IPA (regional waste depot); -EU WBIF; - UNDP; -Swiss SDC; - PAKOMAK partnerships (private sector);	- Apply to the Ministry of Environment and Physical Planning via waste programs, aligning with LEAP. - Submit to UNDP for technical aid, citing 2020-2022 waste-to-food projects. - Monitor EU IPA for regional depot funding through EU Delegation, leveraging 2025 tender. - Partner with private sector like PAKOMAK for collaborations, drawing from circular economy initiatives.
Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Reducing water losses and improving water supply efficiency	19	10,000	10-20% water bill reductions (2,000-5,000 EUR savings yearly).	Reliable water access for residents.	Sustainable resource use. Avoided climate-related costs involve drought resilience, preventing 10,000-25,000 EUR in alternative sourcing.	Own sources	- Plan and procure

Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Installation of "white roofs" on public buildings	19	80,000	Cooling cost reductions of 15-25% (8,000-12,000 EUR annual savings).	Cooler indoor spaces, improving productivity.	Urban heat island mitigation. Avoided climate-related costs include reduced heatwave health impacts, saving 10,000-20,000 EUR in medical responses.	- Ministry of Energy, Mining and Mineral Resources; -National Energy Efficiency Fund; - DBNM (EU IPA lines); - Green Climate Fund;	- Contact UNDP for design assistance, leveraging 2024 photovoltaic co-financing. - Submit to the National Energy Efficiency Fund with assessments, as a high-likelihood domestic source.
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Adding the municipality of Sveti Nikole into the GIS Solar Cadastre database	19	2,000	Better planning for solar investments (potential savings of 1,000-2,000 EUR in surveys).	Data-driven community decisions.	Optimized renewable integration. Avoided climate-related costs include efficient energy transitions, preventing 5,000-10,000 EUR in suboptimal installations.	Own sources or UNDP (Technical Assistance); - EIT Climate-KIC; -GIZ; - Swiss SDC	- Request technical assistance with EIT Climate-KIC through Resilience Lab for database integration. - Contact GIZ for GIS support, citing regional development modules.
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Climate Change Adaptation Partnership	18	3,000	Shared resources and funding leverage (1,000-3,000 EUR in collaborative savings).	Knowledge exchange and community resilience.	Coordinated adaptation efforts. Avoided climate-related costs include proactive measures against extremes, saving 5,000-15,000 EUR in isolated responses.	Office of Prime Minister – Green Climate Fund technical focal point	- Set up a meeting with the National Designated Authority for Green Climate Fund (GCF) technical focal point and access GCF readiness adaptation funding
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Establishing partnership with the private sector	18	2,000	Co-investments and sponsorships (1,000-2,000 EUR in direct contributions).	Job opportunities and skill transfers.	Private-led green innovations. Avoided climate-related costs include shared risk management, preventing 3,000-8,000 EUR in solo adaptations.	International Labour Organization, GIZ	- Contact ILO or GIZ to discuss support with engaging private sector in climate adaptation and resilience activities

Primary adaptation objective 1: Water Security, Wastewater management and Drought Resilience	Construction of a Sewage treatment plant	17	800,000	Wastewater reuse potential (savings of 50,000-100,000 EUR annually in treatment).	Improved sanitation and health for 10,000+ residents.	Reduced river pollution and biodiversity protection. Avoided climate-related costs include flood and drought resilience, saving 100,000-200,000 EUR in contamination cleanups over 10 years.	EU IPA / Interreg / Adrion (Bioreal project); EU WBIF ; -World Bank MSIP; ; - Ministry of Environment and Physical Planning;	- Monitor EU IPA/Interreg/Adrion via EU Delegation, building on 2016-2020 Bioreal. - Apply to the Ministry of Environment and Physical Planning for grants, citing Mustafino phases. - Contact World Bank MSIP for loans, preparing assessments, leveraging ongoing commitments. - Engage EBRD Skopje for financing, drawing from past sewerage projects. - Submit to EU WBIF secretariat for framework support.
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Promotional campaign to raise awareness among citizens about the importance of energy efficient systems	17	25,000	Behavioral energy savings (3,000-6,000 EUR community-wide annually).	Educated households and reduced energy poverty.	Lower consumption patterns. Avoided climate-related costs include mitigated demand spikes during extremes, saving 5,000-10,000 EUR in grid upgrades.	Ministry of Energy, Mining and Mineral Resources ;	- Ministry of Energy support to coordinate with donor agencies willing to support this activity
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Green Urban Planning	17	5,000	Efficient land use (savings of 1,000-3,000 EUR in development costs).	Sustainable communities and inclusivity.	Integrated green spaces. Avoided climate-related costs include urban resilience, preventing 5,000-15,000 EUR in heat/flood damages.	Ministry of Environment and Physical Planning; -Ministry of Local Self-Government; -UNDP; -Swiss SDC; -City Climate Finance Gap Fund; -GIZ; -Faculty partnerships	- Engage UNDP for assistance, citing urban development. - Contact Swiss SDC for initiatives, - Approach the Ministry of Local Self-Government for strategies.
Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Reconstruction and arrangement of green areas and creation of green zones	14	40,000	Tourism revenue potential (2,000-5,000 EUR annually).	Recreational health improvements.	Biodiversity enhancement and carbon sequestration. Avoided climate-related costs include flood absorption, saving 10,000-20,000 EUR in drainage works.	Ministry of Sport; EBRD Green Cities project support; bi-lateral aid – Scandinavian countries	- Submit to Bureau for Regional Development for funding, citing past green arrangements.

Primary adaptation objective 2: Energy Efficiency, Renewable Energy and storage	Creating Urban Cooling Areas	14	100,000	Reduced cooling energy use (10,000-15,000 EUR savings yearly).	Heat relief for vulnerable groups.	Microclimate improvements. Avoided climate-related costs include health costs from heatwaves, saving 20,000-40,000 EUR in interventions.	Bi-lateral aid – Scandinavian countries (e.g. SIDA); GCF Cooling project with World Bank	- Contact GCF NDA technical focal point for engagement in GCF readiness support and cooling project with the World Bank
Total Cost of Actions			**1,617,000**					

Table 19 Action Portfolio (short term prioritized climate resilience measures)

The overall financial needs for the Municipality of Sveti Nikole's climate resilience action portfolio, as outlined in the provided table, total approximately EUR 1,617,000 across 20 priority measures. These needs are distributed across three primary adaptation objectives:

- Energy efficiency and renewable energy (EUR 397,000 for actions like solar panel installations, building renovations, and green urban planning),
- Waste management (EUR 230,000 for procurement of cleaning vehicles, landfill cleanups, and awareness campaigns),
- Water security/wastewater management (EUR 990,000, dominated by the EUR 800,000 sewage treatment plant construction, pipe replacements, and efficiency improvements).

These estimates draw from logical cost projections based on similar projects in North Macedonia, such as past wastewater reconstructions (e.g., Bioreal project at EUR 1,297,942) and energy retrofits (e.g., school heating installations at MKD 8,212,800 ~ EUR 133,541).

The identified investments can be tackled by a mix of own investments, where suitable use of donor funding (grants from development agencies focused on climate resilience).

Sveti Nikole should adopt a blended financing approach: prioritizing high-likelihood grants from national ministries (e.g., block grants for education and environment) and EU programs (IPA III, Interreg) for water and waste actions; securing grants from the on-lent Hungarian Eximbank loan (EUR 250 million for municipalities) for energy infrastructure; engaging private donors for equipment; and exploring innovative mechanisms like crowdfunding or green bonds for smaller campaigns, supported by technical assistance from GIZ/SECO (EUR 14.3 million regionally) and City Climate Finance Gap Fund to enhance project bankability and application success. This strategy leverages Sveti Nikole's track record of mixed funding (e.g., 2020 wastewater revitalization with MKD 10,500,000 total) to ensure scalable, resilient implementation.

Additional financial needs for future long term climate resilience

As presented in the analysis above, although this action plan prioritizes actions for climate resilience, the long-term climate resilience needs for Sveti Nikole are estimated to be about EUR 40 million. Yet, with EU 12 million, Sveti Nikole can tackle the cost-benefit ratio or investing now.

To address the EUR 12 million investment required to initiate Sveti Nikole's long-term climate resilience pathway—focusing on high-impact actions in water security, energy efficiency, waste management, adding agricultural resilience while demonstrating favorable cost-benefit ratios through early avoided losses from droughts, floods, heatwaves, and wildfires—the municipality can pursue a structured, multi-phased approach.

Agricultural resilience is a pivotal sector for Sveti Nikole, given that it contributes nearly 39% to municipal GDP and faces high vulnerability due to heat stress, water scarcity, soil degradation, and disrupted growing seasons. Thus, funding is needed to integrate climate-smart farming techniques, irrigation improvements, and support for small-scale farmers alongside infrastructure upgrades.

Sveti Nikole should prioritize bankable projects like wastewater treatment upgrades, solar deployments on public buildings, integrated waste systems, and agricultural pilots such as drought-resistant crop varieties and efficient irrigation networks. By investing now, Sveti Nikole can leverage compounding benefits, such as reduced operational costs (e.g., 20-40% energy savings and 10-20% water efficiency gains), enhanced adaptive capacity, and protection of agricultural yields, yielding a projected return of 2-3 times the investment in avoided damages (e.g., preventing crop losses valued at EUR 500,000-1 million annually during droughts) and economic co-benefits within 5-7 years, as modeled in similar North Macedonian contexts like the Green Finance Facility (GFF) initiatives and Agency for Agriculture grants.

Key next steps entail preparatory activities to build a robust pipeline, incorporating agriculture's central role.

In early 2026, the municipality should commission feasibility studies and pre-investment assessments, potentially funded through existing partners like UNDP (leveraging their ongoing technical assistance under the GFF for air quality, climate projects, and waste-to-food initiatives) or the EIB City Climate Gap Fund, which has supported similar energy, infrastructure, and rural development studies and upgrades in North Macedonia. These studies would include detailed cost-benefit analyses, environmental impact assessments, and risk modeling for priority actions, with specific modules on agricultural vulnerabilities such as soil erosion mapping and irrigation optimization, costing an estimated EUR 100,000-200,000 and completed within 6 months. Concurrently, Sveti Nikole's LED Department, in collaboration with SmartUp - Social Innovation Lab and the Agency for Financial Support of Agriculture and Rural Development, should organize stakeholder workshops to refine project scopes, incorporating input from farmers, women's agricultural cooperatives, and vulnerable groups to ensure inclusivity and alignment with the Pathways2Resilience strategy, while addressing outmigration by linking resilience to local job creation in sustainable farming.

Metric	Amount (EUR)	Key Takeaway
Short-term Action	**1.2M**	Immediate "low-hanging fruit" projects (as per action plan)
Planned (General)	**23.0M**	Total environmental/infra budget for the next 5 years.
Yearly Inaction Cost	**10.8M**	The "Price of Silence" lost every single year by 2040.

Resilience Gap Investment	**12.0M**	The strategic investment needed for long-term climate resilience today
Economic Benefits	**41.0M**	The value created/saved by the 12M investment.

Table 20 Summary of short-term and long-term climate resilience investment needs for Sveti Nikole (estimates)

For accessing funding, particularly from the Green Climate Fund (GCF), the municipality should engage North Macedonia's National Designated Authority (NDA)—the Office of the President of the Government of Republic of North Macedonia—by scheduling discussions in Q1 2026 with key contacts like to present municipal needs, including agriculture-focused adaptation, and explore accreditation pathways or concept notes. Sveti Nikole can partner with GCF-accredited organizations or UNDP (active in GFF, readiness support, and agriculturally linked projects like municipally useful work programs) to co-develop proposals under GCF's Simplified Approval Process for adaptation projects up to USD 10 million (approximately EUR 9.3 million as of December 2025), emphasizing agriculture's vulnerability through components like climate-smart irrigation and farmer training.

Additional avenues include applying for GCF Readiness Programme grants (up to USD 1 million per country annually) for capacity building in agricultural risk assessment, supplemented by blending with EU IPA III funds (e.g., via the EUR 336,000 regional waste depot tender or Interreg for cross-border agro-resilience), Hungarian Eximbank loans (EUR 250 million pool for municipalities, suitable for irrigation infrastructure), or Bureau for Regional Development grants (building on past rural water and road projects). By mid-2026, submit initial concept notes to GCF, emphasizing scalable pilots like the sewage treatment plant integrated with agricultural wastewater reuse, while monitoring calls from SlovakAid (up to EUR 10,000 microgrants for food security and agriculture) or Japan's GGP (up to EUR 90,000 for water supply and environmental projects) for quick-win components like farmer cooperatives, ensuring a diversified portfolio that secures the full EUR 12 million by 2027.

ANNEX 1. ANALYSIS AND INTERPRETATION OF CLIMATE VARIABILITY AND CHANGES FOR SHTIP (NEAREST REFERENCE STATION FOR SVETI NIKOLE)

The last decade of the 20th century and the beginning of the 21st century are the warmest climatic periods worldwide. These are also among the most distinctive periods from both a weather and climate perspective in the Republic of North Macedonia. Under the influence of natural factors, as well as human activities, climate changes have been occurring over the past thirty years on a global scale, across the territory of Southeast Europe, and in the Republic of North Macedonia. Climate change can be clearly detected in long-term climate data series and is characterized primarily by an increase in air temperature, changes in precipitation regimes, as well as an increased frequency of extreme weather events and periods with extreme climatic conditions.

The need to analyse extreme climatic events arises from trends observed in recent decades, which are expected to continue and intensify in the future. In general, a decreasing trend in the number of frost days has been observed, alongside an increase in the number of warm (tropical) nights, more frequent heatwaves, fewer days with precipitation, and an increase in precipitation intensity.

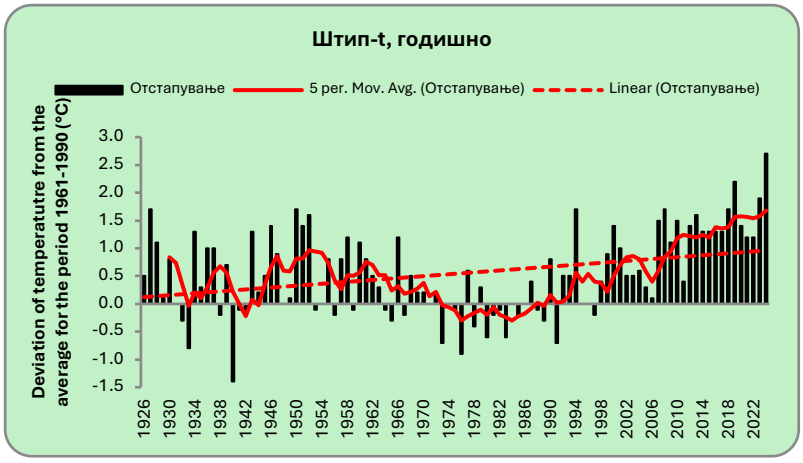
Although extreme events do not occur frequently, they can have significant impacts: causing substantial damage to infrastructure, affecting the economy and public health, and leading to loss of life (IPCC 2013; WHO n.d., 2012; Melillo et al. 2014). It is essential for meteorological communities to improve the understanding and characterization of extreme weather and climate events across time and space using regionally and globally consistent methodologies.

To present these changes, an analysis was conducted of the variability of the main climatic elements- air temperature and precipitation. Since there is no meteorological station in Sveti Nikole with a continuous and long-term measurement record, the analysis includes data from the meteorological station in Štip, as the nearest reference station for Sveti Nikole. The meteorological station in Štip is also one of the three stations with the longest data series in the territory of the Republic of North Macedonia. The analysed period covers 1926-2024, at both annual and seasonal levels, compared to the reference period 1961-1990.

1. CLIMATE VARIABILITY OF AIR TEMPERATURE

Based on the analysis of the long-term variation of the mean annual air temperature (Graph 2), it is observed that relatively higher air temperatures were measured during the 1950s, followed by a colder period from 1973 to 1991. In the period from 1998 to 2024, the mean annual air temperature has been continuously higher than the average for the 1961-1990 period.

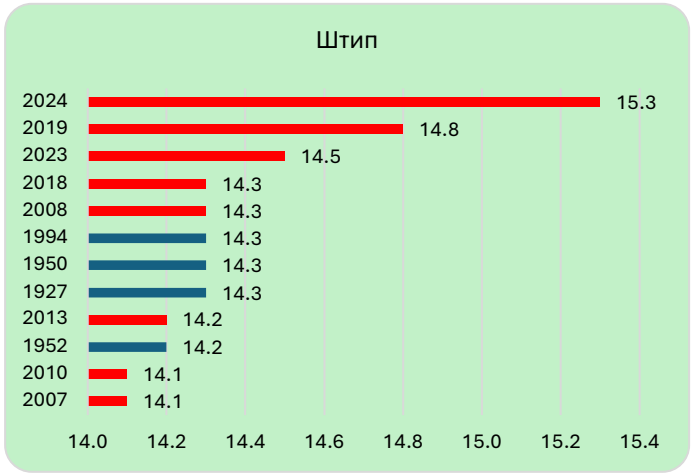
Over the ninety-nine-year period, the long-term variation of the mean annual air temperature ranges between 11.2°C and 15.3°C, while the average annual air temperature for the standard thirty-year climate period (1961-1990) is 12.6°C. The difference between the average annual air temperature for the entire period (1926-2024) and the average annual temperature for the period 1961-1990 amounts to 0.5°C.



Graph 2. Deviation of annual air temperature from the average for the period 1961-1990[2]

The warmest years recorded at the meteorological station in Štip for the period 1926-2024 are 2024, 2019, 2023, 1927, 1950, 1994, 2008, and 2018 (Graph 3). The year 2024 stands out as extremely warm, with an annual air temperature of 15.3°C, which is 2.7°C higher than the 1961-1990 average.

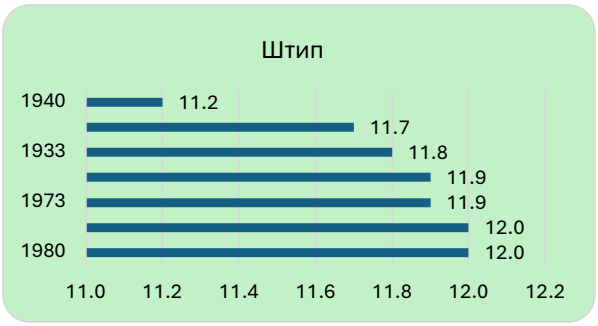
For the available data period, individual extremely warm years have been recorded, but it is evident that the last eighteen consecutive years (2007-2024), except for 2011, rank among the ten highest values of annual air temperature.



Graph 3. Warmest years for the period 1926-2024

[2] **Note for the legend:**
5 per. Mov. Avg - 5-period moving average - average of climate data from the last 5 consecutive years, months, or seasons (depending on the context).
Linear - linear trend of time series (temperature, precipitation).

The coldest years were recorded during the colder twenty-year period, with 1940, 1976, 1933, 1973, 1991, 1980, 1983, and 1978 standing out (Graph 4). The lowest annual air temperature was measured in 1940, at 11.2°C, which is 1.4°C lower than the average for the 1961-1990 period.



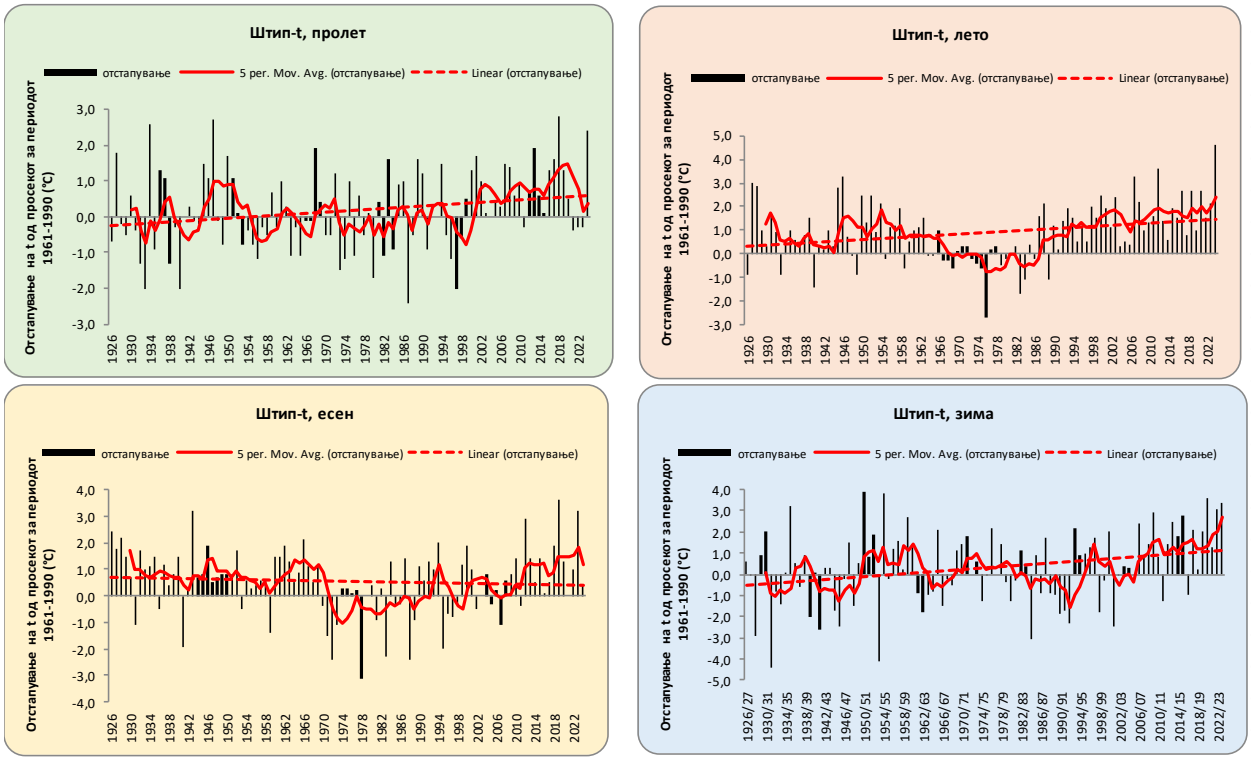
Graph 4. Coldest years for the period 1926-2024

Research conducted on the average annual air temperature by decades shows that the most recent decade (2011-2020) is the warmest decade for the period 1951-2020 (Graph 5).

Graph 5. Average annual air temperature by decades for the period 1951-2020

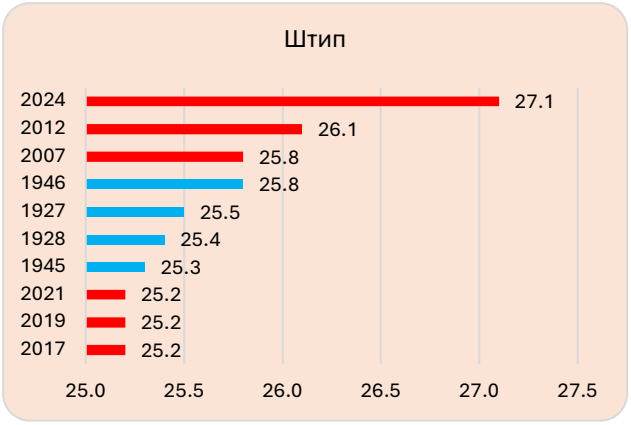
In this decade, nine years (2012-2020) rank among the eight highest annual air temperature values for the period 1951-2020, with 2019 being the second warmest year for the entire period. The decadal value of the annual air temperature for 2011-2020 deviates from the 1961-1990 average by 1.4°C (Graph 5).

The spring (March-April-May) air temperature for the period 1926-2024 ranges from 10.1°C to 15.3°C. The difference between the average spring air temperature for the entire period and the average for 1961-1990 amounts to 0.2°C. An increasing trend in spring air temperature is observed (Graph 6), because of nearly continuous higher spring temperatures over the last twenty-six years compared to the 1961-1990 average, except for 2011, 2021, 2022, and 2023. According to the spring air temperature data, the highest values were recorded in 2018, 1947, 1934, 2024, 1968, and 2013, while the lowest values were recorded in 1987, 1933, 1940, and 1997.



Graph 6. Deviation of seasonal air temperatures from the average for the period 1961-1990

The summer (June-July-August) air temperature for the period 1926-2024 ranges from 19.8°C to 27.1°C, while the average value for the period 1961-1990 is 22.5°C. The difference between the average summer air temperature for the entire period (1926-2024) and the average for 1961-1990 amounts to 0. 9°C.Extremely warm summers were recorded at the beginning of the measurement period, in 1927, 1928, 1945, and 1946. The record measured in the summer of 1946 was not exceeded for more than 50 years, until 2007, when it was matched and later surpassed in 2012 and 2024. During the summer in the final years of the 20th century and the beginning of the 21st century (Graph 6), significantly higher and continuously above-average air temperature values occurred, especially from 1990 to 2024. Most of the years within the last twenty-year period rank among the warmest summers, which explains the evident increasing trend in summer air temperatures. The highest summer temperature values since the beginning of measurements were recorded in 2024, 2012, 1946, and 2007. The year 2024 stands out with an extremely high summer temperature (27.1°C) and the greatest deviation compared to the 1961-1990 average (Graph 6 and Graph 7). The coldest summers were recorded in 1976, 1983, 1940, 1984, and 1989 (Graph 6). During the summer part of the year, specifically in July, the highest air temperature values of the year are recorded (Table 21). The highest maximum air temperature at the Štip meteorological station, 43.5°C, was measured on July 24, 2007. Almost all annual maximum air temperatures above 40°C have been measured after 1985.



Graph 7. Warmest summers for the period 1926-2024

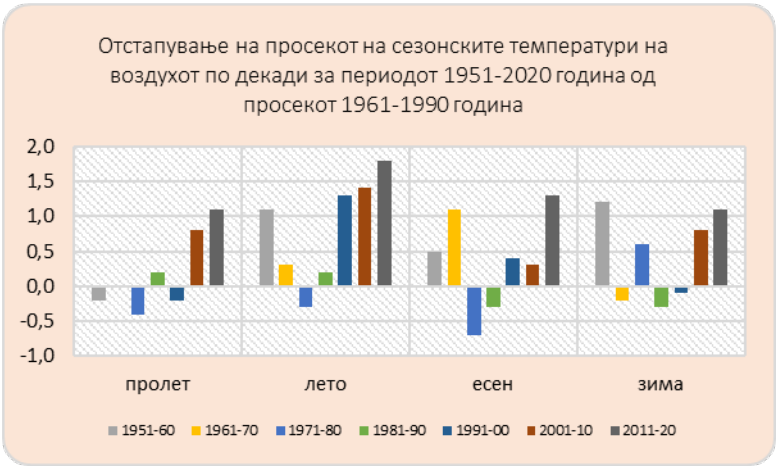
	TX_max (°C)	day	month	year
1	43,5	24	07	2007
2	43,2	5	07	2000
3	42,2	25	07	1987
4	42,2	6	07	1988
5	41,7	21	08	1999
6	41,6	11	08	1994
7	41,6	25	07	2009
8	41,5	7	08	2012
9	41,2	31	07	1985
10	41,0	24	08	1958
11	41,0	1	07	2017

Table 21. Ten highest values of the annual maximum air temperature for the period 1951-2024 at the Shtip meteorological station.

The autumn (September-October-November) air temperature for the period 1926-2024 ranges from 10.2°C to 16.9°C. The difference between the average autumn air temperature for the entire period (1926-2024) and the average for 1961-1990 amounts to 0.5°C. As can be seen (Graph 6), a slight decreasing trend in autumn air temperature is evident. However, despite the downward trend, the highest autumn temperature values were measured in 2019, 2023, and 2012, while the lowest values were recorded in 1978, 1972, and 1988.

The winter (December-January-February) air temperature for the period 1926-2024 ranges from -2.1°C to 6.2°C. The difference between the average winter air temperature for the entire period (1926-2024) and the average for 1961-1990 amounts to 0.3°C. An increasing trend in winter air temperature is observed (Graph 6), while individual annual values continuously fluctuate between positive and negative deviations around the thirty-year average (1961-1990). In the last twenty years, winter temperatures have been consistently higher than the average, apart from the winters 2011/2012 and 2016/2017. The warmest winters since the beginning of measurements were recorded in 1950/1951, 1954/1955, 2020/2021, 2023/2024, 1935/1936, and 2022/2023, while the extremely coldest winters were recorded in 1931/1932 and 1953/1954 (Graph 6). During the winter part of the year, specifically in January, the lowest air temperatures of the year are recorded. The lowest minimum air temperature at the Štip meteorological station, -22.7°C, was measured on January 26, 1954.

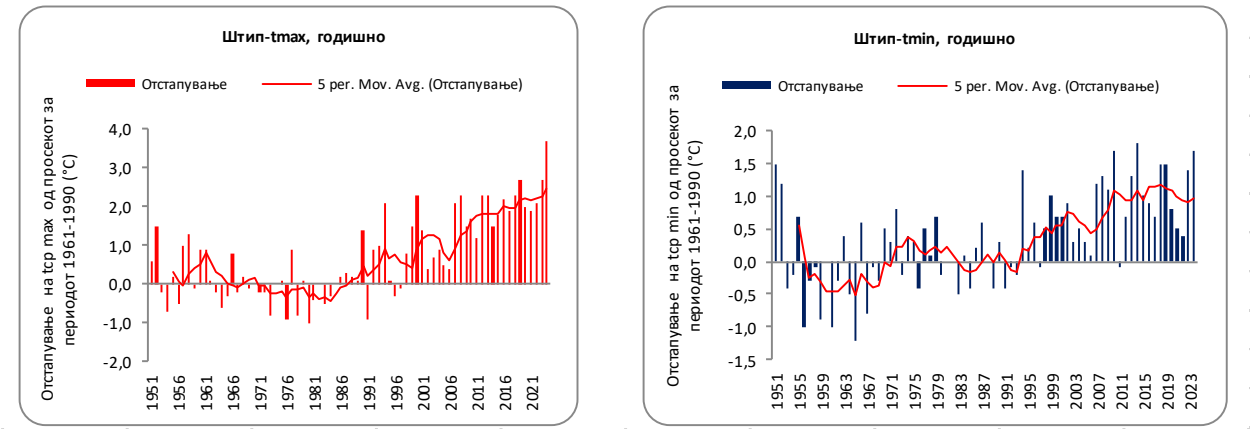
The most recent decade (2011-2020) is also the warmest at the seasonal level (spring, summer, and autumn), with the greatest deviation from the average observed in the summer season (1.8°C). For the winter period, the decade 1951-1960 stands out, with a decadal air temperature value 0.1°C higher than that of the decade 2011-2020 (Graph 8).



Graph 8. Deviation of the average seasonal air temperatures by decades for the period 1951-2020 from the average for the period 1961-1990

Research conducted on the mean annual maximum and minimum air temperatures for the period 1951-2020 shows a clear increasing trend. The increase in maximum temperature is greater compared to the increase in minimum temperature (Graph 9). The difference between the average values for the period 1951–2024 and the

average for the period 1961-1990 amounts to 0.3°C for the minimum temperature and 0.7°C for the maximum temperature.



Graph 9. Deviation of the Mean Annual Maximum and Minimum Air Temperature from the Average for the Period 1961-1990

1. CLIMATE VARIABILITY OF PRECIPITATION

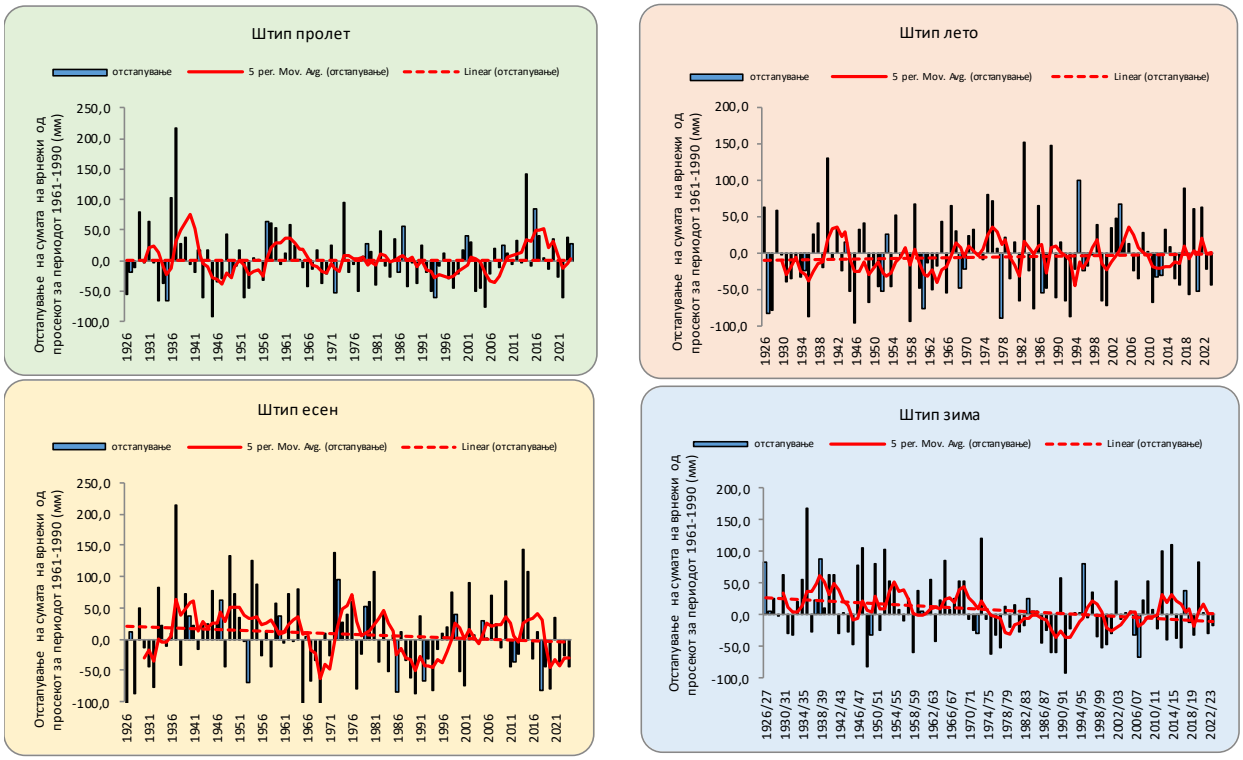
An analysis of annual and seasonal precipitation was carried out in the same manner for the meteorological station in Shtip. The long-term trend of annual precipitation totals (Graph 10) indicates a general decreasing trend in precipitation; however, due to the rapid year-to-year fluctuations in precipitation, the magnitude of the decrease cannot be clearly determined.

Graph 10. Deviation of the annual precipitation amount from the average for the period 1961-1990

The decrease in precipitation over the past forty years, compared to the period 1961-1990, is particularly pronounced on an annual basis during the period from 1984 to 1994, as well as in the years 2000, 2001, 2011, and 2019. The driest years in the period 1926-2024, and at the same time the years with the largest deviations

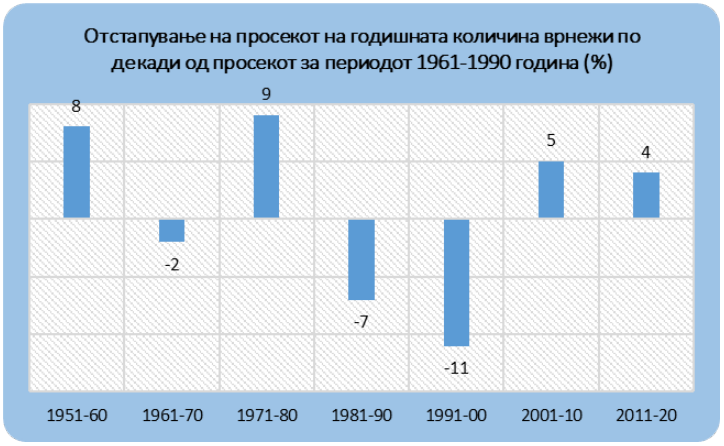
in precipitation from the average, are 1992, 1932, 1928, and 1993. It is characteristic that in the years between these periods, annual precipitation totals higher than the average values were recorded, notably in 1937, 2014, 1974, and 1929.

From the multi-year variation of seasonal precipitation shown in Graph 11, a decrease in autumn and winter precipitation has been observed, an increase in summer precipitation, while for spring precipitation, in general, no clear trend in change can be determined. A characteristic feature of spring precipitation is that the last decade (2011-2020) has the highest average decadal value compared to the other decades in the period 1951-2020. In this period, 2014 and 2016 rank among the five years with the highest spring precipitation totals.



Graph 11. Deviation of seasonal precipitation totals from the average for the period 1961-1990

Precipitation does not show a pronounced and unambiguous trend in spatial and temporal analysis, as is the case with changes in air temperature. Research conducted on the average annual precipitation totals by decades indicates a decrease in precipitation during the two consecutive decades 1981-1990 and 1991-2000 compared to the 1961-1990 average (by 7 to 11%), followed by the two decades 2001-2010 and 2011-2020, during which precipitation above the average was recorded by up to 5% (Graph 11). In these latter decades, several years rank among those with higher annual precipitation totals, with 2002, 2010, 2015, and particularly 2014 standing out as the year with the highest annual precipitation total recorded for the period 1951-2020.



Graph 12. Deviation of the average annual precipitation amount by decades from the average for the period 1961-1990 (%)

A characteristic feature of the period 2011-2020 is the increase in seasonal decadal values for winter precipitation by 7% and for spring precipitation by 24%, while for autumn and summer decadal precipitation totals a decrease of 6% and 7%, respectively, is evident compared to the average values (Graph 13).

Graph 13. Deviation of the average seasonal precipitation amount by decades from the average for the period 1961-1990 (%)

1.1 CLIMATE INDICES

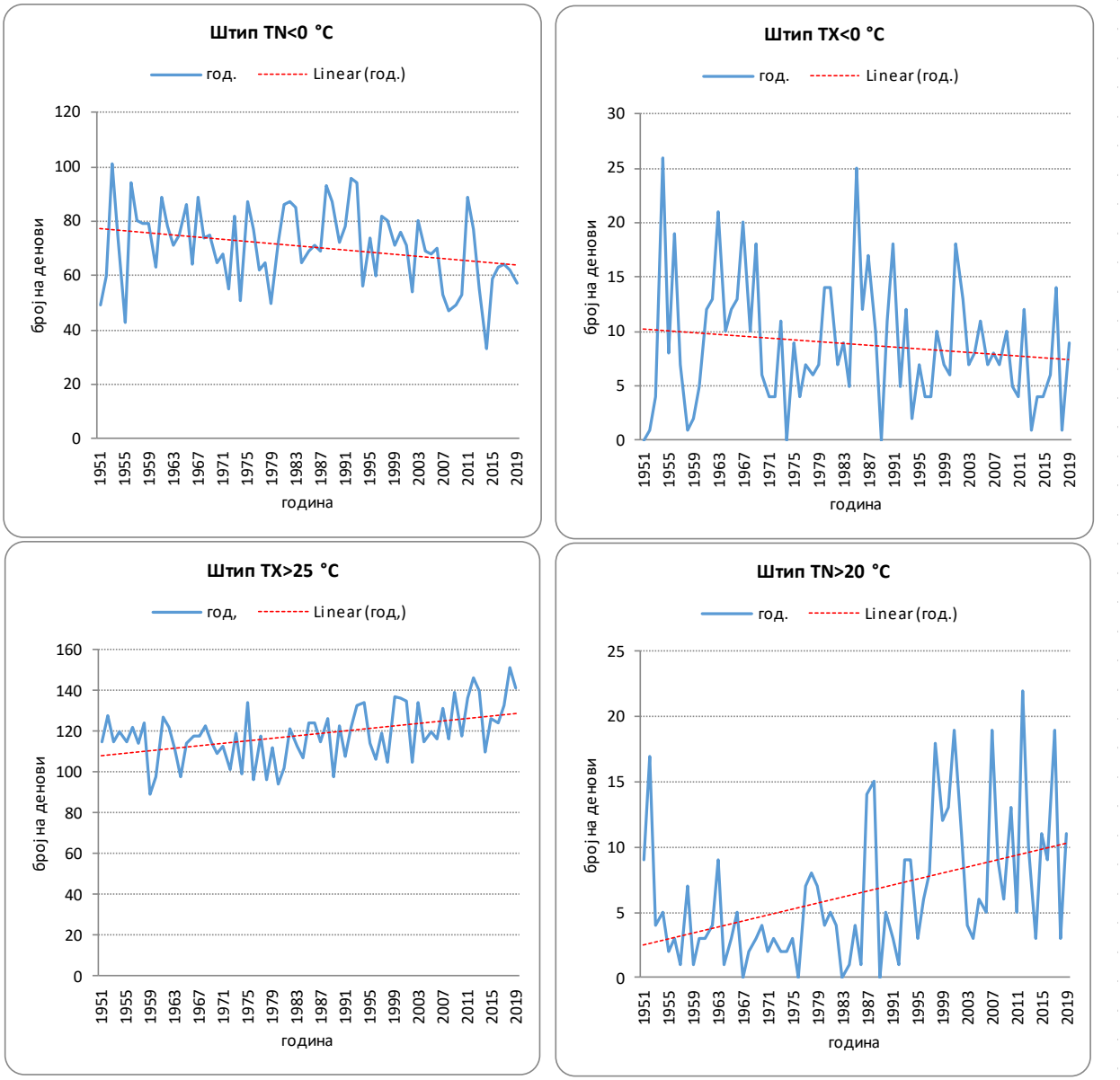
The analysis of temperature indices shows how the observed increase in air temperature affects the reduction in the frequency and duration of cold periods and the increase in warm periods, which may cause adverse impacts. In the period 1951-2019, a decrease was observed in the annual number of frost days (days when the minimum air temperature is below 0°C) and in the number of ice days (days when the maximum air temperature is below 0°C). Ice days occur less frequently than frost days, and therefore their decrease is smaller. During the same period, an increase was observed in the annual number of tropical nights (days when the minimum air temperature is above 20°C) and in the annual number of summer days (days when the maximum air temperature is above 25°C) (Graph 14).

In the period from 1951 to 2019, the annual number of frost days ranged from 33 to 101 days, while the highest annual number of ice days, 26, was recorded in 1954. In certain years, no ice days were recorded at all (Table 22). In the period from 1951 to 2019, the annual number of summer days ranged from 89 to 151 days, while the highest annual number of tropical nights, 22, was recorded in 2012. In certain years, no tropical nights were recorded at all (Table 22).

	Frost days (Tn<0 °C)	**Ice Days (Tx<0 °C)**	**Summer Days (Tx>25 °C)**	**Tropical nights (Tn>20 °C)**
Max	101	26	151	22
Year	1953	1954	2018	2012
min	33	0	89	0
year	2014		1959	

Table 22. Annual maximum and minimum number of frost days, ice days, summer days, and tropical nights for the period 1951-2019

Research conducted on decadal averages, in relation to the reference period 1961-1990, shows that the greatest change was recorded in the last decade (2011-2020), namely a decrease in the annual number of ice days by 4 days and an increase in summer days by 20 days.



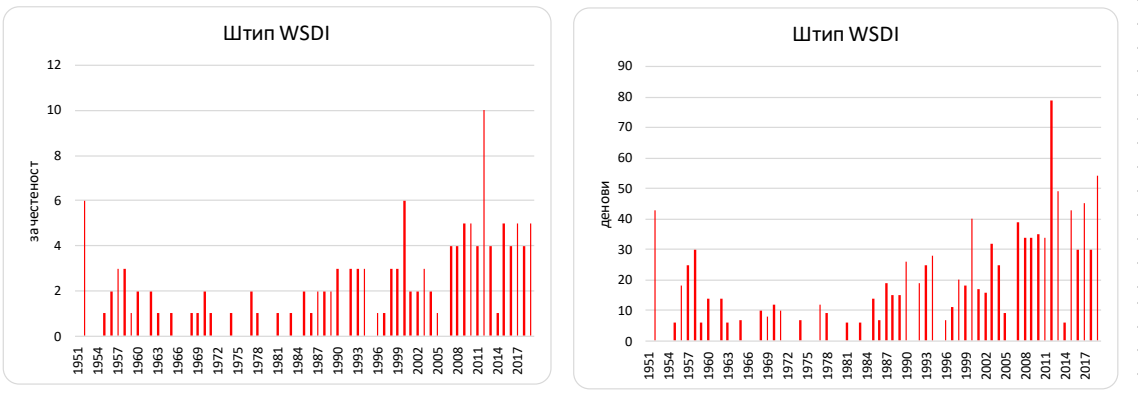
Graph 14. Annual number of frost days, ice days, summer days, and tropical nights for the period 1951-2019

An increase in tropical nights by 6 days was recorded in both last two decades (2001-2010 and 2011-2020). The greatest change, i.e., a decrease compared to the average in the number of frost days by 13 days, was recorded for the decade 2001-2010, while the decrease for the decade 2011-2020 amounts to 12 days. For the analysis of risk to various sectors from high air temperatures, the frequency and duration of excessive or prolonged heat during the year are particularly important. The criterion for determining the Warm Spell Duration Index (WSDI) is the number of days with at least 6 consecutive days when the maximum daily temperature exceeds the 90th percentile for the calendar day, calculated using a five-day moving window centred on each calendar day for the reference period 1961-1990.

In accordance with the statistical analysis of maximum daily air temperature values, it can be concluded that the highest frequency of occurrence is associated with the shortest heat waves, i.e., periods lasting 6 days. The longer the duration of the period, the lower its frequency of occurrence. In the period 1951-2019, a total of 138 heat waves were recorded in Shtip (Graph 15).

Graph 15. Frequency of occurrence of WSDI, Warm Spell Duration Index (period 1951-2019)

The analysis of the annual frequency of heat wave occurrence shows that the total number of recorded waves is not evenly distributed by year. The annual frequency of heat waves increases in the second half of the analyzed period; more precisely, starting from 1985, the frequency of occurrence increases, and unlike the first half of the period, heat waves were recorded almost every year thereafter (Graph 16). It can also be observed that the highest frequency of heat waves was recorded in the last ten years, with a maximum of 10 events in 2012 and the highest total annual duration of 79 days. Higher values of total annual duration generally coincide with the years that have the highest frequency of heat wave occurrence (Graph 16).



Graph 16. **Annual frequency of occurrence and duration of heat waves**

The longest-lasting heat wave in the period 1951-2019 lasted 19 days and was recorded from 22 October to 9 November 2013 (Table 23).

Почеток	Крај	Број на денови
22.10.2013	09.11.2013	19
18.10.2004	04.11.2004	18
12.10.2019	29.10.2019	18
29.4.2003	14.5.2003	16
17.7.2015	31.7.2015	15
20.8.2019	03.9.2019	15

Table 23. Longest warm periods (period 1951–2019)

The greatest increase in both the frequency and the number of days with heat waves on an annual basis, compared to the reference period, was recorded in the decade 2011-2020. In this decade, an increase of 31 heat wave days was recorded in Štip compared to the reference period.

For proper plant growth and development, in addition to the previously mentioned temperature indices, the length of the growing season is of particular importance. The length of the growing season is defined as the number of days between the start of the first period with at least 6 days having a mean daily temperature above 5°C and the start of the first period in the second half of the year with a mean daily temperature below 5°C.

The shortest duration of the growing season was recorded in 1993, lasting 245 days, while the maximum length of the growing season, 346 days, was recorded in 2009, when the growing season lasted almost the entire year (Table 24 and Table 25).

Year	**2009**	**1963**	**2010**	**2003**	**1987**	**1994**	**1970**	**1972**	**2008**	**2014**
Duration (days)	346	340	339	335	333	331	328	327	327	325

Table 24. Ten years with the longest growing season (1951–2019)

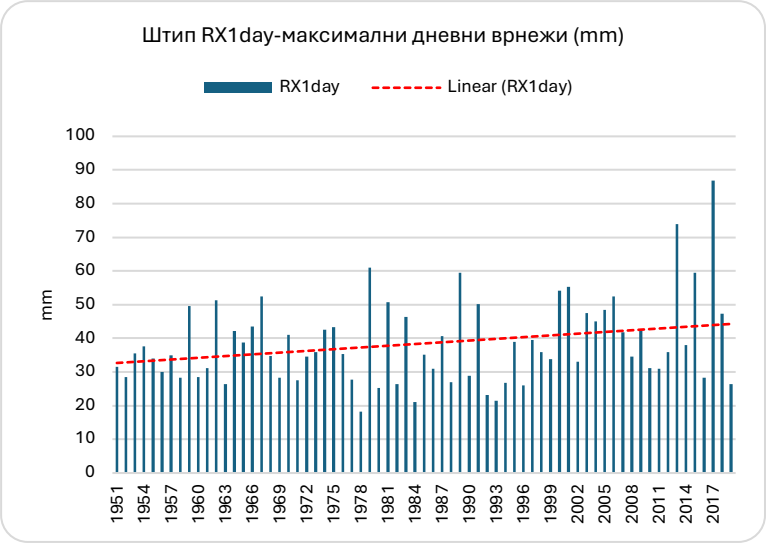
Year	**1973**	**1982**	**1997**	**1981**	**1993**
Duration (days)	251	250	250	248	245

Table 25. Five years with the shortest growing season (1951-2019)

Research based on decadal averages shows that in the most recent decades, 2001-2010 and 2011-2020, the greatest changes in the duration of the growing season were observed. The largest increase and extension of the growing season, by 23 days compared to the reference period, was recorded in the period 2001-2010.

The occurrence of extreme precipitation represents a major hazard that often leads to floods, landslides, infrastructure damage, significant economic losses-especially in agriculture-and frequently even loss of human lives.

According to long-term data (period 1951-2019), the absolute maximum daily precipitation amount, 86.9 mm, was recorded on 24 May 2017 (Table 26). Linear analysis of values over the multi-year period shows an increasing trend in maximum daily precipitation (Graph 17).



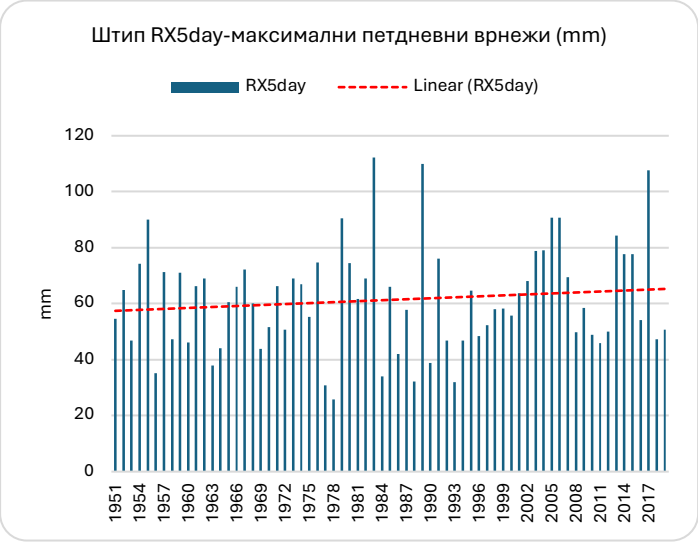
Graph 17. Annual maximum daily precipitation in the period 1951-2019

Table 26. Ten highest annual maximum daily precipitation amounts in the period 1951-2019

Shtip	
2017	86,9
2013	73,9
1979	61,0
1989	59,5

2015	59,5
2001	55,3
2000	54,2
1967	52,4
2006	52,4
1962	51,3
max	**86,9**
date	**24**
month	**5**
year	**2017**

An increasing trend has also been observed in maximum five-day precipitation totals (Graph 18), with the highest value of 112.2 mm recorded on 17 July 1983 (Table 27).



Graph 18. Annual maximum five-day precipitation totals

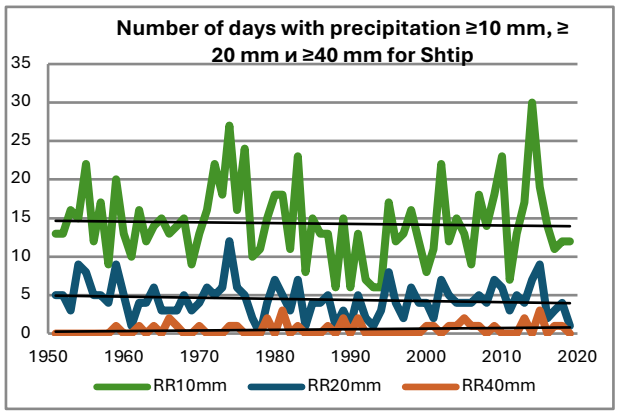
Table 27. Ten highest annual maximum five-day precipitation totals in the period 1951-2019

Shtip	
1983	112,2
1989	109,9
2017	107,6
2006	90,8
2005	90,7
1979	90,5
1955	90,0
2013	84,4
2004	79,1
2003	78,8
max	**112,2**
date	**17**
month	**06**
year	**1983**

According to the definitions of the World Meteorological Organization, a day with heavy precipitation is considered a day with measured precipitation greater than or equal to 10 mm, while a day with very heavy precipitation is a day with precipitation greater than or equal to 20 mm. Additionally, as an index for extreme events, users may define a characteristic precipitation threshold, which in this case has been done by analysing the number of days with precipitation above 40 mm.

The maximum number of days with heavy precipitation in a year, 30 days, was recorded in 2014, while the minimum number, 6 days, was recorded in 1988, 1990, 1993, and 1994. The number of days with very heavy precipitation per year is lower than the number of days with heavy precipitation. Thus, the maximum number of days with very heavy precipitation was 12, recorded in 1974, while 3 days with more than 40 mm were recorded in 1981 and 2015 (Graph 19).

Data on the annual number of days with precipitation above 10 mm, above 20 mm, and above 40 mm in the period 1951-2019 show that, unlike the number of days with heavy and very heavy precipitation, the number of days with precipitation above 40 mm shows an increasing trend (Graph 19).



Graph 19. Annual variation in the number of days with precipitation ≥10 mm, ≥20 mm, and ≥40 mm

Table 28. Ten years with the highest number of heavy, very heavy, and precipitation above 40 mm in the period 1951-2019

Shtip					
	RR≥10		RR≥20		RR≥40
2014	30	1974	12	1981	3
1974	27	1954	9	2015	3
1976	24	1959	9	1966	2

1983	23	2015	9	1979	2
2010	23	1955	8	1989	2
1955	22	1995	8	1991	2
1972	22	1980	7	2005	2
2002	22	1983	7	2013	2
1959	20	2002	7	1959	1
2015	19	2009	7	1962	1

Wind data for Sveti Nikole are currently fragmented and insufficient for long-term climate planning. Measurements are carried out at three stations:

- Štip (with data available since 2010),
- Štip-Mustafino (closer to Sveti Nikole, but installed for the needs of the cargo airport),
- Amzabegovo/Sveti Nikole (the most relevant location, but with data available only since 2023).

The limited time span and specific locational characteristics reduce the reliability of wind trend analysis. Meteorological expertise is required to analyse these data and to prepare wind roses for planning windbreaks, fire prevention, and control of waste dispersion. It is recommended that the municipality formally request data from the Hydrometeorological Service and ensure their professional analysis.

ANNEX 2. LIVELIHOOD VULNERABILITY INDEX

Currently, Skopje emerges as the most developed region in all aspects (development, economic-social, and demographic) followed by the Southeast, East, and Pelagonia regions. The Northeast, Polog, and Vardar regions exhibit the lowest development levels, particularly in the socio-economic component, with noticeable disparities in the demographic index. Considering this regional disparity, which further diverges at the municipality level, the livelihood approach, combined with the effects of climate change, can be used to monitor vulnerability.

Therefore, the Livelihood Vulnerability Index (LVI) (More info here, page 174) has been designed within the Macedonia's Fourth National Communication on Climate Change, aiming to estimate vulnerability across different territorial and community levels, taking into account evident disparities in overall development, resource use, allocation, demographic, and socio-economic aspects among the country's eight statistical and planning regions. It is composite index that considers the interaction of three components exposure, sensitivity, and adaptive capacities to address associated effects or risks. This approach can also serve as a basis for programming and evaluating policy frameworks addressing broader system issues, including its ability to respond to stressors and secure livelihoods. The LVI represents an initial effort to estimate climate/livelihood vulnerability in the country and aims not only to establish a benchmark for the current situation but also to identify measures to reduce vulnerability to future climate change.

In total, 96 datasets (variables) were categorized into three major components: exposure, sensitivity, and adaptive capacity. Each is comprised of several indicators or sub-components (the adaptive capacity component includes socio-demographic features and social networks; the sensitivity component includes food, health and water aspects; exposure refers to soil, precipitation and temperature). Data were collected on a municipal scale through official statistics (primarily from the State Statistical Office's latest publications and MakStat datasets, as well as regular statistical surveys), soil database and other national datasets (e.g., availability of agricultural, rural, and ecological organizations, extension services, memberships in cooperatives, MAFWE personnel distribution, etc.). Regional statistics were used in cases where such disaggregation was not available.

Component 1- Exposure to Climate Change on municipal level

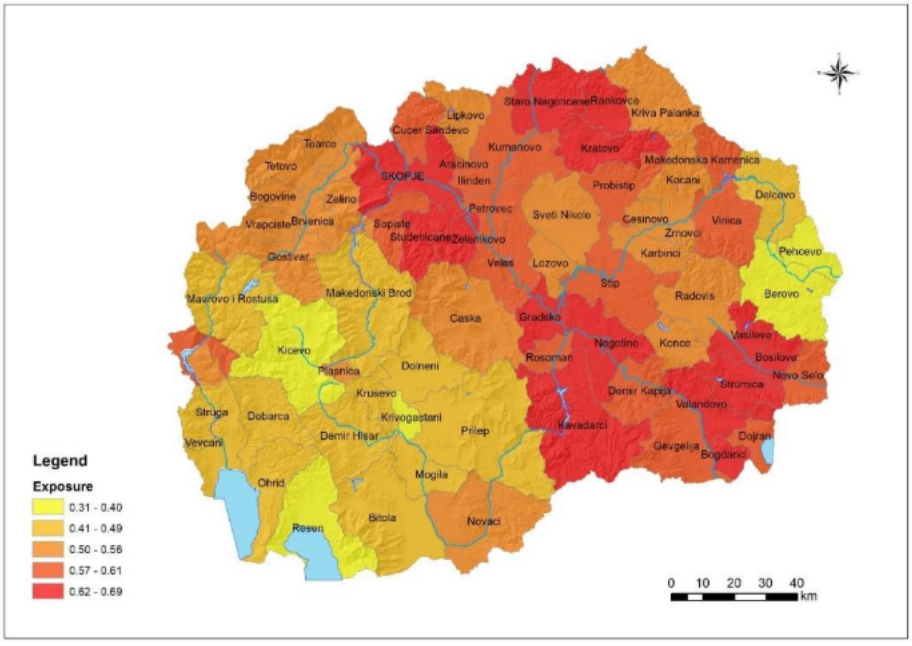


Figure 4. Exposure to climate change at the municipal level

Component 2- Sensitivity to Climate Change on municipal level

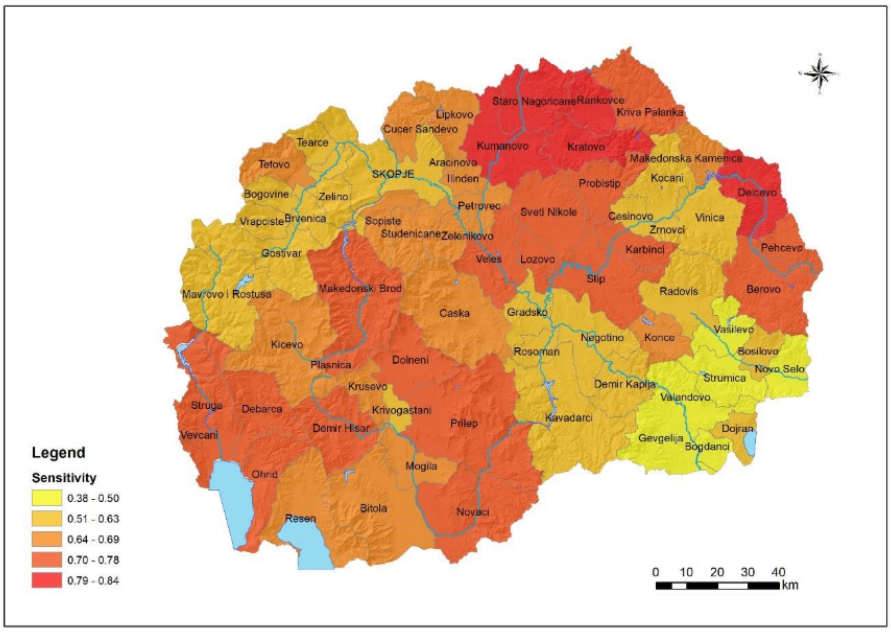


Figure 5. Sensitivity to climate change at the municipal level

Component 3 - Climate Change adaptive capacity on municipal level

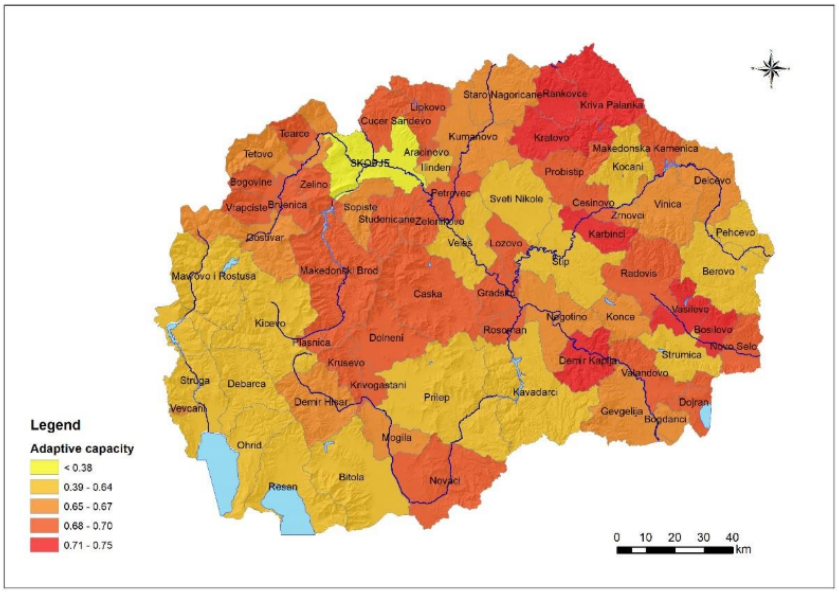
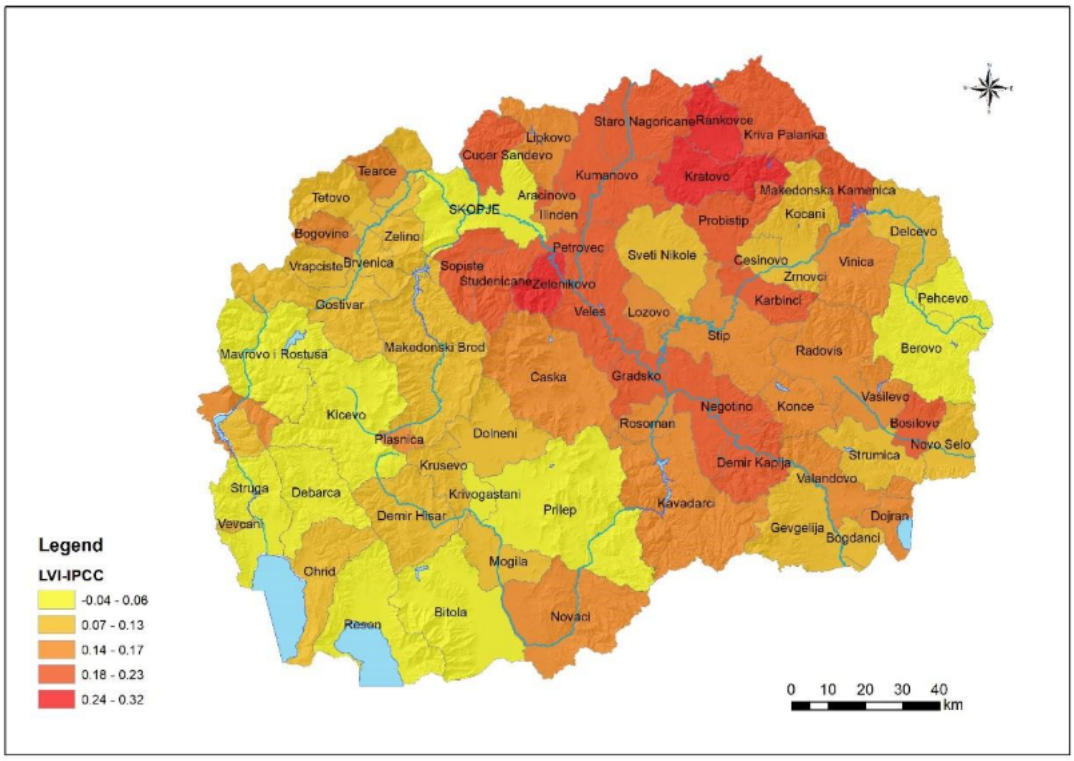


Figure 6. Capacity for adaptation to climate change at the municipal level

Climate Change Livelihood Vulnerability Index on municipal level, combines all variables above into one composite index



Ranking of municipalities as per the Livelihood Vulnerability index (LVI IPCC)

Municipality	LVIm	AVI	LVI IPCC	Average	Rank
Rankovtse	0.769	0.736	0.318	0.608	1
Kratovo	0.757	0.730	0.291	0.593	2
Staro Nagorichane	0.722	0.703	0.230	0.552	3
Zelenikovo	0.679	0.679	0.252	0.537	4
Kriva Palanka	0.713	0.670	0.195	0.526	5
Studenichani	0.674	0.670	0.230	0.525	6
Probishtip	0.701	0.672	0.194	0.522	7
Kumanovo	0.705	0.677	0.184	0.522	8
Makedonska Kamenitsa	0.685	0.661	0.201	0.516	9
Karbintsi	0.711	0.657	0.176	0.515	10
Chucher-Sandevo	0.680	0.660	0.200	0.513	11
Veles	0.685	0.668	0.183	0.512	12
Lozovo	0.704	0.659	0.170	0.511	13
Arachinovo	0.675	0.656	0.201	0.511	14
Plasnitsa	0.703	0.657	0.163	0.508	15
Demir Kapija	0.668	0.643	0.195	0.502	16
Petrovets	0.677	0.649	0.178	0.501	17
Gradsko	0.661	0.645	0.194	0.500	18
Shtip	0.682	0.659	0.156	0.499	19
Sopishte	0.664	0.646	0.183	0.498	20
Bosilovo	0.648	0.638	0.198	0.495	21
Novatsi	0.681	0.643	0.153	0.492	22
Debar	0.669	0.645	0.149	0.488	23
Delchevo	0.706	0.649	0.100	0.485	24
Chashka	0.674	0.630	0.149	0.484	25
Konche	0.663	0.635	0.151	0.483	26
Negotino	0.633	0.631	0.181	0.482	27
Lipkovo	0.664	0.627	0.145	0.479	28
Radovish	0.652	0.621	0.151	0.475	29
Rosoman	0.632	0.619	0.167	0.473	30
Vevchani	0.680	0.631	0.106	0.472	31
Makedonski Brod	0.691	0.623	0.101	0.472	32
Sveti Nikole	0.660	0.633	0.121	0.471	33
Vinitsa	0.643	0.619	0.148	0.470	34
Ilinden	0.643	0.625	0.139	0.469	35
Kavadartsi	0.610	0.619	0.161	0.463	36
Bogovinje	0.644	0.607	0.137	0.463	37
Centar Zhupa	0.659	0.622	0.106	0.462	38
Dolneni	0.685	0.615	0.085	0.462	39
Demir Hisar	0.666	0.620	0.098	0.461	40
Dojran	0.619	0.608	0.155	0.461	41
Valandovo	0.612	0.606	0.160	0.459	42
Ohrid	0.665	0.622	0.091	0.459	42
Teartse	0.633	0.604	0.139	0.459	44
Zhelino	0.640	0.607	0.128	0.458	45
Vasilevo	0.608	0.600	0.158	0.455	46
Gostivar	0.631	0.604	0.126	0.454	47
Vrapchishte	0.635	0.598	0.126	0.453	48
Jegunovtse	0.636	0.602	0.119	0.452	49
Tetovo	0.636	0.605	0.111	0.451	50
Zrnovtsi	0.630	0.604	0.118	0.451	51
Krushevo	0.656	0.601	0.089	0.449	52
Brvenitsa	0.635	0.596	0.113	0.448	53
Mogila	0.652	0.597	0.081	0.443	54
Cheshinovo-Obleshevo	0.618	0.587	0.118	0.441	55
Debartsa	0.668	0.605	0.046	0.440	56
Struga	0.653	0.602	0.059	0.438	57
Bogdantsi	0.582	0.580	0.130	0.431	58
Gevgelija	0.585	0.578	0.125	0.429	59
Kochani	0.609	0.584	0.094	0.429	60
Prilep	0.634	0.588	0.040	0.421	61
Krivogashtani	0.636	0.568	0.049	0.418	62
Novo Selo	0.580	0.562	0.111	0.418	62
Strumitsa	0.542	0.561	0.115	0.406	64
Resen	0.631	0.567	0.009	0.402	65
Bitola	0.598	0.567	0.040	0.402	66
Mavrovo and Rostusha	0.590	0.548	0.052	0.397	67
Pehchevo	0.660	0.568	-0.042	0.395	68
Berovo	0.654	0.571	-0.040	0.395	69
Kichevo	0.624	0.544	-0.042	0.375	70
Skopje	0.490	0.544	0.007	0.347	71

Components, sub-components and variables comprising the Livelihood Vulnerability Indices

Table 29. Ranking of municipalities according to the Livelihood Vulnerability Index (LVI IPCC)

Latent components	Major and sub-components	Variables (relation to vulnerability)
ADAPTIVE CAPACITY (AC, 52)	**Socio-demographic profile (SD, 42)**	
	Population (PO, 3)	Population 2016-2019 (+), Population density 2016-2019 (+), Migration (% of population) 2013-2019 (+)
	Dependency (DR, 1)	Dependency ratio 2016-2019 (-)
	Social and institutional capital (SI, 9)	Schools primary per 1000 population 2018-2020 (-), Doctors 2019 (-), Number of active business entities 2013/2019 (-), Number of kids in kindergartens 2013/2019 (-), Number of employees in kindergartens 2013/2019 (-), Number of primary schools 2017/2019 (-), Number of teachers primary 2017/2019 (-), Number of secondary schools 2017/2019 (-), Number of teachers secondary 2017/2019 (-)
	Human capital (HC, 8)	No education (% of population) 2002 (+), No education and incomplete primary (% of population) 2002 (+), Higher education (% of population) 2002 (-), Unemployment rate 2013-2017 (+), Number of pupils primary 2017/2019 (-), Number of pupils secondary 2017/2019 (-), Number of graduated pupils 2016/2019 (-), Number of users in institutions for adult persons 2013/2016 (-)
	Human capital agriculture (HCA, 3)	Education (% high school in ag. holdings) 2007 (-), No education (% in ag. holdings) 2007 (+), Ag. labour force (in total ag. labour force) 2008 (-)
	Infrastructure (I, 4)	Roads (km) (2013-19) (-), Roads (km/km2) (2013-19) (-), Number of transport means 2013/2019 (+), Construction work 2013/2019 (-)
	Financial capital (FC, 5)	GDP per capita parity (region vs total) 2013-2017 (-), Ag sector contribution (in GDP) 2013-2017 (+), UAA per capita 2007/2016-19 (-), Number of active Business entities 2013/2019 (-), Number of active Business entities agriculture 2013/2019 (-)
	Natural resources (NR, 9)	Ag. holdings density (share in total) 2007 (+), Total ag. land density (share in total available ag. land) 2007 (+), UAA density (share in total UAA) 2007 (+), Farm size (average UAA) 2007 (-), Share own land (in UAA) 2007 (-), Land fragmentation (plots per holding) 2007 (+), Area forest ha 2007 (-), Planted forest area ha 2007 (-), Harvest wooden mass 2007 (+)
	Social networks (SN, 10)	
	General (G, 1)	Number of environmental and rural associations 2020 (-)
	Agriculture (AG, 9)	Number of agriculture associations 2020 (-), Number of cooperatives 2020 (-), Number of cooperatives members 2020 (-), Cooperative ha 2020 (-), Cooperative LU 2020 (-), Cooperative income 2020 (-), Number of MAFWE employees 2019 (-), Number of MAFWE forestry

ANNEX 3. THEORY OF CHANGE

The Theory of Change highlights four interconnected systemic change areas through which Sveti Nikole will move from reactive crisis response to proactive climate resilience.

These areas correspond to the participatory workshop themes and are supported by enabling conditions validated with municipal leadership.

VISION 2035:

Sveti Nikole is a clean, green and safe city with accessible public spaces and efficient urban mobility. Modern water, waste and energy systems ensure sustainable infrastructure and reduce environmental risks. Green belts, parks and renewable energy make the city healthier and more resilient to climate impacts. Citizens of all ages are active participants in community life, supported by inclusive social services and guided by shared responsibility for a better future.

SYSTEMIC CHANGES (How change happens)	HIGH-LEVEL OUTCOMES BY 2030	BEHAVIOUR / PRACTICE SHIFTS REQUIRED	UNDERLYING ASSUMPTIONS / ENABLERS	BACKED UP IN LOCAL/NATIONAL POLICIES	VISIONED BY CITIZENS
1. Physical Space and Mobility **Streets and parks are redesigned to be safer, greener, and easier to use.** **Citizens help shape and care for public spaces.** **City departments work together to improve transport and accessibility.**	• Clean, green, and safe public spaces; • Improved mobility and reduced pollution.	• Upgrade streets and sidewalks; • Improve public transport; • Integrate green corridors and shelterbelts.	• Long-term urban-planning vision sustained; • Coordination between municipal departments improved and sustained; • Citizen participation in public-space co-monitoring and maintenance enhanced.	YES (WMP, ILRP and LEAP)	YES
2. Water & Infrastructure Systems → **Public utilities and departments invest proactively in modern water, drainage and wastewater systems with preventive maintenance.**	• Upgraded and climate-proofed water, drainage, and wastewater infrastructure. • Reduced flooding, drought, and erosion risks.	• Modernisation of water supply, drainage, and wastewater systems. • Replacement of asbestos pipes; • Removal of illegal dumpsites.	• Access to funding and technical expertise for infrastructure modernisation. • Maintained capacity of public enterprises. • Preventive maintenance and monitoring secured.	YES (WMP, ILRP and LEAP)	YES

		• Restoration of shelterbelts. • Introduction of early-warning systems for floods and fires.			
3. Energy Efficiency & Buildings → **Public institutions and households adopt energy-efficiency, solar technologies and energy storage, lowering fossil-fuel dependence.**	• Lower emissions and energy costs. • Improved indoor comfort in schools and institutions. • "Energy efficiency first" principle practiced during major renovations of buildings.	• Public institutions and households retrofit buildings with improved insulation and solar installations; • Communities adopt energy-saving habits; • Local workforce trained for installation and maintenance.	• Financial incentives and skilled workforce available. • Energy-efficiency standards enforced.	YES (WMP, ILRP and LEAP)	YES
4. Citizen Engagement & Social Inclusion→ **Residents actively participate in resilience initiatives, participatory budgeting and awareness campaigns;** **Vulnerable groups are prioritised.**	• Inclusive governance and community participation strengthened. • Enhanced inclusion of vulnerable groups. • Improved social services (child and elderly care centres).	• Citizens actively participate in decision-making, participatory budgeting, and awareness programmes. • New social facilities such as a day-care centre and elderly home improve quality of life and inclusion.	• Trust between citizens and institutions increases. • NGOs, schools, businesses and media support mobilisation. • Resources provided for sustained participation and education.	YES (ILRP and LEAP)	YES
Integrated, proactive climate governance + sustainable systems investments + empowered citizens = reduced climate vulnerability, healthier environment, and inclusive economic growth.					

Table 30. Theory of Change: Systemic Changes, Outcomes and Prerequisites for Climate Resilience

ANNEX 4. STAKEHOLDERS

The Resilience Lab Sveti Nikole has benefited from the active support of following local stakeholders that have committed to advancing the municipality's long-term climate resilience. Through co-creation workshops, data sharing, validation of findings and input on local climate risks and adaptation priorities, these champions have ensured the process remains rooted in local knowledge, institutional capacity and community needs. The table below outlines their contributions and roles in shaping a resilient future.

Political and Governance Stakeholders				
Name / Representative	**Position**	**Organization / Group**	**Type of Commitment**	**Scope of Support**
Dejan Vladev	Mayor	Municipality of Sveti Nikole	Political Support	Provides political leadership, strategic direction, and alignment of climate-resilience objectives with municipal development priorities.
Maja Davkova	Elected Council Member	Municipality of Sveti Nikole	Political Support	Adopts local legislation and approves adaptation funding through the municipal budget.
Valerija Ivanovska	Elected Council Member	Municipality of Sveti Nikole	Political Support	
Frosina Gjorgjieva	Elected Council Member	Municipality of Sveti Nikole	Political Support	
Ivica Arsov	Head of Department for Local Economic Development and Public Activities	Municipality of Sveti Nikole	Coordination / Knowledge Sharing	Leads coordination of the resilience strategy, facilitates cross-departmental collaboration, and ensures alignment with local development plans.
Ivana Dimitrova	Social care advisor	Municipality of Sveti Nikole	Coordination / Knowledge Sharing	Contributes data and insights on vulnerable groups and social inclusion measures in climate adaptation planning.
Elena Pesheva	Head of the Department of Communal Works	Municipality of Sveti Nikole	Resources / Coordination	Provides technical input on municipal infrastructure and supports planning and implementation of adaptation measures related to public services.
Liljana Arsovska	Advisor Inspector – Authorized Environmental Inspector	Municipality of Sveti Nikole	Knowledge Sharing / Resources	Ensures environmental compliance of local projects and supports integration of environmental protection standards in adaptation actions.
Zlatko Malinov	Associate for mechanical installations	Municipality of Sveti Nikole	Participation / Coordination	Supports administrative and operational coordination of project-related municipal activities.
Dejance Petrovski	Junior associate for water pollution protection, land and nature protection	Municipality of Sveti Nikole	Participation / Coordination	Supports administrative and operational coordination of project-related municipal activities.

Ljupka Panevska	Advisor for projects in the field of education and public affairs	Municipality of Sveti Nikole	Administrative Support	Supports administrative and operational coordination of municipal activities related to projects in the field of education and public works
Kiril Gjorgjiev	Public Procurement Associate	Municipality of Sveti Nikole	Administrative Support	Ensures transparent procurement procedures for resilience-related goods and services and supports financial compliance.
Jonche Stojanov	Assistant Head of the Department for Urban Planning, Environmental Protection, Communal Works and Alienation of Construction Land	Municipality of Sveti Nikole	Knowledge Sharing / Coordination	Contributes expertise in urban planning and environmental management, supporting integration of resilience criteria in spatial planning documents.
Suzana Nusheva	Head of Budget Coordination, Accounting and Payments Department	Municipality of Sveti Nikole	Financial / Administrative Support	Oversees financial management and budgeting for resilience activities, ensuring compliance with municipal financial procedures.
Tamara Nushevski	Advisor for conducting public procurement post-packs	Municipality of Sveti Nikole	Administrative Support	Provides administrative support in procurement and documentation related to resilience projects.
Kristijan Milevski	Senior Database Administrator and Web Administrator	Municipality of Sveti Nikole	Technical Support / Data Management	Provides technical support in data management systems and supports creation of the shared resilience data folder.
Aleksandar Donev	Financial Operations Officer	Municipality of Sveti Nikole	Technical Support / Data Management	Provides support in material and financial operations, maintains records and documentation related to financial activities and projects.
Pavle Jovanov	Community warden	Municipality of Sveti Nikole	Technical Support / Data Management	It supervises the observance of communal order, acts upon reports and contributes to the maintenance of public order and cleanliness in the community.

Data and Risk Management Stakeholders

Name / Representative	**Position**	**Organization / Group**	**Type of Commitment**	**Scope of Support**
Darko Temelkov	Firefighter rescuer	Territorial fire department Sveti Nikole	Participation / Knowledge Sharing	Provides firsthand information on local fire risks, emergency response procedures, and areas most exposed to wildfires or heat stress. Contributes practical experience to resilience planning and community safety awareness.
Aleksandar Lazev	Commander of a territorial firefighting unit	Territorial fire department Sveti Nikole	Coordination / Resources	Coordinates firefighting operations and contributes to municipal emergency preparedness planning. Supports the development of response protocols and identification of critical infrastructure at risk.

Riste Panov	Head of regional department	Regional Crisis Management Center Sveti Nikole	Data Sharing / Coordination	Shares data on local emergencies, flood and drought events, and response measures. Supports coordination between local and regional institutions during climate-related incidents and contributes to updating municipal risk maps.
Utilities and Infrastructure Stakeholders				
Name / Representative	**Position**	**Organization / Group**	**Type of Commitment**	**Scope of Support**
Dragan Dimitrievski	Director	Public Enterprise Funeral Services	Participation / Resources	Supports municipal resilience activities through coordination on land management.
Branko Kocevski	Referent for state forests/Head of forest protection and ecology	Public Enterprise National Forests - Sveti Nikole Branch "Forestry"	Resources / Knowledge Sharing	Provides data on forest health, deforestation and biodiversity. Supports identification of areas prone to erosion and potential for afforestation or ecosystem restoration as part of adaptation efforts.
Jovana Jakimova	Referent for the preparation of invoices and billing	Public utility company Komunalec	Participation / Data Sharing	Shares data on waste management, water supply, and sanitation systems. Supports coordination of field operations and integration of green infrastructure and sustainable waste practices into local adaptation measures. Assists in monitoring and reporting on municipal infrastructure conditions, contributing to maintenance planning and preparedness for climate-related disruptions in service delivery.
Tanja Krsteva	Manager of a Drinking Water Factory	Public utility company Komunalec	Participation / Data Sharing	
Daniela Panova	Engineer for project activities and development	Public utility company Komunalec	Participation / Data Sharing	
Jordan Mihailovski	Head of the Communal Works Department	Public utility company Komunalec	Participation / Data Sharing	
Goran Arsov	Head of Sveti Nikole Subsidiary	AD "Water Management of RSM" - Skopje	Participation / Data Sharing	Shares data on water resources management and water management systems. Supports coordination of field activities and maintenance of hydro-melioration infrastructure, contributing to sustainable water management and planning of flood and climate protection measures.
Health and Wellbeing Stakeholders				
Name / Representative	**Position**	**Organization / Group**	**Type of Commitment**	**Scope of Support**
Adrijana Toseva	Youth coordinator	Red Cross	Participation / Awareness	Engages youth volunteers in community awareness campaigns and first aid activities related to climate risks. Supports educational initiatives that strengthen community preparedness and promote healthy lifestyles in changing environmental conditions.
Aneta Jordanova	Secretary	Red Cross	Resources / Coordination	Coordinates humanitarian and logistical support in emergencies, facilitates communication between the Red Cross and

				the municipality, and provides data on vulnerable groups to inform preparedness and response planning.

Environmental Protection Stakeholders				
Name / Representative	**Position**	**Organization / Group**	**Type of Commitment**	**Scope of Support**
Dejan Gicev	Representative, Local Branch Office	Ministry of Environment and Physical planning	Resources / Knowledge Sharing	Provides data and guidance on environmental quality, waste management, and regulatory compliance. Supports alignment of municipal adaptation actions with national environmental policies and contributes technical input for monitoring and reporting on local environmental conditions.

Community Engagement Stakeholders				
Name / Representative	**Position**	**Organization / Group**	**Type of Commitment**	**Scope of Support**
Aleksandra Todevska	Financial assistant	Organization of women in the municipality of Sveti Nikole	Participation/Awareness	Advocates for gender-responsive and socially inclusive adaptation measures, ensuring that women's perspectives and community equity considerations are integrated into municipal resilience planning. Supports coordination of community meetings and awareness sessions, assists in mobilizing women and vulnerable groups, and contributes to inclusive communication and education efforts on climate resilience.
Emina Tokovikj	Communication and dissemination assistant	Organization of women in the municipality of Sveti Nikole	Participation/Awareness	
Irina Pockova	President	Women's civic initiative Sveti Nikole	Participation/Equity	
Rusana Stamenkova	Financial assistant	Women's civic initiative Sveti Nikole	Participation/Awareness	
Aleksandar Trajchev	Header	Scout troop "Goce Delchev" Sveti Nikole	Participation/Awareness	Engages youth volunteers in environmental and preparedness activities, supports community clean-ups and awareness events, promotes climate-resilience education through scouting programmes.
Suzana Dimitrievska	President	Agricultural Cooperative "Eco-Ilinden"	Participation/Awareness	Promotes organic production, supports eco-agricultural practices and contributes to the sustainable development of the local community

Educational Institutions				
Name / Representative	**Position**	**Organization / Group**	**Type of Commitment**	**Scope of Support**

Keti Dimkova	School administrator	OOU "Sveti Kiril I Metodij" Sv.Nikole	Participation / Knowledge Sharing / Community engagement	The educational institutions supported the project by sharing the vision questionnaire with students and parents and engaging in school-based resilience activities. They can continue to contribute through cooperation with the municipality on local awareness campaigns, educational initiatives, and climate actions that foster youth engagement and community participation.
Olgica Stojkova	Phycologist	OOU "Goce Delcev" Sv. Nikole		
Jovanka Eftimova	Physics teacher	OOU "Sveti Kiril I Metodij" Sv.Nikole		
Riste Panev	Professor	SOU "Kocho Racin# Sveti Nikole		

Table 31. Political and Governance Stakeholders Involved in the Process of the project "Resilience Lab Sveti Nikole"