**INTERREG VI-A IPA**

**HUNGARY-SERBIA PROGRAMME**

****RESILIENCE TEST****

****Guide for the resilience assessment of projects****

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## **1. Background and purpose of the Resilience test**

Climate change is one of the biggest problems and challenges of our time. Stopping or at least mitigating these processes and preparing for the expected impacts and consequences is a major challenge for humanity. In particular, cooperation between actors at different levels is essential to achieve positive results on climate change, as are meaningful measures and interventions.

Climate change is already having a major impact today, mainly in the form of extreme weather events and increasingly unusual meteorological phenomena. Heat waves and warm spells, cloudbursts and dry spells are becoming more frequent, with direct or indirect effects such as floods, the emergence and spread of new diseases, water shortages and more complex agricultural production, among others. These are occurring with varying frequency and intensity in different parts of the world but are increasingly being felt in our country. It is therefore crucial to ensure that climate change preparedness and adaptation is reflected in as many aspects of life as possible.

This is also a very important aspect to consider when planning and implementing projects. In terms of project types, infrastructure projects with construction and renovation elements are the most affected, not only because of climate change exposure, but also related to emissions of pollutants and greenhouse gases. This is due to both the nature of the construction works and the longer lifetime envisaged. Consideration of climate adaptation aspects is therefore crucial in the design of buildings and other investments, while ignoring them can lead to serious problems and unexpected costs during maintenance. Reducing energy use, using renewable or less polluting energy sources, increasing green spaces and green areas can reduce the long-term costs of an investment, while improving the quality and resilience of the infrastructure. Integrating these aspects at the design stage can contribute to the development of a well-functioning infrastructure system.

In this context, climate change mitigation improvements will be of particular importance in the 2021-2027 programming period, in line with the European Green Deal. At the same time, climate resilience is also a key priority: it is a mandatory requirement for all infrastructural investments planned for a period of at least 5 years to be assessed in terms of climate resilience (see Regulation (EU) 2021/1060 and 2021/1059 of the European Parliament and of the Council).

The technical and professional background for the development of this Resilience test - prepared for the resilience assessment of projects funded under Interreg - was the "Guide for the Climate Change Resilience Assessment of Infrastructure Projects 2021-2027 (in short: Climate Resilience Guide)"[[1]](#footnote-1) , prepared by MEGÉRTI Hungarian Energy Economic Planning and Evaluation Consulting Office Ltd. on behalf of the Prime Minister's Office. The Climate Resilience Guide provides an overview and assistance for the climate resilience assessment of infrastructure projects implemented with EU funds, based on the technical guidelines published by the European Commission[[2]](#footnote-2) , while taking into account the Hungarian procedural and legal requirements.

The mandatory **climate change resilience assessment** aims to identify projects that may have significant greenhouse gas emissions or are highly exposed to climate change. It will also help project planners to design additional measures into their project to ensure that the infrastructure created will continue to operate cost-effectively and fit for purpose in the long term, by taking into account the likely impacts of climate change and the risks they pose.

This "Resilience test - Guide for the Resilience Assessment of projects funded under Interreg" (hereinafter referred to as the "Resilience test") is intended to provide basic technical assistance for carrying out the climate change resilience assessment required for projects funded by the European Union. The Climate Resilience Guide basically defines two types of resilience assessment to be carried out: Standard and Simplified Resilience Assessments. The Standard Resilience Assessment consists of two sub-assessments (Climate Neutrality and Climate Adaptation), while the Simplified Resilience Assessment consists of one sub-assessment (Climate Adaptation).

The preliminary studies suggest that the developments funded by the Interreg programme will not result in significant greenhouse gas emissions, i.e. more than 20 000 tonnes of CO2eq per year. **Project promoters will therefore be required to carry out a Simplified Resilience Assessment prior to the start of the supported projects or the conclusion of the grant contract - however, a Climate Neutrality Sub-Assessment is not required.** At the same time, if the resilience assessment identifies an aspect of the project as high risk, at least one **mitigation activity** from the set of good practices in the Resilience test must be **included in the** project to address the issue.

# **2. Structure and methodology of the Resilience test**

A short introduction (Chapter 1) describing the background and purpose of the Resilience test is followed by Chapter 2, which focuses on the structure and methodology.

Chapter 3 describes the region's exposure to climate change problems.

Chapter 4 presents the Simplified Resilience Assessment, the first step of which is to identify the climate change characteristics that are occurring or are expected to occur in the coming decades at the project’s site. The second step is to assess and document the sensitivity of the identified factors that are relevant locally and for the project.

Chapter 5 contains a collection of good practices for risk mitigation actions for projects identified as high risk in any criteria.

Chapter 6 contains a model declaration where the project owner declares the assessment of the potential climate change impacts of the project to be implemented, the results of the resilience assessment and if necessary, the development of mitigation action(s).

# **3.** **Climate change vulnerability of the region**

The environment and climate database of the Climate Change Knowledge Portal[[3]](#footnote-3) provides a suitable basis for the analysis and comparison of the Hungarian-Serbian border region in terms of climate risk and resilience. The tool is used to visualize, describe, compare and analyse climate risks globally for cities, areas and regions. It groups the areas according to their climate risk characteristics, creating a detailed risk profile for the individual areas, as well as enabling their comparison. This online portal also contains interactive maps and information related to statistical data. The illustrated aspects are presented based on the SSP-5-8.5 scenario.

Information on the Hungarian-Serbian border region:

**Average mean surface air temperature in 2050**: 14.2-15.3 °C in the region, it can basically be stated that it shows an increasing trend towards the south, so this value is on average higher on the Serbian side. In 2024, the average value for Serbia is 12.41 °C, while the expected average surface air temperature in Hungary is 12.53 °C.

**Projected Number of hot days[[4]](#footnote-4) in 2050**: 17-25 days in the region. The expected change in the number of hot days is higher towards the south, with the highest value (25 days) in the Szerémség district, while this value is 17 days in the Bács-Kiskun county. Based on the SSP-5-8.5 scenario climate model, the number of hot days in the two Hungarian counties in 2024 will be 13 days, and 8-10 days in the Serbian districts on average.

**Projected Number of days with more than 20 mm of rainfall in 2050**: 1 day in all NUTS3 areas of the region. The number of days with extreme amounts of precipitation is not expected to increase in the coming years in the border region.

**Projected Number of ice days in 2050:** 3-5 days in the area. Due to the warming, the number of frosty days will decrease significantly, in 2024 the number of such days are 11-12 days in the Hungarian counties and 9-11 days in the Serbian districts. The southern direction also appears here: the number of ice days will be fewer in the Serbian part of the border area.

Table 1 gives the exact details of the Interreg VI-A IPA Hungary - Serbia Programme areas according to the aspects presented.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hungarian counties / Serbian regions [[5]](#footnote-5)** | **Climate risk aspects** | | | |
| Average mean surface air temperature in 2050 | Projected Number of hot days in 2050 | Projected Number of days with more than 20 mm of rainfall in 2050 [[6]](#footnote-6) | Projected Number of ice days in 2050 [[7]](#footnote-7) | |
| **Bács-Kiskun** | 14,26 °C | 17 days | 1 day | 5 days | |
| **Csongrád-Csanád** | 14,61°C | 20 days | 1 day | 4 days | |
| **South Bačka** | 14,96 °C | 23 days | 1 day | 3 days | |
| **South Banat** | 15,19 °C | 20 days | 1 day | 3 days | |
| **North Bačka** | 14,55 °C | 21 days | 1 day | 4 days | |
| **North Banat** | 14,75 °C | 22 days | 1 day | 3 days | |
| **Middle Banat** | 15,06 °C | 22 days | 1 day | 3 days | |
| **West Bačka** | 14,74 °C | 21 days | 1 day | 3 days | |
| **Srem** | 15,21 °C | 25 days | 1 day | 3 days | |

Table 1: Affected NUTS3 areas in the border region

# **4. Simplified Resilience Assessment**

The assessment aims to determine whether and to what extent the infrastructure elements, networks (project outputs) and their future operation are likely to be vulnerable to the local impacts of climate change.

The analysis should address the project in a comprehensive way, looking at its different components and how it relates to its wider environment - all from a climate change impact perspective. This requires an examination of the following four themes:

* The sensitivity of the project result’s technical state to climate change
* Sensitivity of the project operation to an external factor influenced by climate change (e.g. water supply from a vulnerable aquifer, local renewable energy use, condition of the receiving water body)
* The climate change sensitivity of the services provided by the project outcome (e.g. for tourism facilities – number of tourists; transport infrastructure - traffic; etc.)
* Sensitivity of the surrounding area to climate change as a result of the project (e.g., runoff blockage of linear facilities in the event of torrential rains).

**The steps for conducting the Simplified Resilience Assessment are as follows**:

**1.** Identify the climate change features that are occurring or are likely to occur in the coming decades at the project site.

**2.** Determine the project's sensitivity to climate change only for locally relevant climate change impacts.

The expected result of the assessment is the completion of all cells in Table 4 (see below), with a choice of predefined categories.

|  |
| --- |
| **Step 1: Identify the climate change features that are occurring or are likely to occur in the coming decades at the project site** |

Table 2 below helps to assess whether the project site is affected by each of the consequences of climate change. The information in the second column of the table provides guidance on how to answer this question.

|  |  |
| --- | --- |
| **Consequences of climate change** | **Hungary-Serbia border region** |
| Expected annual change in average temperature (slow increase) | All NUTS3 regions included in the programme. |
| Expected change in average temperature (winter) | All NUTS3 regions included in the programme. |
| Expected change in average temperature (summer) | All NUTS3 regions included in the programme. |
| Expected change in the number of hot days | All NUTS3 regions included in the programme. |
| Increase in the number of heatwave days (daily mean temperature > 25 °C) | All NUTS3 regions included in the programme. |
| Reduction in the number of frosty days in spring (daily min. < 0 °C) | All NUTS3 regions included in the programme. |
| Increase in the average number of days per year affected by sudden temperature drops (10°C in 3 hours) | All NUTS3 regions included in the programme. |
| Increase in the average number of days per year affected by windstorms, violent windstorms, hurricanes (gusts over 85 km/h) | All NUTS3 regions included in the programme. |
| Changes in the seasonal distribution of precipitation | All NUTS3 regions included in the programme. |
| Increase in maximum length of dry periods (longest period with daily rainfall < 1 mm, day) | Slightly, but all NUTS3 regions included in the programme. |
| Increase in the number of days with more than 30 mm of precipitation (number of days with daily rainfall ≥ 30 mm) | Slightly, but all NUTS3 regions included in the programme. |
| Increase in frequency and intensity of floods along rivers | Along rivers. |
| Increased frequency and intensity of flash floods in mountain and hilly areas | All the hilly and mountain areas included in the programme. |
| Increase in the frequency and intensity of urban stormwater run-off | All the municipalities in the area could be affected. |
| Increase in the frequency of waterlogging | All NUTS3 regions included in the programme may be concerned. |
| Increase in the frequency of forest fires | All NUTS3 regions included in the programme may be concerned. |
| Expected impact of climate change on the activation of geological hazards based on the frequency of precipitation days exceeding 44 mm | All NUTS3 regions included in the programme |

Table 2: Spatial extent of climate change impacts

Considerations and expectations to be taken into account during the assessment:

* The assessment makers (project partners) should also consider other relevant information available locally, e.g. the following national strategies, tools:

Hungary:

* Nemzeti Éghajlatváltozási Stratégia – National Climate Change Strategy[[8]](#footnote-8)
* Nemzeti Vízstratégia (Kvassay Jenő Terv) – National Water Strategy Hungary[[9]](#footnote-9)
* https://nater.mbfsz.gov.hu/hu

Serbia:

* Strategija održivog urbanog razvoja Republike Srbije do 2030. godine – Sustainable urban development Strategy of the Republic of Serbia until 2030[[10]](#footnote-10)
* Strategija upravljanja vodama na teritoriji Republike Srbije do 2034. godine – Water management strategy of the territory of the Republic of Serbia until 2034[[11]](#footnote-11)

Other locally available relevant information also can be used (Local environmental data can usually be found in the development strategies, spatial planning instruments, climate and/or environmental programmes, local water damage management plans, SECAP etc. of the municipalities or counties/districts concerned by the development.)

* If necessary, we recommend organising consultations with experts in water management, agriculture, and other areas with local knowledge.
* Please note that in case of the rows of the table containing the results of the Simplified Resilience Assessment (Table 4), where only the definition "All NUTS3 regions included in the program" is included in column 2 of Table 2, the option "not relevant at the project site" cannot be selected in the individual cells.

**In step 1, each row of the table containing the results of the Simplified Resilience Assessment** **(see Table 4) must be assessed to determine whether it is relevant to the project site. The option 'not relevant at project site' should be indicated in each cell of the rows for climate change impacts that are not considered relevant at project site. For other climate change consequences, step 2 is required.**

|  |
| --- |
| **Step 2: Determine the project's sensitivity to climate change** |

For each of the climate change impacts identified as locally relevant in the assessment, the criteria in the columns of the table presenting the results of the simplified resilience assessment (see Table 4) should be considered and all of the following questions should be answered:

* To what extent is the technical condition of the infrastructure vulnerable to the climate change impact?
* Is the operation of the resulting infrastructure dependent, and if so, to what extent, on a factor influenced by the consequence of climate change (e.g. water supply from a vulnerable aquifer; local renewable energy use; characteristics of the receiving water body; thermal comfort of the occupants of the facility)?
* Is the demand for the services provided by the infrastructure sensitive - and if so, to what extent - to the climate change consequence (e.g. for tourism facilities – number of tourists; for transport infrastructure - traffic; etc.)?
* Will the infrastructure make the surrounding area vulnerable to a local climate change effect, and if so, to what extent (e.g. the run-off blocking effect of linear facilities in the event of torrential rainfall)?

**Questions have to be answered on the basis of precise knowledge of the project characteristics** (e.g. the extent of the expected transport needs as a result of the development, the type of products produced, the technology used, etc.) **and** where appropriate, **expert opinions.** Of course, depending on the type of the project different expert opinions may be required, but typically the technical designer of the project or depending on the nature of the development, the utility company experts involved, as well as local planning experts with local knowledge, will have sufficient knowledge to answer the questions. In addition to those listed above, other experts (e.g. water, transport, tourism, nature conservation, etc.) may need to be involved where appropriate, but formal written expert advice is not required. It is also possible to exchange opinions orally in bilateral or multilateral discussions. However, it is essential that the answers to the questions reflect, as far as possible, the views of all professionals involved in the preparation of the project.

For all climate change impacts and sensitivity aspects, there are several options to choose from. The choice between them is based on qualitative methods and is to some extent subjective. The following table provides guidance for the choice:

|  |  |
| --- | --- |
| **Optional option** | **Selection criteria** |
| not sensitive | Due to the nature of the project, the climate change consequence is not relevant at all from the sensitivity point of view (e.g. a reduction in the number of frosty days does not play a role in the development and expected traffic of a summer tourist facility). |
| low sensitivity | The climate change consequence only indirectly affects the implementation and maintenance of the project to a small extent. |
| medium sensitivity | Although the climate change consequence may have a direct impact on the project, it should not prevent the implementation and maintenance of the project, either from a technical or economic point of view. |
| high sensitivity | The given consequence of climate change may have a significant impact on the infrastructure, equipment, inputs and products created, potentially jeopardising the technical or economic sustainability of the project. |

Table 3: Criteria for determining the climate change sensitivity of projects

As a result of the assessment carried out, one of the following categories should be selected in each cell of Table 4 below:

* not relevant at the project site
* not sensitive
* low sensitivity
* medium sensitivity
* high sensitivity.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consequences of climate change | To what extent is the technical condition of the infrastructure vulnerable to the climate change impact? | Is the operation of the resulting infrastructure dependent, and if so, to what extent, on a factor influenced by the consequence of climate change (e.g. water supply from a vulnerable aquifer; local renewable energy use; characteristics of the receiving water body; thermal comfort of the occupants of the facility)? | Is the demand for the services provided by the infrastructure sensitive - and if so, to what extent - to the climate change consequence (e.g. for tourism facilities – number of tourists; for transport infrastructure - traffic; etc.)? | Will the infrastructure make the surrounding area vulnerable to a local climate change effect, and if so, to what extent (e.g. the run-off blocking effect of linear facilities in the event of torrential rainfall)? |
| Expected annual change in average temperature (slow increase) |  |  |  |  |
| Expected change in average temperature (winter) |  |  |  |  |
| Expected change in average temperature (summer) |  |  |  |  |
| Expected change in the number of hot days |  |  |  |  |
| Increase in the number of heatwave days (daily mean temperature > 25 °C) |  |  |  |  |
| Reduction in the number of frosty days in spring (daily min. < 0 °C) |  |  |  |  |
| Increase in the average number of days per year affected by sudden temperature drops (10°C in 3 hours) |  |  |  |  |
| Increase in the average number of days per year affected by windstorms, violent windstorms, hurricanes (gusts over 85 km/h) |  |  |  |  |
| Changes in the seasonal distribution of precipitation |  |  |  |  |
| Increase in maximum length of dry periods (longest period with daily rainfall < 1 mm, day) |  |  |  |  |
| Increase in the number of days with more than 30 mm of precipitation (number of days with daily rainfall ≥ 30 mm) |  |  |  |  |
| Increase in frequency and intensity of floods along rivers |  |  |  |  |
| Increased frequency and intensity of flash floods in mountain and hilly areas |  |  |  |  |
| Increase in the frequency and intensity of urban stormwater run-off |  |  |  |  |
| Increase in the frequency of waterlogging |  |  |  |  |
| Increase in the frequency of forest fires |  |  |  |  |
| Expected impact of climate change on the activation of geological hazards based on the frequency of precipitation days exceeding 44 mm |  |  |  |  |

Table 4: Summary table of the results of the simplified climate change resilience assessment

**Options for moving forward**

The outcome of the Simplified Resilience Assessment will determine whether further climate change assessments are required as part of the project. The following options are available:

1. If the activities planned to be implemented under the project do not show a high level of sensitivity to any of the expected climate change impacts in any of the aspects assessed (i.e. no cell in Table 4 above is defined as "high sensitivity"), no further assessment is warranted. In this case, the applicant makes a Declaration (see Chapter 6).
2. If the activities planned to be implemented under the project are highly sensitive to at least one of the locally foreseeable impacts of climate change in at least one of the aspects assessed, the project receiving support is required to include at least one of the good practices from Chapter 5 in the project.

Risk mitigation actions need to be selected until contracting, and implementation needs to take place by the end of the project.

**If the project already contains an element that is included in the collection** (Chapter 5)**, please indicate the relevant mitigation action in the declaration**.

In case the declared mitigating action will not be implemented by the end of the project, eventual correction can be applied according to Programme rules.

# **5. Collection of risk mitigation actions**

**Nature-based solutions should be the first line of action to reduce the risks and impacts of climate change**. There are several overlapping definitions of nature-based solutions. As defined by the International Union for Conservation of Nature (IUCN)[[12]](#footnote-12) and the United Nations[[13]](#footnote-13):

*Nature-based solutions are actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well- being and biodiversity benefits.*

Nature-based solutions can have a positive impact in the following areas:

* adapting to climate change;
* the resilience of the natural and built environment and society;
* mitigate the progress of climate change by capturing, storing and reducing greenhouse gas emissions in the atmosphere;
* conserving and restoring biodiversity;
* improving the overall quality of the environment;
* sustainable use of natural resources and water;
* maintaining food and water security;
* implementing energy and resource efficient infrastructure interventions;
* other socio-economic benefits.

Good practices are categorised below (in Table 5) according to the climate change implications in Table 4.

**Collection of risk mitigation actions**

**A: Green roofs and green facades for public buildings** (e.g. community centre, museum, church, information point, sports centre) - Greening can be achieved by planting plant species in the ground or in plant pots, by using support panels and container elements fixed to the façade or in front of the façade, by vertical root zone systems or by integrated modular structures. In addition to cooling and shading, green roofs and facades improve air quality, reduce the energy demand of the building, are suitable for CO2 capture, but also for cleaning and retaining rainwater.

**B: Green roofs and green facades for the building(s) covered by the project** - The proposed possible interventions are the same as in A above.

**C: Increasing green spaces** (e.g. outdoor cultural, community, sports and recreational spaces; urban parks; community gardens, courtyards, parks of public buildings, wildflower meadows) - Green spaces are less likely to heat up, can retain water in the area and are also beneficial for biodiversity.

**D: Shading** (shading provided by any vegetation) - In general, traditional tree and plant planting will provide adequate shading for buildings and other paved surfaces. For tree planting in densely built-up urban environments more exposed to thermal insulation effects, the Stockholm Tree Pits solution is recommended. This serves the dual purpose of providing a structural soil with good load-bearing capacity for public functions and also ensures healthier growth and a longer lifespan for the trees. In the case of this Swedish solution, all paved surfaces (except roads) are designed with open pores. This allows surface water to penetrate into the root zone of the trees where it can be stored. All utility lines for inspection and maintenance are accessible via an accessible utility tunnel. Each tree is provided with at least 30 m3 of space for its root zone, which can store about 5 000 litres of water per year.

**E: Permeable pavement surfaces** - These surfaces can be made of porous materials that allow rainwater to permeate through the pavement, or non-porous blocks that allow water to flow between the voids and be absorbed into the soil. In addition to reducing runoff, permeable pavement systems can also trap suspended solids, thereby filtering contaminants from stormwater. These solutions can be used for roads, car parks and pedestrian walkways, for example, in a similar way to conventional technologies. Today, permeable concrete, asphalt and compacted materials are available to ensure natural absorption of moisture between paving stones or around trees. Permeable pavements can also have the advantage of significantly reducing the need for road salt by up to three quarters and can reduce construction costs in residential and commercial developments by reducing the need for traditional drainage elements. Finally, this technology is also useful in reducing the urban heat island effect, as water retained in the ground cools its surroundings through evaporation.

**F: Rain gardens** - A rain garden is a shallow, natural depression decorated with deep-rooted native flowers, shrubs and grasses. It is designed to collect and retain stormwater runoff from drains, driveways and sidewalks, allowing water to slowly evaporate and infiltrate back into the ground. Rain gardens can reduce stormwater runoff by 75-80% after a major rainfall event. A unique and important feature of rain gardens is that they effectively remove up to 90% of chemicals and up to 80% of sediment from rainwater. Compared to traditional lawns, rain gardens release up to 30% more water into the soil. In densely built-up urban environments, their installation can be combined with the Stockholm Tree Pits.

**G: Miyawaki Forest** - Named after Japanese ecologist Akira Miyawaki, the method is designed to restore and self-sustain native flora in up to 20-30 years - as opposed to centuries of natural regeneration. The very small Miyawaki forest requires only 10-20 m2 land and direct sunlight for at least 8 hours a day. The selected urban/suburban area will be planted with as many native shrubs and trees as possible. Seedlings tend to grow towards the sun and therefore compete, so they grow at a much faster rate. By greening urban spaces, providing shade and reducing air pollution, the mini forest can be a useful tool in the fight against the ecological crisis and climate change, but it also helps insect and bird populations and has aesthetic value.

**H: Planting a buffer zone** - Systematically planted forests at the edge of a settlement can protect it from strong winds, dust and other pollutants in the incoming air mass. When selecting trees for planting, it is important to consider soil conditions, other natural factors (climate, prevailing winds, temperature, rainfall, etc.) and to avoid invasive species.

**I: Designing swales and filter strips** – These are the cheapest and most natural methods. Plant-covered surfaces are not only aesthetically pleasing, but the web of soil particles and roots also filter water thoroughly. Therefore, a slow spread over a large area, percolation through a closed plant cover is the most beneficial. Where lacking space or where permeability of the soil is poor, the percolation surface may need to be combined with or replaced by an underground percolator.[[14]](#footnote-14)

**J: Rainwater collection, greywater recycling** - Rainwater from any building can be easily collected in collection tanks and used for irrigation or as greywater for flushing.

**K: Tree planting, development of forest management in mountain and hill areas** - By limiting logging, stopping felling, stopping earthworks that change the shape of the slope or create new/greater loads, potential negative geological events can be prevented.

**L: Leaky log dams** - The idea is to allow small stream flows to pass through the gaps below. In flash floods, however, they hold back the sudden influx of large volumes of water and the sediment and debris that comes with it. The water is released slowly and in a controlled manner through the gap between the logs, thus flattening the flood peak. This relieves and protects low-lying defences, residential or commercial areas. They also have the added advantage of requiring very little material input, especially when constructed using locally harvested timber.[[15]](#footnote-15)

**M: Establishment of a reservoir** - The sample project settlement is located in a hilly area, highly vulnerable to flash floods, and there are frequent droughts in summer. Flash floods and drought cause serious damage to the municipality, and the project aims to address both problems through nature-based solutions. In this method, a lateral reservoir provides a significant part of the water retention. To operate the lateral reservoir, an intake ditch and a discharge ditch with a gate are connected. At the inflow points of the reservoir, easily cleanable sediment traps have been installed to prevent the reservoir from silting up.[[16]](#footnote-16)

**N: Mulching** - Mulching is a layer of material applied to the soil surface. The purpose of mulching is to conserve soil moisture, improve soil fertility and health, prevent weed growth and improve the appearance of the area. Bark, wood shavings, vine pulp, nut shells, garden green waste, crop residues, compost, manure, straw, dry grasses, leaves are commonly used to cover the soil surface. When applied correctly, it can significantly improve the water-holding capacity of the soil.

**O: Coarse woody debris in streams, canals** - Coarse woody debris in stream channels has several ecological and hydrological benefits. Coarse woody debris consists of large tree limbs or trunks that either fall into streams or are deposited in the stream channel by human intervention. Coarse woody debris can be planted with varying degrees of naturalness. They can be used to create barriers that effectively restrict the flow of water. In general, coarse woody debris slows down the flow rate of water and reduces the peak flood stage.

**P: Fire risk database** - Geographers at the University of Szeged have developed a method that can improve the efficiency of fire prevention and forecasting. The method is based on the creation of an up-to-date and large-scale database, refined by field measurements, which is a kind of geo-spatial information application containing the land cover, topography, natural and planted forest conditions, road network, water intakes, etc. of a given area, which can help to control fires. In cooperation with the disaster management, a geo-database and a mapping application have been developed as a pilot project for an area. Where satellite data are used to pinpoint the fire risk of a given forest area, it is much easier to react to spontaneous as well as expected events. Firefighters can also use navigation to help them determine the shortest route, speed, and accessibility.

**Q: Creating map databases** - For most climate risks, it can be useful to create a map database to assess and identify the exposure and extent of risk in the affected areas.

**Soft actions - Local initiatives, community building, awareness raising and knowledge sharing**

Some small-scale, "soft" local community initiatives can also generate change. These are typically not very resource-intensive: they require determination, broad communication, and credible, enthusiastic initiators.

Climate awareness can also be promoted through the creation/support of small local communities for related purposes, or by expanding the activities of well-established, cohesive local communities in other areas. Activities to promote a more sustainable future and social well-being often do not require large-scale action and strong commitment. It is also essential to offer attractive opportunities for different age groups (from pre-school to pensioners) to get involved - even if not at the same time.

**R: Information, awareness-raising** - The main task is to inform the population concerned about the behaviour to be followed and the prohibited activities, by informing them about the risks they face. Awareness-raising lectures, interactive discussions, clubs, workshops, thematic courses, camps can be organised - depending on local possibilities. It is important to strengthen local communication, e.g. by forming groups on social media platforms, expanding the network of contacts, and strengthening opportunities for sharing information and knowledge and exchanging experiences.

**S: Community brainstorming** - The aim is to gather ideas from the public on where and how to implement measures to increase sustainability. An interactive map can be linked to the community brainstorming session where anyone can make suggestions based on the problems they see in their everyday life.

**T: Climate Partnership** - The climate partnership aims at personal involvement of the population and raising awareness of the expected negative impacts of climate change in the region, with a special focus on the immediate risks in the region. Such a partnership can also be a way of gaining the support of residents for the adaptation actions needed at individual and community level.

**U: Community and home composting** - The method involves the treatment and use of organic materials of plant origin through local composting. This avoids organic material becoming waste and saves the costs of transporting and landfilling it. In the case of community composting, it is very important to appoint a responsible person, the "compost master", who is skilled in composting and who supervises the operation of the community composter. Composting can prevent the burning of green and organic waste, thereby preventing fire hazards and air quality deterioration.

|  |  |
| --- | --- |
| **Consequences of climate change** | **Risk mitigation activity letter** |
| Expected annual change in average temperature (slow increase) | **A, B, C, D, R, S, T** |
| Expected change in average temperature (winter) | **A, B, C, D, R, S, T** |
| Expected change in average temperature (summer) | **A, B, C, D, N, R, S, T** |
| Expected change in the number of hot days | **A, B, C, D, N, R, S, T** |
| Increase in the number of heatwave days (daily mean temperature > 25 °C) | **A, B, C, D, N, R, S, T** |
| Reduction in the number of frosty days in spring (daily min. < 0 °C) | **A, B, C, R, S, T** |
| Increase in the average number of days per year affected by sudden temperature drops (10°C in 3 hours) | **A, B, C, R, S, T** |
| Increase in the average number of days per year affected by windstorms, violent windstorms, hurricanes (gusts over 85 km/h) | **H, Q, R, S, T** |
| Changes in the seasonal distribution of precipitation | **I, J, R, S, T** |
| Increase in maximum length of dry periods (longest period with daily rainfall < 1 mm, day) | **A, B, C, D, F, G, I, J, N, R, S, T** |
| Increase in the number of days with more than 30 mm of precipitation (number of days with daily rainfall ≥ 30 mm) | **F, J , K, L, M, R, S, T** |
| Increase in frequency and intensity of floods along rivers | **L, M, O, Q, R, S, T** |
| Increased frequency and intensity of flash floods in mountain and hilly areas | **K, L, M, O, Q, R, S, T** |
| Increase in the frequency and intensity of urban stormwater run-off | **F, I, J, Q, R, S, T** |
| Increase in the frequency of waterlogging | **F, J, Q, R, S, T** |
| Increase in the frequency of forest fires | **P, Q, U, R, S, T** |
| Expected impact of climate change on the activation of geological hazards based on the frequency of precipitation days exceeding 44 mm | **K, Q, R, S, T** |

Table 5: Matching potential mitigation solutions to the problems

# **6. Declaration of completion of the Resilience Test**

**DECLARATION**

|  |
| --- |
| INTERREG PROGRAMME NAME: **Interreg VI-A IPA Hungary-Serbia Programme**  CALL FOR PROPOSALS CODE NUMBER: **2nd Call for Proposal, HUSRB/25**  NAME OF PROJECT PARTNER ORGANISATION: ......................................................................................................................  ADDRESS OF THE PROJECT PARTNER ORGANISATION: ..........................................................................................................  PROJECT TITLE: ......................................................................................................................................................................  PROJECT ACRONYM: ..............................................................................................................................................................  PROJECT (PLANNED) DURATION IN MONTHS: ........................................................................................................................ |

I, the undersigned, as representative of the project partner organisation, declare that a simplified resilience assessment has been carried out for the project to be implemented, potential climate change impacts have been assessed, relevant risks have been identified and categorised according to their sensitivity.

The results of the Simplified Resilience Assessment for our project are:

*(Please underline if it is A) or B) below is relevant!)*

1. The activities planned to be carried out under our project do not show a high sensitivity to any of the expected climate change impacts in any of the aspects assessed, and therefore no further assessment is warranted.

*OR*

1. The activities we plan to implement in our project are highly sensitive to at least one of the locally foreseeable impacts of climate change in at least one of the aspects assessed. Accordingly, I declare that:[[17]](#footnote-17)

b1) we already have the following mitigating action(s) planned in the project: ….. [[18]](#footnote-18)

b2) we do not have any mitigating action(s) planned in the project, therefore we are committed to implement the following mitigating action(s): ….. [[19]](#footnote-19)

Date: ..............................................................................

|  |  |
| --- | --- |
| Name of the official representative of the project partner organisation: |  |
| Signature, stamp: |  |

1. The guide is available at (published in February 2022): <https://www.palyazat.gov.hu/letoltes/662752a887ce895887042e98> [↑](#footnote-ref-1)
2. COMMUNICATION FROM THE COMMISSION: Technical Guidelines on Climate Resilience Assessment of Infrastructure for the period 2021-2027 (2021/C 373/01) [↑](#footnote-ref-2)
3. <https://climateknowledgeportal.worldbank.org/> (The World Bank Group) [↑](#footnote-ref-3)
4. Hot days are those days when the daily maximum temperature reaches or exceeds 35°C [↑](#footnote-ref-4)
5. NUTS 3 level. [↑](#footnote-ref-5)
6. Number of days when the daily precipitation amount is ≥ 20 mm [↑](#footnote-ref-6)
7. The days when the daily maximum temperature is < 0 °C. [↑](#footnote-ref-7)
8. <https://nakfo.mbfsz.gov.hu/hu/node/517> [↑](#footnote-ref-8)
9. <https://www.vizugy.hu/vizstrategia/documents/997966DE-9F6F-4624-91C5-3336153778D9/Nemzeti-Vizstrategia.pdf> [↑](#footnote-ref-9)
10. https://www.mgsi.gov.rs/cir/dokumenti/urbani-razvoj [↑](#footnote-ref-10)
11. <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC182399/> [↑](#footnote-ref-11)
12. Source[: https://www.iucn.org](https://www.iucn.org) [↑](#footnote-ref-12)
13. Source: <https://wedocs.unep.org/bitstream/handle/20.500.11822/39752/K2200677%20-%20UNEP-EA.5-Res.5%20-%20Advance.pdf?sequence=1&isAllowed=y> [↑](#footnote-ref-13)
14. <https://vizmegtartomegoldasok.bm.hu/hu/tudastranszfer/innovativ_megoldasok> [↑](#footnote-ref-14)
15. <https://networknature.eu/casestudy/26186> [↑](#footnote-ref-15)
16. <https://networknature.eu/casestudy/26186> [↑](#footnote-ref-16)
17. If you have selected option B) please fill in b1) or b2. [↑](#footnote-ref-17)
18. Please insert the corresponding letter(s) of the planned action(s) from Chapter 5 of the present Resilience test. [↑](#footnote-ref-18)
19. Please insert the corresponding letter(s) of the newly chosen action(s) from Chapter 5 of the present Resilience test. [↑](#footnote-ref-19)