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2nd SECAP SUSTAINABILITY FORUM

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Adaptation to Climate Change in the APCAP Network

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Adaptation to Climate Change in the APCAP Network



Timeline:

1 - Creation of the GT Trans Group - May 2016

APCAP began monitoring issues related to adaptation to climate change approximately 8 years ago through participation in the Transport and Communications Working Group – Transport Subgroup, coordinated by the Institute of Mobility and Transport (IMT) and which is part of the National Strategy for Adaptation to Climate Change (ENAAC).



2 – Important discussion about priority areas of intervention

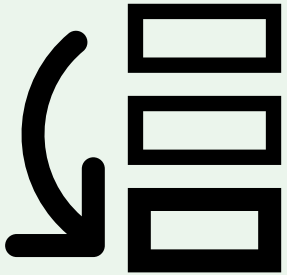
2 – 1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes - Oct 2016 - Despite 7 years have passed, the survey is quite relevant because it constitutes a good basis for work due to the questions it has raised

3 – 2nd Survey on impacts of climate/weather related events on road transport assets - Oct 2022
Update of the 2016 survey regarding heavy rains and heat waves (wildfires)

Adaptation to Climate Change in the APCAP Network

During the working group discussion, the following areas of intervention were identified as the priority ones:

- Studies of the vulnerabilities of transport systems, namely the identification of limits that may compromise their normal operation in the face of the forecast climate scenarios.
- Prevention plans for extreme climatic episodes
- Emergency plans for extreme climatic episodes
- Adaptation of critical transport infrastructures
- Studies for the redefinition of parameters to be considered in the planning of transport systems
- Production of climate risk cartography
- Innovation and good practices in adapting transport systems
- Use of ITS to provide emergency information to users
- Adaptation of transport service operators in terms of equipment and management
- Adaptation of nature conservation solutions, critical for the preservation of biodiversity, associated with transport infrastructures



1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes

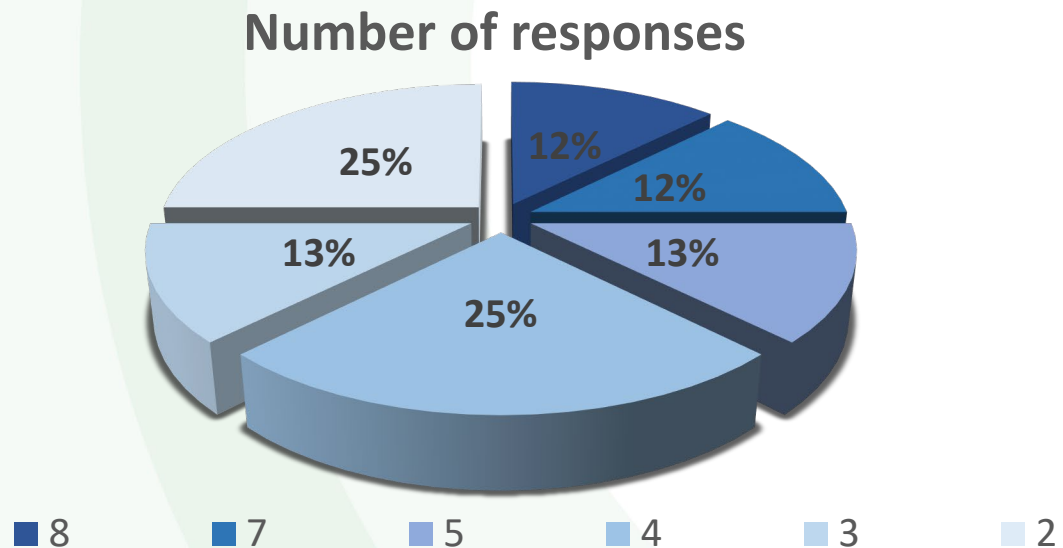
- Critical Infrastructures
 - Road classified as a Principal Route
 - Road presenting a relevant history of traffic interruptions caused by extreme weather conditions (the effects of which cause floods, fires, subsidence of pavements, slopes, etc.)
 - Road identified in the UNECE (United Nations Economic Commission for Europe) agreement on main international connections



The survey only covered APCAP critical infrastructures

1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes

- To which extent climate change and/or extreme weather events are considered to be a problem for transport in Portugal or in a Portugal specific region
 - Very uneven perception among the various concessionaires (responses range from 2 to 8) – average: 4



1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes



- Planned investments considering impacts of extreme weather and/or other climate related factors in the period (2017-2021) in the APCAP critical infrastructures



- The planned investments did not specifically address the impacts of extreme weather events or other climate-related factors, although they could influence the management of those impacts

1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes



Weather or climate related factors which have impacted critical infrastructure



Precipitation: Drainage, slopes, tolls, equipment, infrastructure



Wind: Signs and infrastructure



High temperatures: Tolls, bridges, pavement and infrastructure



River levels: Bridges and infrastructure



Low temperatures, only reported by those that manage interior north concessions

- ✓ **Precipitation and winds are predominant factors in the APCAP network responses.**
- ✓ **Average sea level and sea storms were not noted by any concessionaire, probably due to the location of the APCAP network.**
- ✓ **Over time the magnitude of damage and/or disruption caused by weather or climate related events is stabilized.**

1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes

- User's perception – Existence of critical infrastructure users' requests concerning the implementation of response measures
 - In general, there are no requests for the implementation of climate change adaptation measures.
 - There are only a few requests involving **vegetation control areas** for **preventing fires** following high temperatures and complaints related to motorway interruption due to an unstable hydraulic culvert because of **water force after heavy rainfall**.



1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes

- Indication of any impacts suffered by the critical infrastructures arising from weather/climatic related factors, including extreme events



75% of the concessionaires considered that weather/climatic related factors have had little or non-existent impacts on the infrastructures

- Indication whether the observed trends have already necessitated or will require adaptation responses



Most of the answers considered that no adaptation responses are required.

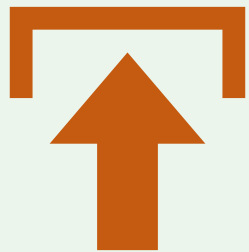
- Confirmation if the government/organization has mainstreamed weather and/or climate related considerations in planning, design and construction of transport infrastructure



The concessionaires answered affirmatively. The meteorological/climatic aspects are taken into account in the planning, design or construction of the transport infrastructure (rules and regulations for the construction of roads and bridges, pavements adapted to the climatic conditions, wind warning panels, ...)

1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes

- Indication of the thresholds of meteorological/climatic factors at which the integrity and functionality of the critical infrastructures are expected to be significantly impaired

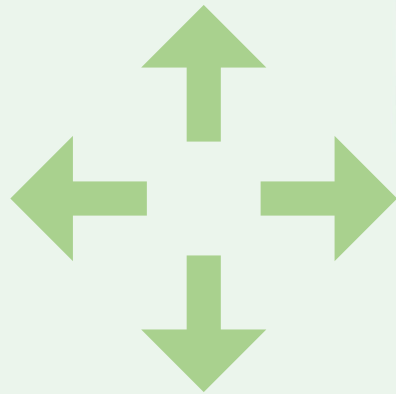


The information about the thresholds is available in the project, but in general is not systematized in easily accessible information systems, exception regarding limits for wind speed on bridges (in 10% of the number of critical infrastructures), rainfall and water levels in rivers on 5% of the critical infrastructures

- ✓ This may be a matter that needs to be further investigated since the knowledge of these limits is essential for the definition of the alert levels that must be considered in the various infrastructures.

1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes

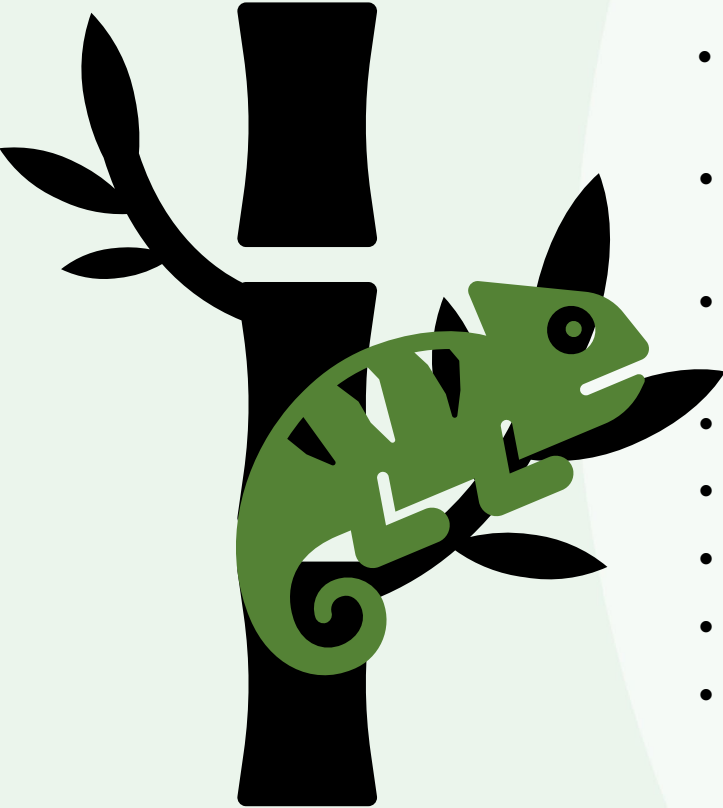
- Concessionaires' perspective on the possibility of infrastructure being indirectly affected by weather and/or climate induced changes, namely migratory phenomena, changes in energy demand, changes in agricultural and industrial production, modal transfers of transport, ...
 - Most concessionaires reveal that this is still a matter that needs further studies, but 25% of the responses invoked that the operation of infrastructures can be affected by the following changes:
 - Energy demand,
 - Industrial production,
 - Modal transport transfers,
 - Interruption in the supply chain of products and job shortages and that
 - Infrastructure and the operation of tolls may change due to changes in migratory phenomena, modal transport transfers and competitiveness issues



1st Survey on Climate Change Impacts and Adaptation for Transport Networks and Nodes

- Adaptation measures involving critical infrastructures that are considered effective, good value for money and an example of best practices

- Changes on the maintenance and inspection of the drainage system or even increase the capacity of the drainage system
- Improve communication with users, namely by adapting the infrastructure, warning panels, etc.
- Increase the area of vegetation clearance and the frequency of vegetation maintenance
- Increase protections against lightning at low voltage
- Adaptation of pavements
- Diagnosis/inventory of infrastructure risks and Risk Analysis
- Safety and Environmental Management Plans that address extreme weather events
- Training and reinforcement of the preventive alert system and reinforcement of the emergency response device



2nd Survey on impacts of climate/ weather related events on road transport assets

After the 1st survey, a new one was answered in 2022 in order to collect information on the impacts of climate/weather related events on road transport assets in the last 5 years (period 2017 and 2022).

The following climate hazards were considered separately in the survey:



Heavy precipitation

- Since 2017 no event was registered by any concessionaire



High temperature

- This item was related to wildfires that disrupted traffic operations
- 33 events reported since 2017
- The length of disruption (traffic diversion or long-term road closure) was between 1-3 h or 3-12 h, in most of the events.

2nd Survey on impacts of climate/ weather related events on road transport assets

Question: What measures have the concessionaires implemented in the face of these occurrences (precipitation and heat waves)

- Increasing the resilience of the infrastructure, for instances by introducing changes in inspections and increasing inspection frequencies of several components of motorways, developing studies to assess the structural capacity of components in order to evaluate their resistance and to be able to adjust current and planned maintenance and conservation for increasing their resilience to extreme events (especially heavy rainfall and strong winds)
- Monitoring the infrastructure (bridges) with the installation of sensors that allow studies and evaluations of its resistance to various scenarios.
- Improvement of internal communications and the communication with the rescue entities
- Identification and detailed characterization of the risks and opportunities related to climate change.
- Compliance with the criteria of vegetation maintenance for fire prevention under the Forest and Rural Fire Management System, preservation of native flora and weed control.

2nd Survey on impacts of climate/ weather related events on road transport assets

Question: Have measures been implemented by other bodies – e.g., relevant authorities or other sectors – which positively affected the road/road network?



The IPMA (Portuguese Institute for Sea and Atmosphere) provides up-to-date information on weather forecasts, daily risk maps for wildfires, floods and other important information related to weather extremes.



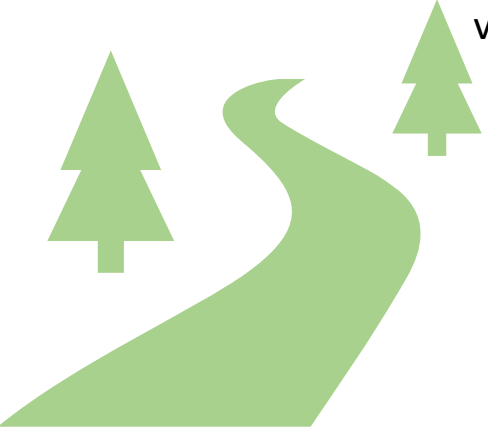
After the wildfires of 2017, there were some legal changes, especially regarding vegetation maintenance (vegetation clearing in the proximity of roads and residential areas).

2nd Survey on impacts of climate/ weather related events on road transport assets

Conclusions

Given the time elapsed, there is **not yet a database with sufficient history to point out trends** and justify clear conclusions, but it is an evidence that improvements related to the resilience of the infrastructure have been initiated and are under development

The adaptation of our assets to climate change, in order to increase their resilience to increasingly violent natural phenomena is therefore the last point of this presentation

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- In general, the concessionaires are already collecting data to support and develop Climate Change Resilience Plans.
 - The Concessionaires also have in place, and in coordination with the civil protection authorities, Prevention and Emergency Plans for extreme events, which in many cases are also part of the contractual obligations (for example, for serious accidents, spills of hazardous materials, fires and others)

APCAP's path passes through three fundamental pillars:

Promoting Road Safety; Promoting Sustainable Mobility and Contributing to the Fight against Climate Change