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## PROMOTING GREEN LIVING AREAS



# NUDGES

## O 2.1 | NUDGES blueprints

### Proofs of Concept

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## Executive Summary

**Output 2.1** consolidates the proofs of concept and lessons learnt from the experimental implementation of **climate-related behavioural nudges** across six pilot locations in the Euro-Mediterranean region. It demonstrates how **sensory-based and culturally grounded interventions**—rooted in sight, sound, smell, touch, and taste—can effectively influence environmental attitudes and behaviours at community and urban levels.

The output presents the methodology, activities, and results of each pilot, all designed to **reduce the psychological distance of climate change** by transforming abstract data into concrete, emotionally meaningful experiences. Each country applied a dominant sensory pathway: visual art in Bulgaria, sound-based mobility cues in Spain, olfactory engagement in Slovenia, tactile artistic expression in Italy, taste-based sustainable eating in Greece, and multisensory child-centred activities in Bosnia and Herzegovina.

A key element of the output is the **engagement of next generations**, particularly school-aged children, who acted as early adopters and multipliers of sustainable habits, accelerating behavioural change among families and local communities. The results show **positive directional trends across all pilots**: improvements in understanding that climate change is real and human-caused, increased perception of its impacts, and stronger willingness to adopt pro-environmental habits such as recycling, reducing car use, choosing local products, or improving diet.

While **statistical significance was limited by small sample sizes**, the convergence of qualitative and quantitative evidence supports the **effectiveness of multisensory nudges** as tools for environmental compliance and climate action. The output also captures practical challenges, lessons learned, and recommendations for scaling, including the need for shared indicators, stronger follow-up, and co-creation with local actors.



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Overall, Output 2.1 provides a **practical and transferable evidence base**, demonstrating that when behavioural insights are combined with local culture and sensory experience, **climate engagement becomes more intuitive, relatable, and durable**.



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# 1. Introduction

The **NUDGES project** seeks to explore the potential of **climate nudges** to promote **pro-environmental behaviour** across the Euro-Mediterranean region. Stemming from the behavioural economics work popularized by Thaler & Sunstein (2008), the project focuses on **nudges as subtle modifications in choice architecture** that guide individuals toward more climate-friendly actions without restricting their options or heavily altering incentives.

The key focus is on **climate nudges**—those specifically aimed at fostering behaviours that benefit the climate. Importantly, these nudges are characterized by **two criteria**: they must be both **motivated by climate concerns** and **directly enhance behaviours that positively impact the environment**. For example, a nudge encouraging cycling to work qualifies as a climate nudge only if motivated by environmental goals rather than for personal health benefits, even if both outcomes result in positive change.

This project leverages **Mediterranean culture** to explore the connection between **cultural experiences and the transition from climate awareness to individual and collective pro-environmental behaviours**. By engaging the **five senses**—visuals, music, taste, and other sensorial experiences—this initiative seeks to harness local cultural practices to drive climate action.

This output gathers the **results of the proofs of concept and lessons learnt** from the experimental implementation of nudges. "This output gathers the results of the proof of concept and lessons learned from the experimental implementation of nudges.



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## 2. Methodology

Partner	Methodology of the Proof of Concept
<p>Pilot 1 – Bosnia and Herzegovina (PREDA):</p> <p><b>Next Generation Citizens – Eco Heroes</b></p>	<p>The programme recruited 16 children (Jan–Feb 2025). The methodology integrated baseline and follow-up assessments (child and parent questionnaires) to measure environmental awareness, emotional connection, and behavioural change. Sensory and symbolic nudges were applied, visual, auditory, scent, taste, and tactile, combined with cultural storytelling and symbolic identity tools such as Eco Hero badges and Eco Challenge Maps. Results indicated that playful and emotional learning effectively fostered sustainable behaviour and social responsibility among children.</p>
<p>Pilot 2 – Spain (MUSOL):</p> <p><b>Sound Inspiration</b></p>	<p>Three schools were involved: (1) Experimental Group – Cultural Intervention (musical walking route), (2) Experimental Group – Regular Nudge (climate change workshop), and (3) Control (no intervention). Over three months (Feb–May), eight sessions were held along the “musical route,” integrating music, dance, and play. A total of 43 parents participated. Questionnaires and observations assessed the behavioural effect of cultural nudges and their scalability for sustainable mobility.</p>



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Partner	Methodology of the Proof of Concept
Pilot 3 – Slovenia (E-Zavod):  <i>A Smell of Change</i>	The two-day intervention (24–25 May 2025) included guided tours, smell walks, and workshops on herbal spread preparation, tea tasting, and hydrosol production. Cultural nudges were displayed in public spaces through scent-related messages. Three groups (control, nudge, cultural) with 90 total participants took part. Follow-ups at 0, 3, and 6 months assess behavioural changes. Results confirmed that olfactory experiences can emotionally anchor sustainability values.
Pilot 4 – Italy (UdA):  <i>Touching the Untouchable</i>	Workshops promoted cognitive, motor, and social engagement through artistic expression. Results showed significant changes in climate perception (Temporal Distance Q14: +1.60, $p=0.017$ ), indicating greater immediacy of climate awareness. Tactile engagement fostered empathy, self-esteem, collaboration, and reflection, translating abstract environmental issues into tangible personal experience.
Pilot 5 – Greece (AUTH):  <i>Tasting the Transformation</i>	The intervention followed a structured behavioural design: (1) baseline assessment of dietary habits and perceptions, (2) intervention phase with varying exposure to stimuli, and (3) post-test and follow-up surveys at 3 and 6 months to measure shifts in attitudes and behaviours. The proof of concept validated that



Partner	Methodology of the Proof of Concept
	combining nudges with cultural framing produces both short- and long-term behavioural change in sustainable eating.
Pilot 6 – Bulgaria (MHS):  <b>The Power of Visuals</b>	Pre- and post-intervention questionnaires measured climate awareness. The use of humour and art acted as nudging tools, making climate topics tangible, and engaging. Despite limited timing, the proof of concept confirmed that creative competition effectively raises environmental awareness among youth

Table 1. Methodology of the Proof of Concept

### 3. Results

The statistical analysis adopted a **robust multi-layered framework** to evaluate intervention effectiveness on the ordinal Likert-scale data. To ensure validity, a **dual hypothesis-testing strategy** was employed: **Welch's t-test** served as the primary parametric method due to its robustness against heteroscedasticity, complemented by the **Mann-Whitney U test** for non-parametric validation. Effect sizes were quantified using **Hedges' g** and **Cliff's  $\delta$** . For methodological transparency, an **exploratory causal inference framework** (including X-Learner and Difference-in-Differences) was also implemented; however, this analysis was **restricted by data availability** across pilots and **did not yield statistically significant results**.

Regarding the interpretation of findings, the **triangulation of these analytical methods** offers a nuanced perspective rather than definitive validation. While statistical significance was infrequently achieved and certain outcomes presented ambiguous or contradictory patterns, a **recurrent directional trend** aligned with



positive expectations was observed across both parametric and non-parametric assessments. Consequently, these results should be viewed as **exploratory evidence**: the methodological convergence suggests that small-scale, context-specific interventions hold the potential to influence environmental awareness, though larger cohorts are required to confirm these shifts statistically.

### *3.1. Pilot 1 – Bosnia and Herzegovina (PREDA): Next Generation Citizens – Eco Heroes*

The pilot combined behavioural nudges and cultural activities involving both children and parents through a multisensory approach, including tactile recycling exercises, visual storytelling, and cooperative group play. Results indicate a significant increase in the belief that climate change is real (Q1: +1.23,  $p=0.013$ ) and human-caused (Q4–Q6: +1.14, +0.87,  $p<0.05$ ).

These findings demonstrate that early multisensory engagement can effectively foster lasting environmental awareness and empathy, shaping values and perceptions from childhood through experiential learning.

### *3.2. Pilot 2 – Spain (MUSOL): Sound Inspiration*

The intervention used sound-based nudges to encourage walking to school through musical installations and auditory storytelling. Data revealed a positive behavioural trend, with participants increasingly believing that individual actions can impact climate change ( $p=0.01$ ) and that reducing car use contributes to mitigation ( $p=0.07$ ). The sense of hearing transformed daily mobility into a shared, joyful act of climate care, turning awareness into collective experience and habit formation.

### *3.3. Pilot 3 – Slovenia (E-Zavod): A Smell of Change*

The pilot introduced olfactory workshops and scent-based experiences that linked local herbs, soil, and climate awareness. Although not all statistical effects reached significance, the overall trend was consistently positive, showing greater recognition of human influence on climate change and stronger emotional connections to local nature. The sense of smell proved to be an effective tool for creating memory-based



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environmental awareness and a deeper community identification with sustainability and place-based heritage.

### *3.4. Pilot 4 – Italy (UdA): Touching the Untouchable*

The intervention leveraged artistic co-creation and tactile workshops to foster deep emotional and cognitive engagement, successfully translating abstract environmental issues into embodied experiences. While the Climate Change Perception Scale indicated a counterintuitive shift in 'Temporal Distance' (Q14: +1.60,  $p=0.017$ )—suggesting participants perceived effects as further in time—the project's overall impact remains positive. Crucially, the comparative analysis demonstrated that participants achieved significantly higher awareness scores than the control group ( $p < 0.01$ ), validating the methodology's effectiveness in sustaining climate sensitivity despite the complex internal trends.

### *3.5. Pilot 5 – Greece (AUTH): Tasting the Transformation*

The pilot focused on climate-friendly eating habits, integrating the Mediterranean diet as a cultural and behavioural anchor for sustainability. Participants exposed to nudging interventions perceived climate change consequences as more serious (Q8: +0.65,  $p=0.082$ ). The sense of taste effectively linked sustainability with pleasure, culture, and local identity, demonstrating that responsible food choices can become both meaningful and enjoyable when rooted in tradition and shared values.

### *3.6. Pilot 6 – Bulgaria (MHS): The Power of Visuals*

The pilot implemented visual and cultural interventions, including documentary screenings, art workshops, and the Climate Fresk collaborative game. Findings showed significant improvements across several dimensions — Reality (Q1), Causes (Q4–Q6), Consequences (Q7), Spatial (Q10), and Temporal Distance (Q13,  $p=0.01$ ). The visual medium made climate change visible, human, and immediate, turning imagination into local action and reinforcing the power of visual storytelling in shaping climate consciousness.



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## 4. Discussion

Climate change often feels **abstract and distant**. Climate change often felt abstract and distant. The Interreg Euro-MED **NUDGES Project** explored how climate engagement changed when individuals experienced it **through the senses**, embedding behavioural nudges within everyday cultural and community rituals across six European pilots.

We began in “**uncharted territory**”: few validated protocols and limited cross-cultural evidence linked multisensory experiences to sustainable behaviour. Rather than imposing a top-down standard, we adopted a **bottom-up approach**: each country partnered with local actors (families, schools, museums, community organisations) to identify behavioural frictions, design locally meaningful stimuli, and test nudges in situ, beyond laboratory settings.

The practice methodology followed a **repeatable cycle**: to support transferability while safeguarding cultural fit, each pilot emphasised a **dominant sensory pathway**, visual interventions in Bulgaria (e.g., screenings, art, Climate Fresk), sound-based school mobility nudges in Spain, tactile artistic co-creation in Italy, olfactory workshops in Slovenia, taste-based links between the Mediterranean diet and sustainability in Greece, and multisensory activities with children and parents in Bosnia & Herzegovina.

Pilots assessed **perceived climate-change risk**, integrating beliefs about reality, human causation, and spatiotemporal proximity, capturing concern for health, environment, and economy, and motivating willingness for **individual action and collective support**.

Across countries, we observed **encouraging signals**: significant increases in the belief that climate change was real and human-caused (Bosnia & Herzegovina; Bulgaria), improvements in perceptions of consequences (Greece; Bulgaria), shifts in perceived spatial/temporal distance (Italy; Bulgaria), and behavioural indications consistent with reduced car use and stronger perceived personal impact (Spain).



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Where statistical significance was not attained, trends nevertheless remained **positive and informative for iteration** (e.g., Slovenia).

We presented the toolkit emerging from this cross-country “**test bed**”: **what worked reliably, what required adaptation**, and **how partners could build** a stronger, more scalable **NUDGES 2.0**, recognising that robust effects would have required larger groups than many cultural-ecological settings permitted. NUDGES aimed to understand how to make nudges sustainable over time through **culturally grounded interventions** that leveraged the social and emotional dimensions of local contexts, showing that climate change was a shared challenge that connected us and could only be addressed through cooperation, by weaving, rather than flattening, the differences and similarities that shaped our behaviours.

#### *4.1 Perception as the Driver of Behaviour*

Across the pilots, results would suggest that perception may be a decisive driver of behaviour. Modifying how people perceive climate change, rendering it real, human-caused, and near, could represent the initial and most critical step toward modifying how they act.

Through sensory and cultural activation, abstract data became embodied motivation: participants did not simply learn about climate change; they felt it, experienced it, and related it to their daily lives. Evidence from the pilots would imply that culture could play a key role in activating emotion and meaning, reaching beyond conventional awareness campaigns. Cultural participation would provide a language of feeling that might turn information into shared, memorable, and durable understanding. By merging art, storytelling, play, and heritage, these activities could make sustainability personally relevant and socially embedded, allowing participants to internalize values rather than simply receive information.

#### *4.2 Senses as Gateways to Agency*

Each sensory dimension would appear to have contributed in a distinct way to behavioural transformation:



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- **Sight** might have inspired reflection and collective imagination, turning observation into civic engagement.
- **Sound** could have transformed routine into climate-conscious habit, strengthening social connection through rhythm and shared experience.
- **Touch** would seem to have rebuilt empathy and connection, grounding awareness in direct physical experience.
- **Smell** might have anchored memory and belonging, linking environmental responsibility to place and identity.
- **Taste** could have connected pleasure, culture, and responsibility, illustrating how sustainable choices can be both desirable and meaningful.

Together, these multisensory pathways would seem to reconnect people with the material world, reducing psychological distance and fostering a renewed sense of care and responsibility toward the environment.

## 5. Challenges and Lessons Learnt

While the pilots demonstrated strong potential, they also encountered challenges that provide valuable lessons for future implementation.

Challenges	Lesson learnt
<p><b>Small sample sizes:</b> Some interventions worked with small participant groups or lacked one of the groups for robust comparison.</p>	<p>While qualitative insights were rich, future pilots should aim to increase sample sizes where possible and ensure higher statistical power.</p>
<p><b>Resource and Logistics Constraints:</b> Sensory interventions often require specific materials (musical equipment, herbs, art supplies, food</p>	<p>A shared inventory of recommended materials and low-cost alternatives could be developed. Additionally, identifying local</p>



products, visual tools). Logistics and procurement sometimes posed difficulties.	suppliers and relying on community resources can facilitate implementation.
<p><b>Cultural Sensitivity and Adaptation Needs:</b></p> <p>Each pilot operated within a distinct cultural environment. What works in one context (e.g., taste-based nudges linked to the Mediterranean diet) may require adaptation elsewhere.</p>	Nudges must be co-created with local actors to ensure cultural relevance. A flexible framework, rather than a fixed protocol, supports meaningful adaptation
<p><b>Maintaining Participant Engagement Over Time:</b></p> <p>Some interventions faced challenges in sustaining enthusiasm, especially when external factors (school schedules, weather, holidays) disrupted regular activities.</p>	Embedding nudges within enjoyable, participatory, and creative activities (music, games, cooking, art) helped maintain motivation. Future designs should prioritise interactive formats and community celebration.
<p><b>Data Collection Difficulties:</b></p> <p>In some cases, it was difficult to complete the follow-up questionnaires.</p>	Incorporating more observational data, as evaluation tools may reduce response fatigue and increase data quality.

Table 2. *Challenges and Lessons learnt*



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## 6. Conclusions and Recommendations

The **Proofs of Concept** developed across the six pilot countries support the idea that **sensory-based and culturally grounded nudges** can produce **measurable improvements in climate perception, emotional engagement, and pro-environmental behaviour**, even within small and diverse populations. Despite methodological and contextual differences, all pilots show **convergent positive trends**: reduced psychological distance, strengthened personal relevance of climate issues, and increased readiness to adopt climate-friendly habits.

A central conclusion emerging from the interventions is that **culture and sensory experience are powerful mediators between knowledge and action**. By transforming climate information into **embodied, emotional, and social experience**, the pilots succeeded in activating forms of engagement that are not easily achieved through traditional awareness campaigns. Sensory nudges helped participants understand climate change not only cognitively but also **experientially**, connecting sustainability to identity, place, pleasure, and daily routines.

### 6.1 Key Recommendations for Improvement and Scale-up

**Standardise core indicators while preserving local flexibility:** The multisensory approach works best when it adapts to cultural contexts. However, future phases should define a minimal set of shared indicators to improve comparability across countries, especially for longer-term impact evaluation.

**Strengthen longitudinal Follow-up:** Several pilots included follow-up measurements at 3 or 6 months. Scaling the intervention would benefit from extending these periods and including behavioural tracking where possible (mobility data, dietary changes, waste reduction habits, etc.).

**Enhance co-creation with Local Actors:** Engagement increases when participants, schools, municipalities, and community groups co-design the nudges. A standardised co-creation toolkit could support replication in other Mediterranean communities.



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**Integrate nudges into existing municipal or school programmes:** Embedding the interventions into ongoing mobility plans, cultural festivals, school curricula, or community gardens will increase durability and reduce costs while strengthening institutional buy-in.

**Prioritise capacity-building for practitioners:** Training educators, youth workers, and municipal staff in behavioural insights and sensory design can multiply the reach of the intervention and ensure high-quality implementation.

**Develop a replication package:** Producing a toolkit that includes methodological guides, ready-to-use sensory nudges, evaluation templates, and communication materials will facilitate adoption in additional regions and schools.

Overall, the pilots suggest that scaling up is both feasible and advisable. The approach has strong potential for broader Euro-Mediterranean application and could be incorporated into territorial climate strategies, youth participation programmes, and cultural policy.

## *6.2 A Framework for Future Policy Design*

The collective outcomes of the pilots could represent a prototype for sensory-based behavioural policymaking. The NUDGES approach would appear to integrate cultural and cognitive dimensions into sustainability strategies, offering policymakers potential tools for experiential, human-centred programme design. Such a framework might support the creation of education, cultural, and local governance initiatives that move beyond information transfer toward emotional engagement and participatory action. If further validated, this model could contribute to the development of innovative, evidence-based policies that use sensory and cultural experience to foster deeper, more durable environmental change. Ultimately, the Proof of Concept would seem to indicate that when culture meets behavioural science, sustainability could become not only more achievable, but more profoundly human.



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