sustainability

MDPI

Article

From Denial to Acceptance—Leveraging the Five Stages of Grief to Unlock Climate Action

Ivo Baselt [1,*], Sabine Erber [2], Laurence Monnet [3], Frédéric Berger [4], Fabio Carnelli [5], Lydia Pedoth [5], Andrea Moro [6], Elena Bazzan [6] and Rogelio Bonilla [3]

1 Research Group Alpine Streams and Natural Hazards, University of the Bundeswehr Munich, Werner-Heisenberg Weg 39, 85577 Neubiberg, Germany
2 Energy Institute Vorarlberg, Stadtstrasse 33, Campus V, 6850 Dornbirn, Austria; sabine.erber@energieinstitut.at
3 Auvergne-Rhône-Alpes Énergie Environnement, Le Stratège-Péri, 18 Rue Gabriel Péri, 69100 Villeurbanne, France; laurence.monnet@auvergnerhonealpes-ee.fr (L.M.); rogelio.bonilla@auvergnerhonealpes-ee.fr (R.B.)
4 French National Institute for Agriculture, Food, and Environment (INRAE), Rue de la Papeterie–BP76 2, 38402 St-Martin-d'Hères, France; frederic.berger.2@inrae.fr
5 EURAC Research, Center for Climate Change and Transformation, Viale Druso 1, 39100 Bolzano, Italy; fabio.carnelli@eurac.edu (F.C.); lydia.pedoth@eurac.edu (L.P.)
6 iiSBE Italia, International Initiative for a Sustainable Built Environment, Energy Center, Via Borsellino 38/16, 10138 Torino, Italy; andrea.moro@iisbeitalia.org (A.M.); elena.bazzan@iisbeitalia.org (E.B.)
* Correspondence: ivo.baselt@unibw.de; Tel.: +49-(0)-89-6004-3844

Abstract

Climate change is not only a technical and environmental challenge but also an emotional and psychological one that affects public engagement, policy acceptance, and long-term sustainability. This study presents a conceptual framework based on the Kübler-Ross model from psychotherapy to explore emotional responses to climate change: denial, anger, bargaining, depression, and acceptance. Based on a thematic analysis of the interdisciplinary secondary literature and illustrative cases, we analyse how these emotional dynamics influence climate mitigation and adaptation efforts. Each stage reveals specific psychological barriers and entry points for communication, resilience-building, and policy design. We argue that emotional readiness is a critical yet underacknowledged factor in sustainable development and societal transformation. Addressing emotional dimensions can support mental health, increase acceptance of climate measures, and improve the alignment between sustainability strategies and public responses. Our findings emphasise the importance of tailoring sustainability communication and policies to different emotional stages to foster inclusive, effective, and lasting climate action.

Keywords: climate grief; emotional responses; climate change communication; Kübler-Ross model; adaptation; sustainability engagement; climate psychology; thematic analysis; eco-anxiety; public acceptance

check for updates

Received: 7 August 2025
Revised: 23 September 2025
Accepted: 7 October 2025
Published: 8 October 2025

Citation: Baselt, I.; Erber, S.; Monnet, L.; Berger, F.; Carnelli, F.; Pedoth, L.; Moro, A.; Bazzan, E.; Bonilla, R. From Denial to Acceptance—Leveraging the Five Stages of Grief to Unlock Climate Action. *Sustainability* **2025**, *17*, 8929. https://doi.org/10.3390/su17198929

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

Climate change, long perceived as psychologically distant, is now recognised as one of the most pressing global challenges with profound social and psychological implications as acute impacts intensify worldwide [1–3]. Shifting climate and weather patterns are forcing ecosystems to adapt, migrate, or collapse, disrupting biodiversity and weakening the resilience of natural and human systems [4–6]. Beyond its physical impacts, climate change profoundly affects psychological well-being [7,8]. It disrupts key determinants

of mental health such as environmental stability, social cohesion and economic security, and disproportionately affects already disadvantaged groups [9]. The omnipresence of climate impacts, amplified by media coverage, confronts individuals with a constant stream of complex challenges and a perceived pressure to act. Many people experience psychological strain as they face the responsibility to address these global issues, manifesting as eco-anxiety, worry, and grief [10–15]. These emotional responses shape public engagement and policymaking, as shown by studies on psychological barriers and socio-cultural influences [16–18]. Even scientists reckon with the emotional toll of the climate crisis, which can hinder the communication of research or, conversely, strengthen scientific curiosity [19,20]. Yet an important gap remains in translating insights about psychological barriers and socio-cultural influences into a more nuanced understanding of emotional dynamics and in applying this knowledge to enhance communication and foster societal engagement in policymaking.

In recent decades, climate change has been approached mainly through a natural science lens. Yet despite extensive empirical evidence, scientific knowledge alone has not triggered widespread local action [21–23]. Complex data can even foster avoidance, denial or inaction. This underscores the need to better integrate social science perspectives, especially psychological insights, since human behaviour is shaped by emotions and lived experience. Emotional awareness supports resilience and fosters sustainable behaviour. Bridging psychological distance by linking global to local realities is crucial for effective communication [24]. Addressing emotions constructively can turn helplessness into agency [10,11] and strengthen both risk perception and environmental connectedness [25,26].

Although research on the emotional and psychological dimensions of climate change is expanding, significant gaps remain. Emotions are often studied in isolation, neglecting their dynamic and evolving nature across different contexts. This limits understanding of how emotions influence engagement and action. Furthermore, emotional responses shaped by ethical, cultural, and socio-economic contexts are underexplored, creating geographical and cultural biases. Current studies also insufficiently address the interplay between individual emotions and collective dynamics, restricting insights into how to foster resilience and collaboration. While some work considers mental health interventions and community coping strategies [27,28], their systematic integration into climate communication and policy remains limited. Bridging these gaps requires a holistic, process-oriented framework.

Within this work, we apply the five stages of grief model [29] to understand emotional responses to climate change and their impact on societal and individual action. Originally developed in a psychotherapeutic context by Elisabeth Kübler-Ross [29,30], the five progressive stages—denial, anger, bargaining, depression, and acceptance—describe how individuals process terminal illness. These stages are dynamic and often intertwined. The idea that public responses to climate change can reflect the Kübler-Ross stages [29] was first suggested by Running (2007) [31], who observed parallels between grief and emotional reactions in environmental discourse. Building on this conceptual link, our study develops a more systematic and theory-informed framework that integrates psychological literature, climate narratives, and applied strategies to identify patterns of collective and individual emotional engagement. We propose that the Kübler-Ross framework can meaningfully capture emotional trajectories triggered by climate change. In this context, grief reflects not personal mortality but the distress of a planet in crisis, compelling humanity to confront its responsibility and act. Recognising that individuals move through emotional phases highlights a critical research and policy gap, as emotional readiness strongly shapes engagement with climate action. If responses to climate change resemble the five stages of grief, the Kübler-Ross model offers a framework for understanding these reactions and a foundation of therapeutic approaches. By adapting these strategies to the climate context,

communicators and policymakers can address psychological resistance, facilitate engagement, and encourage action. This approach helps foster a more resilient and proactive society in the face of the climate crisis.

This paper is structured as follows: After outlining the conceptual and methodological foundations, the core section analyses emotional responses to climate change through the lens of the five stages of grief. Each stage (denial, anger, bargaining, depression and acceptance) is discussed with reference to psychological theory and examples from climate discourse and literature and linked to strategies for overcoming emotional barriers. The final section synthesises key findings and explores implications for communication, policy and future research.

2. Materials and Methods: Comparative Analysis of the Five Stages of Grief in Response to Climate Change

The five stages of grief (denial, anger, bargaining, depression and acceptance) serve as a conceptual framework for analysing emotional responses to climate change. Originally developed by Kübler-Ross [29] to describe how individuals cope with terminal illness and loss, the model is here adapted to examine psychological dynamics at individual, community and societal levels. This grief framework offers a process-oriented perspective to understand emotional barriers and entry points that shape engagement with climate action. Building on Running's initial analogy [31], this study develops a more structured analytical framework. Whereas Running (2007) [31] introduced the grief model as a communicative tool based on personal observation, our approach systematically operationalises the five stages through thematic analysis [32], drawing on interdisciplinary literature and climate narratives to derive stage-specific emotional patterns and strategies for engagement. The Kübler-Ross model provided a deductive analytical structure, within which we identified and organised emotional themes. The analysis followed Braun and Clarke's six-phase process [32], including data familiarisation, initial coding, theme development, review, definition and reporting. While the overarching structure was theory-driven, the interpretation of emotional dynamics and illustrative examples drew on inductive insights from practice, literature and discourse, allowing for context-sensitive variation. Although no original empirical data were collected for this study, the analysis was based on a systematic interpretation of diverse secondary sources, including academic literature, grey literature, media discourse, documentation from the Interreg Alpine Space project ADAPTNOW, and public communications from climate activists and political actors.

Material was selected based on its relevance to collective emotional responses to climate change and was reviewed iteratively. The selection of literature was guided by the initial conceptual link between climate grief and the Kübler-Ross model introduced by Running (2007) [31], which served as a thematic starting point. Building on this foundational perspective, we conducted a targeted literature and discourse review with a primary focus on publications from 2020 onwards, reflecting the growing academic and societal attention to climate-related emotions in recent years. The material analysed included peer-reviewed literature, grey literature (e.g., NGO and policy reports), and public climate discourse (activist statements, media coverage, and policy communications). Sources were selected for their relevance to emotional responses to climate change, particularly as they relate to denial, anger, bargaining, depression, or acceptance, while excluding purely technical material without emotional framing. The search process was conducted iteratively using databases such as Scopus, Web of Science, and Google Scholar. Keywords included combinations of "climate grief", "eco-anxiety", "climate denial", "anger", "bargaining", "depression", "acceptance", "emotional responses", and "Kübler-Ross". Identified material was screened for relevance to emotional responses to climate change and grouped into the

five grief stages. Within each stage, excerpts were coded semantically to identify recurring emotional patterns, framings, justifications, and expressions. In cases where excerpts overlapped multiple stages, assignment was based on the most dominant emotional tone or discursive framing. Codes were clustered into thematic subcategories (e.g., "climate delay" within denial; "green consumerism" within bargaining). The coding followed a deductive logic based on the Kübler-Ross model, refined inductively through thematic clustering. Braun and Clarke's six-phase model of thematic analysis [32] provided the analytic scaffolding. While no original data were collected, the approach enabled a structured synthesis of diverse discourse material. Coding was conducted by the lead author and reviewed iteratively by the co-author group to ensure thematic coherence and reflexivity.

The conceptual framework developed here offers a bridge between psychological theory and climate discourse and aims to inform the design of emotionally responsive communication and policy strategies. To contextualise this approach, we build on prior work that applied the grief model beyond its original therapeutic setting. For instance, Friedrich and Wüstenhagen (2017) used the five-stage model to analyse emotional responses among energy sector leaders during Germany's nuclear phase-out [33]. In contrast, the present application focuses on the broader public and aims to identify patterns of collective emotional engagement with climate change. To situate our analysis within a wider psychological landscape, we also reviewed related frameworks addressing emotional and behavioural responses to disruption and loss, such as the Dual Process Model [34], the Transtheoretical Model of Behaviour Change [35], the Transactional Stress Model [36], the Risk Perception Theory [37], the Protection Motivation Theory [38], the Post-Traumatic Growth Inventory [39] and Kotter's 8-Step Change Model [40]. These models were not applied in this study but informed the design and interpretation of the grief-based framework.

The grief model was further operationalised through the visual representation in Figure 1, which maps the five stages onto an emotional trajectory defined by two axes: energy/motivation to act and satisfaction. Here, satisfaction is understood as emotional alignment, that is, the degree to which individuals experience internal coherence, clarity, and stability in the face of climate change. This trajectory is divided into the following four quadrants:

- the Phase of Conflicted Resistance (high energy, low satisfaction);
- the Phase of Emotional Exhaustion (low energy, low satisfaction);
- the Phase of Revitalised Reflection (low energy, increasing satisfaction);
- the Phase of Positive Engagement (high energy, high satisfaction).

The curve illustrates how individuals might move through these emotional stages. It identifies critical risks, such as the potential for a permanent crisis if progression stalls, and emphasises the goal of reaching acceptance and adaptation. While the original Kübler-Ross model places bargaining before depression, in the context of climate change, bargaining can also re-emerge in the form of constructive negotiation and reorientation after depressive states. To reflect this dynamic more accurately, two forms of bargaining are shown in the diagram: "pessimistic bargaining" in the phase of emotional exhaustion and "optimistic bargaining" as part of revitalised reflection and the transition towards engagement. This conceptual distinction acknowledges both defensive and transformative expressions of bargaining in climate-related emotional trajectories.

To ground the framework in real-world contexts, we drew illustrative input from the ADAPTNOW project, which since 2022 has supported climate adaptation and risk governance in Alpine regions. The project includes actors from five countries and addresses both structural and emotional dimensions of climate-related challenges. Although no formal data collection or evaluation was conducted, informal reflections and documented outputs from pilot activities were reviewed for relevance to the grief framework. Selected

successful examples were thematically aligned with specific emotional stages and are used in this paper to illustrate patterns or transitions observed in practice. These cases serve as illustrative vignettes rather than empirical validation and are referenced accordingly in the strategy sections. Finally, to complement these perspectives, we conducted a selective literature and discourse review on eco-anxiety, climate grief, public resistance to climate policy, and emotional dynamics in climate communication. Public narratives around activist movements (e.g., Letzte Generation, Extinction Rebellion, Fridays for Future) and policy processes (e.g., the Paris Agreement) were examined to identify recurring emotional patterns and enrich the analytical interpretation.

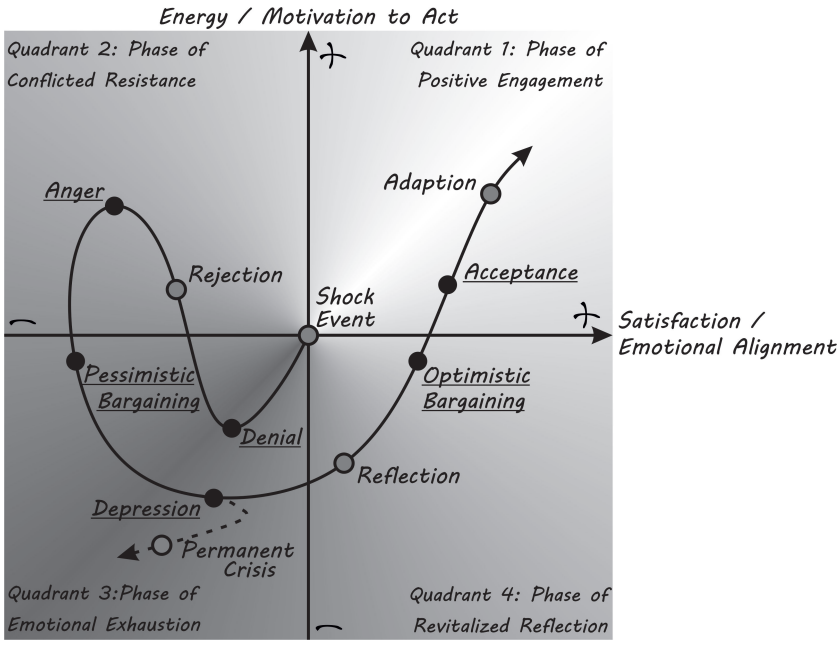

Figure 1. Visualising the phases of grief in energy and satisfaction dynamics: This diagram illustrates the emotional and motivational progression through the phases of grief following a significant shock event. The vertical axis represents the level of energy or motivation to act; the horizontal axis reflects emotional alignment or satisfaction, i.e., the extent to which individuals experience internal coherence and emotional stability in the face of climate change. The stages of grief are depicted as black points along the trajectory, with intermediate phases represented by grey points in between. Reprinted/adapted with permission from [41]. 2021, Jikybebna.

3. Results—Strategies for Overcoming the Stages of Grief in the Context of Climate Change

This section applies the Kübler-Ross model to analyse emotional responses to climate change as a dynamic process. Each of the five grief stages is examined in a dedicated subsection, structured into three parts. First, we introduce the psychological foundations of the respective stage, based on its original therapeutic context and function within the grief process. Second, we explore how this emotional stage manifests in the context of climate change, drawing on interdisciplinary research, media narratives, and real-world examples. Third, we outline practical strategies to address and overcome the specific emotional barriers associated with each stage, with a focus on enabling climate engagement, supporting emotional resilience, and informing policy and communication approaches.

3.1. Denial

3.1.1. Psychological Foundations

Denial is usually the first stage of grief, characterised by a refusal to accept the reality of the situation, leading individuals to experience shock, numbness, and disbelief. Affected

patients may minimise or ignore the impact of the loss, clinging to a false, preferable reality as a psychological defence mechanism against an uncomfortable truth. This stage often involves isolation, as individuals may avoid others who have accepted what is happening. Kübler-Ross [29] notes that technological advancements have instilled fear of violent, painful deaths, prompting individuals to deny the reality of their own inevitable demise. In her treatment of terminally ill patients, Kübler-Ross emphasised that denial is a necessary step, allowing individuals time to navigate their feelings and providing individuals a buffer against the intense emotions that follow a loss and offering a sense of safety and control in the face of overwhelming emotions. She advocated respecting and validating this state rather than hastening individuals to confront their grief. Creating a safe environment where patients can express their emotions at their own pace is essential; while denial may be a temporary phase, confronting reality is ultimately necessary for healing and adaptation.

3.1.2. Climate-Related Expressions and Societal Manifestations

In the context of climate change, denial refers to the refusal to accept the scientific consensus that human activities are contributing to global warming and climate change. It can also refer to the refusal to acknowledge the severity of the problem and the urgent need for action to mitigate its impacts. Denial can take many forms, ranging from outright rejection of the evidence to downplaying its significance or framing it as a natural occurrence that is beyond human control. According to various studies that mention it directly or indirectly [10–12,33,42], denial can take different forms and levels, which are grouped in the following:

- **Scientific denial** is the refusal to accept scientific evidence and proven data of climate change. Individuals may dispute the validity of climate change research or believe that natural climate cycles, not human activities, are responsible for the observed rapid changes in the climate. For example, in the 1960s and 1970s, scientists like Charles David Keeling systematically measured rising atmospheric CO_2 concentrations, providing early empirical support for the greenhouse effect [43]. However, these findings received limited political and public attention at the time, partly because short-term cooling trends and scientific uncertainties led to widespread hesitation and undermined early recognition of the data's significance [44]. As shown in Lewandowsky et al. (2015) [45], such denial can even influence the scientific community itself, leading to an overemphasis on uncertainty and a shift in language that aligns with contrarian narratives.
- **Personal denial** is the belief that climate change will not affect oneself or one's community. Individuals may believe that they are immune to the effects of climate change, such as extreme weather events, rising sea levels, or food and water scarcity.
- **Cultural denial** is the belief that climate change is not a significant issue or that it is not a priority compared to other societal concerns. Individuals may believe that economic growth, national security, or other issues are more important than addressing climate change.
- **Temporal denial** is the belief that climate change is a problem for the future and not the present. Individuals may believe that the impacts of climate change will not affect them in their lifetime or that future technologies will solve the problem.
- **Political denial** is the failure of governments to acknowledge or act on climate change. Governments may be influenced by powerful lobbyists, short-term political goals, or public opinion that denies the existence or severity of climate change. For example, after the discovery of the ozone hole by British Antarctic Survey researchers in 1985 [46], the scientific link between chlorofluorocarbons (CFCs) and stratospheric ozone depletion gained new urgency. Nevertheless, leading chemical manufacturers such as DuPont initially questioned the strength of the evidence, referring to it as

speculative and based on uncertain models [47]. Company representatives warned that a premature ban on CFCs could impose substantial economic risks without conclusive proof of environmental harm. Political actors and industry lobby groups echoed this scepticism, often downplaying the issue and calling for further study before regulatory measures were adopted [44,48]. Ultimately, these objections were overcome, and the 1987 Montreal Protocol phased out several industrial chemicals, including CFCs. Several fossil fuel companies, most notably ExxonMobil and the American Petroleum Institute, actively funded campaigns from the 1980s onwards that cast doubt on climate science. These campaigns sought to undermine public trust in climate models and emphasised economic harms of regulatory measures, despite internal knowledge of the risks associated with greenhouse gas emissions [49–51]. Furthermore, when the Kyoto Protocol was introduced in 1997 to limit greenhouse gas emissions, several governments and industry representatives opposed binding commitments, arguing that such measures would harm economic competitiveness and disproportionately affect developed nations. In the United States, the Senate pre-emptively rejected any treaty excluding developing countries, and the administration later withdrew from the protocol entirely [44,48]. In the early 2000s, certain political leaders and media figures continued to challenge the scientific consensus on anthropogenic climate change, framing it instead as a natural or cyclical phenomenon and downplaying the urgency of action [44,51].

A softer form of climate change denial, often termed climate delay, acknowledges that climate change is real but justifies inaction or minimal, insufficient efforts. Unlike traditional climate denial, which disputes the science behind climate change or denies human causation, climate delay accepts the problem's existence while undermining solutions or suggesting inadequate ones. This tactic, sometimes called "discourses of climate delay," subtly opposes or waters down ambitious climate policy through arguments that appear reasonable but lead to procrastination, minimal responses, or diversion. Lamb et al. (2020) examines how various arguments serve to delay climate action by accepting the reality of climate change while promoting insufficient responses [52]. The authors categorise climate delay arguments into the following four main types:

1. Redirecting responsibility shifts accountability away from systemic change by emphasising individual responsibility (e.g., carbon footprints) or by using "whataboutism" to argue that someone else, other countries or sectors should take action first.
2. "Promoting non-transformative solutions" refers to arguments suggesting that disruptive change is unnecessary. Instead, they favour minimal or incremental approaches, such as technological optimism, which assumes that future innovations will resolve climate issues without significant policy shifts, or "fossil fuel solutionism," where fossil fuel companies portray themselves as part of the solution to climate change.
3. Emphasising the downsides focuses on the social and economic costs of climate policies, suggesting they may be more harmful than climate impacts themselves. Examples include arguments that climate policies threaten jobs or well-being, which may appeal to marginalised communities. This category also includes "policy perfectionism," which argues for limited actions out of fear that ambitious policies could harm public support.
4. Surrendering to climate change conveys doubt about the feasibility of climate mitigation. It includes "doomism", the belief that catastrophic climate change is inevitable, mitigation efforts are pointless, and change is impossible, which portrays socio-economic reorientation as unrealistic. These views can foster resignation and hinder collective action.

Lamb et al. (2020) suggest that the four named discourses are often mixed and presented in good faith, but they tend to mislead the public, erode support for robust

climate policies, and slow climate action [52]. The authors argue that identifying these delay discourses is essential for climate scientists, advocates, and policymakers to counteract them and promote more honest, effective communication about the climate crisis.

In line with Kübler-Ross's observation that technological advancements have heightened fears of violent and painful deaths, leading individuals to deny the reality of their own mortality, climate change denial can similarly arise from the unsettling recognition that, despite humanity's remarkable technological achievements, we remain unable to fully control the forces of nature. The denial may also stem from the realisation that humanity's actions increasingly override planetary boundaries [53–55], pushing ecosystems beyond their limits and destabilising the delicate balance required for sustaining life on earth. This realisation challenges the illusion of mastery and exacerbates the psychological discomfort of confronting a crisis as vast and uncontrollable as climate change. Denial can thus be understood as a psychological defence against the overwhelming complexity of the climate crisis, where anxiety may trigger avoidance or minimisation [13]. Yet such mechanisms can significantly hinder mitigation and adaptation, as illustrated by delayed individual and policy responses [56]. Denial at individual, community, and political levels often results in delayed or insufficient action, thereby exacerbating future climate risks. Political leaders who downplay the crisis may hinder essential regulations, while individuals and communities may postpone sustainable choices such as switching to renewable energy, adopting ecological farming practices, or investing in public infrastructure for climate adaptation. Such inaction perpetuates environmentally harmful behaviours and weakens collective resilience. Denial also contributes to a lack of awareness about the broader health, social, and environmental consequences of climate change, ultimately limiting public mobilisation for urgent climate action.

3.1.3. Strategy: Education Drowns Denial

Overcoming climate denial requires addressing psychological barriers through acknowledgement, education and community engagement. Kübler-Ross emphasised the importance of validating emotions such as fear, sadness and anxiety [29]. Recognising these feelings reduces isolation, fosters openness and helps individuals face rather than suppress their emotions. Safe spaces, through workshops, forums or public campaigns, allow people to voice concerns, understand impacts and explore solutions. Community leaders and educators can organise school-based or community-based climate discussion circles or neighbourhood climate cafés to provide low-threshold spaces for dialogue and emotional expression. Communication is central to countering denial. Clear, accessible information about climate science, its consequences and the urgency of action is essential. Educational programmes, social media and local outreach can dispel misinformation and foster shared awareness. Policymakers should consider integrating climate literacy modules into formal education curricula and support community-based education initiatives through funding or partnerships with local NGOs. However, knowledge alone may not shift behaviour; environmental consciousness and trust in institutions more strongly influence risk perception [57]. Localising the issue through concrete examples, such as extreme weather events or natural hazards, deepens understanding and emotional connection. One promising tool is the use of local hazard zone maps, which enhance risk perception and awareness. Recent evidence from South Tyrol shows they also increase residents' willingness to engage in protective action and risk communication [58]. To enhance their effect, visual risk maps should be complemented with tailored communication formats such as guided map-based workshops, school projects, or public exhibitions that help translate technical content into accessible local narratives. While denial may offer temporary relief, enabling individuals to act through behavioural change, advocacy or local engagement

fosters agency. Gradually introducing more challenging information helps people adjust to reality without becoming overwhelmed. Collaboration across government, industry and civil society reinforces this process, especially in communities where climate impacts are already visible. Regional authorities could establish cross-sector climate task forces that include representatives from education, health, emergency services and civil society to coordinate local awareness campaigns and behavioural change incentives. Framing climate change as an opportunity, for instance through job creation or economic innovation, can shift perception. Actionable solutions turn denial into hope, resilience and engagement.

3.2. Anger

3.2.1. Psychological Foundations

The second stage of grief, anger, is marked by powerful emotions of frustration, resentment, hostility, irritability and blame. Psychologically, it is a natural and intense response often triggered by perceived threats, frustrations, or feelings of injustice [59]. Individuals may direct their anger toward themselves, others, or even the situation itself, grappling with feelings of helplessness or unfairness. This anger can manifest both outwardly, as visible hostility or irritability, and inwardly, where it may simmer as self-blame or guilt. Although anger can be a difficult emotion to manage, it can also serve as a motivator, inspiring individuals to demand change or seek justice [60]. However, if not managed constructively, it can deepen polarisation and foster hostility toward those who hold different views or fail to act in alignment with one's beliefs. Elisabeth Kübler-Ross emphasised that anger is a valid and important emotion in the grieving process, encouraging individuals to acknowledge their anger rather than suppress it [29]. She believed in the importance of expressing anger healthily, which could include talking about feelings with trusted friends or family members or engaging in creative outlets like writing or art. Kübler-Ross suggested that anger often stems from feelings of helplessness and fear, and understanding its root can help individuals process their feelings more effectively.

3.2.2. Climate-Related Expressions and Societal Manifestations

People express their anger in response to climate change in a variety of ways, and the intensity of these reactions can differ significantly based on individual perspectives and experiences. Anger regarding climate change often manifests in frustration directed at governments, companies and institutions for their inadequate response to this pressing issue. This dissatisfaction stems not only from the failure of these entities to implement effective measures to mitigate climate change but also from a perceived apathy or lack of understanding among the public [61,62]. Movements like Greenpeace, Extinction Rebellion, Letzte Generation, and Fridays for Future express a profound sense of anger over the inaction they perceive from authorities. These groups have mobilised large-scale protests globally, employing tactics such as civil disobedience and disruptive actions to underscore the urgent need for climate action. Their demonstrations are not only a call for change but also a visceral expression of public discontent and frustration with the status quo. Social media platforms have become essential for articulating this anger, providing a space for individuals to voice their concerns about political and economic inaction on climate issues. Hashtags like #VoteForClimate, #ClimateStrike, and #FossilFree facilitate online campaigns and the dissemination of information about climate-related matters, amplifying the call for action. Many individuals have responded by becoming politically active, striving to elect representatives who prioritise climate action and holding those in power accountable for their decisions regarding environmental policies. This grassroots activism has also contributed to the emergence of ecological parties, such as Die Grünen, Europe Écologie Les Verts, and Verde. These parties originated as social movements in the 1970s, protesting

against environmental degradation, nuclear energy, and the arms race, and they continue to advocate for environmental protection and climate justice today.

In addition to anger stemming from the lack of action on climate change, societal frustration can also arise in response to decisions made in favour of climate initiatives. This anger often manifests when individuals perceive that policymakers have enacted measures significantly affecting their lives. For instance, government-imposed climate mitigation strategies, such as speed limits or the shutdown of power plants, are frequently viewed as encroachments on personal freedoms, economic stability, or increasing costs of living. Numerous examples illustrate how this discontent can lead to substantial protests, particularly among communities and sectors directly impacted by these policies. The Yellow Vest protests in France, which began in 2018, were sparked by a proposed tax designed to reduce carbon emissions and quickly evolved into a broader expression of social and economic discontent [63]. This movement underscored widespread frustration over climate policies perceived as disproportionately burdening lower-income individuals, especially those dependent on car travel for their livelihoods. Similarly, coal worker protests in Germany and Poland in 2020 and 2021 arose in response to national commitments to phase out coal. Workers and unions in coal-dependent regions expressed their anger over job losses and economic decline, fearing that the transition to renewable energy would happen without sufficient protections or compensation for those affected [64,65]. In Germany in 2023 and 2024, protests erupted against the government's proposed heating law (Gebäudeenergiegesetz), which critics framed as socially unfair and economically burdensome, particularly for lower- and middle-income homeowners. The legislation's requirement to install renewable heating systems was perceived as a costly imposition, sparking widespread resistance. Empirical analysis shows that right-wing populist actors effectively mobilised this discontent by amplifying affordability concerns and fuelling mistrust in state-led climate policy [66]. Opposition to renewable energy projects has also been significant, with regional protests increasingly resembling organised social movements [67–70]. Across various contexts, communities' and citizens' referendums have resisted local wind farms [71,72], solar installations [73,74], high-voltage power lines [67,75], and biofuel production sites [76–78]. Commonly cited concerns include environmental degradation, health risks, and economic disadvantages. Critics often argue that such projects disrupt local landscapes, depress property values, or deliver few tangible benefits to affected communities. In the Netherlands, farmers staged protests in 2019 against regulations designed to reduce nitrogen emissions, arguing that stricter regulations on livestock and fertiliser use disproportionately affect their livelihoods. They express anger over policies perceived as lacking viable alternatives for sustainable farming [79,80]. These examples highlight how opposition to climate policies often emerges, particularly when combined with emotional responses like anger, due to perceptions of economic or social inequities. Measures that are viewed as disproportionately affecting certain groups or imposing unfair burdens can intensify feelings of frustration and resentment, further fuelling resistance to necessary climate actions. The anger processes in society against climate actions emphasise the need for climate strategies that consider fairness, local needs, and economic impacts to foster broader support for necessary environmental initiatives.

While anger can serve as a powerful catalyst for action [81], it is essential to recognise that it can have both positive and negative effects on efforts to combat climate change. On one hand, anger can galvanise individuals and communities to demand change from those in power. It can inspire people to take personal actions, such as reducing their carbon footprints, supporting sustainable businesses, or advocating for climate initiatives within their communities. These individual efforts can accumulate, contributing to larger-scale change over time. Throughout history, anger has fuelled many successful social movements,

effectively drawing attention to urgent issues like climate change. However, this same anger can also foster division and polarisation, complicating efforts to find common ground and collaborate on solutions. When emotions run high, individuals may become less receptive to opposing viewpoints and less willing to engage in constructive dialogue, making it challenging to build consensus around effective strategies for addressing climate change. Moreover, while anger can drive momentum, prolonged feelings of frustration can lead to burnout and a sense of hopelessness, which can ultimately undermine climate action. Therefore, it is crucial to strike a balance between acknowledging the urgency of the climate crisis and fostering a sense of hope and optimism about the potential for meaningful change. Emphasising constructive engagement and collective action can help harness the motivating power of anger while mitigating its divisive effects.

3.2.3. Strategy: Dialogue Alleviates Anger

Elisabeth Kübler-Ross emphasised the need to address anger constructively, recommending open conversations and safe spaces where individuals can express feelings without judgement, fostering a supportive environment [29]. In the context of climate change, strategies that encourage dialogue, promote collaboration and support meaningful change are essential. For instance, in the ADAPTNOW pilot project, the Regional LAG Management Association in Val Pusteria encouraged all municipalities in the valley to jointly develop Sustainable Energy and Climate Action Plans. A shared timeline and common goals reduced the burden of acting in isolation and improved resource efficiency. Policymakers and regional coordinators can replicate this approach by facilitating inter-municipal cooperation frameworks that pool resources and build trust across administrative boundaries. Anger can be a powerful motivator if channelled effectively. Recognising public frustration over climate inaction enables policymakers to address root causes and build strategies grounded in understanding, collaboration and optimism. Highlighting successful initiatives, such as renewable energy projects or sustainable businesses, can inspire collective engagement. Forums, discussion groups and online platforms help people express frustration and develop mutual support. Educators and civil society actors can initiate moderated peer dialogue formats, such as youth climate forums, citizen panels or school-based reflection workshops, to provide structured outlets for emotional expression and solution-oriented debate.

However, while acknowledging anger is important, societies must clearly reject destructive behaviours, such as violence or criminal acts in the name of climate action. Establishing such boundaries is essential to preserve trust and promote constructive dialogue. Grounding discussions in scientific evidence ensures clarity and prevents misinformation. Training community leaders in active listening further reinforces social cohesion and emotional processing. Local administrations and NGOs can offer short training modules in conflict-sensitive communication for mayors, teachers and association leaders to help de-escalate tensions and redirect anger productively. Channelling anger into participation, through local initiatives, activism or volunteering, transforms frustration into meaningful contributions and reinforces agency. Collaborative responses strengthen social bonds and reduce isolation. Celebrating even small successes sustains motivation and hope. By redirecting anger into constructive engagement, communities can build resilience and a united, proactive response to the climate crisis. Municipalities and schools can create low-threshold platforms, such as local climate awards, storytelling nights or poster exhibitions, where community-led initiatives are publicly acknowledged. AI-based image generators such as Midjourney can also be used to translate emotional prompts into visual artworks that express climate-related anger, frustration or fear. These images can form the basis for community exhibitions in public spaces, such as town halls or libraries, and spark inclusive

dialogue around shared concerns and visions. Two examples generated with Midjourney are presented in Figure 2, illustrating anger and frustration. Equivalent visualisations can be created for other emotions and concerns to support participatory reflection and dialogue.

(**a**) (**b**)

Figure 2. Two examples generated with the AI-based image generator Midjourney, illustrating (**a**) anger and (**b**) frustration related to climate change. Equivalent visualisations can be created for other emotions and concerns to support participatory reflection and dialogue. The associated text prompts used for image generation are: (**a**) Hyperrealistic scene of a male coal worker in his 50s, standing in front of a decommissioned power plant with protest banners in the background, fists clenched, face marked by frustration and anger over climate policies threatening his livelihood, overcast sky, industrial landscape, cinematic lighting, 8k detail, photorealism–ar 1:1–v 5.2; (**b**) Hyperrealistic portrait of a young girl looking frustrated and emotionally affected, standing in a dramatic Alpine landscape affected by climate change, with melting glaciers, dried vegetation, and altered ecosystems in the background, soft natural lighting, cinematic atmosphere, 8k detail, shallow depth of field–v 5.2–ar 1:1.

3.3. Bargaining

3.3.1. Psychological Foundations

The third stage of grief, bargaining, is characterised by attempts to negotiate or regain control over a challenging situation. Kübler-Ross describes this stage as involving the hope that the individual can avoid the cause of grief by negotiating or seeking compromise [29]. For example, the terminally ill person may "negotiate with God" for more time to do specific important things or promise to adopt a reformed lifestyle in exchange for extended life. In less severe circumstances, bargaining can take the form of seeking partial solutions or compromises to mitigate the perceived loss. While bargaining can provide a temporary sense of relief or progress, it often delays more transformative changes, as compromises may prioritise immediate convenience over long-term solutions.

3.3.2. Climate-Related Expressions and Societal Manifestations

In the context of climate change, bargaining manifests as efforts by individuals, communities, corporations, and governments to reconcile environmental responsibilities with practical, economic, or social considerations [82]. This process is often preceded by a state of emotional blockage or overwhelm, in which individuals experience a growing awareness of the climate crisis but feel unable to act coherently. Hamilton (2022) describes this as a disconnection between the emotional and cognitive-behavioural dimensions of engagement, where individuals may "want to do something" but cannot yet face the full

emotional weight of the problem [83]. In this state of tension and uncertainty, bargaining becomes a strategy to reduce discomfort by seeking manageable, partial solutions. While these negotiated positions can inhibit systemic change, they also mark a turning point: through the development of emotional reflexivity and the collective processing of grief, bargaining can evolve into a form of transformative agency. Participants in Hamilton's study described this shift as turning toward painful emotions, ultimately enabling deeper alignment between values and actions.

At an individual level, people may adopt low-impact actions such as recycling, reducing plastic use, or purchasing eco-labelled products. These actions, while valuable, often serve as substitutes for addressing higher-impact behaviours [82], such as reducing car or air travel or significantly cutting energy consumption. Similarly, communities might support renewable energy initiatives, such as local solar or wind projects, but resist more disruptive changes like banning fossil fuel-based heating or adopting strict land-use policies. For example, "green consumerism" reflects a form of bargaining in which individuals attempt to reconcile sustainability ideals with the desire for convenience or social status. Rather than adopting more transformative behavioural changes, consumers often turn to more accessible and visible actions. Purchasing electric vehicles, using biodegradable packaging, or buying eco-labelled products allows individuals to feel aligned with climate goals while maintaining familiar routines. This behaviour exemplifies the value–action gap, where environmental attitudes do not always translate into impactful lifestyle shifts due to factors like habit, affordability, or social norms [84–86]. This form of symbolic or low-threshold action exemplifies what we refer to in Figure 1 as Pessimistic Bargaining, an emotionally ambivalent phase where perceived limitations lead to partial or performative responses. These can serve as coping mechanisms but often delay deeper engagement or systemic change.

In the corporate sector, bargaining often takes the form of climate strategies that prioritise flexibility over transformation. A key example is the widespread use of voluntary carbon offsetting, through which companies claim carbon neutrality by investing in tree planting, renewable energy, or conservation projects. While these initiatives may support climate goals, they frequently replace more effective internal measures, such as decarbonising operations or supply chains. This strategy has been identified as a form of institutional greenwashing, marked by a gap between symbolic climate claims and weak emission performance, often enabled by offset projects lacking additionality, transparency, or robust safeguards [87,88]. Empirical studies show that such approaches are commonly used to boost corporate image while preserving carbon-intensive business models [89,90], with selective disclosures masking material shortcomings and delaying systemic change. At the same time, many firms participate in regulated carbon trading schemes, such as the EU Emissions Trading System, which allow them to buy credits instead of cutting their own emissions. Though these markets can lower costs and support aggregate reductions, they also enable high-emitting companies to avoid structural transformation. Research shows that large-scale offsetting often redirects resources away from internal decarbonisation [89], while weak oversight and widespread overcrediting further undermine climate integrity [91]. These dynamics are especially visible in the Global South. In Kenya, for instance, offset projects backed by companies like Meta and Netflix have been criticised for reinforcing inequality rather than delivering real emission reductions. Investigations point to limited local participation, concentrated external benefits, and questionable long-term outcomes [92,93]. Such cases exemplify how climate responsibilities are outsourced through financial compensation, allowing actors to avoid deeper change. Without stricter safeguards and more inclusive governance, this form of bargaining risks

perpetuating environmental injustice. It reinforces the need for equity-oriented reforms in global climate policy to ensure a fairer distribution of responsibilities and benefits.

At the policy level, governments, particularly those in resource-dependent economies, frequently negotiate compromises that balance climate commitments with economic realities. For instance, oil-exporting nations might set gradual emissions reduction targets or make conditional commitments to phase out fossil fuels, delaying immediate, large-scale reforms. Similarly, agricultural sectors often lobby for flexibility in meeting climate regulations, such as allowing modified fertiliser use or maintaining limited livestock numbers to avoid drastic impacts on yields. A prominent case is Indonesia, where climate and development policies often intersect in the palm oil sector. While the government has pledged to reduce deforestation, it continues to support palm oil expansion as a core pillar of national economic growth, reflecting the tension between environmental goals and development priorities [94].

International climate negotiations, such as the UN Climate Change Conferences, epitomise the bargaining process on a global scale. High-emission, wealthy nations often propose financial tools such as the Green Climate Fund to support developing countries in adapting to climate impacts. At the same time, they advocate for slower emission reductions at home. Meanwhile, nations that are disproportionately affected by climate change, such as low-lying island states or those facing severe droughts, demand more ambitious commitments to ensure their survival. The resulting agreements often reflect a compromise between economic and environmental priorities, but these compromises may inadequately address the urgency and scale of the crisis. The Paris Agreement is a prime example of such a negotiated outcome. This international accord aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels, with the additional goal of pursuing efforts to limit the temperature increase to 1.5 degrees Celsius. While the agreement represents a landmark in collective climate action, it relies heavily on voluntary commitments, leaving room for uneven implementation and insufficient progress towards its stated goals.

Although negotiating agreements is often a slow and complex process, delaying the implementation of critical climate solutions, bargaining frameworks play a significant role in shaping global climate action. They offer a structured approach to fostering cooperation among diverse stakeholders, such as governments, businesses, and environmental organisations. By finding common ground, bargaining can enable the development of policies and programmes that align competing interests, promoting collective efforts to address climate change. Strategies and measures that reflect co-creation, longer-term visioning, or inclusive negotiation, such as participatory planning or integrated climate-development approaches, align more closely with what we conceptualise as Optimistic Bargaining (Figure 1). These instances suggest emotional readiness to move beyond ambivalence toward transformative climate action. Additionally, the compromises achieved through bargaining often stimulate innovation by encouraging investment in research and development of new technologies, such as renewable energy systems and carbon capture techniques. These advancements can drive progress in reducing emissions and adapting to climate impacts. Furthermore, successful negotiations can build trust among stakeholders, establishing the groundwork for long-term collaboration and ensuring that future climate initiatives have a strong foundation. Ultimately, bargaining reflects humanity's effort to reconcile immediate economic and social needs with the broader imperative to address the escalating climate crisis. While it provides a necessary pathway for cooperation, bargaining must evolve to address its inherent limitations. By moving beyond incremental compromises and embracing transformative solutions, societies can shift from negotiating minimal progress to achieving the systemic changes required for a sustainable and equitable future. Balancing

the strengths and weaknesses of bargaining is essential to advancing effective and inclusive climate action.

3.3.3. Strategy: Empathy Guides Bargaining

Climate change is a complex challenge that demands collaboration across society, involving both formal stakeholders and the wider public with diverse perspectives and priorities. Effective bargaining embraces this diversity, recognising its potential to generate robust solutions through constructive dialogue and shared goals. Progress must occur across levels, from grassroots initiatives to national policies and international agreements, by aligning economic, environmental and social priorities. According to Kübler-Ross, negotiations should be approached with openness and a willingness to compromise [29]. Climate discussions must acknowledge uncertainty, validate differing viewpoints, rely on procedural fairness, and reflect the complexity and global diversity of climate change impacts and responses [95,96]. Stakeholders should seek mutually beneficial outcomes by balancing short-term needs with long-term aims. At the local level, municipalities can promote cooperative planning processes, share resources across administrative boundaries and coordinate regionally to increase efficiency and impact. Policymakers can initiate inter-municipal climate platforms that coordinate climate adaptation goals and host joint scenario workshops to facilitate shared decision-making across regions. Trust in local climate governance grows through transparency, inclusive decision-making and meaningful public participation. Public consultation, especially through formats like participatory budgeting, climate assemblies, transition arenas and transition experiments, or digital platforms, can strengthen democratic values and enhance the legitimacy of collective choices, including among younger citizens [96–99]. Educators and youth organisations can actively involve students in these participatory processes through school-based simulations of climate assemblies or partnerships with municipal councils. Strengthening such social infrastructure encourages long-term engagement and shared ownership of solutions. Local administrations can support this by funding coordination offices, offering facilitation training for citizens, and embedding participation requirements in local climate strategies. Clear reporting systems and binding targets ensure accountability and sustained momentum. Bargaining is not merely about compromise. It must lead to equitable, durable outcomes. Transforming disagreement into cooperation demonstrates that collective solutions are possible even in complex situations. To be effective, bargaining must move beyond symbolic agreements and address systemic change, advancing fairness and resilience.

3.4. Depression

3.4.1. Psychological Foundations

Depression, the fourth stage of grief, often emerges as individuals and communities confront the overwhelming scale of the crisis and the perceived lack of progress in addressing it. Kübler-Ross observes that during this stage individuals despair at the recognition of their mortality or the permanence of their loss [29]. They may become silent, withdraw from social connections, refuse engagement, and spend much of their time in a state of mournfulness or sullenness. If depression is not addressed seriously, individuals risk becoming trapped in this stage, unable to process their emotions and move forward. This stagnation can lead to a prolonged or even permanent crisis, making it difficult to progress toward acceptance—the stage where energy, satisfaction, and proactive engagement can be reclaimed (Figure 1).

3.4.2. Climate-Related Expressions and Societal Manifestations

In the context of climate change, depression can manifest as hopelessness in the face of environmental destruction, the loss of ecosystems and species, or the socio-economic

impacts of climate disruptions [3]. Even among climate scientists, who are professionally engaged with these realities, such eco-distress has been observed, manifesting as emotional strain, hopelessness, and symptoms closely resembling depression [100]. The transition from bargaining to depression, as described by Kübler-Ross, occurs when individuals realise that their attempts to negotiate or regain control have not succeeded in altering the outcome. In the case of climate change, this might happen when people recognise that compromises or incremental actions are insufficient to address the scale of the crisis. This realisation can lead to profound feelings of despair, powerlessness, and grief over the seemingly irreversible damage to the natural world [3,8,101]. When communities or populations experience collective despair, it can erode political will and societal momentum for meaningful climate action, further exacerbating the crisis.

Depression related to climate change manifests differently across regions and cultures but shares common emotional threads [3,8]. In Northern Europe, the decline of traditional winters has led to "winter grief" [10], with individuals mourning the loss of snow and seasonal landscapes that are integral to cultural traditions and identities. This loss disrupts local well-being and contributes to a broader sense of disconnection from nature. In Pacific island nations, rising sea levels threaten to submerge entire homelands, leading to despair at the loss of ancestral lands and cultural heritage. This looming displacement amplifies feelings of helplessness and grief. Similarly, Australia's devastating 2019–2020 bushfires left many Australians grieving the destruction of homes, lives, ecosystems, and wildlife. The fires underscored a sense of vulnerability and powerlessness that lingers long after the immediate disaster. In Sub-Saharan Africa, farmers face the impacts of drought and desertification, which render traditional agricultural practices unsustainable. This environmental degradation exacerbates socio-economic challenges, leaving communities trapped in cycles of despair. Globally, eco-anxiety and climate grief are particularly acute among youth [2,14,102], who face fears of inheriting a destabilised planet. Movements like Fridays for Future reflect both the despair of recognising the crisis and the determination to act despite it.

To prevent depression from becoming a permanent barrier, it is essential to address both its psychological and systemic causes. According to Kübler-Ross, transitioning from depression to acceptance requires time, validation, and a supportive environment [29]. In the climate context, this means ensuring that individuals and communities have the resources and platforms to process their grief while recognising the tangible progress of global efforts. By addressing depression seriously and supporting the transition through grief, society can enable individuals to reclaim energy and satisfaction, driving meaningful progress toward a sustainable and equitable future.

3.4.3. Strategy: Community Heals Depression

Addressing climate-related depression is most effective when strategies are rooted in local engagement. Community-based actions empower individuals and groups by providing tangible ways to counter helplessness and contribute to meaningful change [103]. Municipalities and NGOs can create structured volunteer programmes that include low-barrier entry points for participation, such as "climate action weekends" or "green neighbourhood challenges", enabling residents to become involved regardless of prior knowledge or background. Effective approaches focus on supporting emotional responses and fostering resilience through participation but need to be embedded in active hope [104]. Involvement in local sustainability efforts, such as community gardens, tree planting or cleanup campaigns, can offer a sense of purpose and connection [105,106]. These activities strengthen social ties, create visible progress and reduce feelings of despair. Municipalities can support this by ensuring access to green spaces that allow residents to engage with nature,

relax or exercise. Regular outdoor activities like walking or gardening provide both emotional and physical benefits. Local authorities can also facilitate community-led projects through grants or incentives. To maximise impact, grant programmes can be combined with coaching formats or peer-support structures that help community groups sustain their engagement and avoid burnout. These efforts foster agency and shared responsibility, offering concrete opportunities to transform helplessness into hope. Understanding how climate change is being addressed locally, through municipal plans, public meetings or neighbourhood initiatives, can reinforce a sense of progress and inclusion. Working with schools, universities and local organisations to engage younger generations further supports this shift. Developing climate related curricula, hosting sustainability events or mentoring students in environmental projects channels grief into forward-looking engagement. Educators can integrate creative reflection tools such as emotion mapping, storytelling or AI-generated climate imagery into classroom activities to help students express and process their emotions constructively. Such initiatives connect personal emotions to collective action and help nurture a hopeful, resilient outlook.

3.5. Acceptance

3.5.1. Psychological Foundations

Acceptance, the final stage of grief, is defined by a willingness to face reality and take purposeful action. Drawing from Kübler-Ross's model, acceptance often reflects a calm acknowledgment of the inevitable, expressed in sentiments such as, "It will be alright", or "I can't change it, so I might as well prepare for it". At this point, individuals and communities come to terms with the inevitability of change, make peace with loss, and adopt a constructive mindset [29]. It involves embracing a situation without resistance, recognising its challenges, and adapting to its demands. Emotional stability and a retrospective perspective enable people to adapt with realism and empowerment, focusing on solutions rather than obstacles.

3.5.2. Climate-Related Expressions and Societal Manifestations

Acceptance is not about resignation but about finding purpose, resilience, and a proactive stance in the face of adversity. This aligns with recent findings from climate-informed psychotherapy, where acceptance is defined as an active and value-driven strategy that fosters psychological flexibility and helps transform distress into meaningful engagement [107]. In the context of climate change, this mindset represents a profound shift, as acceptance here means acknowledging global warming as real, driven by human activities, and requiring urgent responses. It also entails understanding that some impacts, such as rising sea levels and extreme weather, are unavoidable, making adaptive measures as critical as mitigation efforts. Recognising that while certain impacts are unavoidable, this awareness creates opportunities for proactive preparation and meaningful action. Acceptance transforms despair into action, fostering collaboration and innovation to address present and future challenges. In the ACT framework, this shift is understood as a move from experiential avoidance to committed action grounded in values, enabled by mindful acceptance of one's internal emotional landscape [107]. This becomes the foundation for a solution-oriented approach to building a sustainable and resilient future. This stage fosters a balanced perspective, reducing feelings of anxiety and helplessness while empowering individuals and communities to confront the crisis with clarity and determination. Acceptance does not signify resignation or a retreat from mitigation but rather an integration of the realities of a warming planet into actions focused on adaptation, resilience, and long-term sustainability. The transition from bargaining and depression to acceptance occurs when individuals and societies recognise that efforts to negotiate or regain control are insufficient to address the

magnitude of the climate crisis. This acknowledgment often brings feelings of despair and grief over the irreversible damage inflicted on ecosystems, biodiversity, and natural systems. However, this realisation also sets the stage for a transformative shift toward acceptance and resiliency, enabling proactive and constructive responses as well as purpose-driven action [7].

The first half of the 21st century has emerged as a pivotal period for this transition, marked by significant shifts in the global discourse on climate action. While the latter part of the 20th century primarily focused on climate protection and mitigation strategies to curb emissions, the early 21st century has increasingly emphasised the necessity of climate adaptation. This shift reflects a collective realisation that although mitigation remains indispensable, adapting to the unavoidable consequences of climate change is equally critical. The growing focus on climate adaptation highlights the urgency of addressing the symptoms of climate change alongside its causes. In Germany, for instance, the first federal climate protection law, aimed at reducing emissions, was passed in December 2019. In contrast, a federal climate adaptation act, which addresses the consequences of climate change, was not introduced in the Bundestag until October 2023. This delayed recognition underscores the emerging yet critical role of adaptation in comprehensive climate strategies.

Climate adaptation involves adjusting to changing environmental conditions and addressing specific impacts of climate change, such as heat waves, heavy rainfall, and surface runoff. It is akin to treating the symptoms of a serious illness, providing immediate relief and preventing complications, while climate mitigation seeks to address the root causes by stabilising or reducing greenhouse gas emissions. Both adaptation and mitigation are essential and complementary; effective climate action relies on a careful balance between managing present impacts and preventing future crises. Acceptance, in the context of climate change, embodies this dual focus. It signifies acknowledging the reality of the crisis, the urgency of action, and the need to address both its causes and consequences. Moving beyond debates about whether climate change is occurring, acceptance involves proactively addressing how individuals, communities, and governments can live with and adapt to a rapidly changing environmental reality. This transition to acceptance represents not only a psychological shift but also a practical and strategic pivot essential for navigating the complexities of the climate crisis. However, this transition is not uniform across the globe. It often manifests in isolated examples at national, municipal, and community levels. Acceptance drives diverse responses, ranging from individual lifestyle changes to ambitious policy initiatives and infrastructure projects. Individuals who embrace the reality of climate change adjust their behaviours, such as reducing energy consumption, adopting plant-based diets, and using sustainable transport options. Communities implement local initiatives, such as renewable energy cooperatives, conservation projects, and urban greening efforts, showcasing collective resilience and adaptability [108].

On a larger scale, countries like the Netherlands exemplify comprehensive climate adaptation through programmes like Room for the River, which mitigates flood risks by creating natural floodplains. Similarly, cities like Turin, Italy, demonstrate leadership in urban adaptation. Turin's Climate Adaptation Master Plan incorporates strategies such as enhancing green infrastructure, reducing urban heat islands, and improving water management systems. These measures not only address immediate climate risks but also promote sustainability and resilience. Such examples highlight how acceptance can lead to innovative and impactful climate action. Yet, they also reveal disparities in progress. While some regions, cities, and communities lead the way, others face challenges such as resource constraints, political inertia, or a lack of awareness. Bridging these gaps will require fostering global collaboration and ensuring equitable access to resources, knowledge, and tools for adaptation. When widely embraced, acceptance has the power to transform

isolated successes into a cohesive global movement. It enables individuals and societies to act with clarity and purpose, fostering solutions that balance immediate needs with long-term goals to build a sustainable and resilient future.

3.5.3. Strategy: Acceptance Drives Adaptation

Promoting acceptance of climate change is essential for enabling collective and proactive responses, yet it requires overcoming deeply rooted beliefs and attitudes. Acceptance enables individuals, communities, stakeholders and decision-makers to move from awareness to action through behavioural shifts, institutional commitment, local initiatives and policy engagement. However, this transition is often preceded by intense negative climate emotions, which must be acknowledged and processed before meaningful engagement can occur [62]. When paired with well-designed communication, these responses help establish a supportive environment for climate action. Scientists, policymakers and communicators should provide clear, accurate and accessible information about climate research, its potential impacts and actionable solutions. Infographics, interactive tools [109–111], visual models [110,111], digital media, augmented reality [112] and serious games [113–115] can translate complex material into relatable content for diverse audiences. Emotional resonance is central to fostering acceptance. Positive examples of successful adaptation at neighbourhood level, along with accessible options for individual preparedness, help counterbalance crisis narratives and demonstrate tangible benefits. Personal stories, such as farmers adopting drought-resistant crops or families benefitting from renewable energy, make climate impacts more relatable and evoke empathy. Such narratives humanise the issue and improve risk communication [116].

Building on this emotional grounding, several documented interventions illustrate how acceptance can translate into concrete adaptation outcomes. In Nepal, the Local Adaptation Plan of Action engaged vulnerable communities in acknowledging local climate risks and co-developing tailored strategies, resulting in forestry-based risk reduction and integration of resilience into community planning [117]. The multi-level planning process similarly placed emotional readiness at the centre, using formats like story circles and scenario workshops to support shared understanding and co-create adaptation plans across governance levels [95]. Cross-country research from Ghana, Honduras and Tajikistan further shows how participatory scenario development helped actors internalise risks and inform national priorities [118]. The RISE project in Indonesia and Fiji used citizen science flood monitoring to strengthen local risk acceptance, with the resulting data informing water-sensitive infrastructure design and municipal planning [119]. In Ghana's national adaptation planning, peer learning exchanges fostered emotional engagement among subnational actors and triggered behavioural and policy shifts, such as resource advocacy and curriculum reform [120]. Finally, storytelling can be a powerful mechanism for translating acceptance into adaptation actions. In the UK, creative "futures storytelling" workshops engaged participants in co-creating fictional yet plausible adaptation scenarios, helping them emotionally connect to potential futures and clarify values, thus informing adaptation planning across scales [121]. Similarly, indigenous storytelling, rooted in oral traditions and context-specific knowledge, has been shown to bridge diverse worldviews and inspire culturally sensitive adaptation frameworks by grounding strategies in stories that communities recognise and trust [122].

The ADAPTNOW project served as a practical testbed for several strategies. In the following, we present selected interventions from different pilot sites to illustrate how emotional readiness and adaptation were addressed in real-world contexts. These examples are based on documented observations and project outputs and were integrated as illustrative vignettes to complement the conceptual framework (see Methods for selection

and analytical approach). First-hand experience can be a powerful catalyst for moving from climate awareness to meaningful adaptation. In the ADAPTNOW pilot in northern Italy, foresters in the Puster Valley faced daily evidence of ecosystem degradation due to changing climate conditions. Their close connection to the landscape fostered a deep emotional engagement, which led to the development of an artificial reforestation framework. Although initially viewed as controversial, the approach gained local support as a pragmatic and forward-looking strategy to safeguard forest resilience. This case illustrates how experiential knowledge and emotional acceptance can enable professional communities to act despite uncertainties and ecological sensitivities. A comparable dynamic was observed in the urban planning pilot, where both the mayor and the city's urban planning councillor had reached a stage of acceptance regarding climate risks. Their emotional stance created an environment of openness and institutional courage, allowing for the full integration of climate adaptation into the city's new general masterplan. This transformation, from hesitant acknowledgement to structural embedding, was only possible because key decision-makers moved beyond symbolic commitment and engaged in participatory co-creation. In contrast, other pilot locations where stakeholders remained in the bargaining phase tended to favour partial or reactive measures, limiting the transformative potential of planning processes. In Kempten (Germany), an ADAPTNOW pilot region, a local grammar school (Hildegardis-Gymnasium) developed a comprehensive climate protection plan. More than 100 concrete measures were proposed across sectors such as energy, mobility, biodiversity, and food systems. Particularly noteworthy is the school's "climate ambassadors" programme: pupils who not only communicated about climate change and the options for mitigation and adaptation with their peers but also actively contributed to designing and implementing measures within the school context. This peer-level engagement fostered emotional acceptance and demonstrated how student-led initiatives can translate climate awareness into tangible adaptation and mitigation actions across the institution. In the Italian municipality of Chivasso, iiSBE Italia facilitated a territorial laboratory focused on local governance and climate resilience. The process included a detailed stakeholder mapping, followed by participatory design workshops that surfaced emotional and political barriers to adaptation. By working through these dimensions, the municipality was able to move from passive acceptance to an active commitment to future-oriented climate planning. Finally, we tested the use of AI-generated imagery within the ADAPTNOW consortium to support participatory visioning. Figure 3 shows two examples created with Midjourney, based on ideas from local dialogues on climate-adapted urban design. One image depicts a neighbourhood shaped by community gardening; the other shows a sun-shaded public square with trees and textile canopies. These visual prompts helped translate abstract adaptation goals into emotionally resonant, place-based visions.

Acceptance is not the end of the journey but a critical turning point. When embedded into strategies at local, national and global levels, it enables societies, institutions and governments to move from reactive coping to purposeful transformation. Acceptance provides the clarity, resolve and cooperation needed to shape a sustainable and resilient future. Once acceptance is reached, the path toward effective climate adaptation becomes not only visible but also practically achievable.

(**a**) (**b**)

Figure 3. Two examples generated with the AI-based image generator Midjourney, based on ideas articulated in community dialogues. (**a**) A climate-resilient neighbourhood in France, shaped by community-led urban gardening with rooftop gardens, edible landscapes and shared courtyards. (**b**) A redesigned public square in a Southern Italian city, featuring textile shading structures, tree canopies and resting areas to mitigate heat stress. Both visual prompts were used to translate adaptation ideas into emotionally resonant, place-based images that can support local dialogue and engagement. The associated text prompts used for image generation are: (**a**) Hyperrealistic scene of a climate-adapted French urban neighbourhood with rooftop gardens, green balconies, and residents tending to community gardens in inner courtyards; Haussmann-style architecture, edible landscapes, calm afternoon light, cinematic detail, 8k resolution–ar 1:1–v 5.2; (**b**) Hyperrealistic visualisation of a sun-exposed public square in a Southern Italian city redesigned with textile sunshades, pergolas, mature trees and stone benches, people relaxing in the shade during a hot summer afternoon, Mediterranean architecture, urban heat adaptation concept, photorealistic, 8k detail–ar 1:1–v 5.2.

4. Discussion

We applied Kübler-Ross's five stages of grief to analyse emotional responses to climate change, hypothesising that this framework offers a valuable lens for understanding public engagement and facilitating action. Our results confirm its relevance for interpreting how individuals and communities process the emotional challenges of the climate crisis. By highlighting emotional dynamics, we underscore the importance of understanding public perceptions as a foundation for achieving societal transformation. Situating emotions like eco-anxiety, grief and anger within a process-oriented model, our work builds particularly on research by [2,8,10–12,31,62,81–83,100]. It emphasises the dual role of emotions in hindering or motivating action and the need to foster agency and resilience through mental health support and collective spaces. Complementing insights from Spence et al. (2012) [24] and van der Linden (2015) [17], our framework also addresses psychological barriers such as Gifford's (2011) "dragons of inaction" [16]. Addressing these barriers requires integrating emotional readiness into climate policy and communication, thereby fostering more inclusive and effective climate action [9]. In line with Dodds (2021) [13], who identified anxiety as both a barrier and an entry point for therapeutic and behavioural responses to climate change, our findings confirm that addressing emotional complexity is central to overcoming inaction. Unlike treating emotions as isolated states, our framework introduces a temporal perspective, illustrating how emotions evolve across denial, anger, bargaining, depression, and acceptance. These stages manifest clearly in climate contexts, influencing responses across individual, community, and governmental levels. The framework pro-

vides policymakers, decision-makers, and communicators with a tool to assess emotional states within target audiences and to design strategies aligned with readiness to engage. By bridging emotional readiness with actionable strategies, it supports broader public engagement and collective action toward sustainable outcomes. This adaptation of the Kübler-Ross model expands climate psychology by framing emotions as dynamic processes rather than static states, allowing for a more nuanced understanding of how engagement evolves over time.

While the five-stage grief model provides a temporal framework for understanding emotional engagement with climate change, practical implementation requires more targeted guidance. To support this, we introduce an applied mapping structure in Table 1, which links each grief stage to a common psychological barrier, an exemplary suitable message framing cue, an appropriate participatory engagement strategy, and observable indicators of readiness to move forward to the next stage. This structure enables policymakers, educators, and communicators to assess the current emotional state of individuals or groups (e.g., communities, institutions, or regions) and to apply tailored strategies aimed at facilitating progression toward acceptance. Delivering the right message at the right moment can help reduce resistance and deepen engagement. Readiness indicators serve as diagnostic tools to determine when individuals or collectives may be open to transitioning into the next phase of emotional and behavioural engagement. This stage-based logic offers policymakers a novel lens for aligning communication strategies with emotional readiness, bridging psychological theory with applied climate governance.

Table 1. Emotional readiness mapping—Linking grief stages to barriers, communication strategies, participatory tools, and indicators of engagement. This table provides a diagnostic overview of emotional phases in climate engagement and helps practitioners assess where individuals or groups currently stand. By identifying typical barriers and appropriate communication cues, it supports the targeted use of participatory strategies and helps determine readiness for progression toward deeper engagement or adaptation.

Grief Stage	Prevailing Barrier	Message Framing Cue	Participatory Lever	Indicator of Readiness
Denial	Psychological distancing, minimisation of risk	"These changes affect our community now."	Localised education, infographics, serious games	Willingness to acknowledge local climate impacts
Anger	Distrust, blame, perceived unfairness	"Your frustration is valid. Let's talk about just solutions."	Structured dialogue forums, climate assemblies	Initial openness to hear opposing views or collaborate
Pessimistic Bargaining	Overwhelm, disengagement, symbolic actions	"Small steps matter, but we must act meaningfully together."	Low-threshold involvement (e.g., idea boxes, surveys, consultations)	Participation in small-scale or token efforts
Depression	Powerlessness, grief, withdrawal	"You're not alone. Together we can make a difference."	Community-building, peer support, creative formats	Renewed interest in group activity or shared emotional expression
Optimistic Bargaining	Strategic avoidance of deeper change	"These actions are a step forward, How can we do more?"	Co-creation workshops, feedback loops, deliberative processes	Proactive suggestions or demand for deeper, systemic engagement
Acceptance	Emotional fatigue, residual uncertainty	"Adaptation is possible. Here's how we already succeed."	Institutional commitment, scenario planning, youth leadership	Integration of adaptation into strategies, policies, or long-term vision

Once emotional states are identified and readiness indicators suggest the potential for deeper engagement, the question becomes: how can this momentum be translated into reduced resistance, meaningful engagement, and long-term collective resilience? To support this transition, we propose a set of seven strategic recommendations that address emotional responses and promote sustainable behaviour change, particularly in local contexts. These **Seven Towards Action**, presented in Table 2, offer targeted guidance for communication and policy practice based on insights from the five stages of grief. They are intended to bridge emotional readiness with practical tools for climate action and to support communities, educators, and decision-makers in navigating the psychological complexities of transformation.

Table 2. Seven Towards Action—Strategic recommendations for responding to emotional stages of climate engagement. This table complements the diagnostic mapping in Table 1 by providing seven actionable strategies for practitioners, educators, and policymakers. Each recommendation addresses specific emotional dynamics and offers guidance on how to support constructive engagement and enable climate adaptation, particularly at the local level.

No.	Recommendation	Description
1.	**Frame Climate Change with Local Relevance**	Highlight tangible climate and weather impacts that resonate with local experiences, and frame adaptation measures through their co-benefits, such as improved infrastructure, job creation, and public well-being.
2.	**Acknowledge and Support Emotional Responses**	Recognise emotions such as grief, anxiety, and frustration as valid reactions. Integrate emotional literacy and mental health resources into climate strategies, including peer support and safe spaces for open dialogue.
3.	**Engage Diverse and Trusted Voices**	Tailor communication to different cultural and social contexts, involving under-represented groups, and collaborate with trusted community figures to counter misinformation, strengthen credibility, and increase relevance.
4.	**Bridge Psychological Distance**	Use relatable narratives and local examples to connect abstract climate science with everyday life, reducing denial and disengagement.
5.	**Empower Constructive Engagement**	Channel emotional responses into action by enabling participatory forums, co-creation of solutions, and citizen-led contributions to policy.
6.	**Encourage Realistic and Inclusive Change**	Promote practical behavioural shifts framed as "win-win" actions and emphasise their contribution to broader systemic change.
7.	**Foster Hope and Long-Term Resilience**	Present climate change as solvable. Support education, citizen science, and intergenerational dialogue to build shared purpose, agency, and emotional resilience.

While Kübler-Ross's model provides a valuable framework for understanding emotional responses to climate change, it is not without limitations [30]. The implied linearity can oversimplify how individuals and groups experience emotions, which often fluctuate, overlap, or recur in non-sequential ways. The illustrated progression in Figure 1 represents an idealised example. In reality, depending on personality, group dynamics, and lived experiences, the ordering of stages may vary, certain phases may be skipped or revisited, and transitions are not always unidirectional. Furthermore, the magnitude and trajectory of emotional responses, such as the alignment between satisfaction and motivation, can differ substantially across individuals or communities. Transitions between stages are also influenced by decisions made within each phase. For example, unresolved tensions in the bargaining stage may trigger a renewed episode of anger. Figure 1 should therefore be un-

derstood as a stylised, ideal-typical representation. Emotional responses to climate change are likely to follow a more dynamic and entangled pattern rather than a singular, linear path. Moreover, in the climate context, emotional reactions are shaped by diverse factors, including personal experiences, age, cultural norms, and shifting media narratives [37,102]. In contrast to individual grief, collective emotional responses to climate change are also subject to external forces such as political messaging, economic pressure, and industrial lobbying. These influences can intentionally amplify or suppress certain emotions, particularly denial, anger, or resignation, and may reinforce structural inertia or resistance to change [42,45,49,50].

The Kübler-Ross model under-represents several emotional states that are crucial for climate engagement. These include hope, guilt, shame, apathy, anxiety and worry, each of which plays a complex role in shaping how individuals process and respond to climate threats. For instance, hope has been identified as a protective emotional resource that supports agency, especially among young people and educators, and can buffer against despair or disengagement [2,9,11]. Guilt and shame may serve as motivators for pro-environmental action but can also induce emotional overload and paralysis when not constructively channelled [11,83]. Apathy, often rooted in emotional numbing or perceived helplessness, has been linked to disengagement and passivity, particularly in contexts where systemic barriers block meaningful action [8,15]. Furthermore, both worry and anxiety, especially in the form of eco-anxiety and climate distress, can either lead to constructive coping and engagement or, under certain conditions, contribute to psychological distress and emotional fatigue [8,11]. These dynamics highlight that emotional responses are neither inherently positive nor negative but context-dependent and shaped by individual, social, and cultural conditions. As such, the Kübler-Ross model provides only a partial account of the emotional landscape relevant to climate change, reinforcing the need to complement it with research on broader emotional repertoires and adaptive capacities. However, when thoughtfully adapted and tailored to specific target groups, the model offers a powerful foundation for advancing both climate psychology and policy scholarship by enabling the development of phase-specific strategies that actively support emotional transitions and engagement. Consequently, climate policy and communication must be grounded not only in scientific evidence but also in an understanding of the full emotional spectrum involved in climate engagement. Effective strategies should foster emotional resilience, strengthen community relationships, and create spaces for constructive processing of diverse emotional responses. This aligns with Lawrance et al. (2022) [9], who argue that evidence-based interventions must account for the multiple, interconnected pathways linking climate impacts and mental health and prioritise climate justice to reduce psychological burdens. Addressing the emotional complexity of the climate crisis beyond the grief-centred lens of the Kübler-Ross model enables individuals, communities, institutions, and stakeholders to process their experiences, build trust, and engage more effectively in adaptation and transformation. Thus, our adapted framework not only contributes to the grounding of emotional phases in climate discourse but also opens a pathway for integrating emotion-centred diagnostics into policy design and participatory planning.

5. Conclusions

Applying Kübler-Ross's five stages of grief to climate change provides a process-oriented perspective to interpret emotional responses and identify barriers and enablers of climate action. While our framework offers a conceptual structure to situate emotions, the following key research gaps remain:

1. The temporal progression of emotional stages needs empirical validation: It is unclear whether and how individuals or communities move linearly through the five stages,

revisit certain phases, or experience hybrid emotional states. Longitudinal and comparative studies could provide deeper insights into emotional trajectories in different social and cultural contexts. In addition, future research should examine whether and how targeted interventions, such as message framing or participatory formats, can support transitions between emotional stages and foster greater engagement.

2. Emotions beyond the original Kübler-Ross model, such as hope, guilt, shame, or apathy, warrant closer examination. These affective states may play a crucial role in transitions between stages or in sustaining action, yet remain under-represented in grief-based models of engagement.
3. Future research should explore emotional transitions in collective settings: How do emotional stages manifest in groups, institutions, or movements? Do communities share emotional trajectories, or are emotional responses fragmented across sectors and generations?
4. There is a need for intervention studies that assess how psychologically informed communication, climate education, and therapeutic approaches can facilitate emotional readiness and support movement toward constructive engagement and acceptance.
5. A promising avenue lies in educational and professional training. As highlighted by recent findings [123], the integration of climate-related emotional competence into psychology and education curricula remains limited. Research into pedagogical models and learning outcomes is essential to prepare future practitioners for the emotional complexities of climate change.

In sum, future research should not only examine what people feel in response to climate change but also how these emotions unfold, shift, and can be constructively addressed. Deepening our understanding of these emotional processes is vital to designing effective, inclusive and resilient climate strategies.

Author Contributions: Conceptualization, I.B.; methodology, I.B.; formal analysis, I.B.; investigation, I.B., S.E., L.M., F.B., F.C., A.M., E.B. and R.B.; resources, I.B., S.E., L.M., F.B., F.C., A.M., E.B. and R.B.; data curation, I.B., S.E., L.M., F.B., F.C., A.M., E.B. and R.B.; writing—original draft preparation, I.B.; writing—review and editing, I.B., S.E., F.C., L.P., A.M. and E.B.; visualization, I.B.; supervision, I.B., F.C., L.P., A.M., E.B. and R.B.; project administration, I.B. and R.B.; funding acquisition, I.B., S.E., L.M., F.B., F.C., A.M., E.B. and R.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Interreg Alpine Space Programme project ADAPTNOW, co-funded by the European Union, grant number ASP0100048. The APC was funded by the University of the Bundeswehr Munich.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

ADAPTNOW	ADAPTation Capacity Strengthening for Highly Affected and Exposed Territories in the Alps NOW
CFC	chlorofluorocarbon
ACT	acceptance and commitment therapy

References

1. Lee, H.; Calvin, K.; Dasgupta, D.; Krinner, G.; Mukherji, A.; Thorne, P.W.; Trisos, C.; Romero, J.; Aldunce, P.; Barrett, K.; et al. Climate Change 2023: Synthesis Report: Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. 2023. Available online: https://www.ipcc.ch/report/ar6/syr/ (accessed on 20 July 2025).
2. Koder, J.; Dunk, J.; Rhodes, P. Climate Distress: A Review of Current Psychological Research and Practice. *Sustainability* **2023**, *15*, 8115. [CrossRef]
3. Nie, P.; Zhao, K.; Ma, D.; Liu, H.; Amin, S.; Yasin, I. Global Climate Change, Mental Health, and Socio-Economic Stressors: Toward Sustainable Interventions across Regions. *Sustainability* **2024**, *16*, 8693. [CrossRef]
4. Nogués-Bravo, D.; Rodríguez-Sánchez, F.; Orsini, L.; de Boer, E.; Jansson, R.; Morlon, H.; Fordham, D.A.; Jackson, S.T. Cracking the Code of Biodiversity Responses to Past Climate Change. *Trends Ecol. Evol.* **2018**, *33*, 765–776. [CrossRef]
5. Baselt, I.; Heinze, T. Rain, Snow and Frozen Soil: Open Questions from a Porescale Perspective with Implications for Geohazards. *Geosciences* **2021**, *11*, 375. [CrossRef]
6. Zeng, X.M.; Berdugo, M.; Saez-Sandino, T.; Tao, D.; Ren, T.; Zhou, G.; Liu, Y.R.; Terrer, C.; Reich, P.B.; Delgado-Baquerizo, M. Temperature thresholds induce abrupt shifts in biodiversity and ecosystem services in montane ecosystems worldwide. *Proc. Natl. Acad. Sci. USA* **2025**, *122*, e2413981122. [CrossRef] [PubMed]
7. Inglis, J. Grief, Grit, and Gratitude: Finding Resilience in the Face of Climate Change. In *From Environmental Loss to Resistance*; Loadenthal, M., Rekow, L., Eds.; University of Massachusetts Press: Amherst, MA, USA, 2020; pp. 19–30. [CrossRef]
8. Cosh, S.M.; Ryan, R.; Fallander, K.; Robinson, K.; Tognela, J.; Tully, P.J.; Lykins, A.D. The relationship between climate change and mental health: A systematic review of the association between eco-anxiety, psychological distress, and symptoms of major affective disorders. *BMC Psychiatry* **2024**, *24*, 833. [CrossRef] [PubMed]
9. Lawrance, E.L.; Thompson, R.; Le Newberry Vay, J.; Page, L.; Jennings, N. The Impact of Climate Change on Mental Health and Emotional Wellbeing: A Narrative Review of Current Evidence, and its Implications. *Int. Rev. Psychiatry* **2022**, *34*, 443–498. [CrossRef]
10. Pihkala, P. Climate Grief: How We Mourn a Changing Planet. *BBC*, 3 April 2020. Available online: https://www.bbc.com/future/article/20200402-climate-grief-mourning-loss-due-to-climate-change (accessed on 20 July 2025).
11. Ojala, M.; Cunsolo, A.; Ogunbode, C.A.; Middleton, J. Anxiety, Worry, and Grief in a Time of Environmental and Climate Crisis: A Narrative Review. *Annu. Rev. Environ. Resour.* **2021**, *46*, 35–58. [CrossRef]
12. Comtesse, H.; Ertl, V.; Hengst, S.M.C.; Rosner, R.; Smid, G.E. Ecological Grief as a Response to Environmental Change: A Mental Health Risk or Functional Response? *Int. J. Environ. Res. Public Health* **2021**, *18*, 734. [CrossRef]
13. Dodds, J. The Psychology of Climate Anxiety. *BJPsych Bull.* **2021**, *45*, 222–226. [CrossRef]
14. Brophy, H.; Olson, J.; Paul, P. Eco-anxiety in youth: An integrative literature review. *Int. J. Ment. Health Nurs.* **2023**, *32*, 633–661. [CrossRef]
15. Owczarek, M.; Redican, E.; Shevlin, M.; Nolan, E. Psychometric assessment of climate-related emotional responses: A systematic review of measures for eco-anxiety and related constructs. *Curr. Psychol.* **2025**, *44*, 4883–4905. [CrossRef]
16. Gifford, R. The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *Am. Psychol.* **2011**, *66*, 290–302. [CrossRef]
17. van der Linden, S. The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *J. Environ. Psychol.* **2015**, *41*, 112–124. [CrossRef]
18. Baselt, I. Climate Change Adaptation in the Alpine Territories: Risk Perception, Obstacles and Adaptation Strategies. In Proceedings of the Interpraevent 2024—Conference Proceedings, Vienna, Austria, 10–13 June 2024; pp. 147–150.
19. Gulliver, J.S. Climate Change Adaptation: Civil and Environmental Engineering Challenge. *J. Hydraul. Eng.* **2020**, *146*, 01820001. [CrossRef]
20. Schipper, E.L.F.; Maharaj, S.S.; Pecl, G.T. Scientists have emotional responses to climate change too. *Nat. Clim. Chang.* **2024**, *14*, 1010–1012. [CrossRef]
21. Naustdalslid, J. Climate change–the challenge of translating scientific knowledge into action. *Int. J. Sustain. Dev. World Ecol.* **2011**, *18*, 243–252. [CrossRef]
22. Jasanoff, S. Knowledge for a just climate. *Clim. Chang.* **2021**, *169*, 36. [CrossRef]
23. Bornmann, L.; Haunschild, R.; Boyack, K.; Marx, W.; Minx, J.C. How relevant is climate change research for climate change policy? An empirical analysis based on Overton data. *PLoS ONE* **2022**, *17*, e0274693. [CrossRef]
24. Spence, A.; Poortinga, W.; Pidgeon, N. The psychological distance of climate change. *Risk Anal. Off. Publ. Soc. Risk Anal.* **2012**, *32*, 957–972. [CrossRef]
25. Stancu, A.; Ariccio, S.; de Dominicis, S.; Cancellieri, U.G.; Petruccelli, I.; Ilin, C.; Bonaiuto, M. The better the bond, the better we cope. The effects of place attachment intensity and place attachment styles on the link between perception of risk and emotional and behavioral coping. *Int. J. Disaster Risk Reduct.* **2020**, *51*, 101771. [CrossRef]

26. Carnelli, F.; Pedoth, L. Enhancing risk governance by addressing key risk communication barriers during the prevention and preparedness phase in South Tyrol (Italy). *Sustain. Dev.* **2024**, *32*, 1538–1547. [CrossRef]
27. Xue, S.; Massazza, A.; Akhter-Khan, S.C.; Wray, B.; Husain, M.I.; Lawrance, E.L. Mental health and psychosocial interventions in the context of climate change: A scoping review. *npj Ment. Health Res.* **2024**, *3*, 10. [CrossRef] [PubMed]
28. Schlatter, L.; Kumar, M.; Kumar, P. Climate Change and Mental Health Nexus in National Climate Policy-Gaps and Challenges. *Ann. Glob. Health* **2025**, *91*, 19. [CrossRef] [PubMed]
29. Kübler-Ross, E. *On Death and Dying*, 1st ed.; Macmillan: London, UK, 1969.
30. Doka, K.J. *Grief Is a Journey: Finding Your Path Through Loss*; Atria Books: New York, NY, USA, 2016.
31. Running, S.W. The 5 Stages of Climate Grief. Available online: https://scholarworks.umt.edu/ntsg_pubs/173 (accessed on 20 July 2025).
32. Braun, V.; Clarke, V. Using thematic analysis in psychology. *Qual. Res. Psychol.* **2006**, *3*, 77–101. [CrossRef]
33. Friedrich, E.; Wüstenhagen, R. Leading Organizations Through the Stages of Grief. *Bus. Soc.* **2017**, *56*, 186–213. [CrossRef]
34. Stroebe, M.; Schut, H. The Dual Process Model of Coping with Bereavement: Rationale and Description. *Death Stud.* **1999**, *23*, 197–224. [CrossRef]
35. Prochaska, J.O.; Velicer, W.F. The Transtheoretical Model of Health Behavior Change. *Am. J. Health Promot.* **1997**, *12*, 38–48. [CrossRef]
36. Lazarus, R.S.; Folkman, S. *Stress, Appraisal, and Coping*; Springer: New York, NY, USA, 1984.
37. Renn, O.; Rohrmann, B. Cross-Cultural Risk Perception: State and Challenges. In *Cross-Cultural Risk Perception*; Renn, O., Rohrmann, B., Eds.; Springer: Boston, MA, USA, 2000; pp. 211–233. [CrossRef]
38. Rogers, R.W. A Protection Motivation Theory of Fear Appeals and Attitude Change. *J. Psychol.* **1975**, *91*, 93–114. [CrossRef]
39. Tedeschi, R.G.; Calhoun, L.G. The posttraumatic growth inventory: Measuring the positive legacy of trauma. *J. Trauma. Stress* **1996**, *9*, 455–471. [CrossRef]
40. Kotter, J.P. *Leading Change*, 1st ed.; Harvard Business School Press: Boston, MA, USA, 1996.
41. Jikybebna. Kübler-Ross Grieving Curve (Edited). Own Work; Licensed Under CC BY-SA 4.0. Creative Commons Attribution-ShareAlike 4.0 International. 2021. Available online: https://commons.wikimedia.org/wiki/File:K%C3%BCbler_Ross_grieving_curve_(edited).svg (accessed on 2 September 2025).
42. Norgaard, K.M. Climate Denial: Emotion, Psychology, Culture, and Political Economy: Chapter 27. In *The Oxford Handbook of Climate Change and Society*; Dryzek, J.S., Norgaard, R.B., Schlosberg, D., Eds.; Oxford University Press: Oxford, UK, 2011; pp. 399–413. [CrossRef]
43. Keeling, C.D. The Concentration and Isotopic Abundances of Carbon Dioxide in the Atmosphere. *Tellus* **1960**, *12*, 200–203. [CrossRef]
44. Weart, S.R. *The Discovery of Global Warming: Revised and Expanded Edition*; New Histories of Science, Technology, and Medicine Series; Harvard University Press: Cambridge, MA, USA, 2008; Volume 13.
45. Lewandowsky, S.; Oreskes, N.; Risbey, J.S.; Newell, B.R.; Smithson, M. Seepage: Climate change denial and its effect on the scientific community. *Glob. Environ. Chang.* **2015**, *33*, 1–13. [CrossRef]
46. Farman, J.C.; Gardiner, B.G.; Shanklin, J.D. Large losses of total ozone in Antarctica reveal seasonal ClOx/NOx interaction. *Nature* **1985**, *315*, 207–210. [CrossRef]
47. Mullin, R.P. What Can Be Learned from DuPont and the Freon Ban: A Case Study. *J. Bus. Ethics* **2002**, *40*, 207–218. [CrossRef]
48. Parson, E. *Protecting the Ozone Layer: Science and Strategy*; Oxford University Press: Oxford, UK, 2003. [CrossRef]
49. Oreskes, N.; Conway, E.M. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, 1st ed.; Bloomsbury: New York, NY, USA; Berlin, Germany; London, UK, 2010.
50. Frumhoff, P.C.; Heede, R.; Oreskes, N. The climate responsibilities of industrial carbon producers. *Clim. Chang.* **2015**, *132*, 157–171. [CrossRef]
51. Supran, G.; Oreskes, N. Assessing ExxonMobil's climate change communications (1977–2014). *Environ. Res. Lett.* **2017**, *12*, 084019. [CrossRef]
52. Lamb, W.F.; Mattioli, G.; Levi, S.; Roberts, J.T.; Capstick, S.; Creutzig, F.; Minx, J.C.; Müller-Hansen, F.; Culhane, T.; Steinberger, J.K. Discourses of climate delay. *Glob. Sustain.* **2020**, *3*, e17. [CrossRef]
53. Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, F.S., III; Lambin, E.F.; Lenton, T.M.; Scheffer, M.; Folke, C.; Schellnhuber, H.J.; et al. A safe operating space for humanity. *Nature* **2009**, *461*, 472–475. [CrossRef] [PubMed]
54. Rockström, J.; Steffen, W.; Noone, K.; Persson, Å.; Chapin, F.S., III; Lambin, E.; Lenton, T.M.; Scheffer, M.; Folke, C.; Schellnhuber, H.J.; et al. Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecol. Soc.* **2009**, *14*, 1–33. [CrossRef]
55. Steffen, W.; Richardson, K.; Rockström, J.; Cornell, S.E.; Fetzer, I.; Bennett, E.M.; Biggs, R.; Carpenter, S.R.; de Vries, W.; de Wit, C.A.; et al. Sustainability. Planetary boundaries: Guiding human development on a changing planet. *Science* **2015**, *347*, 1259855. [CrossRef]

56. Pagliacci, F.; Defrancesco, E.; Bettella, F.; D'Agostino, V. Mitigation of Urban Pluvial Flooding: What Drives Residents' Willingness to Implement Green or Grey Stormwater Infrastructures on Their Property? *Water* **2020**, *12*, 3069. [CrossRef]
57. Choon, S.W.; Ong, H.B.; Tan, S.H. Does risk perception limit the climate change mitigation behaviors? *Environ. Dev. Sustain.* **2019**, *21*, 1891–1917. [CrossRef]
58. Pedoth, L.; Stawinoga, A.E.; Thaler, T.; Schneiderbauer, S.; Carnelli, F.; Damyanovic, D. Impacts of hazard maps on individual reaction? Results from a case study in South Tyrol, Italy. *Int. J. Disaster Risk Reduct.* **2025**, *130*, 105803. [CrossRef]
59. Greenberg, L.S.; Paivio, S.C. *Working with Emotions in Psychotherapy*; The Practicing Professional; Guilford Press: New York, NY, USA, 1997.
60. Moser, S.C. Getting real about it: Navigating the psychological and social demands of a world in distress. In *Environmental Leadership: A Reference Handbook*; Gallagher, D.R., Ed.; The SAGE Reference Series on Leadership; SAGE: Thousand Oaks, CA, USA; London, UK, 2012; pp. 432–440.
61. Gregersen, T.; Andersen, G.; Tvinnereim, E. The strength and content of climate anger. *Glob. Environ. Chang.* **2023**, *82*, 102738. [CrossRef]
62. Kovács, L.N.; Jordan, G.; Berglund, F.; Holden, B.; Niehoff, E.; Pohl, F.; Younssi, M.; Zevallos, I.; Ágoston, C.; Varga, A.; et al. Acting as we feel: Which emotional responses to the climate crisis motivate climate action. *J. Environ. Psychol.* **2024**, *96*, 102327. [CrossRef]
63. Mehleb, R.I.; Kallis, G.; Zografos, C. A discourse analysis of yellow-vest resistance against carbon taxes. *Environ. Innov. Soc. Transitions* **2021**, *40*, 382–394. [CrossRef]
64. Reay, D. Coal Mine Protests in Germany and Poland Highlight Phase-Out Challenges. 2020. Available online: https://www.cleanenergywire.org/news/coal-mine-protests-germany-and-poland-highlight-phase-out-challenges (accessed on 2 September 2025).
65. Via AP News Wire. Polish miners, power workers, protest shift away from coal Solidarity Czech Republic Prague Warsaw European Union. *The Independent*, 9 June 2021.
66. Haas, T.; Sander, H.; Fünfgeld, A.; Mey, F. Climate obstruction at work: Right-wing populism and the German heating law. *Energy Res. Soc. Sci.* **2025**, *123*, 104034. [CrossRef]
67. Neukirch, M. Grinding the grid: Contextualizing protest networks against energy transmission projects in Southern Germany. *Energy Res. Soc. Sci.* **2020**, *69*, 101585. [CrossRef]
68. Prochaska, A.; Smith, M. How Local Opposition Can Thwart Renewable Energy Projects. *POWER Magazine*, 1 October 2024.
69. Foehringer Merchant, E. Community Opposition and Grid Challenges Slow the Pace of Renewable Efforts, National Survey of Developers Shows. *Inside Climate News*, 23 February 2024. Available online: https://insideclimatenews.org/news/23022024/community-opposition-and-grid-challenges-slow-pace-of-renewable-efforts/ (accessed on 2 September 2025).
70. EHN Curators. Europe's renewable energy growth faces backlash as communities demand more benefits and engagement. *Environmental Health News*, 7 May 2025 .
71. Nugent, C. Why Greta Thunberg and Other Climate Activists Are Protesting Wind Farms in Norway. *Time*, 28 February 2023.
72. Töller, A.E.; Garske, B.; Rasch, D.; Weigel, A.; Hahn, H. Failing successfully? Local referendums and ENGOs' lawsuits as challenges to wind energy expansion in Germany. *Z. Vgl. Polit.* **2024**, *18*, 273–301. [CrossRef]
73. Polczer, S. Alberta communities unite in grassroots protest against solar farms. *Western Standard*, 17 March 2025.
74. The Brussels Times with Belga. Associations call for a moratorium on wind and solar farms in the EU. *The Brussels Times*, 4 June 2025. Available online: https://www.brusselstimes.com/1611672/associations-call-for-a-moratorium-on-wind-and-solar-farms-in-the-eu (accessed on 2 September 2025).
75. Cain, N.L.; Nelson, H.T. What drives opposition to high-voltage transmission lines? *Land Use Policy* **2013**, *33*, 204–213. [CrossRef]
76. Big Bad Biomass International Action: Protests in Indonesia against Biomass Co-Firing. *Trend Asia*, 21 October 2022.
77. Bower, A. Community members protest planned biofuel plant near Peace Arch border. *CityNews Vancouver*, 30 October 2023.
78. Protest against ethanol plant turns violent in Gadwal. *Times of India*, 5 June 2025.
79. Wetzels, H. How a Nitrogen Crisis Turned Dutch Farmers to Rage. *ARC2020*, 12 February 2021.
80. Darroch, G. Farmers to stage new protest against nitrogen plans on October 16. *DutchNews* , 7 October 2019. Available online: https://www.dutchnews.nl/2019/10/farmers-to-stage-new-protest-against-nitrogen-plans-on-october-16/ (accessed on 2 September 2025).
81. Stanley, S.K.; Hogg, T.L.; Leviston, Z.; Walker, I. From anger to action: Differential impacts of eco-anxiety, eco-depression, and eco-anger on climate action and wellbeing. *J. Clim. Chang. Health* **2021**, *1*, 100003. [CrossRef]
82. Bryant, A. What Is Climate Grief? 2019. Available online: www.climateandmind.org/what-is-climate-grief (accessed on 20 July 2025).
83. Hamilton, J. "Alchemizing Sorrow Into Deep Determination": Emotional Reflexivity and Climate Change Engagement. *Front. Clim.* **2022**, *4*, 786631. [CrossRef]

84. Blake, J. Overcoming the 'value–action gap' in environmental policy: Tensions between national policy and local experience. *Local Environ.* **1999**, *4*, 257–278. [CrossRef]
85. Kollmuss, A.; Agyeman, J. Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environ. Educ. Res.* **2002**, *8*, 239–260. [CrossRef]
86. Agarwal, S.; Kweh, Q.L.; Goh, K.W.; Wider, W. Redefining marketing strategies through sustainability: Influencing consumer behavior in the circular economy: A systematic review and future research roadmap. *Clean. Responsible Consum.* **2025**, *18*, 100298. [CrossRef]
87. Sasaki, N. Addressing scandals and greenwashing in carbon offset markets: A framework for reform. *Glob. Transitions* **2025**, *7*, 375–382. [CrossRef]
88. Mateo-Márquez, A.J.; González-González, J.M.; Zamora-Ramírez, C. An international empirical study of greenwashing and voluntary carbon disclosure. *J. Clean. Prod.* **2022**, *363*, 132567. [CrossRef]
89. Stolz, N.; Probst, B. The negligible role of carbon offsetting in corporate climate strategies. *Nat. Commun.* **2025**, *16*, 7963. [CrossRef]
90. Huang, F.; Wu, J.; Wu, Z.; Fu, W.; Guo, P.; Zhang, Z.; Khan, F. Unpacking greenwashing: The impact of environmental attitude, proactive strategies, and network embeddedness on corporate environmental performance. *J. Environ. Manag.* **2025**, *373*, 123625. [CrossRef]
91. Cabiyo, B.; Field, C.B. Embracing imperfection: Carbon offset markets must learn to mitigate the risk of overcrediting. *PNAS Nexus* **2025**, *4*, pgaf091. [CrossRef]
92. Botha, A. Carbon Credit Caution: Lessons from Kenya's Offset Controversy. *FurtherAfrica*, 6 August 2025.
93. Biogradlija, A. Carbon Offsets in Kenya: Scrutiny Over Conservation, Community Rights, and Profit Distribution. *EnergyNews* , 13 January 2025. Available online: https://energynews.biz/carbon-offsets-in-kenya-scrutiny-over-conservation-community-rights-and-profit-distribution/ (accessed on 2 September 2025).
94. Cisneros, E.; Kis-Katos, K.; Nuryartono, N. Palm oil and the politics of deforestation in Indonesia. *J. Environ. Econ. Manag.* **2021**, *108*, 102453. [CrossRef]
95. Helfgott, A.; Midgley, G.; Chaudhury, A.; Vervoort, J.; Sova, C.; Ryan, A. Multi-level participation in integrative, systemic planning: The case of climate adaptation in Ghana. *Eur. J. Oper. Res.* **2023**, *309*, 1201–1217. [CrossRef]
96. Paulis, E.; Pilet, J.B.; Vittori, D.; Rojon, S. When climate assemblies call for stringent climate mitigation policies: Unlocking public acceptance or fighting a losing battle? *Environ. Sci. Policy* **2025**, *171*, 104159. [CrossRef]
97. Frantzeskaki, N.; Loorbach, D.; Meadowcroft, J. Governing societal transitions to sustainability. *Int. J. Sustain. Dev.* **2012**, *15*, 19. [CrossRef]
98. Hölscher, K.; Avelino, F.; Wittmayer, J.M. Empowering Actors in Transition Management in and for Cities. In *Co-creating Sustainable Urban Futures*; Springer: Cham, Switzerland, 2018; Volume 11, pp. 131–158. [CrossRef]
99. Reianu, D.G.; Dobra, D.M. Digital Public Consultation and the Opportunities for Participatory Democracy: An Exploratory Study. *Soc. Sci.* **2024**, *13*, 630. [CrossRef]
100. Calabria, L.; Marks, E. A scoping review of the impact of eco-distress and coping with distress on the mental health experiences of climate scientists. *Front. Psychol.* **2024**, *15*, 1351428. [CrossRef] [PubMed]
101. Pihkala, P. Klimakummer, Klimadepression und Solastalgie. In *Climate Emotions: Klimakrise und Psychische Gesundheit*; Psychosozial-Verlag: Gießen, Germany, 2022; pp. 97–128. Available online: https://researchportal.helsinki.fi/en/publications/klimakummer-klimadepression-und-solastalgie (accessed on 20 July 2025).
102. Hickman, C.; Marks, E.; Pihkala, P.; Clayton, S.; Lewandowski, R.E.; Mayall, E.E.; Wray, B.; Mellor, C.; van Susteren, L. Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *Lancet Planet. Health* **2021**, *5*, e863–e873. [CrossRef]
103. Cosentino, M.; Gal-Oz, R.; Safer, D.L. Community-Based Resilience: The Influence of Collective Efficacy and Positive Deviance on Climate Change-Related Mental Health. In *Storytelling to Accelerate Climate Solutions*; Coren, E., Wang, H., Eds.; Springer: Cham, Switzerland, 2024; pp. 319–338. [CrossRef]
104. Hayes, K.; Blashki, G.; Wiseman, J.; Burke, S.; Reifels, L. Climate change and mental health: Risks, impacts and priority actions. *Int. J. Ment. Health Syst.* **2018**, *12*, 28. [CrossRef]
105. Lampert, T.; Costa, J.; Santos, O.; Sousa, J.; Ribeiro, T.; Freire, E. Evidence on the contribution of community gardens to promote physical and mental health and well-being of non-institutionalized individuals: A systematic review. *PLoS ONE* **2021**, *16*, e0255621. [CrossRef]
106. Hume, C.; Grieger, J.A.; Kalamkarian, A.; D'Onise, K.; Smithers, L.G. Community gardens and their effects on diet, health, psychosocial and community outcomes: A systematic review. *BMC Public Health* **2022**, *22*, 1247. [CrossRef]
107. Bellehumeur, C.R.; Carignan, L.M.; Robinson, N. Acceptance and commitment therapy to alleviate climate-induced psychological distress. *Br. J. Guid. Couns.* **2024**, 1–13. [CrossRef]

108. Georgi, B.; Swart, R.; Marinova, N.; van Hove, B.; Jacobs, C.; Klostermann, J.; Kazmierczak, A.; Peltonen, L.; Kopperoinen, L.; Oinonen, K.; et al. *Urban Adaptation to Climate Change in Europe: Challenges and Opportunities for Cities Together with Supportive National and European Policies*; EEA Report; European Environment Agency: Copenhagen, Denmark, 2012; Volume 2.
109. ClimaSTORY—l'Adaptation au Changement Climatique. Available online: https://climastory.fr/ (accessed on 7 April 2025).
110. Bokhove, O.; Hicks, T.; Zweers, W.; Kent, T. Wetropolis extreme rainfall and flood demonstrator: From mathematical design to outreach. *Hydrol. Earth Syst. Sci.* **2020**, *24*, 2483–2503. [CrossRef]
111. Baselt, I.; Großmann, L.; Rieger, W. Naturgefahrenmodelle—Interaktive Tools für eine erfolgreiche Risikokommunikation. *Wildbach- Lawinen- Eros.- Steinschlagschutz* **2023**, *87*, 16–25.
112. Sermet, Y.; Demir, I. Virtual and augmented reality applications for environmental science education and training: Chapter 17. In *New Perspectives on Virtual and Augmented Reality*; Daniela, L., Ed.; Perspectives on Education in the Digital Age; Routledge: London, UK, 2020; pp. 261–275. [CrossRef]
113. Baselt, I. Study of Physical Natural Hazard Models: Final Report: Technical Report. Available online: https://www.capa-eusalp.eu (accessed on 20 July 2025).
114. Bär, C.; Johnsen, L.; Gölz, S. Potenzial von Serious Games als Instrument zur Beförderung von Nachhaltigkeit: Eine Betrachtung aus Sicht des Umweltbundesamtes: UBA TEXTE 80/2023. Available online: https://www.umweltbundesamt.de/publikationen/potenzial-von-serious-games-als-instrument-zur (accessed on 20 July 2025).
115. HQ50 Serious Game: Hochwasser in Ihrer Gemeinde! 2024. Available online: https://howapro.de/howa-hq50-game/ (accessed on 20 July 2025).
116. Wachinger, G.; Renn, O.; Begg, C.; Kuhlicke, C. The risk perception paradox–implications for governance and communication of natural hazards. *Risk Anal. Off. Publ. Soc. Risk Anal.* **2013**, *33*, 1049–1065. [CrossRef] [PubMed]
117. Regmi, B.R.; Star, C.; Leal Filho, W. Effectiveness of the Local Adaptation Plan of Action to support climate change adaptation in Nepal. *Mitig. Adapt. Strateg. Glob. Chang.* **2016**, *21*, 461–478. [CrossRef]
118. Bizikova, L.; Pinter, L.; Tubiello, F.N. Recent Progress in Applying Participatory Scenario Development in Climate Change Adaptation in Developing Countries. Part II. Available online: https://www.iisd.org/system/files/publications/participatory-scenario-development-climate-change-adaptation-part-ii.pdf (accessed on 20 July 2025).
119. Wolff, E.; French, M.; Ilhamsyah, N.; Sawailau, M.J.; Ramírez-Lovering, D. Collaborating With Communities: Citizen Science Flood Monitoring in Urban Informal Settlements. *Urban Plan.* **2021**, *6*, 351–364. [CrossRef]
120. Manteaw, B.O.; Amoah, A.B.; Boadi, J.; Awuah, P.; Dorcoo, S. Accelerating climate action through increased knowledge: Transitional learning innovations for subnational adaptation planning in Ghana. *Soc. Impacts* **2025**, *6*, 100126. [CrossRef]
121. Harcourt, R.; Bruine de Bruin, W.; Dessai, S.; Taylor, A. Envisioning Climate Change Adaptation Futures Using Storytelling Workshops. *Sustainability* **2021**, *13*, 6630. [CrossRef]
122. Fernández-Llamazares, Á.; Cabeza, M. Indigenous Storytelling and Climate Change Adaptation. In *Resilience Through Knowledge Co-Production*; Roué, M., Nakashima, D., Krupnik, I., Eds.; Cambridge University Press: Cambridge, UK, 2022; pp. 247–260. [CrossRef]
123. Pitt, C.; Norris, K. Climate change and mental health: Postgraduate psychology student and program coordinator perspectives from Australia and Aotearoa New Zealand. *Aust. Psychol.* **2024**, 59, *553–565.* [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.