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Abstract

This state-of-the-art report summarizes the current academic and practical literature on the role of human and social factors in the implementation of sustainability goals in the Alpine region. Drawing on interdisciplinary sources from behavioural science, social psychology, governance studies and sustainability research, the report analyzes the so-called "human implementation gap" - the discrepancy between broad societal support for sustainability and the actual behavioural and institutional changes observed in practice. The analysis identifies key drivers of this gap, including individual attitudes, social norms, institutional frameworks and communication dynamics. Special attention is given to participatory stakeholder management, an analysis of sustainability workshops, and multi-level governance approaches. Based on a selected body of empirical studies, sustainability projects and workshops, the report identifies good practices and transferable models.

Keywords:
human implementation gap; sustainability transformation; Alpine region; stakeholder engagement; participatory governance; behavioural change; cross-border cooperation; marginalized groups; environmental communication; sustainability competences

1 Introduction

The Tenth Report on the State of the Alps (Marot et al., 2025) underlines the high vulnerability of the region to both environmental and socio-economic pressures and highlights the central role of human action in shaping a sustainable future. It emphasizes that technical innovation and political commitment alone are not sufficient; rather, successful implementation of sustainability goals requires a deep understanding of the human and social dimensions that influence change on the ground. Participatory governance, social cohesion and active community engagement are identified as critical drivers for building resilience and promoting sustainable development. Addressing these factors is essential to bridging the persistent "human implementation gap"- the discrepancy between widespread awareness of sustainability issues and the behavioural, institutional, and structural changes needed to address them.

This state-of-the-art-analysis report responds to these challenges by providing a comprehensive overview of the current state of knowledge on the behavioural and institutional factors affecting the implementation of sustainability goals in the Alpine region. It draws on insights from academic literature, practical case studies and project experience, with a particular focus on workshops and good practice examples.

The report is organized as follows:

Chapter 2 explains the applied methodology, including a multimedia and interdisciplinary literature review strategy, which provided the foundation for the subsequent analysis. Building on this, Chapter 3 presents the main results, structured into four sub-chapters. Chapter 3.1 analyzes the human implementation gap by exploring psychological, social, and institutional factors that hinder sustainable transformation, and discusses evidence-based intervention strategies as well as the importance of effective communication and change management. Following this, Chapter 3.2 examines the main stakeholder constellations in the Alpine region, highlighting the complexity of multi-level governance and emphasizing the need for inclusive approaches that also address marginalized groups. Chapter 3.3 then shifts the focus to cross-border governance structures, illustrating their contribution to sustainable development through the presentation of both institutional frameworks and practical examples. In addition, Chapter 3.4 reviews selected workshops and training programs that aim to promote sustainability competencies, strengthen individual agency, and support system-level change. Finally, Chapter 4 discusses the overarching findings and draws conclusions for the next steps in the project HumanFactor. The report is completed by a glossary, a bibliography, and a list of supplementary sources to support further reading and application.

Originally, a chapter on mountain sports was planned. During the research, it became clear that the approaches presented in the literature on mountain sports do not have any outstanding independent approaches specific to mountain sports with regard to the human implementation gap.

Since the other approaches presented in this report are also applicable to mountain sports, we decided not to include a separate chapter.

2 Methodology

This report is based on a structured literature review process. The central research question guiding the analysis was:

> *"What role do human behaviour and social dynamics play in the implementation of sustainability goals in the Alpine region?"*

In order to find what is already known about this question, a multi-media approach was applied. The methodological focus was guided by the heuristic principle "from the inside (individual) to the outside (framework conditions)", allowing for a deep exploration of human behaviour within broader governance and structural contexts. This approach allowed the study of individual motivations, social interactions, and institutional frameworks relevant to the implementation of sustainability in the Alps.

The research process included both scientific and grey literature. All project partners contributed their resources to a common research guide, which served as a centralized knowledge base. The following project partners are involved in the HumanFactor project funded by the Interreg Alpine Space program:

- Federal Ministry of Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management Austria
- Oxalis SCOP France
- Protect Our Winters Austria
- Intersectoral School of Governance Baden-Württemberg, Germany

Literature was selected and reviewed based on its relevance to the research question and the following keywords:

- Core search terms: stakeholder overview, human implementation gap, cross-border governance, workshops/training/materials, best practices, mountain sports.
- Supplementary terms: human factor, sustainability, transition, climate policy, change, human behaviour, attitude-behaviour gap, Alpine region, Alps.

Scientific publications, policy reports, and practical case studies were considered using a snowball sampling method. All search results from online databases (Google Scholar; Springer Link; Pedocs) and institutional repositories were managed using Citavi, which supports citation tracking, keyword tagging, and content annotation. An initial broad search was followed by targeted screening of selected sources, using the research question as the analytical lens. Selected literature was

summarized, categorized, and thematically clustered. The findings were then synthesized to identify patterns and good practices. Particular attention was paid to real-world implementation of sustainability approaches in the Alpine region - such as knowledge transfer in workshops, governance innovations and good practice case studies - that combine human behavior with systemic change. We used ChatGPT in some cases to summarize texts and highlight key findings. We used DEEPL for the translation of French texts into English.

3 Results of the State-of-the-Art-Analysis

3.1 Human Implementation Gap

This chapter analyses what some have called the "human factor"[1] in Alpine sustainability policies (Lückge & Simon 2022), which plays an important but somehow traditionally overlooked role in the implementation gap of these policies. This needs to be distinguished from human factors research in general, which aims to view humans with all their mental limitations not as a problem, but rather as an indispensable component of social systems (Nachbagauer et al. 2020).

3.1.1 Theoretical Background on the Human Factor

3.1.1.1 Psychological Factors: Behavioural Science

As early as in the 1970s, researchers have found that there is a gap between environmental awareness on the one side and pro-environmental behaviour on the other side. The first models to explain this gap were linear and emphasized the role of knowledge. Researchers hypothesized that more knowledge would lead to more awareness and therefore to more pro-environmental behaviour (Kollmus & Agyeman, 2022). Soon, these models were proven to be wrong. It was observed that people's actual behaviour still deviated from pro-environmental attitudes, even when they were educated on matters of the environment. This phenomenon became prominent as the "value-action gap" (Blake 1999) or "attitude-behaviour gap" (Terlau & Hirsch, 2015; Juvan & Dolnicar, 2014) in the behavioural sciences. These two terms will be used synonymously.[2] Given that "changes in demand, including individual behaviour changes, could reduce CO2 emissions by 40% to 70% by 2050" (Valkengoed et al., 2022), overcoming this gap is crucial. This is why researchers have tried for decades to find the most promising theory that explains the deviation of attitudes and behaviour. However, as Kollmus and Agyeman (2002, p. 239) highlight, the „ques-

[1] The *human factor* is understood as the interplay of psychological, social, and institutional elements that influence human behaviour in the context of sustainability transformation.
[2] In contrast to the human implementation gap, which represents the structural level, the two terms describe an individual, psychological level.

tion of what shapes pro-environmental behaviour is such a complex one that it cannot be visualized through one single framework or diagram“. Nevertheless, we still want to mention some of the most important frameworks here.

Similarly to the aforementioned linear models, the theory of planned behaviour argues that “attitudes, social norms and perceived behavioural control affect people’s intentions to behave in certain ways and this again leads to actual behaviour“ (Juvan & Dolnicar, 2014, p. 77). However, critics say that intentions do not automatically translate into behaviour and this has been demonstrated in several studies. Attribution theory is another attempt to explain the attitude-behaviour gap. It argues that “people simply do not see themselves to be the cause of the problem, and therefore do not see behavioural change on their part to be part of the solution“ (ibid., p. 78). Other researchers have used cognitive dissonance theory to explain the phenomenon. This theory claims that people feel psychological discomfort when cognitions about themselves and their behaviour are inconsistent. As a consequence, people respond to cognitive dissonance by adjusting either beliefs or behaviours“ (ibid., p. 79). Research has identified a wide range of psychological factors that contribute to the attitude-behaviour gap. They include claiming there are no alternatives, claiming that other issues are of greater importance, lack of information, being too busy, blaming others, having faith in technological solutions, denying responsibility, displacing responsibility, or arguing there is negligible impact from personal behaviour, to list a few (ibid., p. 77). Research has also found that direct experiences have a much more powerful impact on human behaviour than indirect experiences and the lack of the former might also be a cause for the existing gap (Kollmus & Agyeman, 2022).

3.1.1.2 Social, Institutional and Economic Factors

It should be considered that humans don’t exist in a vacuum but live in societies, groups and contexts that are shaped by many different interplays and dynamics. Therefore, research has not only highlighted psychological (internal) factors that contribute to the human implementation gap, but also emphasized the importance of social, institutional or economic factors (ibid.). Many of the early models to explain the attitude-behaviour gap in sustainability overlooked factors such as economic constraints, social pressures, existing feedback mechanisms about ecological behaviour or even opportunities to choose between different actions (ibid.). Furthermore, there was for a long time no debate about the importance of habits, although previous research indicates that it takes time and practice to make specific behaviour a regular and habitual one. But as Blake (1999) highlights, it is important to look at how people form views about the environment as they live their lives in different social contexts. In regards to the Alpine region consequently “[s]ustainable development in the Alps can only be successful if the social and economic models take into account the needs and opinions of the people living in the Alpine region. This also includes focusing on and raising awareness of the essential and intrinsic role of intact nature and biodiversity for the

quality of life in the Alps: as a basis for agriculture, tourism and recreation, for protection against natural hazards and for many other important ecosystem services“ (Alpine Convention, 2025).

Therefore, a “policy must be sensitive to the everyday contexts in which individual intentions and actions are constrained by socioeconomic and political institutions” (ibid., p. 274). Lawrence (2020) argues similarly – and noticeably two decades later – that it is important to integrate cultural, social and environmental factors, or what he calls “human ecology” (p. 97), into addressing barriers to sustainable development. In his paper he critiques the United Nations 2030 Agenda for Sustainable Development and the SDGs saying that they fail to address human ecology and instead assume a linear cause-effect relationship between resources and goals. In order to overcome the implementation deficits of the SDGs, ecosystem awareness needs to be fostered (ibid., p. 111), which means that the actual contexts and realities people live in need to be paid greater attention to. More recent studies have shown the significance of these social dynamics: Andre and colleagues (2024) for instance emphasize in their paper that many individuals can be considered conditional cooperators which means that they are more likely to contribute to a common good when they believe others do too. However, people often underestimate other’s willingness or support, which leads to a perception gap, which again is an obstacle to pro-environmental action. According to the Human Development report (2024) 69 percent of people around the world report being willing to sacrifice some of their income to contribute to climate change mitigation, while only 43 percent perceive others believing the same.

Correcting this misperception therefore is an important task for policymakers and practitioners.

Blake (1999) sees three obstacles between people’s concern and their actual behaviour. Two of them refer to internal factors: ‘individuality’ which refers to personal attitudes as well as characteristics and ‘responsibility’ which refers to the degree to which a person feels responsible for the environment. The third obstacle refers to an external, social factor: ‘practicality’. By that he means “practical social or institutional constraints that may prevent people from adopting pro-environmental action, regardless of their attitudes or intentions. These include lack of time, lack of money “[…] as well as lack of information, encouragement and pro-environmental facilities such as recycling and adequate public transport provision. Some people may also be physically unable to carry out some environmental actions“ (ibid., p. 268).

Building on these conceptual foundations, the work of Niamir and Creutzig (2025) shows that trust is not just a “soft” factor, but a key structural condition for meaningful participation and transformative change. Their modular modeling approach highlights the importance of transdisciplinary collaboration and calls for the active involvement of stakeholders—not just in the development of future pathways, but throughout the entire modeling process.

While participatory scenario building plays an important role, the authors go further by combining agent-based models, empirical data (such as surveys and big data), and a flexible set of micro-

and macro-level models. This integrated framework enhances the relevance and credibility of decision-making tools and supports policy design that is evidence-based, context-sensitive, and grounded in real-world dynamics. By explicitly considering social behavior, institutional contexts, and technological options, the model offers a strong foundation for developing sustainable transformation pathways that reflect the diversity and complexity of everyday life.

Intervention Strategies

Due to the prevailing human implementation gap, which is largely rooted in human behaviour, both researchers and practitioners have asked themselves: How can we intervene in human behaviour to achieve our sustainability goals? The following chapter focuses on the proposed intervention strategies.

Behaviour change literature has established that interventions do not directly change behaviour itself but target one or more determinants (psychological variables) of behaviour instead (Van Valkengoed et al., 2022). Authors claim that „to understand the effectiveness of interventions, it is necessary to understand which interventions target which determinants of environmental behaviour“ (ibid., p. 1483). This is also highlighted by Vlasceanu and colleagues (2024). Determinants of behaviour include knowledge, attitudes towards the behaviour, self-efficacy, injunctive norms towards the behaviour[3], descriptive norms towards the behaviour[4], problem awareness, ascription of responsibility, outcome efficacy, personal norms and risk perception, self-focused emotions and negative affect towards environmental problems. These determinants can be targeted by different interventions. Some main categories of interventions are:

- information provision
- education
- feedback
- goal setting
- commitment
- incentives (including rewards and penalties)
- nudging (choice architecture)
- individualized marketing
- regulatory or legal obligations (Valkengoed et al., 2022; ADEME, 2016).

A critical point is, that there is no such thing as a miracle tool, it is almost never enough to focus on a single intervention strategy or tool since each has its limitations. For instance, strategies that influence one’s own economic calculations (incentives), changes in one’s environment (nudges)

[3] Injunctive norms refer to individuals’ perceptions of what behaviors are socially approved or morally expected—what people believe they *ought* to do according to societal standards.
[4] Descriptive norms, by contrast, reflect what individuals perceive others *actually* do—what is seen as typical or common behavior in a given social context.

or in one's regulatory constraints (legal obligations) do not lead to a changed relationship between an individual and their environment. On the other hand, strategies aimed at changing one's representation or increasing one's skills (education, information provision) are usually not able to overcome obstacles linked to deficient price signal or lack of available technologies (ADEME, 2016). Therefore, often it is necessary to combine different strategies without overlooking the fact that some might not be compatible. This prompts the question of whether it might not be interesting for the HumanFactor Project to develop a method to survey the need for such tools and then combine the findings in a meaningful way.

In a large-N study analyzing 63 countries, Vlasceanu and colleagues (2024) tested several interventions which were supposed to lead to four climate mitigation outcomes: the belief in climate change, the support for climate change mitigation policy, the willingness to share climate mitigation information on social media and effortful behaviour (tree planting initiatives). They generally found that tailoring of interventions is crucial, meaning that interventions must match audience characteristics, including belief levels, political ideology, and national contexts. They also tested which interventions were most successful for the different outcomes. One exemplary finding is that to boost the belief in climate change the most successful intervention was communication „aimed at reducing the psychological distance of climate change, by making it feel more geographically, socially, and temporally close" (p. 2). The following section discusses the important role of climate communication. We will furthermore come back to the topic of interventions in the chapter „Practical Approaches".

3.1.1.3 Implications for Change Management – Climate Communication

In recent years, the importance of climate communication addressing regular citizens has become a bigger research field and general focal point of change managers, activists and public officials (Evers & Schmid 2025). This development mirrors the literature on the human implementation gap which puts individuals at the center of attention. It also mirrors the wish to intervene in counterproductive human behaviour by means of communication.

The research by Perga et al. (2023) for instance critiques how climate science is communicated through the media. While media coverage increases public awareness, it often emphasizes distant, catastrophic events and downplays solution-oriented or socially grounded knowledge. This leads to disengagement, fear-based responses, and a lack of action. Drawing on psychological theory, the study shows that for communication to be effective, it must promote agency, collective efficacy, and emotional engagement rather than paralysis. It calls for a realignment from "newsworthiness" to "news effectiveness" to better support behaviour change. This insight complements recent practical approaches that aim to develop more constructive, empowering communication tools.

The German project "Klimafakten" released a whole handbook on climate communication (Schrader, 2022). The main objective of the book is to turn the scientific reality of climate change into a social one (ibid., p. 9) by making people talk to each other about the realities of climate change. The main part is divided into 13 chapters, each with an imperative title. Examples are: "Tell stories", "Avoid catastrophism", "Use images, but choose them wisely" or "Avoid scientific jargon". The core message of the handbook is that "[c]ommunication is not linear and one-dimensional, but multi-layered and multidirectional. It has several levels: Words, tones of voice, gestures, facial expressions, unspoken words, images, emotions, associations, people" (ibid.). The Austrian Federal Ministry for Climate Action has similarly released a „Climate Dialogue Guide" (BMK, 2022) and a guide on "Visual Climate Communication" (BMK, 2023) for teachers, public authorities, NGOs or businesses.

The chapter on framing in the Climate Communication Handbook explains that terms are never neutral, but always activate frames of meaning that influence our perception and interpretation. Anyone talking about climate should therefore use language consciously and ask themselves what associations resonate with certain terms. The authors recommend always framing your own concerns in an honest and emotionally resonant way, rather than just arguing factually, and recommend the so-called framing sandwich: moral concern - facts - moral message. Here is an example of what such framing can look like:
We all want a livable future for ourselves and the next generations (moral concern). Scientific evidence shows that our current way of living is driving climate change and environmental degradation (fact).

Choosing sustainable practices is therefore not just sensible, but a reflection of our responsibility and care for each other and the planet (moral message). It can be useful to differentiate between promotion and prevention frames. A table in the book furthermore shows suitable vocabulary pairs, for example:

- Achieve: "seize opportunity", "promote", "strive for", "hope"
- Prevent: "avoid mistakes", "safeguard", "be committed", "responsibility" (Schrader, 2022, p.15).

Another tool described in the handbook is "consensus messaging". It aims to increase confidence in climate science by emphasizing that around 97% of climate scientists agree: Climate change is human-made. Studies show that this message is particularly effective in polarized societies such as the US in reducing doubts and promoting acceptance of climate protection measures. In less polarized countries like Germany the effects are weaker, but consensus messaging can help to lay the foundations for constructive discussions. It is particularly helpful in moments when misinformation or specific doubts about the science emerge. Its effectiveness depends on five factors:

Clarity, emphasis on agreement, transparent citation of sources, relevance of information and repetition. For practitioners, consequently consensus messaging is not a universal cure, but it is a useful tool in the repertoire of good climate communication. Or as climate communication researcher Anthony Leiserowitz sums it up in ten simple words: "It's real, it's us, it's bad, scientists agree, there's hope"(Schrader, 2022, p. 339).

3.1.2 Models for practice

The upcoming section introduces two models that have built up on existing theory on human behaviour and aim at helping practitioners to find the right intervention strategies for their specific problems. Furthermore, a guide to project implementation will be introduced shortly. These practical approaches aim to overcome the well-documented attitude-behaviour gap discussed earlier (Blake, 1999; Kollmuss & Agyeman, 2002), by translating psychological insights into actionable strategies.

UNICEF's **Behavioural Drivers Model** is a conceptual framework to help understand and intervene in human behaviour by identifying the psychological as well as the external factors that drive human decision making. It synthesizes a wide range of behaviour and decision-making theories (some of which have been mentioned in the chapters above) into a practical tool for social and behaviour change programming. It therefore aims to bridge the gap between theory and real-world application and is especially useful for sustainability practitioners. The model consists of two levels. The level 1 drivers model focuses on the main drivers of human behaviour, which in the model are called "factors"[5]. The level 2 drivers model features different dimensions of each factor. The figure below shows several psychological factors (green) as well as sociological (red) and environmental (blue) factors that influence human behaviour. Each of these factors has several determinants. For instance, the factor "interest" has the following determinants: attention, feasibility, potential gains, perceived risks, needed efforts, affordability, desire and so on….

[5] **Driver/factor**: In UNICEF's Behavioural Drivers Model, the terms are used interchangeably at Level 1 to describe broad categories that influence behaviour (e.g. interest, norms, ability). Each driver/factor is further broken down into specific determinants at Level 2.

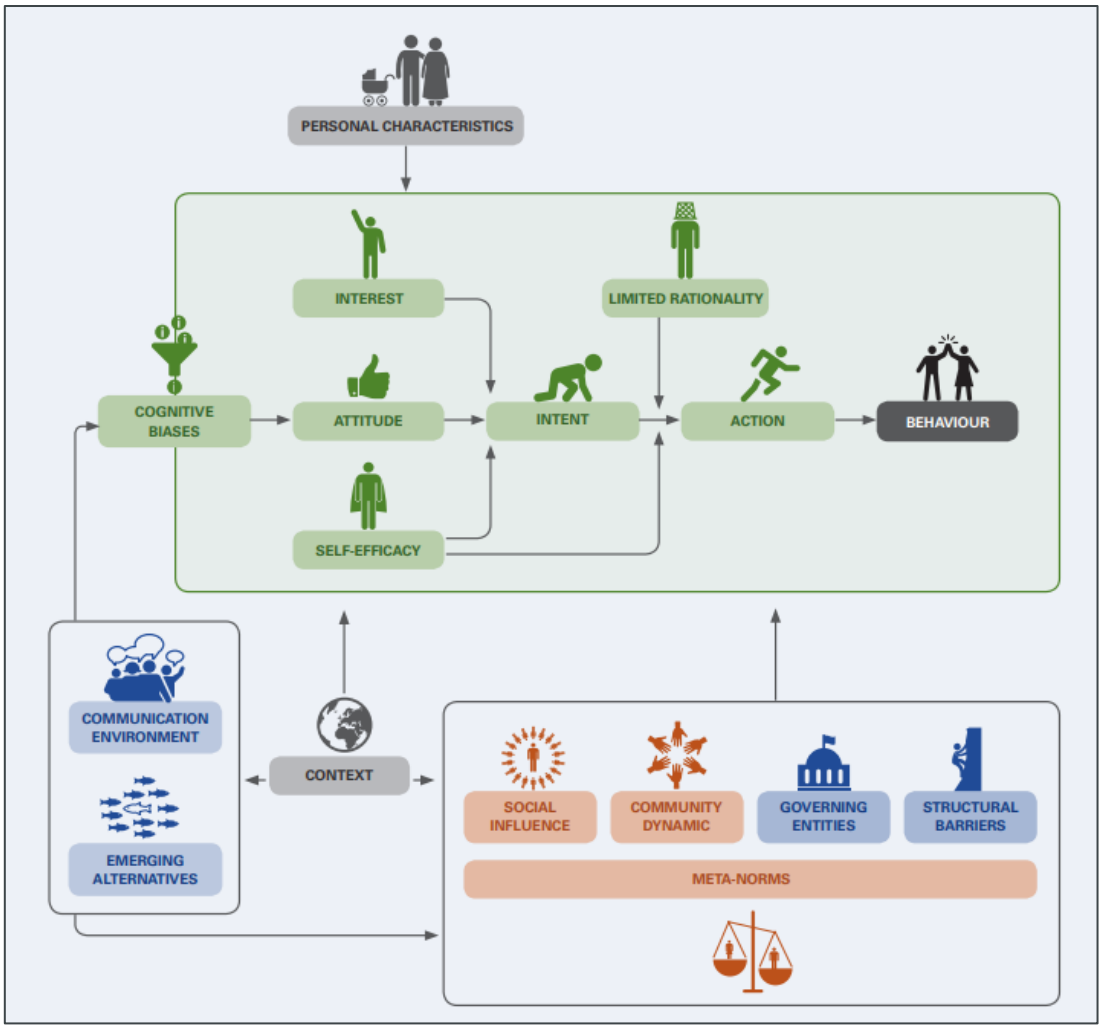

Figure 1: Behavioural Drivers Model Level 1 according to Petit (2019, p. 28).

This model can be applied to guide programme design and the selection of appropriate intervention strategies. Key learnings for practitioners are:

- Start with formative research to identify which behavioural drivers are most relevant in your specific context.
- Narrow down the broad list of theoretical drivers to a focused set of key influences that are evidence-based and locally valid.
- Use these selected drivers as the backbone of your strategy, guiding both the design and targeting of interventions.
- Shift your monitoring focus from activities and outcomes to the behavioural drivers themselves, tracking whether and how they are changing.
- Design adaptive, evidence-based programmes that respond dynamically to what the drivers reveal, ensuring greater impact and resource efficiency.

A similar tool is the **Behaviour Change Wheel** (BCW) developed by Susan Michie, Maartje van Stralen and Robert West. It is a "framework designed to aid intervention designers in moving from a behavioural analysis of a problem to an evidence-based intervention method. This framework allows designers to identify intervention functions and policy categories that can bring about change" (The Decision Lab, 2025). The Behaviour Change Wheel comprises three interconnected layers:

1. The Hub: At the center lies the COM-B model, which identifies three essential components influencing human behaviour: Capability (C), Opportunity (O), and Motivation (M). Effective interventions target one or more of these components to facilitate behaviour change.
2. Intervention Functions: Encircling the hub are nine intervention functions that can address deficits in Capability, Opportunity, or Motivation. These functions include Education, Persuasion, Incentivization, Coercion, Training, Restriction, Environmental Restructuring, Modeling, and Enablement.
3. Policy Categories: The outermost layer consists of seven policy categories that support the implementation and the delivery of intervention functions. These categories encompass Communication/Marketing, Guidelines, Fiscal Measures, Regulation, Legislation, Environmental/Social Planning, and Service Provision (Michie et al. 2025).

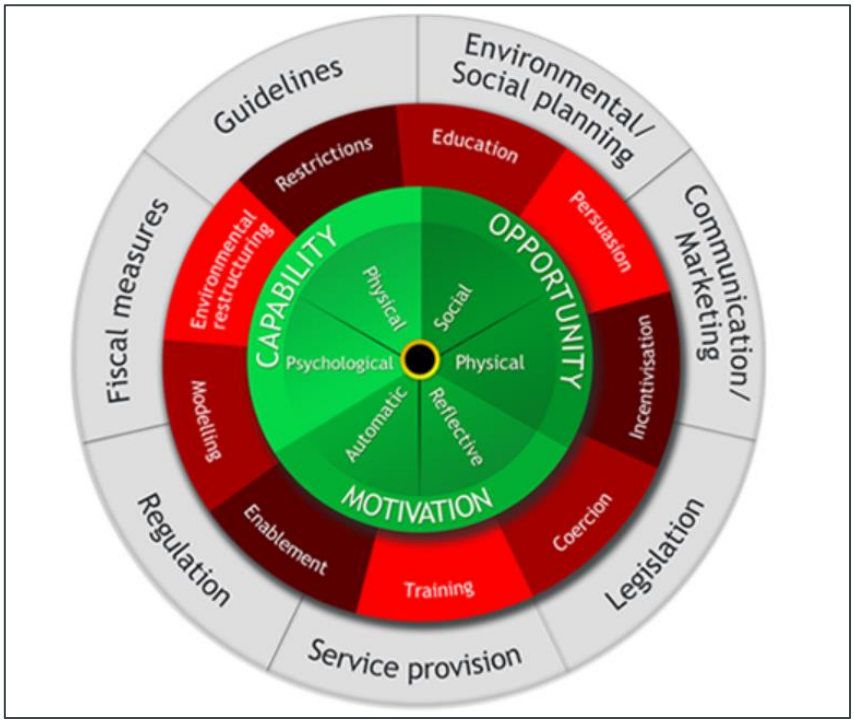

Figure 2: Behaviour Change Wheel (taken from Michie et al., 2025).

According to the authors, BCW „provides a systematic way of identifying relevant intervention functions and policy categories based on what is understood about the target behaviour“ (Michie et al. 2025). Several case studies have applied the BCW and analyzed its usability for creating behaviour change interventions in different situations such as individual energy consumption (Wilson & Marselle, 2016) or personal food choices (Cornish et al., 2019).

These two models can serve as valuable tools for determining intervention strategies, especially in project planning. ADEME (2016) gives practical recommendations for the implementation of such a project. The recommendations are linked to six different stages of a project:

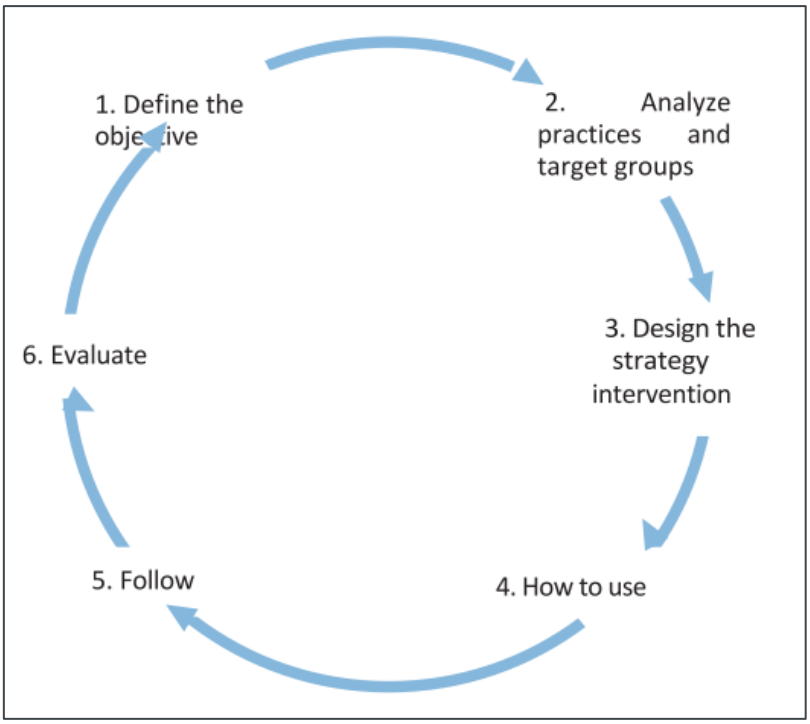

Figure 3: The six stages of a project according to ADEME (2016, p. 145).

The first recommendation is to define a clear objective for the project by asking “what needs to change, for whom, when and to what extent?“ Secondly, it is essential to understand the practice one wants to develop in all its components and to get a good grasp of the targeted population. The third recommendation refers to the stage of the project in which the intervention strategy is planned. At this stage, it is useful to ask key questions such as “What is the target population’s attitude to the proposed behaviour?“ or “Does the target population have the financial means to implement the proposed behaviour?“. More questions can be looked up in ADEME’s report. In the fourth phase, it is advised to minimize implementation risks by setting aside time in the beginning of the project in order to test hypotheses and, if necessary, reorient the project. In a fifth step, it is important to monitor the progress of the progress and lastly, one needs to evaluate whether the project is relevant, coherent, effective and efficient (ADEME, 2016).

3.2 Stakeholders in Alpine Regions

Stakeholder management is a critical success factor in bridging the human implementation gap for sustainability transformation. In Alpine regions such as South Tyrol (Ebner et al., 2022) or Switzerland (Díaz & van Vliet, 2018), studies show that stakeholders hold highly diverse perspectives on ecosystem services and sustainability-related projects - ranging from economically driven views to ecological or cultural concerns. This divergence can lead to tensions in implementation processes and is identified as a contributing factor to the so-called human implementation gap. A lack of trust and poor communication between project initiators and local actors may ultimately lead to resistance or rejection of projects. According to Díaz and van Vliet, trust is an essential component in avoiding these implementation risks: “The finding also points to importance for project initiators to maintain trust during the decision-making process and avoid creating unnecessary implementation barriers” (Díaz & van Vliet, 2018, p. 13). Equally crucial is the continuous flow of information and early involvement of affected actors: “Participants […] wanted to have fluent access to concrete information about the project and its future plans” (p. 14).

Insights from intersectoral governance research further emphasize that successful collaboration across diverse actor groups critically depends on recognizing and addressing asymmetries in power, knowledge, and resources, while continuously fostering trust throughout the cooperation process (Gonser & Schmid, 2023). Moreover, rather than aiming for a single "optimal" solution, it is essential to jointly explore and negotiate acceptable options among stakeholders, acknowledging the multiple, non-linear pathways that complex governance contexts often present (ibid.) This challenge is also reflected in the field of sustainable tourism. Wagenseil et al. (2024) empirically confirm a significant gap between the high strategic relevance assigned to sustainability goals and the actual degree of implementation at destination level: “Despite the indicated importance, the degree of implementation lags significantly behind” (p. 659). This confirms the persistent difficulty of translating shared visions into concrete, coordinated action on the ground. The authors attribute this gap in part to the fragmented nature of Alpine tourism governance, which requires complex, cross-sectoral collaboration. In this context, stakeholder coordination becomes not only a question of process design but a critical success factor for effective transformation.

3.2.1 Multilevel Stakeholder Management

Stakeholder management in the Alpine region is especially complex, as these ecosystems are environmentally fragile and socioeconomically heterogeneous. Competing interests from tourism, agriculture, conservation, and energy development must be mediated carefully. With regard to the human implementation gap, differentiated stakeholder management across national, regional, and municipal levels is essential - each with distinct roles, challenges, and actors (Díaz & van Vliet, 2018; Maccioni et al., 2024; Ebner et al., 2022).

Table 1: Overview of different stakeholder levels

Level	Main Functions	Typical Challenges	Key Stakeholders
National	Strategy and promotion	Distance to practice, top-down risks	Ministries, national agencies
Regional	Mediation and coordination	Diverse interests, network complexity	State authorities, regional authorities, DMOs[6]
Local	Implementation and inclusion	Resource constraints, local conflicts	Municipalities, citizens, local businesses

(own presentation based on ibid.)

Wagenseil et al. (2024) emphasize the importance of clearly defined roles and responsibilities in this multilevel context. They point to the lack of empirical knowledge about how local actors, particularly Destination Management Organizations (DMOs), perceive their responsibilities and act upon them. This gap in role clarity and coordination further complicates the translation of sustainability strategies into local action.

National and Local Governance Perspectives

At the national level, Lange et al. (2018) identify five key principles of good governance applicable across all political levels: "Openness, Participation, Accountability, Effectiveness, [and] Coherence" (p. 4). These principles can be seen as a normative governance framework to support effective and inclusive participatory processes. In line with this, Wagenseil et al. (2024) call for greater institutional coherence between strategic sustainability frameworks and local implementation mechanisms. The misalignment between abstract sustainability criteria and the actual capacities of local stakeholders - such as DMOs - can further exacerbate the human implementation gap if not addressed through clear governance structures and inter-level coordination. At the local level, the sources consistently highlight the importance of culturally sensitive, participatory implementation. Early involvement of fringe stakeholders (Maccioni et al., 2024), acknowledgement of emotional and place-based attachments (Ebner et al., 2022), and the need to address practical trade-offs and conflicts on the ground are key success factors.

[6] A DMO can be defined as a coordinating body that plays a central role in achieving a transformation towards sustainable tourism by formulating a vision, integrating sustainability into destination strategies, and managing stakeholder cooperation. For example: Sustainable Development Manager

Regional Example: Trentino's Stakeholder Engagement Strategy

At the regional level, Maccioni et al. (2024) present a nuanced stakeholder engagement model based on their study in the Trentino region of Northern Italy. They emphasize that managing sustainability in complex socio-ecological systems requires not only the coordination of established stakeholders, but also the active inclusion of marginalized voices. In their study of stakeholder dynamics in sustainable tourism governance, Maccioni et al. (2024) distinguish between core stakeholders and fringe stakeholders. Core stakeholders are those directly involved in delivering essential tourism functions - such as ski-lift operators, transport services, local public institutions, trade associations, and natural park administrations. In contrast, fringe stakeholders include actors with limited influence and fewer resources, such as residents, community groups, and non-tourism sectors. While often excluded from formal planning, these groups may hold important perspectives on sustainability (ibid.).

To engage this broad range of actors, the authors propose a three-stage process: listen, meet, and collaborate. In the first phase "listen", the focus lies on identifying the needs, perspectives, and relevance of diverse stakeholders - both institutional and non-institutional - with particular attention to marginalized or traditionally overlooked groups. This is followed by "meet", where structured spaces for dialogue are established to foster mutual learning, relationship-building, and trust among actors with differing interests and influence. The final phase "collaborate", involves the co-creation of concrete actions and strategies, such as pilot initiatives, joint planning processes, and participatory monitoring mechanisms, thereby ensuring shared responsibility and commitment to sustainability goals. To support the progression from "listen" to "collaboration", the authors highlight the importance of both internal and external incentives that can activate and sustain stakeholder engagement. Internal factors include intrinsic motivations, local values, and leadership qualities, while external triggers comprise formal incentives such as policy frameworks, funding opportunities, or crisis situations. These triggers help move stakeholders beyond passive participation toward active co-responsibility for sustainability. The authors emphasize that particularly the involvement of fringe stakeholders - those not typically included in tourism governance - is not only a matter of social justice but also a condition for the strategic effectiveness of sustainable destination development (ibid.).

Q Methodology as a Participatory Approach on local level

One methodological approach suitable for managing complex stakeholder settings at the local level is the Q methodology. As Doody et al. (2009, p. 1136) explain, it offers "an effective framework for public participation […]. It allows the public to discuss sustainable development in familiar language and in the context of their daily lives". The method combines qualitative input - subjective ranking of opinion statements - with quantitative analysis (factor analysis) to detect shared discourses. It was used by Doody et al. (2009, p. 1130) to combine "public opinion with

technical expertise" for selecting sustainability indicators, and by Díaz and van Vliet (2018) to analyze differing stakeholder perspectives on a photovoltaic pilot project in the Swiss Alps. According to Díaz and van Vliet, Q methodology is "especially suited to determine the different interests of stakeholders' groups" (p. 1). Through Q-sorting, they identified four distinct perspectives, ranging from technocratic supporters to ecologically wary stakeholders. In sum, Q methodology is increasingly recognized as part of the broader family of socio-cultural valuation methods - particularly relevant for participatory, value-driven governance in sensitive contexts like Alpine regions.

Altogether, effective stakeholder management in Alpine regions requires a context-sensitive, multi-level approach that combines strategic coordination, inclusive participation, and culturally informed communication to bridge the human implementation gap. Building on this understanding, it is crucial to take a closer look at the specific roles, challenges, and potentials of marginalized groups within these stakeholder landscapes - actors who are often overlooked but whose involvement is essential for socially just and sustainable transformation processes.

3.2.2 Marginalized Groups

In Alpine sustainability governance, the inclusion of marginalized or underrepresented groups is increasingly acknowledged as both ethically and strategically relevant. As explained Maccioni et al. (2024) refer to these actors as "fringe stakeholders" - including groups such as non-tourism sectors, grassroots initiatives, or socially marginalized communities - who are often excluded from formal planning processes. In contrast, "core stakeholders" are defined as public institutions, environmental authorities, and tourism-related businesses that hold central roles in governance structures. The authors argue that engaging fringe stakeholders enhances the legitimacy and resilience of sustainability strategies, as it opens the process to perspectives and knowledge otherwise overlooked. Their proposed three-phase engagement approach - listen, meet, collaborate - is explicitly designed to reduce structural barriers and progressively involve these actors in meaningful ways.

Although not always labeled as such, marginalized groups also appear in other studies. Ebner et al. (2022) show that stakeholder perceptions of mountain lake ecosystem services are highly diverse, including emotional attachments, cultural meanings, and local knowledge. These less formalized but deeply rooted perspectives can influence project acceptance and effectiveness. The authors recommend socio-cultural valuation as a means to make these perspectives visible and actionable, particularly in managing conflicting expectations and trade-offs (Ebner et al., 2022). Doody and colleagues (2009) demonstrate how participatory tools such as Q methodology can help integrate the voices of marginalized groups by allowing them to express opinions in "familiar language and in the context of their daily lives" (p. 1129). The method's low-threshold design and emphasis on subjective experience are particularly suited for capturing the values and concerns

of those who might otherwise be excluded from expert-driven processes. This approach helps translate diverse social discourses into meaningful indicators for sustainability planning (ibid.). A specific example of structural marginalization is addressed by Oedl-Wieser (2017), who focuses on the role of women in Alpine mountain regions. Despite their significant contributions to sustainable livelihoods, biodiversity preservation, and climate adaptation, women's work is often "invisible and not appreciated enough in society" (p. 809). She attributes this to enduring patriarchal norms, socio-cultural expectations, and difficult economic conditions that limit women's access to decision-making processes (p. 810). This reflects a broader pattern in which structurally disadvantaged groups are not adequately integrated into formal governance structures, despite their critical relevance for sustainability goals.

Considering all aspects, these studies highlight the importance of proactively identifying and engaging marginalized groups in stakeholder processes. Their inclusion not only enhances social justice and legitimacy but also increases the relevance, acceptance, and resilience of sustainability interventions in complex Alpine environments.

3.2.3 Tools for Stakeholder Analysis

A well-founded stakeholder analysis forms the basis for effective participation processes. It serves to systematically identify relevant actors and groups, to make their perspectives visible and to derive suitable participation formats. The ISoG BW toolbox describes two central methods for this purpose: 1. The Influence-Impact Matrix - also known as Power vs. Interest Matrix - helps to classify stakeholders according to how strongly they are affected and how much influence they can exert on the project. This leads to different strategies for engaging, involving, or informing them. The second method is the net-map method. It makes visible not only formal relationships between stakeholders, but also informal networks, influence structures and communication flows - a helpful tool, especially in complex, cross-sectoral projects. Participation Scoping, which is presented on the Baden-Württemberg Participation Portal, offers a structured combination of issue analysis and stakeholder analysis. It links the thematic focus of a project with the relevant stakeholder groups and thus provides a solid basis for strategically oriented participation processes.

3.2.4 Practical Approach

The PlurAlps project (2016-2019), funded by the EU's Interreg Alpine Space Programme, offers a science-based, practical approach to stakeholder engagement in the Alpine context, as outlined in its white paper. It tackled the challenges of migration, demographic change, and social cohesion by fostering inclusive, multi-level governance and local participation. Its design and implementation are directly based on bottom-up, participatory methods that strengthen local capacity and stakeholder cooperation (PlurAlps White Paper, 2020).

Stakeholder Management in Practice (Alpine Cooperation Potential, 2020)

PlurAlps involved a diverse set of actors across sectors and governance levels:

- Local municipalities, mayors and administrations
- Civil society organizations, NGOs, migrant associations
- Education and welfare institutions
- Regional planning authorities and research institutes

The project piloted numerous local integration initiatives, where stakeholder engagement was actively facilitated through instruments such as:

- Social Planning Instruments (SPI) for long-term integration strategies
- Dialogue forums, labs, and participatory workshops for joint decision-making
- Local cooperation networks, often supported by intercultural mediators and coordination staff

PlurAlps explicitly recognized the importance of tailoring engagement strategies to local conditions, and emphasized inclusive participation as a foundation for social innovation. They combined field research with self-evaluations, case studies, and policy analysis. The evaluations revealed:

- High trust and collaborative intensity among local actors
- Low formalization of cooperation structures - often verbal agreements, but strong commitment
- Gaps in economic actor involvement, which were identified as a priority for improvement

(Alpine Cooperation Potential, 2020)

The White Paper concluded with 15 policy recommendations for inclusive stakeholder integration - covering themes from coordination and data governance to pluralist education and conflict mediation.

> *"Experiences from the PlurAlps project show that integration processes are not automatic and need to be consciously designed to bring local actors together." (PlurAlps White Paper, 2020, p. 28)*

PlurAlps stands out as a transferable governance model for stakeholder engagement in rural and mountainous regions. Its social planning tools, open participatory methods, and cross-border cooperation structures offer Alpine municipalities a concrete and evaluated model for inclusive, adaptive governance in the face of societal transformation.

White Paper Download (Title: Fostering pluralism as a key to local development in the Alpine Space)
Alpine Cooperation Report Download (Title: Alpine Cooperation Potential - Practical cooperation potentials between Alpine regions)

3.2.5 Good Practice Example

The AlpES project (2015–2018) aimed to promote a shared understanding and application of the ecosystem services (ES)[7] concept across the Alpine Space. Led by Eurac Research (Italy), it involved ten partners from six Alpine countries and engaged stakeholders in nine regional test areas. The project's focus was on mapping, assessing, and integrating Ecosystem Services into policy and planning - always in close cooperation with relevant stakeholder groups (AlpES Final Report, 2018)

Stakeholder Management:

1. Planning phase:
From the beginning, AlpES placed strong emphasis on co-design. Regional and national stakeholders were consulted early to define indicators and formats for knowledge transfer.

2. Implementation phase:
Stakeholder engagement was carried out through:

- Workshops and interviews, e.g., in Alto Bellunese or Corona Verde.
- WebGIS and WIKIAlps, allowing open access to ES indicators, maps, and methodological information.
- Training tools, including one-day sessions, an e-learning platform, and transnational workshops

3. Evaluation and adaptation:
Stakeholder feedback directly influenced tool development, communication formats, and the adjustment of ES indicators.

Concrete lessons emerged from field experiences (e.g., the need for cultural adaptation of terminology in Veneto, or the need for participatory conflict analysis in the Préalpes d'Azur). These experiences shaped AlpES's final recommendations for inclusive and context-sensitive environmental governance.

[7] Ecosystem services are the direct and indirect benefits that humans derive from nature, such as clean water, fertile soil, climate regulation, and recreational opportunities. The concept helps to make the value of ecosystems visible and supports more sustainable decision-making in areas like land use, planning, and conservation.

Stakeholder Matrix – AlpES Project

Table 2: Stakeholder Matrix AlpEs Project

Stakeholder Group	Role in the Project
Regional and municipal authorities	Integration of ecosystem services into planning and land-use regulation
Scientific institutions	Development of indicators, mapping, and assessment methodologies
NGOs and environmental networks	Outreach, communication, and mediation in stakeholder processes
Local communities and land users	Participation in workshops and consultations; feedback on tool applicability
Policy-makers and ministries	Adoption of ES into regional strategies and formal instruments (e.g. land-use laws)

(own presentation based on AlpES Final Report, 2018)

The AlpES project stands out for its transparent and iterative stakeholder engagement strategy. Rather than applying a one-size-fits-all model, the project co-created tools with local actors, tested them in real-world contexts, and adapted based on evaluation feedback.

> *"The AlpES project has helped to bring the ecosystem services concept onto the agendas of decision-makers. It has also broadened the pool of stakeholders who understand and practice the concept"(p. 25).*

All in all, AlpES empowered Alpine communities and institutions to better understand and manage their surrounding ecosystems, while laying the foundation for more sustainable, inclusive, and knowledge-based regional development.

Link to project and materials:
https://www.alpine-space.eu/project/alpes/

3.3 Alpine Cross-Border Governance

3.3.1 Theoretical and Historical Background

The Alpine region[8] covers a surface area of about 190,000 km^2 and extends over eight countries, namely France, Italy, Switzerland, Liechtenstein, Austria, Germany, Monaco and Slovenia. Around 15 million people live in the Alps. Only after the end of the Second World War, formal

[8] As determined in the Alpine Convention.

cooperation in the Alps has been established (Renner et al. 2010). A milestone in Alpine cooperation was the establishment of the Alpine Convention, which entered into force in 1995 and embodies an international treaty for the protection, preservation, and development of the Alps. It can be seen as an example of cross-border implementation of the Sustainable Development Goals (SDGs) by the United Nations. The work of the Alpine Convention is carried out by several different organs. The highest body of the Convention is the Conference of the Contracting Parties – the Alpine Conference - which usually meets every second year. It is the political decision-making body that discusses goals as well as measures for implementation of the Convention. Other organs are the Permanent Committee of the Alpine Conference that usually meets twice a year as well as the Permanent Secretariat, which is responsible for administrative support. In addition to these organs, there are several working groups and boards that usually work under two-year mandates (Alpine Convention, 2025).

Also in the 1990, so called „Euroregions“ were established. These are smaller border regions that enter into a cooperation network with territorial authorities (Ulrich & Scott, 2021). Together with the establishment of INTERREG Alpine Space in the year 2000, which has enabled cooperation on many levels, these developments created a true „boom“ of Alpine cross-border cooperation. INTERREG is a series of programmes in order to promote European territorial cooperation. It is divided into four strands: strand A covers cross-border cooperation, strand B covers transnational cooperation (e.g. in the Alps), strand C covers interregional cooperation and, lastly, strand d covers outermost areas. The implementation of INTERREG is done through concrete projects, for which different partners from different countries come together. Our project „HumanFactor“ is an excellent example.

In 2015, the EU launched EUSALP, a macroregional strategy for the Alpine space. It forms the strategic basis for cross-border governance in the region. The three thematic pillars of EUSALP are (1) economic growth and innovation, (2) mobility and accessibility and (3) environment and energy. Several working groups started their work in 2016. They have been working on implementation initiatives as well as policy proposals for decision makers in many different policy fields such as forest fire prevention or green infrastructure.

3.3.2 Central Roles of Alpine Cross-Border Governance

In the literature, cross border governance is seen to play several roles or functions. Blatter (2000) lists establishing a regulatory regime, functioning as a transfer hinge, creating an innovation pole and facilitating cross-border coalition building as its main functions. Böhm (2023) views cross-border governance as multi-level governance of the territory, a regional development instrument, an instrument of mutual reconciliation, a visible manifestation of European Integration (see also Nienaber & Wille, 2020), and lastly an important part of the paradiplomatic activities of subnational actors. The last role refers to the assumption that cross-border governance can be a tool for

subnational authorities and other local political actors to pursue their own political vision as they are empowered to do so (Plangger, 2019). What can be observed is a shift from a very national setting, where states plan and govern, to local and subnational actors taking over these roles (Nienaber & Wille, 2020). These roles offer important leverage points for addressing the human implementation gap in Alpine sustainability programs. For example, cross-border coalition building and the empowerment of subnational actors can enhance local ownership and engagement – key factors often missing when implementation falls short. By aligning governance functions with local capacities and values, cross-border governance can help bridge the gap between ambitious sustainability goals and everyday practices.

Alpine cross-border governance differs from regular modes of governance. As the Alps are a region of different nations and many diverse languages with multiple dialects, communication, of course, can be a challenge to cooperation. Alpine cross-border cooperation therefore needs to "overcome discontinuities that result from, for example, difference of systems, political cultures or a complex situation of actors involved in the specific conditions and contexts of border regions" (Nienaber & Wille, 2020, p. 2). In addition to that, remoteness, steepness and to some extent inaccessibility sometimes hinder economic development (Renner et al., 2010). On the other hand, this richness in culture and diversity can also be used as a resource. A major challenge in Alpine cross-border cooperation is intersectoral cleavages. As Blatter (2000, p. 421 & 422) exemplifies, cross-border cooperation in the Lake Constanze Area was in the beginning centered around sectoral focal points, which resulted in very selective cooperation networks and antagonistic visions in regards to what the cooperation is intended to accomplish. Therefore, it is important that cooperation is in fact intersectoral, meaning that different sectors come together to incorporate their specific needs and views into the cooperation. Another challenge to cross-border governance are potential asymmetries that can occur when partners cooperating across borders are embedded at different administrative levels and have very different competencies or resources (Ulrich & Scott 2021).

3.3.3 Good Practice Examples

The Alliance in the Alps (an observer in the HumanFactor Project) represents a well-established practical approach to cross-border governance in the context of sustainable regional development. Founded in 1997, the network brings together approximately 280 municipalities from seven Alpine countries – Austria, Germany, France, Italy, Liechtenstein, Slovenia, and Switzerland - with the shared goal of implementing the principles of the Alpine Convention at the local level.

> *"The aim of the Alliance is to improve the quality of life in the Alpine region in a sustainable way – together, in practice, and in harmony with nature."(alpenallianz.org)*

The Alliance serves as a transnational platform for collaboration and knowledge exchange, enabling municipalities to address shared challenges such as climate adaptation, biodiversity protection, and sustainable tourism. It does so by offering structured support in the form of methodological guidance, funding, training, and facilitation of peer learning.

Core Elements of the Approach

- Decentralized and participatory governance: Municipalities retain ownership of their local processes, while being supported in co-designing projects with residents, NGOs, and local businesses.
- Horizontal exchange: Through workshops, joint projects, and field visits, member municipalities share lessons learned and adapt successful strategies.
- Integration of international policy frameworks: The network explicitly links local practice to the goals of the Alpine Convention, Agenda 2030, and EU cohesion policies.

Stakeholder participation is embedded as a structural principle, not an add-on. Citizens, youth, civil society organizations and local businesses are regularly involved in all project phases – from conception to implementation and reflection.

Link to Alliance in the Alps

A good example of Alpine cross-border cooperation of different authorities is the Allgäu-Walser-Pass. It is a cross-border guest card that tourists in the Oberstdorf (Germany) and Kleinwalsertal (Austria) regions receive. It allows free use of public transport such as buses and trains on both sides of the border as well as numerous discounts at different leisure and cultural facilities. Oberstdorf and the Kleinwalsertal thus form a joint tourist economic area that makes national borders almost invisible in the everyday lives of travelers. The potential of such cooperation is particularly evident in the area of sustainable mobility: Guests are motivated to leave their cars at home and use environmentally friendly offers. The cooperation involves different administrative systems and requires close coordination between German and Austrian stakeholders. In this way, the Allgäu-Walser Pass contributes to traffic calming, the reduction of emissions and sustainable regional development. It is an example of an integrated, Alpine-wide tourism strategy, as is also being pursued within the framework of European programs such as Interreg or EUSALP. The joint development of tourism offers and mobility solutions strengthens the region as a unified destination. Similar offers also exist in other regions, such as the Tiroler Zugspitz Arena, connecting the German region of Garmisch-Patenkirchen with the Austrian region of Tyrol.

Link to Allgäu Walser Pass

The Espace Mont-Blanc is an Alpine cross-border cooperation initiative between France, Italy and Switzerland, in which the French departments of Savoie and Haute-Savoie, the Italian region of Valle d'Aosta and the Swiss canton of Valais are involved. The aim of the cooperation is the protection and sustainable development of the unique Alpine region, which is characterized by its exceptional natural heritage as well as significant economic and tourist activities. Espace Mont-Blanc can be considered as a good example of Alpine cross-border governance, as it has enabled structured cooperation across national borders for over 30 years. The initiative addresses key issues such as environmental protection, sustainable mobility, energy planning, education and climate change adaptation. A central instrument is the Mont Blanc Observatory, which collects and analyzes data on the environment, economy and society to enable well-founded decisions. Another example of cross-border cooperation within Espace Mont Blanc is the AdaPT Mont-Blanc project, which develops climate change adaptation strategies involving local authorities, scientists and the population. This project promotes the exchange of best practices and the development of joint measures to tackle climate challenges in the Alpine region. The Espace Mont-Blanc is also seeking recognition of the Mont Blanc massif as a UNESCO World Heritage Site, which would underline the international importance of this area and further strengthen the protection of its natural and cultural heritage.

Link to Espace Mont Blanc

3.4 Analysis of existing workshops in the field of sustainability

Against the background of the next steps in the project (development of blueprints for regional workshops and skillboxes), this chapter takes a more analytical look at existing workshop concepts.

The researched educational offers in the form of workshops and training courses are intended to help adults and young people outside the school context to acquire knowledge, competencies and skills that will support them in understanding and implementing climate goals. As the terms knowledge, competencies and skills are not always clearly defined, a brief classification of the terms on which this report is based is first required:

Knowledge is not a pedagogical term, but a psychological and sociological one. It describes a complex process of memorizing, linking and remembering content. A distinction is made between declarative knowledge (“knowing that”) and procedural knowledge (“knowing how”) - i.e. between communicable knowledge and applicable skills (Nolda, 2023). According to the Digital Dictionary of Adult and Continuing Education, *competence* is the ability to act appropriately and in a self-organized manner in unknown or complex situations. In addition to knowledge and skills, it also includes social, personal and emotional aspects and is primarily developed through lifelong, experience-based learning (Arnold, 2023). Knowledge is an essential component of competence.

However, knowledge alone is not enough - competence only arises through the interplay of knowledge, ability, willingness and situational application. It is therefore a question of making knowledge capable of action, especially in new or complex situations (Arnold, 2023).

> *"Skills are automated components of human behaviour that are acquired through practice and serve to solve specific tasks." (Gudjons, 2020, p.222).*

Skills refer to concrete, goal-oriented actions that are usually motor, cognitive or sensorimotor in nature - such as reading, arithmetic or a technical skill. In contrast to competence, which also includes motivation, knowledge and situation-appropriate action, skills are narrowly defined and can be trained. This can be put into practice as follows: In a weekend workshop in the Alps, a participant learns how climate change is altering Alpine ecosystems. She learns about local animal and plant species and their vulnerability. Through exercises such as identifying species in the field or creating a climate action plan, she develops skills that she can put into practice. She demonstrates competence when she begins to apply what she has learned to her own way of life, to sensitize others in the village, and to participate actively in a conservation project - self-organized, reflective, and responsible.

The following section introduces selected training formats that were analyzed in relation to the definitions above.

3.4.1 Introduction of Selected Examples

Given the wide range of training courses and workshops available, this report focuses on a curated selection based on their relevance to the research question and accessibility of their conceptual documentation. The following workshops and training programs were selected:

a. ACB Training, Engaging stakeholders for climate act on: how to better consider the "human factor" and use positive narratives A. "hands-on" training for multipliers:

The ACB Climate Action Training is a practical, multi-stage training format that supports key players in the Alpine region in involving stakeholders more effectively in climate protection processes. The focus is on the human factor and the use of positive narratives[9]. The training is aimed at members of the Alpine Climate Board, Rope Teams and multipliers from various sectors. It combines theoretical input, practical exercises and peer-to-peer exchange. Participants learn how to deal with resistance to change, analyze psychosocial influencing factors and develop locally adapted participation strategies. The format is divided into three phases: an online intro, a face-to-face workshop and a practice-oriented follow-up.

[9] This narrative-based approach echoes the recommendations by Perga et al. (2023), who emphasized that climate communication should foster agency and emotional engagement rather than fear and paralysis.

b. Climate Fresk:

The Climate Fresk workshop is a three-hour collaborative learning format that teaches the scientific basis of climate change and enables participants to take action. Based on the reports of the Intergovernmental Panel on Climate Change (IPCC), participants use 42 cards to work out the cause-effect relationships of climate change. it's organized in 3 steps:

1. The "game" itself: understanding the connections between the causes and effects of climate change
2. Creative phase: participants emphasize their learnings through creativity (drawing, naming the poster...)
3. Debrief: discussion about the feelings which were created during the workshop and putting those feelings into context.

This interactive method creates a deep understanding of the systemic relationships. The workshop is suitable for adults and children (aged 9 and over) and can be conducted both in person and online.

c. Carbon literacy training:

The Carbon Literacy Training is a one-day training programme that aims to raise awareness of the carbon costs and impacts of everyday activities and to promote the ability and motivation to reduce emissions at individual, community and organizational levels. Participants acquire knowledge about the basics of climate change, the social and environmental consequences and strategies for reducing emissions. Interactive learning methods enable them to identify and implement concrete measures to reduce their carbon footprint. Upon successful completion, participants receive a certificate that identifies them as “Carbon Literate”.

d. CAS Sustainable Development Bern University of Applied Sciences

The CAS Sustainable Development at the University of Bern provides in-depth knowledge and practical skills in the field of sustainable development, based on the goals of the 2030 Agenda. The program is aimed at professionals from the private sector, public administration and NGOs who wish to expand their skills in the social, environmental and economic dimensions. It comprises eight modules - three compulsory foundation modules and five freely selectable action field modules - as well as two written assignments, for a total of 15 ECTS credits. The course lasts one to two years and is offered in German, English and French.

The following analytical perspective examines how knowledge, skills and competences are addressed in the selected workshops.

3.4.2 Analytical Perspective

The workshops/trainings were systematically analyzed according to the introductory definitions of knowledge, skill and competence.

Knowledge:

All workshops convey foundational sustainability knowledge - ranging from climate science (Climate Fresk, Carbon Literacy) to interdisciplinary policy frameworks (CAS Sustainable Development) and behavioural insights (ACB). However, the depth and complexity of this knowledge varies significantly. CAS stands out by integrating economic, social, and environmental dimensions, while Climate Fresk simplifies knowledge delivery through visual mapping.

Skills:

Practical skills (in Gudjons' sense) are well embedded in all formats. For example:

- ACB trains facilitation techniques and resistance management.
- Carbon Literacy includes carbon footprint analysis and action planning.
- CAS offers project development and interdisciplinary collaboration.
- Climate Fresk enables systems thinking and problem-solving through simulation.

These workshops show that procedural skills are both teachable and transferable, particularly when paired with real-world contexts and stakeholder interaction.

Competence:

Competence, as defined by Arnold, becomes visible where knowledge and skills are applied in complex, self-directed, and often socially mediated situations. The ACB and CAS formats especially foster competence by embedding:

- Self-reflection
- Stakeholder engagement
- Strategic thinking
- Action under uncertainty

In contrast, Climate Fresk and Carbon Literacy build competence more indirectly, focusing on awareness and motivation, which may require follow-up structures to deepen long-term competence development.

The following table summarizes the focus of each workshop across the three defined dimensions:

Table 3: Exemplary analysis grid knowledge, skill, competence

Workshop	Knowledge	Skill	Competence
ACB	Social psychology, change models	Facilitation, narrative use, active listening	Adapting strategies, leading engagement processes
CAS Sustainable Dev.	Sustainability frameworks, SDGs	Project dev., interdisciplinary teamwork	Strategic leadership, real-world implementation
Carbon Literacy	Climate science, emissions data	CO_2 tracking, action planning	Critical reflection, initiating personal action
Climate Fresk	IPCC-based systems knowledge	Systems mapping, visual synthesis	Understanding complexity, motivating action

(own presentation based on analysis of the 4 workshops)

To contextualize the analysis within a broader policy framework, the following section relates the workshop findings to EPALE's Decalogue of Good Practice. The EPALE article "Helping Adults Build Skills for a Sustainable Future" emphasizes the critical role of adult education in promoting sustainability across environmental, economic, and social dimensions.

> *"Beyond the core vocational skills that receive the lion's share of attention from policy-makers and education and training providers, there is a need to broaden the range of adult learning provision to include sustainability-related skills if we are to pave the way for a more sustainable environment, society and economy" (EPALE, 2025).*

The article presents a "Decalogue of Good Practice", outlining ten key strategies for effectively equipping adult learners with sustainability competencies (EPALE, 2025):

1. **Adopt a forward-looking perspective:** Recognize that essential sustainability skills evolve over time; therefore, education should anticipate and adapt to future developments.
2. **Predict possible sustainable futures:** Identify potential pathways to sustainability to determine the skills necessary for navigating these futures.
3. **Cultivate futures thinking competencies:** Help learners anticipate and mitigate unintended consequences of their actions on sustainability.

4. **Foster unlearning and relearning:** Encourage adults to challenge outdated knowledge and embrace new learning aligned with sustainable practices.
5. **Emphasize resilience competences:** Develop learners' abilities to adapt to change, manage uncertainty, and recover from disruptions.
6. **Establish a sustainability competence framework:** Utilize frameworks like the European Union's GreenComp[10] (Bianchi et al., 2022) to map and develop key sustainability competencies.
7. **Continuously update competence areas:** Regularly revise the competency framework to address emerging sustainability challenges and opportunities.
8. **Build alliances for sustainability dialogue:** Foster collaborations among academia, vocational education and training providers, practitioners, and industry to enhance sustainability education.
9. **Understand learner barriers:** Identify and address obstacles that prevent adults from fully engaging in sustainability education.
10. **Understand learner motivation:** Explore and leverage factors that motivate adults to pursue and apply sustainability-related competencies.

(EPALE, 2025)

By implementing these practices, adult education can play a pivotal role in facilitating the transition toward a sustainable future.

The cross-analysis with EPALE's "Decalogue of Good Practice" reveals several strengths - and some systemic gaps:

Table 4: Strength of workshops

EPALE Principle	Most Strongly Fulfilled By	Observations
1. Forward-looking perspective	CAS, ACB	Climate and policy foresight integrated
2. Visioning sustainable futures	CAS	Structured vision-building in project work, limited in one-off formats

[10] "GreenComp consists of four competence 'areas' that correspond to the definition of sustainability; and the 12 'competences' that, taken together, make up the building blocks of the sustainability competence for all people" (Bianchi, 2022, p.14).

3. Understanding negative impacts	Carbon Literacy, Climate Fresk	Strong behavioural framing and awareness-building
4. Fostering unlearning & relearning	CAS, ACB	Facilitate paradigm shifts and reflection
5. Resilience competences	CAS, ACB	Managing uncertainty and change addressed
6. Sustainability competence frameworks	CAS, Carbon Literacy	Explicit or implicit align-ment with frameworks like GreenComp
7. Updating competence ar-eas	CAS, Climate Fresk	Regular content updates, but less focus on meta-compe-tence evolution
8. Alliances across sectors	ACB, CAS	Clear intersectoral links; less developed in more grass-roots formats
9. Understanding learner barriers	ACB, CAS	Embedded in design and group facilitation
10. Understanding learner motivation	Climate Fresk, Carbon Liter-acy	Emotional engagement and agency-building central to approach

(own presentation based on ibid.)

While the workshops deliver strong content and methodology, the following areas offer potential for development:

- Strengthen continuity and follow-up, especially in short-term formats
    - to truly build competence, learning needs continuity - opportunities for practice, reflection, feedback, and application over time.
- Build meta-cognitive and resilience skills more explicitly
    - think about our own thinking in monitoring how we learn, reflecting on how we make decisions, adjusting our strategies when things don't go as planned

- Frame learning objectives more clearly around transformative competence[11]
    - those competencies empower learners not only to learn about sustainability, but to act for it. In a way that is context-sensitive, reflective, and future-oriented

The final section draws conclusions and outlines implications for the development of future formats.

3.4.3 Recommendations from the workshop analysis for further discussion

Based on the comparative analysis of competence definitions and the EPALE guidelines, the following recommendations are proposed:

- Support ongoing competence building: Offer mentoring, action projects or peer reflection sessions after initial workshops (community of practice).
- Clarify competence-oriented learning outcomes: Go beyond factual knowledge to articulate what learners should be able to do in complex, real world situations.
- Balance declarative and procedural knowledge: Combine "knowing that" (facts/theory) with "knowing how" (methods/application) in all phases of the workshop.
- Embed reflective and social dimensions: Encourage group learning, critical dialogue and context-sensitive decision making to promote holistic competence.

In sum, these educational offers show considerable potential to foster sustainability competences - particularly when they combine well-structured content with applied, reflective and socially embedded learning pathways.

4 Conclusion

This report highlights several key insights that will directly inform the next steps of the HumanFactor project. The analysis shows that bridging the human implementation gap requires not only a deeper understanding of individual behaviour, but also new ways of supporting learning, collaboration, and long-term engagement across different stakeholder groups.

For the planned project workshop (WP 1.1), where the results of this report will be presented and discussed, several preliminary recommendations emerge that can serve as a starting point for further dialogue and development. Regarding the upcoming training sessions (WP 1.4), the findings suggest that future formats should go beyond traditional knowledge transfer. It will be important to create spaces that combine theoretical input with practical exercises, promote self-reflection

[11] The seven key competencies for sustainability listed by UNESCO can be seen as an example of transformative competencies: "These key competencies for sustainability describe the knowledge, skills, attitudes and values that enable people to reflect on their own actions, deal with complexity and work for change" (p. 10). The seven competencies are therefore designed to enable change, i.e. to act in a transformative way (UNESCO, 2017).

and peer learning, and work with real-life cases to strengthen participants' ability to act in complex, uncertain environments. Attention should also be paid to emotional and social dynamics, which play a key role in behavioural change but are often overlooked in conventional training settings. The creation of a modular Skillbox (WP 1.3) is another key step. Based on the report's findings, the Skillbox should provide flexible, easy-to-apply tools for behavioural change and stakeholder engagement. It should offer clear guidance on combining different intervention strategies depending on the audience and context, and it should encourage adaptation rather than rigid application. Practical templates, checklists, and examples derived from behavioural science and participatory governance approaches could help practitioners transfer knowledge into action more effectively. Finally, the establishment of a Community of Practice (WP 2.1) appears crucial to sustaining momentum beyond individual trainings. As the analysis underlines, successful transformation processes are rarely achieved through one-off events. A Community of Practice can provide a platform for regular exchange, shared learning, and collective innovation. To be effective, it should build on trust and openness, encourage cross-sectoral networking, and be firmly anchored in the real challenges that practitioners face in their local contexts.

These initial recommendations are intended as a discussion basis for the upcoming project workshop (WP 1.1). They aim to ensure that the next project steps are firmly rooted in the evidence and insights gathered through this report, while leaving room for joint refinement and further co-creation with the HumanFactor team and stakeholders.

5 Glossary of Key terms

Attitude-Behaviour Gap

The observed mismatch between individuals' environmental attitudes and their real-life actions. Also referred to as the value-action gap.

Behaviour Change Wheel (BCW)

A framework for designing behaviour change interventions, built around the COM-B model of Capability, Opportunity, and Motivation. It includes layers of intervention functions and policy categories.

COM-B Model

A model within the Behaviour Change Wheel describing behaviour as an interaction between Capability, Opportunity, and Motivation.

Climate Communication

Strategic communication efforts aimed at making climate change socially visible, emotionally engaging, and behaviourally relevant.

Cognitive Dissonance

Psychological discomfort caused by conflicting beliefs and behaviours, often resolved by adjusting either attitudes or actions.

Competence

The ability to apply knowledge and skills in complex, real-world, and often uncertain situations. In sustainability contexts, this includes reflexivity, collaboration, and resilience.

Cross-Border Governance

Collaborative governance arrangements across national borders to coordinate policies, practices, and shared goals - especially relevant in multi-country regions like the Alps.

Framing

The way information is presented to shape perception and interpretation, often by evoking specific associations or emotions.

Fringe Stakeholders

Actors with low visibility or influence in formal governance processes (e.g., residents, grassroots initiatives), yet who hold important perspectives.

Human Implementation Gap

The discrepancy between public support for sustainability goals and the actual behavioural and institutional changes required to achieve them.

Intersectoral Governance

A governance approach that brings together actors from different sectors - such as public administration, business, civil society, and academia - to collaboratively address complex challenges. It emphasizes coordination, shared goals, and joint responsibility across institutional boundaries.

Knowledge

A cognitive and sociological concept involving the retention, linking, and recall of information. Often categorized as declarative ('knowing that') and procedural ('knowing how'). Forms the foundation for developing skills and competence.

Marginalized Groups

Social groups that are excluded from mainstream decision-making processes, often due to lack of resources, visibility, or institutional access.

Nudging

A behavioural intervention that alters how choices are presented without restricting options, in order to influence decision-making.

Participatory Stakeholder Management

A governance approach that involves diverse stakeholders - including marginalized groups - in co-designing, co-deciding, and co-implementing sustainability strategies.

Pluralistic Ignorance

A situation where individuals mistakenly believe that their personal views or intentions (e.g., willingness to act on climate change) are not shared by others.

Q Methodology

A research method combining qualitative and quantitative techniques to explore subjective viewpoints through sorting of opinion statements.

Skills

Practiced, goal-oriented abilities - often motor, cognitive, or sensorimotor - that solve specific tasks. Skills are narrower than competences and typically trainable.

Stakeholders vs. Actors

Stakeholders are individuals, groups, or organizations that have an interest in or are affected by a decision, activity, or outcome. They may actively participate or be passively impacted. Actors, in contrast, are those who take an active role in shaping processes, making decisions, or implementing actions. While all actors are stakeholders, not all stakeholders are necessarily actors.

Transformative Competence

The capacity to initiate and sustain change by thinking critically, imagining alternatives, and acting towards long-term sustainability goals.

Transformative Learning

An educational approach that fosters critical reflection and leads to a profound change in perspectives and behaviour.

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