



Public Awareness And Behavior Change For Climate Conscious Actions

Maria Ursula seventy¹, Fiorenza Florent¹, Calvin¹

¹Makassar public university Faculty of social sciences and law, Anthropology education study program

*Corresponding Author: Maria Ursula seventy

Article Info

Article History:

Received July 02, 2023

Revised July 14, 2023

Accepted July 29, 2023

Keywords:

Public, Behavior, Actions.

Abstract

Global action is urgently needed to address the serious threat that climate change poses and to advance sustainability in the twenty-first century. Raising public awareness and encouraging behaviour change toward eco-friendly methods are essential to the success of this effort. The understanding of human behaviour in relation to climate change is explored in this essay along with the most recent research trends in these fields. Focuses on efficient communication tactics and behavioural changes that can encourage both individual and collective climate-conscious behaviour. To thoroughly explore the elements impacting climate change beliefs and behaviour change drivers, the technique used in this study employs a mixed-methods approach, integrating quantitative surveys and qualitative interviews. Researchers get better insights into the complexity of human decision-making processes and the possible levers for long-lasting behaviour modification by integrating various data sources. The results highlight the significance of efficient communication techniques in closing the knowledge-action gap. Messages about climate change can be tailored, social norms can be used, and visual communication features can be used to increase engagement and favourably affect attitudes. Behavioural interventions have been helpful in encouraging sustainable habits and long-term behaviour change. This document offers a number of evaluation criteria and techniques to evaluate the effectiveness of public awareness campaigns and initiatives. These include tracking adjustments in attitudes and perceptions, examining behavioural changes, gauging media involvement, and assessing knowledge and awareness changes. The study highlights the value of performing thorough evaluations to guide decision-making based on evidence and improve communication tactics for optimum impact.

Introduction

According to Thatcer et al (2020) One of the most important problems facing humanity in the twenty-first century is climate change. Extreme weather occurrences, rising sea levels, rising global temperatures, and changing climatic patterns all point to the urgent need to solve this problem. Understanding human behaviour and promoting sustainable practices at the individual and community levels are at the heart of successful climate change mitigation and adaptation activities (Owen, 2020). Researchers and politicians have stressed the necessity of public knowledge and behaviour change as key elements of climate action, acknowledging the importance of human agency in determining the course of climate change (Hügel & Davies, 2020). According to Shen et al (2020) The role of humans in climate change cannot be disregarded. The quantity of greenhouse gas emissions, the uptake of sustainable practices, and the effectiveness of climate-conscious legislation are all influenced by people's views,

attitudes, values, and everyday behaviours. Therefore, in order to develop communication methods and treatments that encourage climate-conscious behaviour, it is crucial to have a greater understanding of how people and communities perceive climate change, interact with related information, and respond to behavioural interventions (Hillebrand & Johannsen, 2021).

This thesis' main goal is to investigate the dynamic connection between public knowledge, behavioural modification, and climate action. We want to discover effective behavioural interventions and communication tactics that can encourage improvements in attitudes and behaviour toward climate change by reviewing the body of literature, theoretical frameworks, and empirical studies. In order to better inform targeted interventions and policy suggestions, this research also aims to identify the factors that influence climate-conscious behaviour. A thorough literature review that explores the theoretical underpinnings of human behaviour and behaviour change in the context of climate change follows the thesis. The impact and efficacy of behavioural therapies and climate change communication are then examined in previous research. The literature review identifies any knowledge gaps in the topic and lays the groundwork for our research's potential contribution.

The research design, data collection methods, and analysis strategies used to generate insights into public views, knowledge, and behavioural patterns connected to climate change are then described in the methodology section. We strive to capture a comprehensive picture of the intricate interplay between individual beliefs, society norms, and climate-conscious behaviours by combining quantitative surveys with qualitative interviews or focus groups. The thesis's ensuing sections explore the many facets of human behaviour in relation to climate change. We look into how cultural norms, risk perceptions, and cognitive biases affect people's views and decision-making around climate challenges. We also look at how community dynamics, peer pressure, and social norms might help or impede the adoption of sustainable practices. The study also explores the critical impact that strong communication tactics have in increasing public knowledge and encouraging climate-conscious behaviour. We want to identify the most effective methods for disseminating knowledge about climate change and motivating action by investigating message framing, audience targeting, and communication channels (Shahzad et al., 2021).

The thesis also looks into different behavioural interventions to encourage sustainable behaviours at the individual and group levels, including nudging strategies, rewards, and education programs. We evaluate the efficacy and durability of these interventions in promoting communities that are climate resilient and significant behaviour change. The research's results and conclusions have important ramifications for decision-makers, practitioners, and organizations involved in campaigns to modify people's behaviour in response to climate change. The findings of this study will contribute to the development of evidence-based strategies and interventions that will hasten climate action, reduce greenhouse gas emissions, and promote a worldwide sustainability culture. In order to ensure a more sustainable future for future generations in the face of a rapidly changing climate, it is crucial that we maximize the capacity of public knowledge and behaviour change.

Methods

To examine the connection between public knowledge, behaviour change, and climate action, this study uses a mixed-methods approach. The complexity of human and societal responses to climate change can be fully understood with the integration of quantitative and qualitative methodologies. The research design, data collection methods, and data analysis strategies utilized to accomplish the research objectives are described in the methodology section. This study tries to triangulate data and acquire a more nuanced knowledge of the factors driving climate-conscious actions by combining quantitative surveys and qualitative interviews or

focus groups. B. Sequential Explanatory Design: The research adopts a sequential methodology, with the collection of quantitative data coming first and then that of qualitative data. The qualitative phase is used to add to the analysis overall, explain quantitative results, and offer new insights.

Data on participant demographics, perceptions of climate change, knowledge, attitudes, and behaviours relevant to sustainable practices are gathered using a structured questionnaire. Sampling, B. Probability 1. Sampling: To choose a representative sample from the target population, a random sampling approach will be utilized. The sample will come from a variety of geographic and demographic origins. 2. Sample Size: To ensure the validity and trustworthiness of the results, a proper sample size will be calculated using statistical calculations. C. Method of Data Collection: 1. internet surveys: To reach a large and varied audience, the survey will be distributed through internet platforms, email invites, and social media channels. 2. In-Person Surveys: To guarantee inclusion, in-person surveys will be performed in designated places for participants who might not have reliable internet access

Quantitative data analysis, third: A. Descriptive Statistics: In order to give a comprehensive picture of the sample's characteristics and perceptions of climate change in general, demographic data and frequency distributions will be evaluated. B. Inferential Statistics: To explore relationships between variables and find important factors impacting climate-conscious behaviours, parametric and non-parametric tests such t-tests, chi-square tests, and correlation analyses will be utilized. Gathering Qualitative Data A. Semi-Structured Interviews/Focus Groups: Selected respondents from the quantitative survey will be the subject of in-depth interviews or focus groups during the qualitative phase.

Their viewpoints, experiences, and motives with regard to climate change and sustainable practices will be revealed through this in rich, contextual detail. SAMPLING, B. 1. Purposeful Sampling: Participants are chosen to represent a variety of viewpoints on climate change and behaviour change and are chosen based on their varied replies. 2. Saturation: Data collecting will go on until it reaches a certain point, making sure that no fresh information comes from next focus groups or interviews.

Analysis of Qualitative Data A. Thematic Analysis: To uncover recurring patterns, themes, and categories linked to climate change views and behaviour change drivers, transcribed interview and focus group data will be examined using thematic coding. B. Integration with Quantitative Data: To give a thorough and nuanced picture of how public awareness, behaviour change, and climate action interact, qualitative findings will be merged with quantitative results.

Sixth, Moral Considerations A. Participants will be given full disclosure regarding the study's objectives, confidentiality, and voluntary nature. Before collecting any data, informed consent will be acquired. B. Anonymity and Confidentiality: To preserve participants' privacy, all participant identities will be anonymized, and data will be stored securely. Restrictions: A. Self-Reporting Bias: The study may contain response bias and social desirability bias due to its dependence on self-reported data. B. Generalizability: Despite efforts to collect a varied sample, sampling issues could prevent the results from being fully generalizable to the entire population.

Reliability and Validity: Data triangulation will increase the reliability of the results by applying mixed-methods research. B. Inter-Rater dependability: To make sure there is dependability, qualitative data will be independently coded and compared in order to demonstrate inter-rater agreement. In summary the methodology selected intends to offer a thorough knowledge of the elements affecting public awareness of and behaviour change connected to climate change. The combination of quantitative and qualitative data will enable

a thorough study and provide recommendations for behaviour modification and successful climate change communication.

Result and Discussion

Understanding Human Behaviour in the Context of Climate Change

Table 1. Factors Influencing Climate Change Perceptions and Behaviours

Factors	Description	Influence on Climate Change Behaviour
Climate Change Knowledge	Level of understanding about climate change and its implications	High knowledge leads to more actions to mitigate climate change.
Attitudes towards Environment	Personal attitudes and values towards the environment and sustainability	Positive attitudes lead to pro-environmental behaviours.
Social Norms	Perceived social norms and expectations regarding environmental behaviours	Conformity to positive norms encourages sustainable actions.
Personal Values	Individual ethical, moral, and personal values that influence decision-making	Alignment with environmental values result in pro-environmental choices.
Risk Perception	Perceived risk and seriousness of climate change impacts on personal and global levels	High-risk perception leads to greater willingness to take action.
Environmental Education	Exposure to environmental education and awareness programs	Well-informed individuals are more likely to adopt sustainable practices.
Cultural Influence	Cultural beliefs, practices, and traditions related to the environment	Culture can either promote or hinder sustainable behaviours.
Access to Resources	Availability of resources to support sustainable lifestyle choices	Limited access to resources may hinder climate-conscious actions.
Media and Communication	Influence of media and communication channels on shaping perceptions and attitudes	Effective climate change communication can inspire action.
Personal Experience	Past experiences with extreme weather events and climate change impacts	Direct experiences can drive climate change awareness and behaviour change.

Several important elements that affect human behaviour in the context of climate change are highlighted in the table above. Each component has a significant impact on how people

perceive and act in relation to climate challenges, which has an effect on efforts made in the general direction of sustainability and climate-conscious behaviour (Folke et al., 2021). First and foremost, understanding climate change is a key factor. People who are more aware of climate change and its repercussions are more inclined to take preventative measures to lessen its effects (Clayton & Karazsia, 2020). The importance of education and awareness initiatives in promoting climate-conscious behaviour is highlighted by this.

Second, behaviours are greatly influenced by attitudes toward the environment and individual values. People who value protecting the environment and have favourable ideas about it are more likely to engage in eco-friendly behaviour and support sustainability programs. Social standards have a significant impact that cannot be understated. People frequently adopt behaviours they believe to be socially acceptable (Siegrist et al., 2021). People are more inclined to adopt sustainable behaviours when they are the standard in a group or civilization, which has a good domino effect.

Another crucial component is one's perception of risk. People may be inspired to take action by the perceived risk and severity of climate change's effects on both a personal and global scale (Mahmud et al (2021)). People are more inclined to adopt sustainable habits proactively if they feel threatened by the possible effects of climate change. Programs for environmental education and awareness are essential for developing climate-conscious behaviour (Gilbertson et al., 2022). People get a deeper awareness of climate challenges through educational and entertaining efforts, fostering a knowledgeable and responsible approach to environmental sustainability.

Additionally important are cultural factors. Cultural values, customs, and traditions can either encourage or discourage sustainable behaviour. A potent technique for promoting climate-conscious behaviour is acknowledging and utilizing cultural beliefs that encourage environmental care. Resources' accessibility is important from a practical standpoint. The adoption of sustainable living choices can be aided by having access to resources such as money and eco-friendly goods and services. On the other hand, a lack of resources may prevent people from doing climate-conscious acts.

Public perceptions are shaped by the media and other avenues of information. By emphasizing the seriousness of the problem and offering doable actions to help with climate solutions, effective climate change communication can motivate people to take action. Individuals' understanding of and conduct related to climate change can be strongly impacted by personal encounters with extreme weather events or direct repercussions of climate change. People may become more conscientious of their behaviours and make sustainable decisions after personally experiencing the effects of climate change.

Appreciating the interaction of numerous elements that affect attitudes and behaviours is essential to comprehending human behaviour in the context of climate change. It is feasible to promote climate-conscious behaviour at both the individual and community levels by addressing these issues through education, awareness, and effective communication, helping to ensure the world has a sustainable and resilient future.

Effective Communication Strategies for Climate Change Awareness

Table 2. Effective Communication Strategies for Climate Change Awareness

Communication Strategy	Description	Impact on Climate Change Awareness
Message Framing	Tailoring climate change messages to highlight gains and benefits of taking climate-conscious actions (e.g., cleaner air, cost savings) versus emphasizing losses and consequences.	Positive framing emphasizes the benefits of sustainable actions, encouraging positive responses from the audience. Negative framing highlights the consequences of inaction to create a sense of urgency and responsibility.
Audience Targeting	Identifying specific target audiences and customizing communication based on their unique needs, interests, and values.	Tailoring messages to specific groups ensures relevance and resonance, increasing the likelihood of message retention and behavioural impact.
Media and Communication	Utilizing a mix of media and communication channels (e.g., social media, television, print, radio) to reach diverse segments of the population.	Social media platforms enable broad reach and engagement, while traditional media may target specific age groups or local communities effectively.
Inclusive and Empathetic Messaging	Adopting an inclusive and empathetic tone that acknowledges the diverse perspectives and experiences of the audience.	Creating an inclusive and empathetic messaging fosters a sense of community and encourages open dialogue, leading to greater awareness.
Call-to-Action	Providing clear and actionable steps that individuals can take to contribute to climate solutions (e.g., reducing waste, using public transportation, supporting renewable energy).	A compelling call-to-action motivates individuals to engage in climate change actions, transforming awareness into tangible outcomes.
Visual Communication	Incorporating visual elements (infographics,	Visual communication can simplify

	images, videos) to convey complex information	complex concepts and evoke emotional
	and make messages more engaging and memorable.	responses, enhancing message retention.
Storytelling	Using storytelling techniques to present climate	Stories can create emotional connections
	change impacts and solutions in a compelling narrative format.	and enhance understanding, making climate change more relatable.

A selection of potent communication tactics for increasing public knowledge of climate change are shown in the table above. These tactics are intended to involve a variety of audiences, effectively communicate climate-related knowledge, and motivate constructive actions to lessen the effects of climate change. Let's go into greater detail about each tactic: This communication method involves crafting climate change messaging to emphasize either the advantages and rewards of making environmentally responsible decisions or the possible disadvantages and effects of doing nothing. Positive framing highlights the benefits of sustainable measures, such as enhanced quality of life, financial savings, and cleaner air.

Negative framing, on the other hand, highlights the need for quick action and any potential drawbacks of climate change. Both strategies can be used to appeal to various audience groups and inspire people to get involved in climate change solutions. Identifying specific target groups and tailoring messages to fit their particular needs, interests, and values are essential to effective climate change communication. Customizing messaging to appeal to particular populations makes communication more pertinent and relatable, increasing the possibility that the message will be remembered and motivating climate-conscious behaviour. This tactic highlights the significance of using a variety of media and communication channels to reach various demographic groups. Social media platforms, for instance, can efficiently target particular age groups or regional communities while encouraging participatory debates with a large audience. Using numerous mediums makes guarantee that messages about climate change are seen by a larger and more varied audience.

The audience's varied viewpoints and experiences are acknowledged while communicating about climate change in an inclusive and sympathetic manner. Such messaging supports open communication and community building, which can increase public knowledge and comprehension of climate change issues. Communication about climate change must include a strong call to action. People are empowered to make noticeable changes in their daily lives when given clear and doable actions they can take to contribute to climate solutions, such as decreasing trash, using public transit, or supporting renewable energy.

Information on climate change can be better communicated by include visual components like infographics, pictures, and videos. Visuals may make difficult ideas and data more understandable and interesting. They have the capacity to arouse emotions as well, which might heighten the significance of taking climate-conscious action. A potent strategy for communicating about climate change is storytelling. Storytelling may establish emotional connections with the audience and make climate change more approachable on a personal level by presenting the implications of climate change and potential solutions in a compelling narrative manner. According to Green et al (2019) Combining these powerful communication techniques can increase the influence of campaigns to raise public awareness about climate change, motivating people to take action and work together to create a future that is more sustainable and resilient. The effectiveness of these tactics may vary depending on the intended

audience, the cultural setting, and the relevance and authenticity of the information, underlining the significance of careful and specialized communication techniques.

Behavioural Interventions to Promote Sustainable Practices

Table 3. Behavioural Interventions to Promote Sustainable Practices

Behavioural Interventions	Description	Impact on Sustainable Practices
Nudging and Choice Architecture	Implementing subtle nudges and changes in the environment to guide individuals towards sustainable choices (e.g., placing recycling bins in prominent locations).	Rearranging default options to Favor sustainable choices can encourage individuals to participate in recycling and waste reduction efforts.
Incentives and Rewards	Offering tangible rewards or incentives for engaging in sustainable actions (e.g., discounts for using public transportation).	Offering financial incentives or non-financial rewards (e.g., loyalty points) can motivate individuals to adopt sustainable behaviours.
Education and Empowerment	Providing information and resources to empower individuals to make informed and sustainable choices (e.g., workshops on eco-friendly living).	Educational programs that inform individuals about climate change impacts and solutions can empower them to take positive actions.
Social Norms and Peer Influence	Leveraging social influence to promote sustainable practices (e.g., social media challenges).	Creating campaigns that highlight positive social norms around sustainable behaviours can encourage individuals to participate.
Gamification	Applying game elements and mechanics (e.g., points, badges) to make sustainable behaviours more engaging and enjoyable.	Incorporating gamification elements into sustainability apps or platforms can make sustainable actions fun and rewarding.
Default Options	Setting sustainable choices as default options (e.g., default printer settings to double-sided).	Designating eco-friendly options as default can increase their prevalence

		and encourage their adoption.
Community-Based Initiatives	Engaging communities in collective sustainable efforts (e.g., neighbourhood clean-up drives).	Community initiatives, such as clean-up drives or tree-planting activities, can foster a sense of community and environmental stewardship.

The table above lists numerous behavioural strategies that can be used to persuade people to adopt eco-friendly habits and promote sustainable activities. Each intervention aims to persuade individuals to make decisions and do actions that are more environmentally friendly, eventually promoting environmental preservation and minimizing the negative effects of human activity on the environment. Let's go into greater detail about each intervention: This intervention involves modifying the environment subtly to influence people to make sustainable decisions. For instance, making energy-efficient options the default setting or strategically positioning recycling bins might motivate people to recycle and practice energy conservation without requiring a lot of work or deliberate choice.

A strong motivator can be the provision of material rewards or incentives for taking sustainable behaviours. Individuals may be encouraged to adopt eco-friendly habits by receiving discounts or advantages for taking the public transit, purchasing eco-friendly goods, or taking part in sustainable activities. People are better able to make wise and sustainable decisions when information and resources are made available to them through educational programs. Workshops, seminars, and educational initiatives on green living, the effects of climate change, and environmental solutions can raise awareness and motivate good deeds. Sustainable behaviours can be promoted by using social influence. Individuals can be encouraged to participate and be a part of a group effort towards sustainability by developing social media challenges or campaigns that highlight good social norms around eco-friendly habits. Making eco-friendly decisions more interesting and fun can be achieved by incorporating game mechanics and components into sustainable behaviours. Implementing points, medals, or awards for performing sustainable acts can make living sustainably enjoyable and satisfying. Making sustainable options the default can have a big impact on behaviour. The predominance of sustainable behaviours can be increased, for example, by setting defaults for double-sided printing and eco-friendly meal alternatives in cafeterias.

Participating in collective sustainable initiatives with communities can promote a sense of belonging and environmental stewardship. Community gardens, tree-planting events, and neighbourhood clean-up drives are a few examples of programs that support sustainable lifestyles and build the connections between people and their environment. Each intervention focuses on many facets of human behaviour and decision-making with the goal of removing obstacles and inspiring people to adopt sustainable behaviours in their daily lives. Policymakers, organizations, and people can collaborate to build a more sustainable future and collaboratively support international efforts to battle climate change and protect the environment for future generations by combining these behavioural approaches. To ensure these interventions' efficacy and long-term influence on encouraging sustainable behaviours, it is critical to carefully plan, carry out, and assess them.

Assessing the Impact of Public Awareness Campaigns and Interventions

Table 4. Assessing the Impact of Public Awareness Campaigns and Interventions

Evaluation Metrics	Description	Methods of Assessment
Knowledge and Awareness	Measuring the level of climate change knowledge and awareness among the target audience.	Pre- and post-campaign surveys to assess changes in knowledge and awareness.
Attitude and Perception	Evaluating the target audience's attitudes and perceptions towards climate change and sustainable practices.	Surveys, focus groups, or interviews to gauge changes in attitudes and perceptions.
Behavioural Change	Assessing changes in individual behaviours related to sustainability (e.g., recycling rates, energy consumption, public transportation use).	Tracking data on specific behaviour's before and after the campaign or intervention to measure behavioural shifts.
Media Engagement	Analysing the reach and engagement of the campaign or intervention through various media channels.	Social media analytics, website traffic, and other metrics to quantify engagement.
Message Effectiveness	Evaluating the effectiveness of campaign messages in resonating with the target audience and influencing their attitudes and behaviours.	Surveys or focus groups to assess message recall and perception.
Long-Term Impact	Examining the sustainability of behaviour changes over time and assessing the long-term impact of the campaign or intervention.	Follow-up surveys or longitudinal studies to assess the persistence of behavioural changes and long-term impact.
Cost-Effectiveness	Analysing the cost-effectiveness of the campaign or intervention in achieving desired outcomes.	Cost-benefit analysis to evaluate the efficiency of the initiative in relation to the resources invested.

In order to evaluate the effectiveness of public awareness campaigns and interventions connected to climate change and sustainability, a variety of assessment metrics and approaches are included in the table above. Understanding the usefulness of such activities in reaching targeted objectives, changing behaviours, and assisting in long-term environmental goals requires evaluating their success. Let's go into greater detail about each evaluation indicator and assessment technique: This statistic focuses on assessing the target audience's knowledge and awareness of climate change. Researchers can evaluate a campaign's effectiveness at

disseminating information and raising awareness by conducting pre- and post-campaign surveys to determine changes in participants' knowledge and awareness levels. Understanding how the campaign affects people's attitudes regarding sustainability and climate change requires evaluating attitudes and perceptions towards these topics. To determine whether the campaign has affected people's attitudes and perceptions, surveys, focus groups, or interviews are held. A crucial sign of whether the campaign was successful in motivating concrete actions is the assessment of behavioural change. Researchers monitor particular behaviours (such as recycling rates, energy usage, and use of public transportation) before and after a campaign or intervention to detect any appreciable changes in those habits. This indicator evaluates the campaign's exposure and participation across a range of media platforms, including social media, internet, and traditional media. The level of audience interaction with the content is measured using indicators such as social media analytics, website traffic data, and others.

An important component of evaluation is how well advertising messages resonate with the target audience and affect their attitudes and behaviours. To evaluate message memory, comprehension, and the degree to which communications have changed attitudes and behaviours, surveys or focus groups are used. Examining the durability of behaviour changes over time is necessary to gauge the campaign's long-term effects. To determine whether the behavioural changes endure beyond the immediate campaign period, follow-up surveys or longitudinal studies are done. Understanding how effectively the campaign achieves its goals in relation to the resources used can be done by analysing its cost-effectiveness. Cost-benefit analyses are performed to determine whether the outcomes are commensurate with the organizational and financial investments. Understanding the impact of the campaign on public awareness and behaviour change requires understanding how each evaluation metric and assessment method is used. Stakeholders can get important insights into the campaign's success and pinpoint areas for improvement in upcoming initiatives by carefully examining these data and conducting thorough assessments. To maximize communication strategies' and interventions' beneficial effects on addressing climate change and promoting sustainable practices, robust assessments are crucial for evidence-based decision-making.

Conclusion

Raising public knowledge of the difficulties posed by climate change and encouraging behaviour change toward sustainable behaviours are of the utmost importance. Effective communication tactics are essential for motivating community and individual climate-conscious behaviour. Designing effective interventions that promote eco-friendly decisions and aid in environmental preservation requires an understanding of human behaviour in the context of climate change. This study's methodology uses a mixed-methods approach that combines quantitative surveys and qualitative interviews in order to acquire a thorough understanding of the variables impacting people's perceptions of climate change and the forces that motivate behaviour change. Researchers can triangulate data using this method, and then make thoughtful suggestions for effective climate change communication and responses.

References

Clayton, S., & Karazsia, B. T. (2020). Development and validation of a measure of climate change anxiety. *Journal of Environmental Psychology*, 69, 101434. <https://doi.org/10.1016/j.jenvp.2020.101434>

Folke, C., Polasky, S., Rockström, J., Galaz, V., Westley, F., Lamont, M., ... & Walker, B. H. (2021). Our future in the Anthropocene biosphere. *Ambio*, 50, 834-869.

Gilbertson, K., Ewert, A., Siklander, P., & Bates, T. (2022). *Outdoor education: Methods and strategies*. Human Kinetics.

Green, K. M., Crawford, B. A., Williamson, K. A., & DeWan, A. A. (2019). A meta-analysis of social marketing campaigns to improve global conservation outcomes. *Social Marketing Quarterly*, 25(1), 69-87. <https://doi.org/10.1177/1524500418824258>

Hillebrand, K., & Johannsen, F. (2021). KlimaKarl—a chatbot to promote employees' climate-friendly behavior in an office setting. In *The Next Wave of Sociotechnical Design: 16th International Conference on Design Science Research in Information Systems and Technology, DESRIST 2021, Kristiansand, Norway, August 4–6, 2021, Proceedings* 16 (pp. 3-15). Springer International Publishing. https://doi.org/10.1007/978-3-030-82405-1_1

Hügel, S., & Davies, A. R. (2020). Public participation, engagement, and climate change adaptation: A review of the research literature. *Wiley Interdisciplinary Reviews: Climate Change*, 11(4), e645. <https://doi.org/10.1002/wcc.645>

Mahmud, S., Mohsin, M., Khan, I. A., Mian, A. U., & Zaman, M. A. (2021). Knowledge, beliefs, attitudes and perceived risk about COVID-19 vaccine and determinants of COVID-19 vaccine acceptance in Bangladesh. *PLoS one*, 16(9), e0257096. <https://doi.org/10.1371/journal.pone.0257096>

Owen, G. (2020). What makes climate change adaptation effective? A systematic review of the literature. *Global Environmental Change*, 62, 102071. <https://doi.org/10.1016/j.gloenvcha.2020.102071>

Shahzad, M., Qu, Y., Zafar, A. U., & Appolloni, A. (2021). Does the interaction between the knowledge management process and sustainable development practices boost corporate green innovation? *Business Strategy and the Environment*, 30(8), 4206-4222. <https://doi.org/10.1002/bse.2865>

Shen, M., Huang, W., Chen, M., Song, B., Zeng, G., & Zhang, Y. (2020). (Micro) plastic crisis: un-ignorable contribution to global greenhouse gas emissions and climate change. *Journal of Cleaner Production*, 254, 120138. <https://doi.org/10.1016/j.jclepro.2020.120138>

Siegrist, M., Luchsinger, L., & Bearth, A. (2021). The impact of trust and risk perception on the acceptance of measures to reduce COVID-19 cases. *Risk Analysis*, 41(5), 787-800.

Thatcher, A., Nayak, R., & Waterson, P. (2020). Human factors and ergonomics systems-based tools for understanding and addressing global problems of the twenty-first century. *Ergonomics*, 63(3), 367-387. <https://doi.org/10.1111/risa.13675>