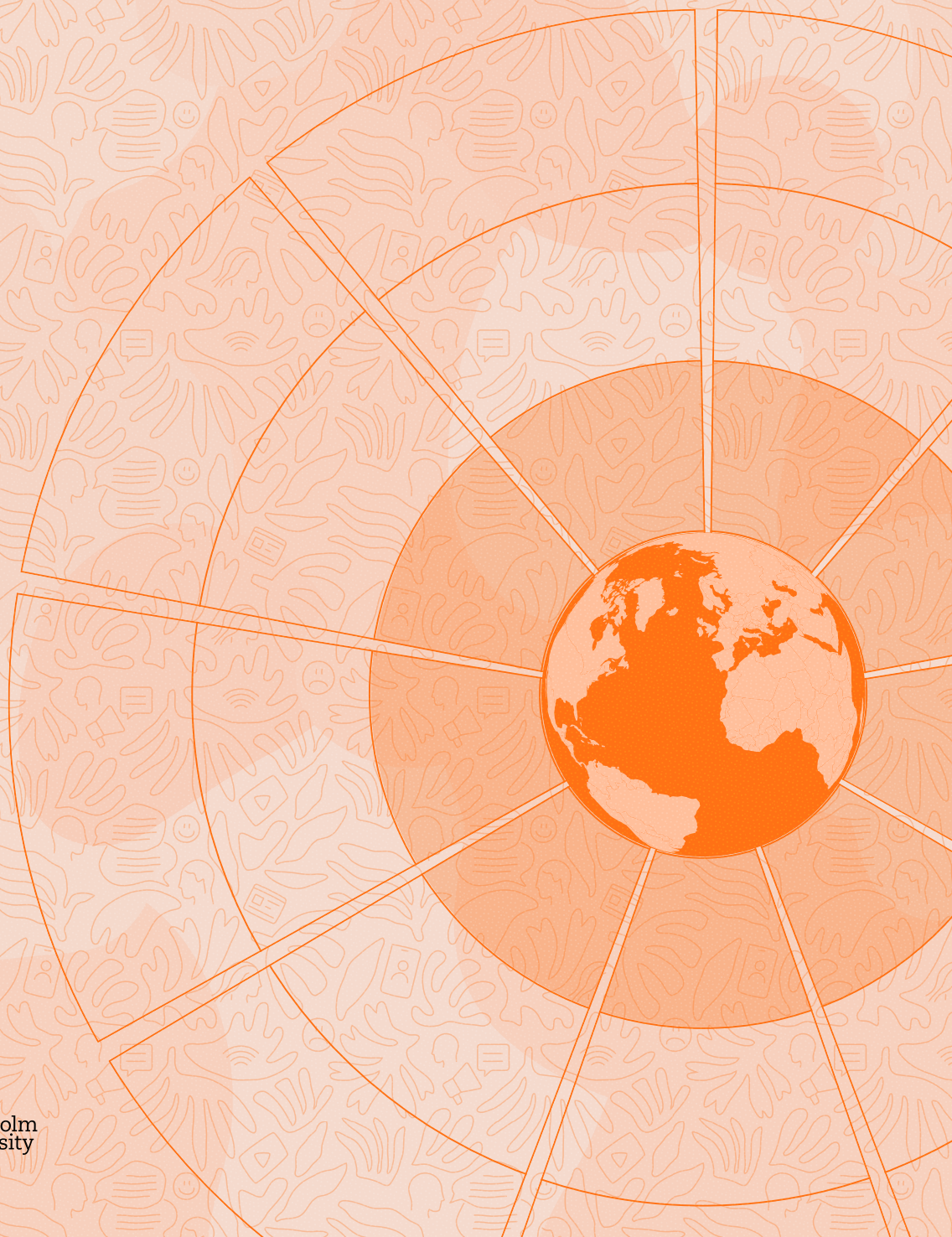
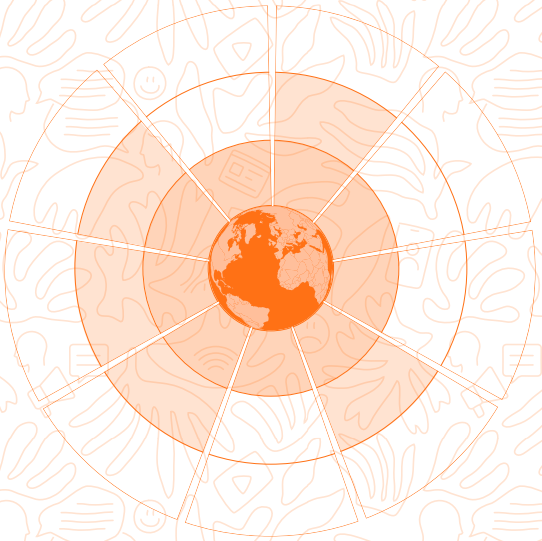
A handbook for sustainability science communication

Planetary Communications

EXTENDED VERSION



Stockholm Resilience Centre | Stockholm University



Written by Fredrik Moberg, Marcus Lundstedt, Marika Haeggman, and Vaida Razaityte from Stockholm Resilience Centre (SRC). **With support from** the whole communication team at SRC and with **contributions from workshop participants**: Astrid Auraldsson, Jonas Bane, Frida Berry Eklund, Owen Gaffney, Diego Galafassi, Daniel Goldberg, Jutta Haider, Martin Hultman, Jerker Lokrantz, Isabelle McAllister, Andrew Merrie, Frank Radosevich, Johan Rockström, Maya Rebermark, Malte Rödl, Adam Springfeldt, Kaj Török, Jakob Trollbäck, Maria Wolrath Söderberg. **Also thanks to many** others who have given feedback and/or participated in seminars where we have road-tested the model and handbook: other SRC colleagues and students, staff at the science centre Universeum, students at Berghs School of Communication, participants at a workshop co-hosted with CommToAct, and several others. **Layout and graphics:** Azote for SRC. **AI support:** Parts of this handbook were co-developed with AI as editorial support to improve the language, clarity, and readability. All edits were verified by the authors to ensure accuracy, and no unverified text remains in the final document. **Final note:** While we are grateful for all contributions and feedback, the final content and any remaining errors remain the responsibility of the authors.

FOREWORD BY JOHAN ROCKSTRÖM

How we communicate can determine the fate of our planet



In 2009, 29 researchers came together with a bold ambition: to define the boundaries within which humanity can thrive on a stable and resilient planet. The resulting Planetary Boundaries framework reveals nine critical Earth system processes, and how close we are to crossing the boundaries that keep our planet safe. More than fifteen years later, the alarm is louder than ever. Seven of nine planetary boundaries have now been breached. We are putting our biosphere – the very foundation of human life, nature, societies and economies – at risk. This grim reality calls for urgent actions, powered by solid science and people collaborating for change.

Inspired by the planetary boundaries work, a new group of researchers, communicators, and creatives has come together and contributed to a science-based communications handbook: Planetary Communications. The hope is to support and connect people worldwide who want to communicate sustainability science as effectively as possible – helping secure life within planetary boundaries.

Scientific knowledge alone does not drive transformation. The urgency of our planetary crisis is deepening, something that is painfully obvious when we look around the world. Record-breaking temperatures, raging wildfires, and catastrophic flooding are becoming the new normal. This escalating crisis demands not just cutting-edge science, but also the ability to communicate it in impactful ways. Science communication must bridge the gap between knowledge and societal action, ensuring that the insights we generate are not confined to academic circles but reach decision-makers and communities worldwide. This is where the Planetary Communications model comes in.

This handbook is more than a guide – it is a call to action. If we are to secure a liveable future, we must transform how we engage the world with sustainability science. This means crafting narratives that resonate across cultures, designing visuals that make complexity accessible, and developing communication strategies that inspire collective action. The Planetary Communications model offers precisely this: a practical, scientifically grounded, and forward-thinking approach to communicating sustainability in ways that mobilise change at scale.

I invite you to explore this handbook not just as a resource for sustainability science communication, but as an essential tool for connecting people across the globe in shaping a safe and just future – for life within planetary boundaries. Science alone cannot save us – how we communicate and act upon it will determine the fate of our planet.

–Johan Rockström

Director, Potsdam Institute for Climate Impact Research (PIK)

Co-founder and professor at the Stockholm Resilience Centre, Stockholm University

Photo: Jadranko Marjanovic

PREFACE

Why we have to talk about how we talk about the planet

"What is new here, really?" Several people in the group from advertising, arts, PR, policy, journalism and academia were not impressed. After a day of workshopping with Johan Rockström on the island of Lidingö outside Stockholm – where the Planetary Boundaries framework was first developed – we had produced a first draft of the model for "Planetary Communications". But instead of applauding our joint efforts, the participants engaged in a lively discussion, and several felt the model simply wasn't landing.

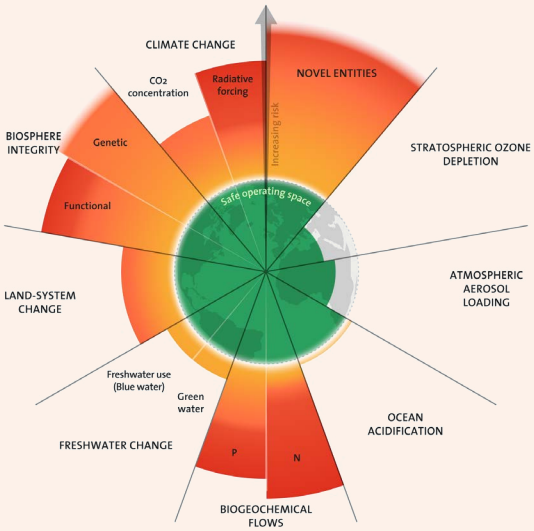
We could have re-done the work and started from scratch, but over time, tested and developed with groups across the planet, it proved more and more useful. To be factful, well-timed, visual and emotionally aware might not be groundbreaking, but still equally important, and used right, very effective. Planetary Communications does not aspire to differ fundamentally from other forms of impactful communication. It is grounded in established practices. Sometimes the lowest hanging fruit is the best. But we all benefit from having a shared language for which fruits to pick, when and where (and sometimes also knowing when not to pick it).

Communicating sustainability science is complex, particularly in today's polarised and partially fact-resistant media landscape, where countless platforms and subjects compete for attention. In this context, communication is a wicked problem: no clear boundaries, no single cause, no straightforward solutions. And every attempted fix changes the problem itself. Hence, this handbook cannot offer a blueprint. What it can offer is a shared language, practical reflections, and food for thought that help communicators navigate complexity more intentionally.

The Planetary Communications model draws on the planetary boundaries framework (Box 1) which has gained widespread attention following its initial publication in 2009, led by Johan Rockström and co-authored by 28 researchers. Since then,

BOX 1

Planetary boundaries – a communicative framework



In 2009, the planetary boundaries framework was proposed by Johan Rockström, former Director of the Stockholm Resilience Centre, and a group of 28 internationally renowned scientists. The planetary boundaries have since then been very successful in communicating the urgency of the intertwined climate and nature crises, influencing science, policy, business and parts of the general public. The nine identified boundaries define limits for human impact on Earth's climate and ecosystems, ensuring societies can develop sustainably without triggering catastrophic environmental thresholds. According to an updated analysis in 2025, seven of the boundaries have been transgressed: climate change, loss of biosphere integrity (ecosystems and biodiversity), land-system change (e.g. deforestation), altered biogeochemical cycles (phosphorus and nitrogen pollution), novel entities (chemical pollution, plastics etc), freshwater flows, and ocean acidification. The remaining boundary processes that are in the green in the framework are stratospheric ozone depletion, and alteration of atmospheric aerosols. Illustration: Azote for Stockholm Resilience Centre.

this framework has been periodically updated. Today, the planetary boundaries are utilised by researchers, policymakers, companies, and environmental organisations worldwide. Meanwhile, Stockholm Resilience Centre (SRC) has refined its communication efforts over nearly 20 years together with our collaborators. The handbook draws on this practical experience as well as research on effective sustainability communication and the psychological barriers audiences face in absorbing information and changing behaviour and attitudes (see the endnotes for sources).

With this handbook we aim to inspire a diverse range of communicators – whether they are professional science communicators or individuals from various fields such as research, education, or business – who seek to enhance their ability to convey science-based sustainability knowledge.

We hope it serves as both inspiration and checklist while also connecting you with others across the globe who want to communicate how we can live good lives within planetary boundaries. At the same time, we recognise that this work is shaped primarily by Global North perspectives. We therefore invite science communicators everywhere to examine the model through the lens of their own cultural realities, and to share critiques and adaptations that help clarify where it holds and where it needs revision.



Photo: iStock

Contents

Foreword: How we communicate can determine the fate of our planet 3

Preface: Why we have to talk about how we talk about the planet 4

The Planetary Communications Model 7

1. Be factful: Stay accurate and evidence based, avoid exaggeration 9

2. Simplify it: Break down complex ideas without oversimplifying 11

3. Time it wisely: Strategically deliver messages when audiences are most receptive 13

4. Link it to other societal concerns: Show intersections with health, economy, equity, etc 15

5. Inspire collective action: Motivate target groups with shared goals 17

6. Highlight solutions: Prioritise those that target the root causes 19

7. Navigate emotions: Address fear, hope, and other emotional reactions constructively 21

8. Make it personal: Connect to individual experiences and values 23

9. Visualise it: Use visuals to make data and concepts tangible 25

Barriers and challenges 27

Putting the planetary communications model into practice 31

Step-by-step fictive example 32

AI: Prompting planetary communication 37

Concluding remarks: Communicating within planetary boundaries 38

Five takeaways 39

Endnotes and Further Reading 40

Other references 48

Appendix: Case studies 49

The Planetary Communications Model

The Planetary Communications model presented here applies a reversed logic compared to the planetary boundaries framework, and features nine essential ingredients for sustainability science communication. In the planetary boundaries framework, the goal is to avoid exceeding certain critical thresholds to ensure the Earth's systems remain stable. In contrast, the planetary communication model emphasises the need to exceed a minimum threshold for each of these essential elements to achieve impactful communication.

The model's nine ingredients are: ***be factful, simplify, time it wisely, link to other societal concerns, make it actionable, highlight solutions, navigate emotions, make it personal,*** and ***visualise it (see figure 1).***

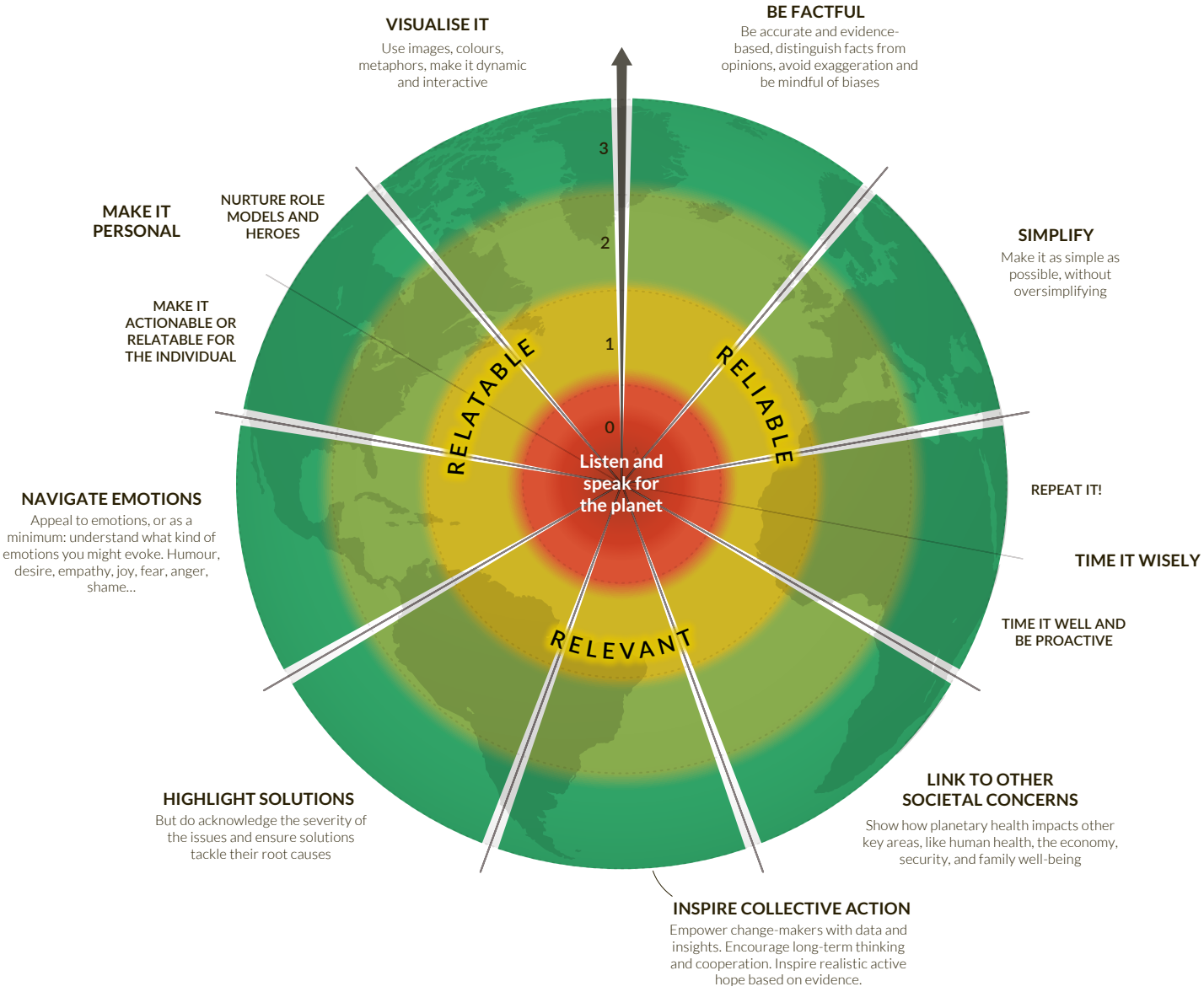


Figure 1: The Planetary Communications framework with its nine ingredients for impactful sustainability science communication. The amount of each ingredient can be either 0=minimal (too low), 1=low, 2=moderate, and 3=high. For each communication effort the mix should be customised to match the sender, message and target group. The ingredients are also grouped into three overarching qualities – Reliable, Relatable, and Relevant – core qualities of effective planetary communication. Illustration: Azote for Stockholm Resilience Centre.

While all these should be considered in every effort, it is important to recognise that not all can or should be maximised simultaneously. Instead, the aim is to find a good mix suited to the sender, message, channel and audience for each communication effort, while also considering challenges like denial, disinformation, misinformation and mistrust in science (see below, section on barriers and challenges). It is also worth noting that too much of one ingredient can spoil the whole. Just as a recipe can be ruined by an excess of salt or baking powder, even a well-intentioned communication effort can fall flat if one element dominates at the expense of the others. Think of it as an audio equaliser: the sliders are the same every time, but the optimal settings change depending on the music (see figure 2).

Before diving into the model itself, a word on something obvious but easy to overlook: spend at least as much time listening to your audience as you do communicating to them. Knowing how they think and talk is what makes everything that follows actually work.

In the following sections, we describe each of the nine essential ingredients and illustrate their meaning and application through selected case examples.

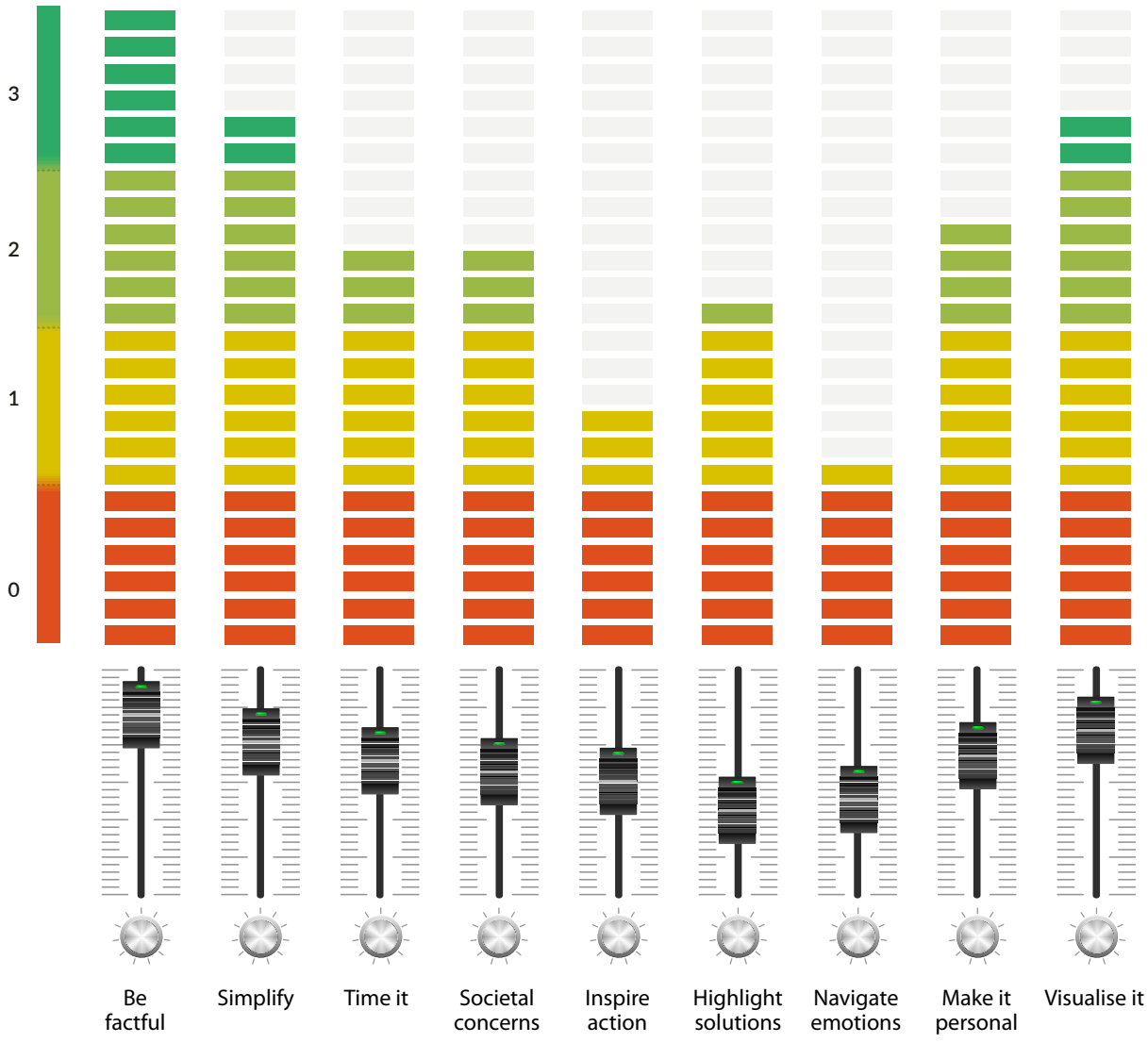


Figure 2: The audio equaliser analogy of the planetary communications framework, with its nine ingredients for impactful sustainability science communication. Just as different musical pieces or genres require their own equaliser settings, each communication effort needs its own mix of the ingredients, shaped by message, audience, channel, and context. **N.B! This figure is only an illustrative example of one possible combination of the nine ingredients.**

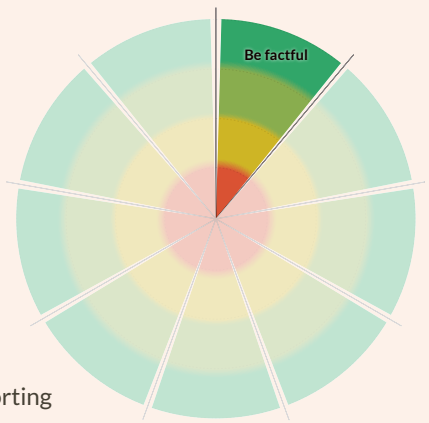
1. Be factful: Stay accurate and evidence based, avoid exaggeration

Factfulness has always been key in sustainability science communication. In a world awash with mis- and disinformation, this has become more important than ever.

Grounding communication in accurate, verifiable evidence while refraining from exaggerating or being biased is more important than ever. Clear distinctions between facts, interpretations, and opinions are crucial, especially when communicating complex and value-laden issues like climate change, biodiversity loss, or sustainable development. Factful communication recognises uncertainty where it exists, avoids cherry-picking data, and steers clear of too alarmist or overly optimistic narratives. *Remember that factfulness doesn't mean being dry or disengaged, it means being reliable and responsible.* Factfulness anchors sustainability storytelling in reality, encourages informed decision-making and fosters critical thinking. It ensures that policy recommendations and calls to action are not only compelling but also credible. For those communicating on behalf of commercial entities, note that making environmental claims to consumers can carry legal obligations (increasingly so in the EU in particular) making rigorous, factful communication not just an ethical but also a legal responsibility.

BOX 2: EXAMPLE CASE

The Global Carbon Project – factful, transparent and informative



Audience: General public, policymakers, media, and researchers across sectors

Planetary Comms mix: High on "Be factful"

The Global Carbon Project (GCP) is a research and communication project led by Future Earth. It exemplifies factful communication by transparently presenting an annual Global Carbon Budget (GCB) with clear methodology, rigorously quantified uncertainties, open data, and a balanced but urgent framing that supports informed policy without resorting to exaggeration.

Despite its underlying complexity, the GCP manages to translate rigorous science into a clear, digestible format for policymakers, media, and the public. Charts and visualisations show global emissions trends, per-capita contributions, and carbon sink behaviour, while FAQs and press releases explain uncertainties and scenarios in accessible language. In this way, climate science is communicated reliably and responsibly, giving audiences a solid, evidence-based picture of where humanity stands in the climate challenge.

Impact: The GCB has become the authoritative benchmark for global emissions tracking. Policymakers use it to evaluate climate pledges, companies and investors reference it for sustainability planning, and journalists rely on its clear visuals and data for climate reporting. Its open-data approach ensures transparency, allowing researchers and decision-makers to interrogate the numbers directly.



Be factful

		Example for each level
3	**Master-level factfulness** Delivers thoroughly vetted, evidence-based information that balances accuracy with accessibility, avoids biases, and draws on open, publicly available data.	Lifecycle analysis of electric versus fossil-fuel vehicles, supported by peer-reviewed studies, addressing both benefits and limitations. Also relating the comparison to other sustainable mobility approaches, e.g., public transport.
2	**Accurate and contextual** Presents accurate, well-researched information with context and transparency, while distinguishing between facts and interpretations.	Highlighting that electric cars reduce emissions, but also noting the environmental and social impact of battery production.
1	**Basic accuracy** Information is accurate but lacks nuance, context, or clear distinctions between facts and opinions.	Stating "electric cars are a solution to climate change" without addressing their limitations or broader systemic factors.
0	**Inaccurate or misleading** Relies on unsupported claims, exaggerations, or biased information, eroding credibility.	Claiming that electric cars are much worse for the climate than gasoline cars due to emissions from battery production.

2. Simplify it: Break down complex ideas without oversimplifying

Communicating climate and sustainability science in an impactful way requires simplifying complexity without oversimplifying it.

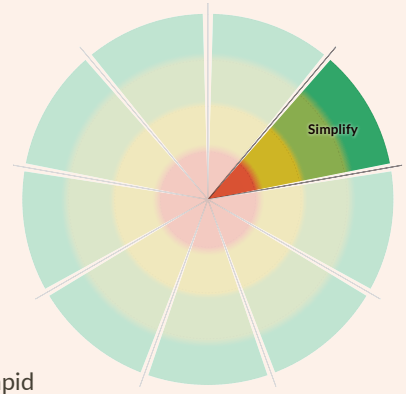
The goal of simplification is to make the science accessible while offering glimpses of its intricacy to inspire understanding and engagement. A key tool for this is plain language, including shorter sentences, everyday words, and active voice to help diverse audiences grasp ideas quickly without feeling talked down to.

For example, frameworks like the Exponential Roadmap Initiative summarises and simplifies many years of climate science into a recommendation "The Carbon Law" (see box 3) of halving emissions every decade through sector-specific strategies. Similarly, the concept of ecosystem services can be made relatable by linking them to everyday needs like clean air, water, and food. Explaining functional biodiversity through metaphors and analogies, such as a "deep bench" in sports, shows how diverse species strengthen ecosystems, much like having several skilled players on each position ensures a team's resilience under pressure.

Such approaches can spark "aha" moments, revealing the complexity of the issues while keeping the message focused and graspable. By striking this balance, it is possible for the science communicator to stay true to the science while empowering people to engage meaningfully with the science and the solutions it offers.

BOX 3: EXAMPLE CASE

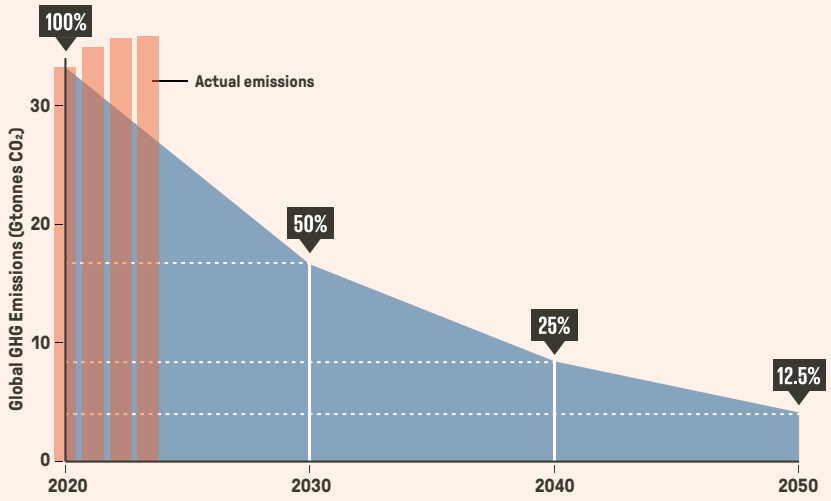
The Carbon Law and the Exponential Roadmap Initiative simplify complex climate science into a rule of thumb



Audience: General public and companies in different sectors

Planetary Comms mix: High on "Simplify it"

The "Carbon Law" by Johan Rockström and colleagues is a rule of thumb stating that global CO_2 emissions must be halved every decade to reach near-zero emissions by mid-century and keep warming well below 2°C. It was introduced in the 2017 Science paper "A roadmap for rapid decarbonization," which drew on carbon budget calculations, Earth system models, and IPCC-based climate science. The underlying research is complex, involving nonlinear dynamics, feedback loops, and uncertainty ranges. However, the authors deliberately translated it into something that could be easily understood outside the scientific community. In this way, rigorous science was turned into a clear, memorable guideline for various business sectors, policymakers and the public.



Impact: Building on the Carbon Law, the Exponential Roadmap Initiative (ERI) was launched to translate the science-based halving-every-decade idea into concrete business action, via its 1.5°C Business Playbook, transition-planning tools, and peer collaboration. In total, the initiative has brought together companies representing more than 2 million employees and over USD 1.2 trillion in annual revenue.

Simplify it

		Example for each level
3	**Simplifying mastery** Easy to understand but subtly introduces the complexity of the issue, encouraging the audience to think deeper without overwhelming them.	"The Earth has organs too: forests that breathe, ice sheets that regulate heat, oceans that circulate nutrients. Push one too far, and like a failing organ in a body, it can collapse the whole system. Tipping points aren't just abrupt changes in one place, they affect Earth's vital functions on a global level."
2	**Simple but adds some depth** Clear and accurate, with a concrete hook that makes the concept memorable.	"Think of Earth as a human body, and the planetary boundaries as blood pressure. Above 120/80 does not indicate a certain heart attack but it does raise the risk, and the doctor suggests lifestyle changes."
1	**Very basic, simple explanation** Accurate and clear, but flat. Delivers the core fact or concept without framing or analogy.	"Halving emissions every decade is a principle that can be applied at any scale, individual, business, region, country." (But see Box 3 for how this same message can be given more depth.)
0	**No simplification** Too complex or jargon-heavy for a general audience, leaving most readers confused or unable to engage with the core message.	"In the next 100 years, the pH level of the oceans will drop from 8.1 to 7.7."

3. Time it wisely: Strategically deliver messages when audiences are most receptive

Even the most compelling message can fall flat if delivered at the wrong moment or heard only once. Timing and repetition are two of the most powerful tools in a sustainability science communicator's arsenal.

Repetition has long been said to be the mother of learning. Processing information more than once helps us understand and remember. Sustainability science tackles complex issues and oftentimes generates complicated results and messages. Repetition of these messages, and of the insights that underlie them, will help make them more understandable, memorable and familiar to the audience.

This is true also for climate-dismissive messages, repeating them many times can make recipients rate them as more true. Even climate advocates tend to perceive sceptic messages as more truthful after having heard them be repeated. With this in mind, the repetition strategy should be applied more often on scientifically proven sustainability messages as well. Repeating basic information in a story that introduces new findings helps make sure the recipients have better chances of understanding the message, and helps to establish a fact based starting point. However, it is important to balance repetition carefully, because overdoing it can lead to audience fatigue, reduced attention, or even resistance to the message, highlighting a clear trade-off between familiarity and engagement.

Linking your messages to news and attention cycles, catching the zeitgeist, or finding a metaphor that resonates with something broader happening in culture or public life is key to successful sustainability communication. One illustrative example is the launch of the annual '10 New Insights in Climate Science' report, which is released during the COP climate meetings (see Box 4). It is updated every year with the latest research findings.

Even with the best intentions, timing can go wrong. One example is when we at the Stockholm Resilience Centre were involved in the launch of a major international study and had already scheduled a press release, and then the Queen of England passed away just an hour before. Launching a climate campaign about melting snow when there's a metre of it on the ground, or issuing a press release about drought impacts during a major flood, are other examples.

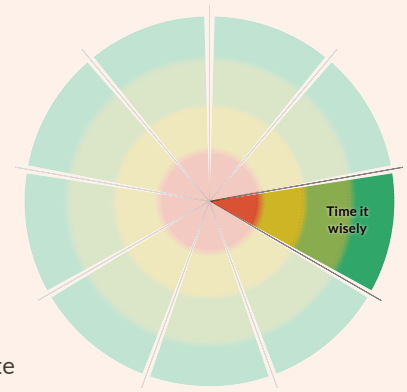
BOX 4: EXAMPLE CASE

The 10 New Insights in Climate Science are published every year during climate COP meetings

Audience: Decision makers and the public

Planetary Comms mix: High on "Time it wisely"

The 10 New Insights in Climate Science (NICS) provide concise, science-based takeaways on critical climate topics, translating complex research into actionable guidance. Each year, the latest scientific studies and climate model analyses are distilled into accessible insights for policymakers, business leaders, and the public. By framing complex climate science in clear, memorable terms, the 10 NICS help decision-makers grasp urgent issues and emerging trends in a rapidly changing climate.



Impact: By being published annually at climate COP meetings, the 10 NICS create a regular rhythm of evidence-based updates that inform policy and strategy worldwide. This yearly repetition (with different content) reinforces awareness, helps track progress, and ensures that the latest scientific findings are continuously integrated into climate decision-making and planning processes.



Time it wisely

		Example for each level
3	**Master-level timing** The timing is impeccable and highly strategic, perfectly aligning with the audience's needs, key dates, and contextual trends. The main message is repeated several times in various contexts and wordings.	Example: Launching the "10 New Insights in Climate Science" report during COP meetings on climate. It is repeated every year, but with new additions from the latest research.
2	**Good timing** Connects to a relevant moment, but the opportunity isn't fully exploited.	Releasing a new report on biodiversity loss during the UN biodiversity summit, but without a press strategy, stakeholder outreach, or a summary tailored to non-specialist audiences.
1	**Basic timing awareness** Timing is considered, but it lacks precision.	Sharing findings on Arctic ice melt sometime in spring, loosely timed to Earth Day, but missing the peak media window and disconnected from any current policy debate or news hook.
0	**Poor timing** Timing is not considered at all, at worst the message and the moment end up working against each other.	Publishing a report on rising temperatures during an exceptional cold snap or issuing a press release about water scarcity during a major flood.

4. Link it to other societal concerns: Show intersections with health, economy, equity, etc

Communicating sustainability science becomes more impactful when the connections between environmental challenges and wider societal concerns are clearly communicated.

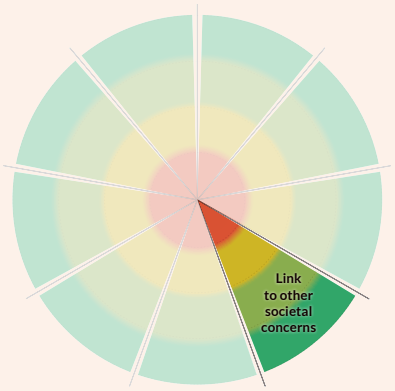
The time of talking about environmental issues in isolation from wider societal concerns is over – if it ever really existed. Addressing environmental challenges as separate issues risks missing the broader picture of how they intertwine with social, economic, and political systems. Communicating sustainability science becomes more powerful when these connections are made visible, for example when heat waves are linked to health issues, extinction of insects to pollination of cash crops, wildfires to loss of life and property, or climate change to worsening social inequalities.

Framing environmental issues within everyday societal contexts helps audiences see their relevance, urgency, and moral dimensions. For instance, discussing air pollution through its impact on children's health or connecting renewable energy to job creation in marginalized communities can ground abstract science in lived experiences.

Such framing not only broadens the audience but also deepens engagement. It invites people to see environmental solutions not as isolated fixes but as pathways to fairer, healthier, and more resilient societies. This integrated approach helps science communicators bridge divides, foster empathy, and inspire action rooted in both knowledge and shared values.

BOX 5: EXAMPLE CASE

The economic cost of insect declines: making biodiversity loss tangible



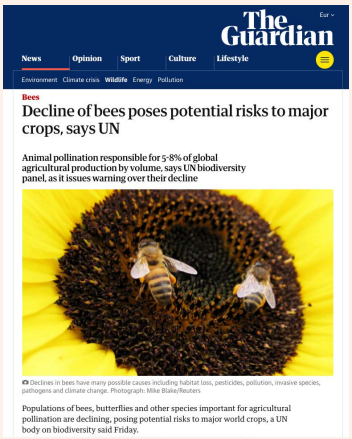
Audience: Decision makers, businesses and the general public

Planetary Comms mix: High on "Link it to other societal concerns"

Globally, both the number and diversity of insects are declining due to habitat loss, disease, pollution, and climate change. To highlight the urgency, IPBES (the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) emphasised the immense societal and economic value of insects. For example, the loss of pollinators alone threatens $235–$577 billion (USD) in global crop output annually. According to the same assessment, pollination services account for 5–8% of total crop market output across different world regions.

Insects also provide essential services beyond pollination, including nutrient cycling, pest control, and soil health. Their decline jeopardises livelihoods, food security, and ecosystem resilience, making the consequences of insect loss economically and socially significant.

Impact: By putting a monetary value on pollination, IPBES made the abstract concept of biodiversity loss tangible for policymakers, businesses, and the public. This approach strengthened the rationale for funding pollinator protection, ecosystem restoration, and broader biodiversity initiatives. The findings were widely reported in outlets such as The Guardian, New York Times, and CNN, demonstrating how linking ecological issues to societal concerns can drive awareness and action.


The Guardian

News Opinion Sport Culture Lifestyle

Environment Climate crisis Wildlife Energy Pollution

Bees

Decline of bees poses potential risks to major crops, says UN

Animal pollination responsible for 5-8% of global agricultural production by volume, says UN biodiversity panel, as it issues warning over their decline

Declines in bees have many possible causes including habitat loss, pesticides, pollution, invasive species, pathogens and climate change. Photograph: Mike Blake/Reuters

Populations of bees, butterflies and other species important for agricultural pollination are declining, posing potential risks to major world crops, a UN body on biodiversity said Friday.

Image: The Guardian

Link it to other societal concerns

		Example for each level
3	**Strong human connection** Describes planetary changes in deeply personal and relatable terms, focusing on how people's lives, health, and finances are directly affected.	"Heatwaves are increasing hospital visits for heatstroke among our elders, pushing up food prices for families, and affecting the safety of our children"
2	**Clear connection** Links climate change to human consequences in a straightforward way, though slightly less emotionally charged. Impacts are still tangible and relevant to people's lives.	"Rising sea levels and more frequent heatwaves due to climate change are already affecting health, food prices, and homes in coastal cities, putting pressure on public resources."
1	**Minimal connection** Mentions potential future human impacts of climate change, but the link is more abstract or indirect.	"Climate change is causing rising sea levels and extreme weather, which could impact global economies and public health in the future."
0	**No direct connection** Presents climate change or biodiversity loss in scientific or environmental terms without linking it clearly to human experience or consequences.	"The planet's average temperature has increased by about 1.4°C since pre-industrial times, causing accelerated ice melt and rising sea levels."

5. Inspire collective action: Motivate target groups with shared goals

Communicating in ways that spark collective action may be one of the most powerful levers sustainability communicators have at their disposal. Individual awareness is a starting point, but how you frame and deliver your message can be the difference between leaving audiences informed and leaving them mobilised.

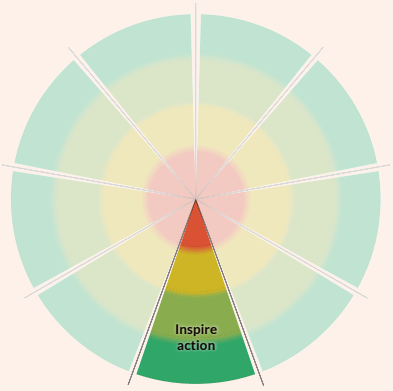
Individual actions matter, but the collective ones are more likely to make an impactful change. Inspiring collective actions through communications involves the process of linking an individual's role in collective actions with "constructive hope". This could be achieved by outlining concrete steps leading to effective actions and showcasing how easy it can be for an individual to take action, how likely the action will lead to change, and what collective benefits it will bring. Research also shows that people are more likely to engage in climate action when they understand that others care too. In fact, 89% of people want governments to do more to address climate change.

For example, a global "River cleanup" campaign (see Box 6) represents this approach in multiple ways. The initiative invites people to join a 10-minute challenge – to pick up waste for 10 minutes, 10 days in a row, individually or in a group, and share their experiences via social media with the campaign tag. The initiative mobilises people to collective action by directing them to take care of their closest surroundings, providing a lived experience of practically making a visible change in a short time, and informing about the impact reached worldwide after the collective action was taken. In addition, it raises awareness through their information channels and educational activities, pointing out both the social and environmental harm of pollution, and the benefits of addressing the issue.

What started as a personal 10-minute challenge by the initiator, Thomas de Groote, grew into an empowered worldwide community taking collective action by removing waste from their local waterways. The experience, lived by Thomas and many others, of shifting from individual contribution to collective impact is a form of constructive hope, something you build through doing, not something you wait to feel.

BOX 6: EXAMPLE CASE

River cleanup campaign in Belgium



Audience: General public, companies and foundations caring for a cleaner environment

Planetary Comms mix: High on "Inspire collective action"

In 2017, Thomas de Groote from Belgium got challenged by his sister to pick up trash for only 10 minutes. He dressed up as a super hero and brought his kids with him. The small action opened eyes to a global problem: plastic pollution. After a few years of organising clean-up actions and learning about the effects of plastic pollution, Thomas founded a non-profit organisation "River cleanup". The initiative invites people around the world to contribute to plastic-free rivers by either joining the 10-minute challenge, organising clean-up events in their local communities, engaging their colleagues at work, or funding the River cleanup organisation.

Through its website, social media channels and educational activities, the organisation is building a worldwide community of "river warriors" that help to further spread awareness of plastic pollution and contribute to its solutions, not only by focusing on the plastic removal, but also targeting the core problem of growing plastic production and consumption.

Impact: What started as a personal 10-minute challenge grew to a community of 288,000 people in 101 countries cleaning waste along more than 450 rivers with the ambition to clean up 1000 rivers worldwide by 2050. As of the end of 2024, the initiative has permanently removed up to 3,6 million kg of waste from the rivers. Interestingly, the campaign has moved beyond physical cleanups, using citizen science, AI, and research partnerships aimed at influencing policymakers and companies toward structural solutions.



Photo: www.river-cleanup.org

Inspire collective action

		Example for each level
3	**Strongly inspires collective action** Clearly calls for shared responsibility and collective effort. Emphasises that change is possible and shows how people can work together to make a real impact. Creates a sense of urgency and empowerment.	"Communities across the country are coming together to plant trees in urban areas, reduce energy use, and advocate for cleaner air. When we act together, we build resilience and create a healthier future for everyone."
2	**Moderately inspires collective action** Encourages action and highlights collective benefits, but the message is less vivid or emotionally compelling. Suggests solutions but may lack a strong call to act together.	"By supporting sustainable farming and reducing food waste, we can help protect the environment and ensure a more secure future for all."
1	**Minimally inspires collective action** Mentions sustainability or solutions in a vague or detached way. Focuses more on the issue and individuals than on mobilising group effort or shared responsibility.	"Switching to renewable energy sources is one way you can reduce your carbon footprint and help mitigate climate change."
0	**Does not inspire collective action** Provides factual information without linking it to action or involving the audience. Lacks any reference to human agency or collaboration.	"Global CO_2 levels have reached their highest point in recorded history, driven by the continued burning of fossil fuels."

6. Highlight solutions: Prioritise those that target the root causes

Bad news alone can overwhelm and paralyse people, causing them to tune out entirely. Pairing honest assessments of the problem with clear, credible pathways forward that tackle root problems is a key ingredient in impactful sustainability science communication.

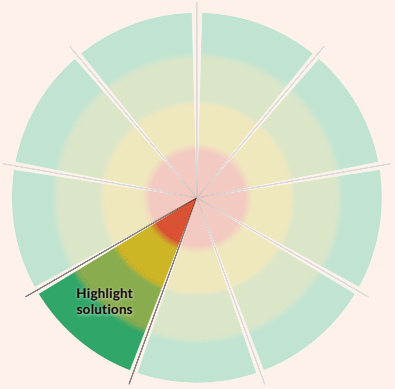
Sustainability science can be overwhelming, filled with complex data, dire warnings, and urgent global-scale problems. Without a sense of agency or direction, these kinds of messages risk leading to apathy or despair. Highlighting solutions and emphasising actionable, positive pathways gives people something concrete to move on and take hold of. It can help to make urgent complex challenges seem more approachable.

Focusing on what can be done, by individuals, communities, and systems helps shift the narrative from fear to possibility. For instance, showcasing cities that have rapidly scaled up cycling infrastructure or farmers restoring soil health through regenerative practices illustrates that change is not only needed, but already happening. Concrete examples like these demonstrate that solutions can be within reach and that people have a role to play. They also help paint a picture of desirable futures, where solving sustainability challenges creates better conditions for people.

Positive framing doesn't mean ignoring or downplaying the enormous challenges. It remains essential to clearly communicate the scale of the problems and propose credible pathways forward that tackle their root causes. This particular ingredient of the planetary communications framework is more about telling stories that motivate people to engage with the science and to do what it takes to contribute to the systemic changes needed to transition to sustainability. By illustrating how science-based strategies align with real-world successes, communicators can build well-informed, active hope, resilience, and momentum. It is this sense of possibility that can turn concern into commitment and science into action.

BOX 7: EXAMPLE CASE

Seeds of good Anthropocenes – highlighting existing sustainable solutions from around the world

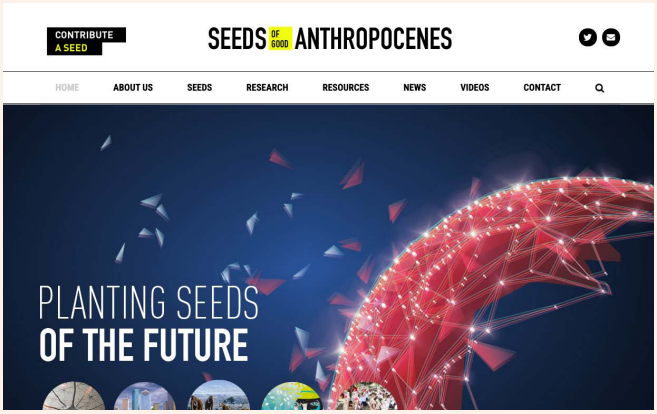


Audience: General public, policy makers and scientists

Planetary Comms mix: High on "Highlight solutions"

The initiative "Seeds of Good Anthropocenes" is both a scientific and a communication effort that identifies and amplifies existing sustainability initiatives ("seeds") that have the potential to contribute to positive futures in the Anthropocene (the age of humans). The rationale behind the initiative is that only focusing on problems and dystopic visions about climate, biodiversity loss, increased inequality etc, tends to make it very difficult to imagine how the world could work differently and inspire solutions towards achieving radical change. The highlighted sustainability solutions can be social initiatives, new technologies or tools, economic or financial instruments, organisations or movements, etc.

Impact: Led by McGill University, the Stockholm Resilience Centre, and Stellenbosch University since 2014, the initiative has resulted in a global database of over 500 real-world solutions-oriented "seeds". By sharing these through public platforms, workshops, and research, the initiative has inspired policymakers, scientists, and the wider public to imagine and engage with more hopeful futures. It demonstrates how positive storytelling can empower action and support more constructive dialogue about sustainability transformations.



Highlight solutions

		Example for each level
3	**Master-level Solutions** Balances urgency with scalable, systemic solutions that inspire collective action and meaningful progress.	Calling for laws that hold producers accountable, tax reforms that price in the full environmental cost of oil-based plastics, and international agreements to reduce plastic production at source.
2	**Targeted and relevant solutions** Offers actionable solutions tied to root causes, but not fully matching the problem's scale or systemic change.	Advocating for a phase-out of single-use plastics and corporate accountability for plastic waste.
1	**General solutions mentioned** Provides broad or small-scale solutions that don't fully address root causes or match the problem's scale.	Encouraging individuals to recycle more as the primary response to ocean plastic pollution.
0	**No solutions or misaligned solutions** Focuses only on the problem or superficial solutions unrelated to root cause.	Warning about ocean plastic pollution with no solutions offered, or implying that a simple fix like banning plastic straws will be enough.

7. Navigate emotions: Address fear, hope, and other emotional reactions constructively

The sustainability science community might be divided on whether to apply an emotional lens, but Planetary Communications is emotional whether we like it or not. The question is not whether to engage with emotions, but how to do so constructively and in a reliable way.

A group of boys trapped in a cave in Thailand, with parents praying at the flooded entry. Divers get them air and food. Eventually, they are saved. This story was covered by media outlets worldwide. Not because it directly impacted most people's lives, but because it is relatable. It could have been my son or brother. We care because we are empathetic creatures.

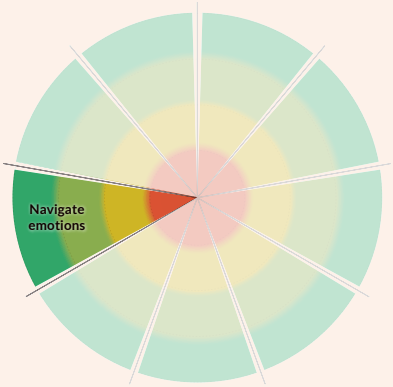
Emotions shape how we understand and act – something marketers have long known. For sustainability communicators, the challenge is balancing scientific rigour with genuine audience engagement. A startling fact alone can trigger strong reactions: faced with the news that coral reefs are reaching their thermal tipping point and experiencing unprecedented dieback, many felt anger, fear, and grief. Strong negative emotions like these can push people past passivity, but positive emotions (hope, pride, motivation) tend to sustain long-term change. As communicators, we have both a responsibility and an opportunity to address both: acknowledging difficult feelings while pointing, for instance, to positive social tipping points like the rapid uptake of solar power and electric vehicles.

A note of caution: emotional responses on social media are often immediate but may not translate into lasting behaviour change. AI can amplify scientific content but also disinformation and manipulative emotional messaging.

Finally, don't overlook surprise and humour, both are underused tools. The journalist's aphorism "man bites dog" captures it well: we remember what is unexpected. Facts alone are often like "dog bites man" – accurate, important, but easy to overlook.

BOX 8: EXAMPLE CASE

Punk stew for the planet: working with humour and a legendary indie rock band to communicate research on healthy and sustainable food



Audience: The general public, music industry and food system stakeholders

Planetary Comms mix: High on "Navigate emotions"

The food research centre PLATE, together with Swedish indie legends Bob Hund, explored a bold question: Could science and creativity change attitudes toward sustainable food? The result was a humorous, thought-provoking food truck for resilient meals, launched during the band's farewell tour. Co-designed with scientists, the menu featured dishes like "Punk Stew" to make healthy and sustainable eating desirable and fun.

"Transformation doesn't work if we take ourselves too seriously. We need both humour and seriousness – enough concern to act, but not so much fear that people shut down," said Bob Hund's creative director, Martin Kann. This linked planetary health, culture, and personal choice while also using playfulness to prevent fear-based disengagement and keep people open to change.

In this collaboration, Bob Hund acted as a cultural translator, converting science into something emotionally resonant and accessible. This kind of bridge-building between expert knowledge and everyday life is one of the most underused tools in sustainability science communication.



Photo: Jeanette Andersson

Impact: The food truck reached a large audience at the events it visited, including the 2025 Way Out West festival with 78,000 attendees and Bob Hund's sold-out farewell concert on 30 August 2025 in Stockholm with 18,000 fans. It also sparked widespread media coverage across newspapers, radio, television, and social media – where it not only gained attention but also triggered healthy debate and some critical voices, adding depth to the conversation.

Navigate emotions

		Example for each level
3	**Master-level emotional navigation** Holds emotional tension between loss and agency, threat and hope, driving both urgency and action.	Showing how climate change threatens the places, people, and ways of life we love most, while making clear that acting together can itself be a source of joy, pride, and renewed purpose.
2	**Strong emotional** Use of strong emotions like fear, hope, or empathy to enhance engagement while maintaining a clear focus on the message.	Scientist Terry Hughes, after surveying the bleaching of the Great Barrier Reef with students and colleagues, tweeted the data and added: "And then we wept."
1	**Mild emotional concerns** Subtle use of emotions like curiosity, empathy or nostalgia to complement the message without overwhelming the facts.	Reporting on declining insect populations by briefly noting that many readers likely remember more fireflies or butterflies in their childhood summers.
0	**No emotional concerns** Focus is purely on facts and logic, with no attempt to evoke or consider emotions.	Communicating research showing that coffee is really bad for the climate without considering the emotions it will stir.

8. Make it personal: Connect to individual experiences and values

To really engage with sustainability science and environmental challenges, most people need to see how the issues presented relate to their own lives, values, and aspirations. Or to someone they look up to, or relate to in other ways.

One common way to make people engage with sustainability science is to ask what they as individuals can do to help contribute to solving a climate or environmental problem. This is why lists with messages like "10 Ways You Can Help Fight the Climate Crisis" are common in the media. Making it personal by connecting to everyday choices, local realities, or deeply held beliefs can turn abstract challenges and research results into meaningful concerns.

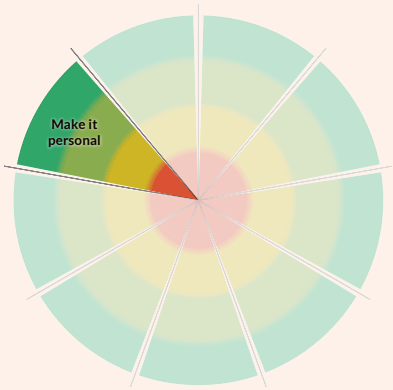
For example, talking about the loss of pollinators might not resonate until it's linked to a favourite fruit disappearing from the breakfast table, like strawberries. Climate change becomes more tangible when framed around changing seasons, rising energy bills, or a grandparent's memories of weather patterns. By inviting people to reflect on what they love, fear, or hope for, science communicators can foster a sense of relevance and emotional connection.

This approach helps build both trust and motivation. When people feel that sustainability isn't just about distant problems or future generations, but about their own health, security, and identity, they tend to be more likely to care and act. Such human-to-human connections can also be achieved by relating to role models or environmental heroes that people look up to.

It is, however, important not to reduce how people can take action solely to their role as individuals or consumers. It is equally essential to ask what actions they can take as citizens, parents, role models, and members of a community (see also previous sections on "Highlight Solutions" and "Inspire Collective Action").

BOX 9: EXAMPLE CASE

How a 15-year-old with braids became an environmental hero and started a global climate movement



Audience: General public and decision makers

Planetary Comms mix: High on "Make it personal"

It has been labelled "The Greta Thunberg Effect" and it refers to how those who are more familiar with her have a stronger sense of collective efficacy (the shared belief within a group that its members can work together effectively to achieve a common goal) and in turn have higher intentions of taking collective actions to reduce global warming.
Thunberg began a global movement by camping out in front of the Swedish Parliament, holding a sign that read "School Strike for Climate." Her catchphrase was "Don't listen to me, listen to the science." After a while, more people joined and the rest is history. She became TIME Magazine's Person of the Year 2019 and has addressed heads of state at the UN, met with the Pope, and inspired many million people to join the global climate strikes.

Another example is the Chilean climate and gender equality activist Julieta Martínez, who has built an entire movement across Latin America and the Caribbean. She started at 14, is now in her early twenties, and in 2026 received the prestigious Swedish WIN WIN Youth Award.

> **Impact:** Greta Thunberg and Fridays for Future helped mobilise 6–7 million people worldwide, earned her TIME's Person of the Year in 2019, and brought youth-led climate action to the center of global political and cultural discourse.



Photo: Time

Make it personal

		Example for each level
3	**Master level** Fully personal, with clear emotional and practical hooks. Highlights heroes and personal potential to encourage people to join (or start) a movement that becomes self-sustaining over time.	"Greta Thunberg was only 15 when she sat outside the Swedish parliament alone with a handmade sign. It started with one person deciding their voice mattered and sparked a global movement."
2	**Moderately personal** Includes basic human relevance or personal benefit; actionable but individually framed.	"By taking simple steps like switching to LED lights or biking to work once a week, you can cut your carbon footprint and save money at the same time."
1	**Mildly personal** Mentions people abstractly, but lacks relevance or clear actionability for the audience.	"Our greenhouse gas emissions are changing the climate at a planetary scale. It is now up to all of us to help bend the curve."
0	**No personal connection** Does not even attempt to connect with individuals; may alienate or overwhelm. Feels irrelevant or abstract.	"Atmospheric carbon dioxide levels have surpassed 420 ppm, disrupting global climate systems and biodiversity at a planetary scale."

9. Visualise it: Use visuals to make data and concepts tangible

Visualisations are among the most powerful tools in any communicator's toolkit. This is particularly true in science communication, where a well-chosen visual can do what complex data and pages of text cannot: make the invisible visible and the complex intuitive.

Visualisations can be everything from static images and simple metaphors to advanced interactive and immersive experiences that engage multiple senses. As such, visualisations are essential ingredients in sustainability science communication because they make complex, interconnected issues easier to understand, remember, and act upon. Iconic visuals like the planetary boundaries framework, ecological footprints, and the SDG "wedding cake" (figure 3) distill dense scientific data into intuitive formats, showing at a glance how ecological, social, and economic factors overlap and interact.

These visuals highlight the urgency and scale of sustainability challenges, bringing clarity to the often-abstract concepts of resource limits, ecological impact, and global goals. By engaging audiences emotionally and intellectually, visualisations can foster a deeper understanding and a sense of shared responsibility, making them powerful tools for inspiring action on sustainability.

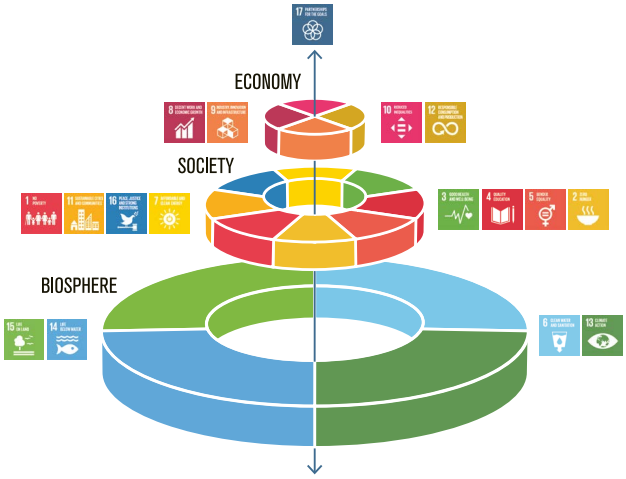
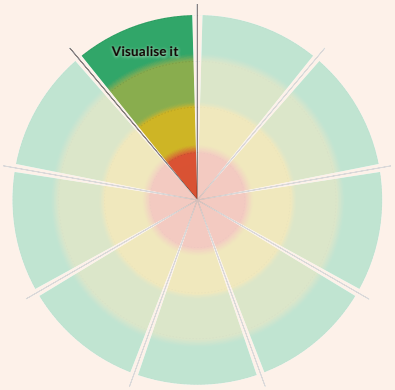


Figure 3: The SDG "wedding cake".

BOX 10: EXAMPLE CASE

"Dear Economy" – an immersive experience re-imagining the economy within planetary boundaries



Audience: General economy, decision makers

Planetary Comms mix: High on "Visualise it"

"Dear economy" is an immersive experience created by Sally, the accounting giant EY's future lab. It is part drama and part escape-room that invites the participants to step into the challenges and possibilities of re-imagining the economy within planetary boundaries. A future that we are currently headed to is described, but also where we could go instead. It makes the statistics hit you in the gut. Participants step straight into a room where they are in contact with the future through digital means and physical objects (a screen, a phone, a printer printing pages, and objects in an office). It is a future where good intentions and transition efforts have proven insufficient,

inviting visitors to imagine a world beyond today's economic logic. The visual and immersive journey invites participants to move through the sensory and emotional landscape of a collapsing world, and into the early outlines of something new.

"It was only when we showed people a crashed economy that they could accept that another economy might be possible," says Tove Blomgren, creative lead at Sally.

Impact: The immersive experience has been presented during the annual political week "Almedalen" in Sweden and has also won an award in Norway. It invites participants to step into a powerful, 30-minute immersive exploration of the limits of today's economic system, and what it would take to imagine a new one beyond short-term logic and planetary overuse.



Visualise it

		Example for each level
3	**Immersive visualisation** Advanced and interactive visuals such as animations, 3D models, or immersive experiences, allowing deeper engagement and understanding of scientific concepts.	A Virtual Reality experience of what it will look like if we cross the planetary boundaries, where you can move around in an immersive environment.
2	**Enhanced visualisation** More detailed or engaging visuals, including infographics, diagrams, and illustrations, to break down complex ideas.	An infographic combining illustrations, icons, and explanatory text, e.g. the planetary boundaries framework or the SDG "wedding cake."
1	**Basic visualisation** Simple visuals such as charts, graphs, or static images to support key data points and concepts.	Static bar charts of loss of species over time, or pie charts showing carbon emissions by sector.
0	**No visualisation** Communication relies solely on text or verbal explanations without any visual aids.	A press release about a new climate study with only text, not even including a metaphor.

Barriers and challenges

Sustainability science communication faces significant, multifaceted barriers that can undermine even the most well-crafted messages and communication efforts.

Communicating sustainability science can be a powerful tool for raising awareness and driving change, but it faces significant and multifaceted challenges or barriers. Examples include mis- and disinformation that erode trust, as well as conflicting interests and entrenched power dynamics that distort or suppress critical narratives. Lack of accessible background information, climate fatigue, hopelessness, and apathy are other well known barriers. These can be further compounded by polarised public discourse and pervasive mistrust in science, creating a complex environment where impactful communication often feels out of reach (figure 4).

These challenges demand a fresh approach, one that moves beyond traditional methods of sustainability science communication to embrace innovative and adaptive strategies. Our planetary communications framework is one such approach. By combining ingredients like simplification, personalisation, visualisation, emotional navigation, and linking environmental issues to broader societal concerns, this approach reimagines how we address these systemic challenges and barriers. Below, we assess these barriers in clusters that often occur together, and discuss how the planetary communication model can help.

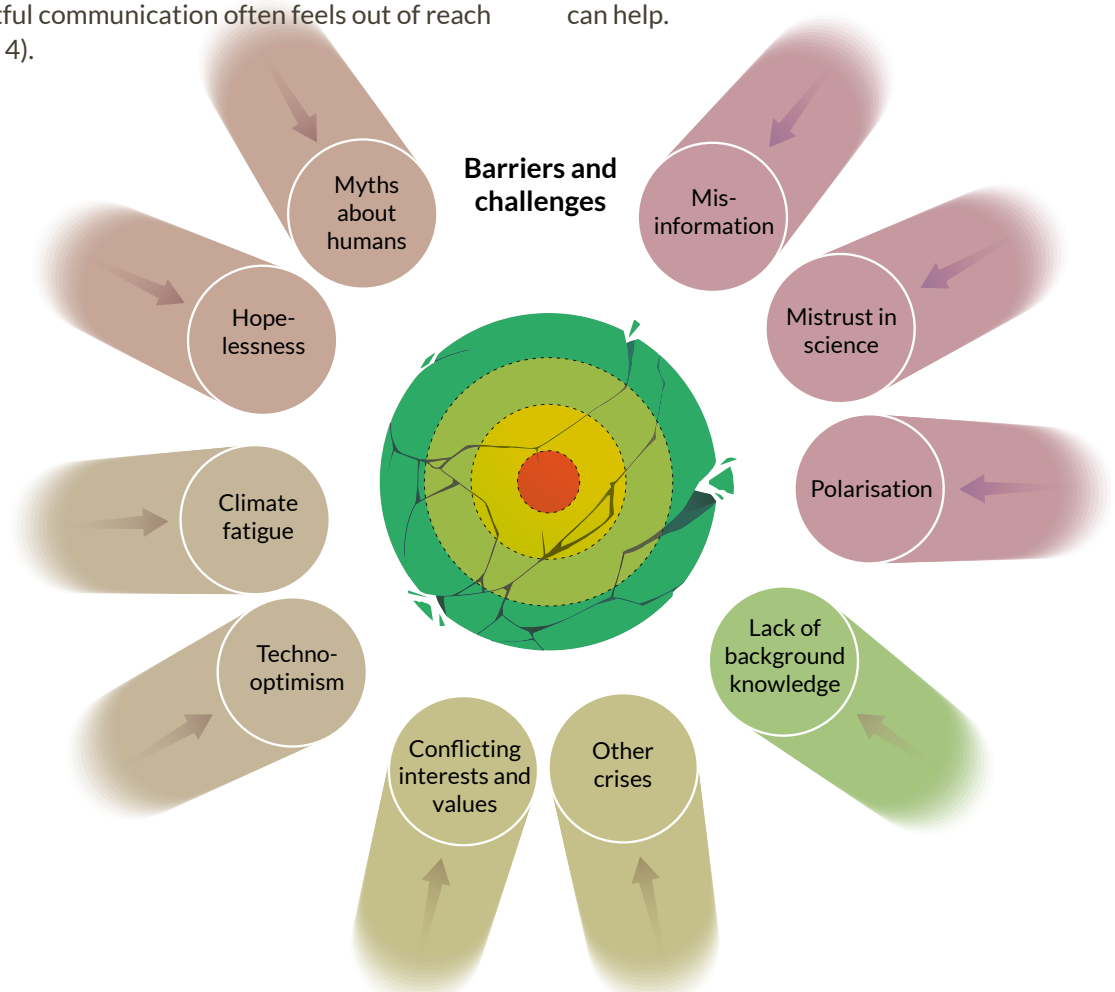


Figure 4: The planetary communications model presented in this handbook (and sustainability science communication in general) faces a number of significant and multifaceted challenges or barriers. Examples include mis- and disinformation, conflicting interests, lack of accessible background information, climate fatigue, hopelessness, apathy, polarised public discourse and pervasive mistrust in science. Illustration: Azote for Stockholm Resilience Centre.

Other crises and conflicting interests/ values

One example of a barrier is that, in recent years, escalating geopolitical tensions and persistent economic instability, have increasingly dominated public and political agendas. As a result, climate and sustainability science messages often struggle to gain traction.

The planetary communications model can help to overcome this by emphasising the need to make sustainability communication resonate with what audiences already prioritise. This includes intentionally linking climate and environmental messages to other societal concerns, such as health, jobs, security, preparedness, equity, or cost of living, that currently command public attention.

By systematically strengthening essential elements such as relevance, credibility, emotional resonance, and narrative framing, the model provides a strategic approach for making sustainability messages more salient, more trusted, and more competitive in an information environment crowded by crisis-driven priorities.

Misinformation, mistrust in science, and polarisation

Mis- and disinformation, mistrust in science, and political polarisation are tightly connected barriers to impactful sustainability science communication. Misinformation fuels doubt and confusion, which can erode trust in scientific institutions. As trust declines, people tend to become more susceptible to misleading claims, especially within polarised information environments where individuals gravitate toward sources aligned with their identity or political group. This creates reinforcing cycles in which false information spreads more easily and skepticism toward science becomes entrenched. Obstruction narratives also tend to fragment and spread across search engines, podcasts, social media, and AI tools simultaneously, making them hard to track or counter from any single angle.

Studies have also shown that digital infrastructure, platform ownership and algorithm design are important factors shaping how both climate information and misinformation circulates. The commercial ownership of major platforms creates structural incentives that can work against public interest, a dynamic sometimes described as platform capture. Another concrete example is how climate obstruction networks have exploited gaps in search engine results to steer users toward denial content through strategically recommended queries, a form of misinformation manufactured through infrastructure rather than just rhetoric. Algorithmic systems, including AI, can similarly amplify or suppress content in ways that have measurable consequences for climate communication. Non-commercial and civic digital infrastructure such as Wikipedia, the Wikimedia Foundation and the Internet Archive offer important counterweights, as does the broader principle of digital sovereignty: ensuring that public knowledge systems are not wholly dependent on commercial platforms.

The planetary communications model can help counter these dynamics by emphasising strategies that build credibility, foster shared values, navigate emotions, and reach across social and political divides. Strengthening elements such as transparency, messenger diversity, and narrative framing can make sustainability messages more resilient to misinformation and more relatable to audiences with differing worldviews. By connecting environmental issues to health, jobs, or community well-being, the model supports communication that can rebuild trust and open space for dialogue even in polarised contexts.

Lack of background knowledge

A lack of background knowledge about climate, biodiversity and sustainability issues can also hinder impactful communication, as many concepts are complex, unfamiliar, or counterintuitive. However, the traditional knowledge-deficit model, the assumption that simply providing more facts will change attitudes or behaviour, has repeatedly been shown not to be the main limiting factor. People rarely make decisions based on facts alone. Emotions, personal values, worldviews, and social identities play equally strong roles in how information is received and acted upon.

The planetary communications model serves as an important reminder of this. By emphasising elements such as emotional resonance, value alignment, narrative framing, and relevance to people's lived experiences, it encourages communicators to go beyond information transfer and engage audiences in ways that make sustainability issues meaningful, motivating, and personally significant.


BIG PROBLEMS
DAILY REPORT
LATEST NEWS
WORLD NEWS
OF PEACE AND PROSPERITY

Myths about humans and hopelessness

Persistent myths about human nature and widespread feelings of hopelessness present another barrier to impactful sustainability communication. For example, narratives suggesting that all people are inherently selfish, short-sighted, or incapable of collective action can undermine motivation and lead audiences to conclude that meaningful change is impossible. Yet research and commentary by writers such as Rutger Bregman and Rebecca Solnit highlight that humans are often far more cooperative, compassionate, and resourceful, especially in times of crisis, than these myths suggest. Solnit, in particular, highlights the concept of active hope: that hope is not a passive feeling but a deliberate choice to engage in problem-solving and action. She uses the vivid analogy of holding an axe to escape a burning house, alluding to that kind of hope as something we actively wield rather than a comfort we wait for.

The planetary communications model aligns with this perspective by emphasising elements such as active, well-informed and realistic hope together with agency, emotional resonance, and narratives of successful collective action. By presenting sustainability not as a doomed struggle but as a domain where human creativity and solidarity can trigger transformation, the model seeks to encourage communicators to inspire action rather than resignation. Yet it is important to note that even well-informed and well-meaning people tend to rationalise climate-harmful behaviour, as Maria Wolrath Söderberg and Nina Wormbs have shown in their research. A reminder that positive narratives about human nature are not sufficient on their own.

Climate fatigue and techno-optimism

Climate fatigue (or eco-fatigue) and overreliance on techno-optimism are additional barriers to effective sustainability communication. At first glance, the two may seem like complete opposites, but they are related in some ways. After all, they both tend to lead to passiveness and disengagement, either because people feel overwhelmed by the scale and urgency of environmental crises, or because they place their hopes on future technological breakthroughs to solve problems without changing behaviour.

Movements such as Greta Thunberg's Fridays for Future channel urgency into collective action, showing that societal and individual engagement in the present is crucial. At the same time, these movements have faced backlash, with critics questioning the efficacy of youth activism or portraying it as alarmist, which can reinforce public skepticism or fatigue. This has also resulted in the emergence of a counter movement where many young people are instead embracing high-consumption influencer culture, prioritising fashion, beauty, and lifestyle content over environmental engagement, despite claiming to care about the planet.

The planetary communications model addresses these challenges by balancing realism with empowerment: combining clear scientific evidence of risk with narratives of agency, feasible solutions, and tangible actions. This approach can help sustain engagement, counter fatigue, and make sustainability communication both credible and actionable.

Narratives suggesting that all people are inherently selfish, short-sighted, or incapable of collective action can undermine motivation and lead audiences to conclude that meaningful change is impossible.

Putting the planetary communications model into practice

Knowing the nine ingredients is one thing, applying them effectively is another. This section shows how the planetary communication model can be used as a flexible design tool, illustrated through a fictive step-by-step example and supported by AI prompting.

In order to put the planetary communications model in practice, the nine ingredients for impactful sustainability science communication can be thought of as an audio equaliser (figure 5) with a slider for each ingredient to create the best possible outcome for each communication effort. Just as different musical pieces or genres require their own equaliser settings, each communication effort calls for its own mix of ingredients, shaped by purpose, audience, and context. Consequently, impactful communication emerges from thoughtfully tuning all sliders so they work together as a balanced and coherent whole. But before you start tuning the sliders, listen. Understanding how your audience thinks, talks, and what they already know or care about is what calibrates the whole model. Without that, even the most carefully tuned mix risks missing the mark.

Below, we describe one fictive case of how the model can be used.

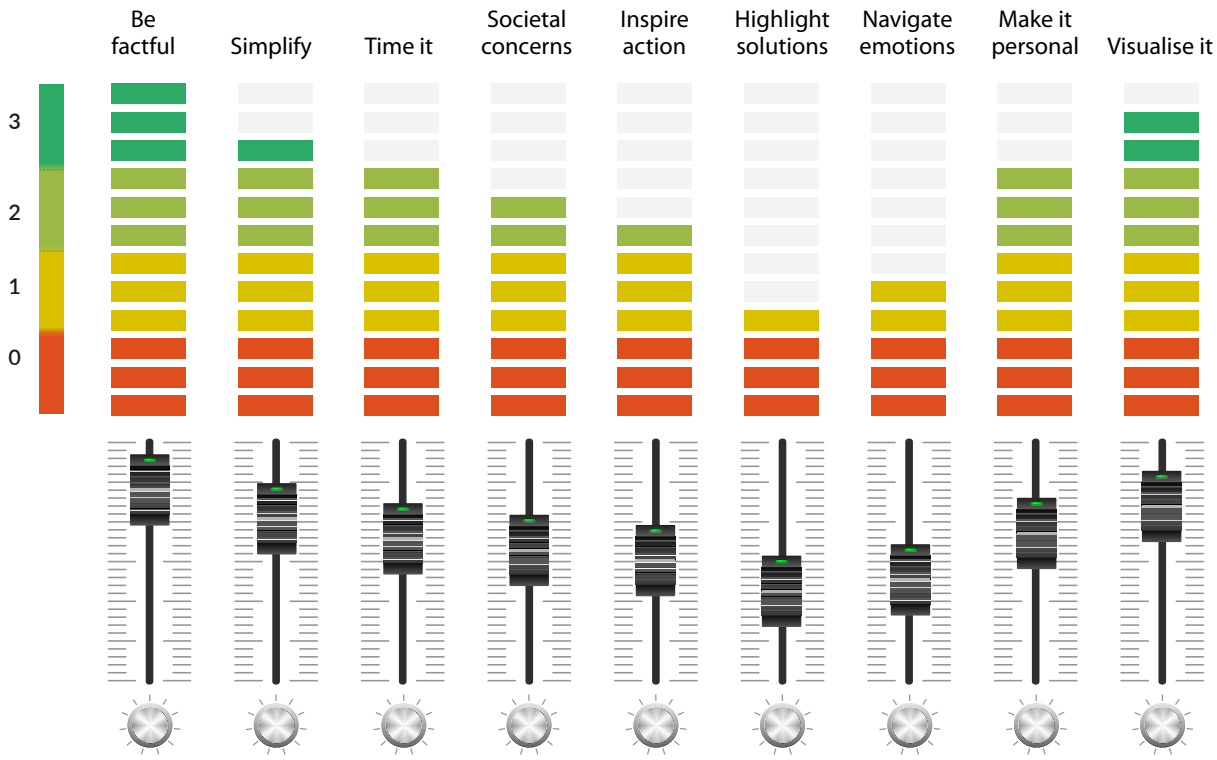


Figure 5: The audio equaliser analogy of the planetary communications framework, with its nine ingredients for impactful sustainability science communication. Just as different musical pieces or genres require their own equaliser settings, each communication effort needs its own mix of the ingredients, shaped by message, audience, channel, and context. **N.B! This figure is only an illustrative example of one possible combination of the nine ingredients.**

STEP-BY-STEP FICTIVE EXAMPLE:

How University X uses the planetary communications model to communicate a major research insight

Background (the research)

After 12 years of interdisciplinary research, Urban Horizons Lab at University X publishes a landmark study: Cities with more green space have significantly healthier populations, stronger social cohesion, lower heat stress, and higher economic resilience. The research is robust but complex: epidemiology, climate science, economics, and sociology.

The lab wants to communicate this insight beyond academia, so they consult the planetary communication model to decide how much of each ingredient to include in their communication.



Photo: Asia Culturecenter/Unsplash

1) Be factful – maintain scientific integrity

Question they ask themselves:

"*How do we stay true to facts and maintain credibility?*"

Result: The comms team at University X starts by building a thorough understanding of the scientific core, through dialogue with researchers and careful reading of the key results. This scientific grounding becomes the foundation that all later communication must remain anchored to. They identify what the data actually shows, what it doesn't show, and where uncertainty exists. They note that the study covers 78 cities over 12 years, is published in a peer-reviewed journal, and that results vary by region. They also flag what cannot be claimed: the findings show correlation, not straightforward causation. Correlation, that cities with more green space tend to have healthier populations, doesn't prove that one causes the other. If AI tools are used during this phase, caution is warranted as AI may exaggerate dominant paradigms, hallucinate implications, or reinforce established narratives at the expense of nuance.

Lesson learned: Resist the temptation to oversell the science, stick to the facts and be honest about limitations.

2) Simplify – clarify the core meaning

Question:

"*What is the simplest true message?*"

Result: Armed with a solid understanding of the science, the team distills the findings into a core message that is both accessible and honest: "Cities with more trees and parks are healthier, safer, and more resilient." This doesn't oversell the findings, it reflects the overall pattern the data supports, while the nuance and caveats established in ingredient 1 remain available for those who want to go deeper.

Lesson: Don't simplify the science, simplify the language.

3) Time it wisely – connect to the moment

Question:

"*Why now?*" "*How often?*"

Strategy: The scientists and their comms team agree to release the findings ahead of a major urban climate summit in Brussels, and by chance they happened to do it during a record-breaking heat wave across Europe.

Lesson: Good timing is key, it can make a huge difference, but the opposite is also true. If your message drowns in political cycles, media distractions, or shifting priorities. And sometimes, a stroke of luck helps too. You can plan your timing, but you can't manufacture a heat wave.

4) Link to other societal concerns – connect to big issues

Question:

"*How does this relate to other things people care about or current challenges?*"

Strategy: The team at University X decides to stress the fact that as climate change intensifies heat waves and inequality, green cities become a key strategy for public health, climate adaptation, and social justice.

Lesson: Anchor the research findings in real-world debates, and other things people care about.

5) Inspire collective action – show what can be done

Question:

"*What can individuals and communities do with this knowledge?*"

Strategy: Even small increases in urban greenery, like street trees, schoolyards, and rooftop gardens, can improve resilience, and everybody can contribute. The communicators at University X choose to provide examples in their messaging of how urban citizens can support local tree-planting and community gardens and advocate for green schoolyards and parks in their neighbourhoods.

Lesson: Action-oriented communication helps close the gap between knowing and doing. When you use concrete, local examples, it's easier for people to see what it means for them, and what they can actually do.

6) Highlight solutions – move beyond problems

Question: "*What higher-level solutions and policy recommendations does the research point to?*"

Result and strategy: The study identifies a number of high-impact solutions: Urban tree corridors, nature-based solutions, etc… The communicators at University X choose to highlight some of the policy recommendations from the study in press releases and social media posts (actions that politicians and city planners can take), e.g., setting minimum targets for urban green space (e.g. % tree cover) and prioritising greenery in heat-vulnerable and low-income areas, as well as funding nature-based solutions as part of climate and health strategies. To maximise policy impact, the communicators chose to target channels that reach decision-makers directly, tagging relevant politicians and ministries in social media posts, pitching an op-ed to an outlet with policy-oriented readerships.

Lesson: Science communication that illuminates higher-level, systemic, solutions, not just problems, tends to be more impactful. Strategies like tagging politicians in social media posts or targeting policy-oriented media outlets can increase the chance of reaching decision-makers directly. However, institutional communicators should be mindful of the line between science communication and advocacy, and check their university's guidelines where relevant.

7) Navigate emotions – balance hope and urgency

Question:

"*What will or should people feel when the message reaches them?*"

Result and strategy: The findings are both a warning and an opportunity: cities are becoming more dangerous due to heat and flooding, but nature-based solutions demonstrably work. The communicators at University X were careful to avoid both alarmism ("cities will become unbearable") and false optimism ("green roofs will solve everything"). They decided to lead with the human cost of urban heat while anchoring this in evidence that even modest investments in green infrastructure produce measurable improvements. They also connected the issue to values like health, children's wellbeing, and fairness, for instance by highlighting that greening efforts should prioritise low-income and heat-vulnerable neighbourhoods.

Lesson: Avoid both doom and hype; cultivate constructive emotion. Fear and guilt can trigger disengagement if not paired with a sense that action is possible and worthwhile. Ground hope in evidence, not wishful thinking, and connect the issue to values your audience already holds.

8) Make it personal – connect to everyday life

Question:

"*Why should people care?*"

Result: The research findings are reframed around everyday experience, not only systemic outcomes. Instead of talking about "the multiple ecosystem services of blue and green infrastructure," the communicators at University X ask: what does this actually feel like for a family living in a city? The answer becomes the message: more green space means cooler summers for children playing outside, cleaner air for people with asthma, parks where neighbours meet and social bonds form. The science hasn't changed, but the entry point has shifted from data to lived experience.

Lesson: Most people don't connect with systems, they connect with their own lives. Translating research findings into personal, sensory, and emotional terms isn't dumbing it down, it's finding the human angle.

9) Visualise – make the insight visual and imaginable

Questions:

"*How can we illustrate or explain our findings visually? What can people see in their minds?*"

Result: The team at University X knows that even a well-crafted message can remain abstract if it stays in words alone. They explore how visuals and metaphorical language can make the findings visible, relatable, and memorable. Some examples they develop:

- Infographics: A split image of two neighbourhoods, one grey and overheated, one green and thriving, showing differences in temperature, health, and social life side by side.
- Maps: City maps highlighting green spaces, heat hotspots, and vulnerable populations, making inequality visible at a glance.
- Photos: Real people using parks, walking shaded streets, and tending community gardens – putting human faces on the data.
- Simple graphs: Clear visual links between green space coverage, temperature, and health outcomes.
- Language tools: Metaphors like "Trees are the lungs of the city" and analogies like "Green infrastructure is to cities what a healthy diet is to the body" help audiences build mental images without needing to read a chart.

Lesson: Visualization is not decoration. The right image, contrast, or metaphor can do in seconds what paragraphs struggle to achieve: turn an abstract system into something people can actually see.

The resulting planetary communication profile for University X's comms effort

After applying the nine ingredients, University X produces this public message in various formats and channels:

> *After more than a decade of research, scientists at Urban Horizons Lab at University X have found that greener cities are not just nicer – they are fundamentally healthier and more resilient.*
>
> *Neighborhoods with more trees and parks experience lower temperatures, better mental health, stronger social ties, and greater economic stability. The study shows that even modest investments in urban nature can dramatically improve quality of life, especially as climate change intensifies heat and inequality.*
>
> *The message is clear: the future of resilient cities is green, and the transition can start now.*

After drafting the communication strategy, University X assesses how strongly each ingredient is represented, using the handbook's discrete scale: 0 = not present; 1 = weak; 2 = moderate; 3 = strong.

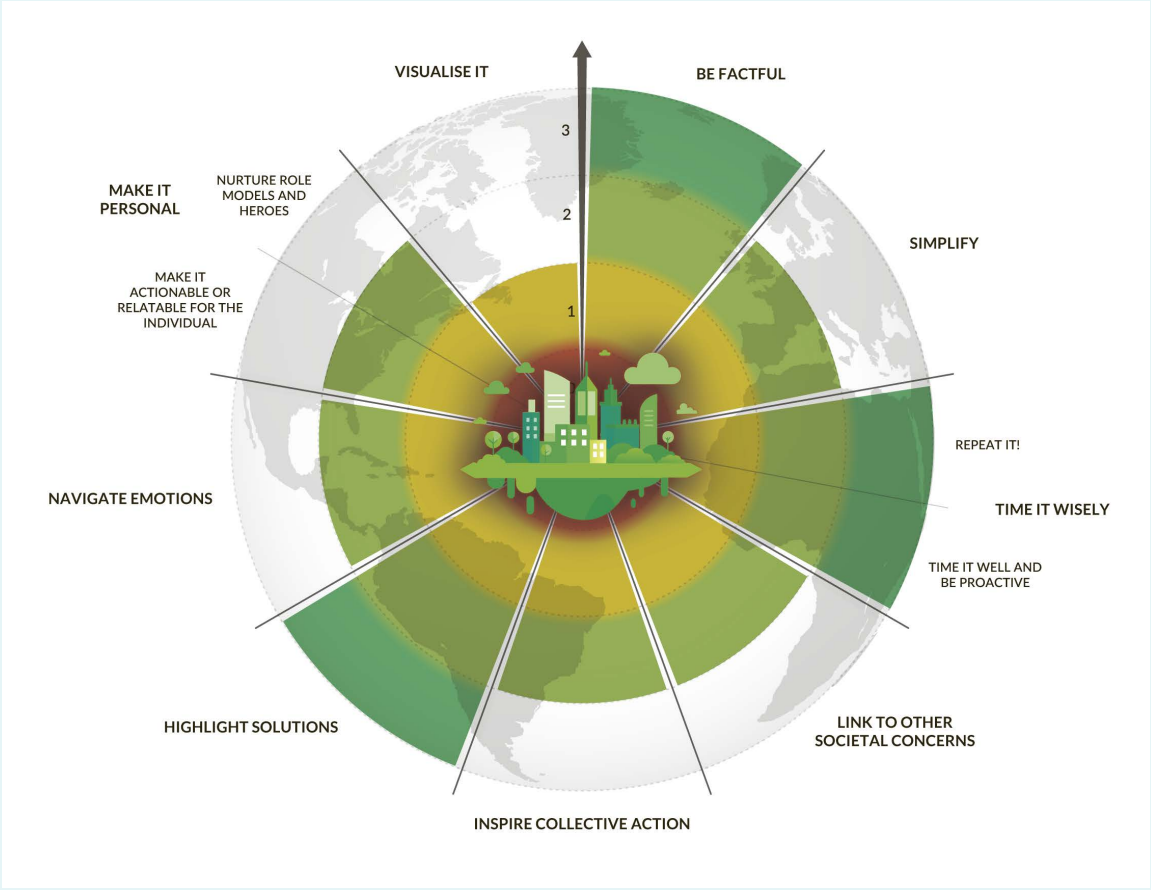


Figure 6: The radar chart shows that University X prioritised scientific credibility, clarity, and societal relevance, while leaving room to strengthen visualization. This demonstrates a core insight of planetary communication: the effectiveness of a message depends not on maximising every ingredient, but on designing a deliberate mix.

Ingredient	Score	Explanation
1. Be factful	3	Grounded in long-term research and robust evidence, no bias or exaggeration
2. Simplify it	2	Core message is simplified to become easy to understand and accessible
3. Time it wisely	3	Timing it to the international meeting, and, by chance, an urban heatwave across Europe
4. Link it to other concerns	2	Strong connections to climate change, health and inequality
5. Inspire collective action	2	Signals shared responsibility by suggesting how different target groups can contribute, but could be more explicit
6. Highlight solutions	3	Green infrastructure presented as a key solution
7. Navigate emotions	2	Balanced tone of urgency and hope, but the emotional aspects could have been stronger says the head of communication while the scientists were not comfortable with that approach
8. Make it personal	2	Links to health of individuals, wellbeing of families, and everyday life
9. Visualise it	1	Imagery present in language, visuals mainly in supporting materials e.g., link to photos in press releases, as they couldn't afford the cost of more interactive and immersive visuals.

AI: Prompting planetary communication

Used responsibly, AI tools can help systematically design, test, and refine your planetary communication efforts for greater impact.

AI tools can serve as a practical ally in applying the Planetary Communications model, helping you systematically test, refine, and adapt sustainability messages for different audiences and channels. Start a new conversation in your AI tool and upload this handbook as a PDF. Then copy the prompt below, fill in your content, and paste it into the chat.

> "You are an expert science communicator applying the Planetary Communications model. Evaluate this content [paste content, or describe the research results/messages and communication work so far] against each of the nine ingredients (simplify, make it personal, visualise it, inspire collective action, link to other societal concerns, navigate emotions, highlight solutions, be factful, time it wisely) as described in the uploaded handbook. Identify strengths, gaps, and suggest concrete improvements or generate alternative versions tailored for the audience [describe audience, or write "suggest audiences"] and channel [describe channel, or write "suggest channels"]. Also consider challenges like denial, misinformation, or mistrust – and how this message might be summarised, reframed, or distorted if encountered through an AI chatbot or AI-generated search overview."

A note of caution: we are acutely aware that AI carries a significant environmental footprint and that its development is shaped by commercial interests that do not always align with sustainability goals. Use it as one tool among many, not as a replacement for human judgement, local knowledge, or genuine dialogue with your audience.



Concluding remarks: Communicating within planetary boundaries

To secure a liveable and just future within planetary boundaries, we must transform not only what we know, but how we communicate what we know.

The planetary crisis is not only a scientific challenge but a communication challenge. As this handbook shows, scientific knowledge alone seldom drives change. What determines whether knowledge leads to understanding, learning, engagement, and action is how it is communicated, by whom, and in what context.

The Planetary Communications Model is a practical tool to help with this. It brings together nine key elements: factfulness, simplification, timing, societal relevance, collective action, solutions, emotional navigation, personal connection, and visualisation. Together, they can help communicators move from simply presenting information to creating communication that people can understand and relate to. The model is designed to complement, not replace, existing communication strategies and processes. As a communicator of sustainability science, you decide what to communicate and why to mobilise your target audiences, but the model provides a shared language and a structured way to reflect on how to do it best.

There is no magic silver bullet for successful sustainability communication. Communicating climate change, biodiversity loss, and sustainable development is a so-called wicked problem, something that is constantly evolving, shaped by misinformation, polarisation, competing crises, and human emotions. This means communication has to keep evolving too. The planetary communications model is therefore not a fixed recipe, it is a flexible framework that you can adapt, test, and improve over time.

By integrating the model into different stages of communication work, from planning and framing to storytelling, design, and evaluation, communicators can craft more impactful messages and allocate time and resources more strategically. The case studies in this handbook illustrate that there is no single optimal mix of ingredients; instead, impactful communication emerges when the sliders are tuned thoughtfully to the specific audience, message, and context.

Effective sustainability communication requires time, resources, and professional expertise. It cannot be treated as an add-on or afterthought. Strategic planning, audience insight, testing, and iteration are necessary to turn complex knowledge into meaningful engagement and action. If communication is underfunded or rushed, even the strongest science may fail to make an impact.

We also need more interdisciplinary research on what works in sustainability communication, for whom, and in which contexts. Both public and private funders, as well as collaborators, can support this by backing research, pilot projects, and evaluations that connect social science, communication studies, and sustainability science. Building this evidence base is essential to counter misinformation and improve practice.

Clearer and more thoughtful communication about sustainability is more important than ever before. It can strengthen trust in organisations, make science more accessible, and support better public decisions. In the end, society benefits from better-informed public dialogue, stronger collective action, and more democratic pathways to sustainable futures.

Last but not least, this handbook is an invitation to collaborate. We encourage everyone reading it to help develop the model further: share it with colleagues and collaborators, mix and match it with your current best practices, and use it as a tool for reflection, dialogue, and innovation. Like sustainability itself, good communication develops through practice and shared effort.

Five takeaways

1	**Communication is key to sustainability** – Securing a just future on a liveable planet requires developing how sustainability science is communicated, not just what is known.
2	**Nine ingredients, endless recipes** – The Planetary Communications model offers nine core ingredients that can be mixed in different ways to help make complex sustainability messages more reliable, relatable, and relevant.
3	**There is no one-size-fits-all** – Impactful communication emerges when the approach is thoughtfully adapted to a specific audience, message, and context – there is no single optimal formula for how to mix the nine ingredients.
4	**Invest in communication** – More time, resources, and expertise in communication is critical for turning scientific insights into real-world engagement, better decisions, and societal benefits.
5	**Communicate for resilience** – Stronger sustainability communication enables better decision-making and can help build long-term resilience for organisations, societies, and the planet.

Endnotes and Further Reading

1. Be factful

Voci, Denise, and Matthias Karmasin. 2024. "Sustainability Communication: How to Communicate an Inconvenient Truth in the Era of Scientific Mistrust." *Journal of Communication Management* 28 (1): 15–40. https://doi.org/10.1108/JCOM-05-2022-0060.

The article examines the current state of sustainability communication and its remaining challenges. It explores how the western industrial system deliberately manufactures "uncertainty" to cast doubt on human-caused climate change, and why public perception differs from scientific consensus, partly due to mis- and disinformation. The authors present counterstrategies tailored to four groups: science deniers, adaptation skeptics, whitewashers, and world saviors.

Nemes, Noémi, Stephen J. Scanlan, Pete Smith, et al. 2022. "An Integrated Framework to Assess Greenwashing." *Sustainability* 14 (8): 4431. https://doi.org/10.3390/su14084431.

An actionable framework to assess truthfulness of "green" and "net-zero" claims across corporate, governmental and NGO communication is presented, aimed at detecting deceptive or vague sustainability narratives and improving verifiable disclosure. The authors suggest that the framework is best used to assess public environmental claims made by organisations and uncover lies, half-truths, and misleading claims.

Haider, J., & Rödl, M. 2023. "Google Search and the creation of ignorance: The case of the climate crisis". *Big Data & Society* 10(1). https://doi.org/10.1177/20539517231158997

The article examines the challenge of being factful from the perspective of commercial search engines. The authors show that everyday Google searches on topics like food, clothing, and travel systematically tend to reproduce high-carbon perspectives while obscuring the scale of change needed. A reminder that factful communication is necessary but not sufficient: the digital infrastructure through which audiences encounter information can work against it.

2. Simplify it

De Vries, Gerdien. 2020. "Public Communication as a Tool to Implement Environmental Policies." *Social Issues and Policy Review* 14 (1): 244–72. https://doi.org/10.1111/sipr.12061.

The paper presents three suggestions for environmental public communications: keep it simple, balance the message, and provide an action perspective. The author concludes that informational complexity, caused by the heaping of irrelevant details, can trigger a backlash, undermining the effectiveness of environmental public communications. Thus, the most effective environmental public communications are those that present one simple message.

3. Time it wisely

Muradova, Lala, Hayley Walker, and Francesca Colli. 2020. "Climate Change Communication and Public Engagement in Interpersonal Deliberative Settings: Evidence from the Irish Citizens' Assembly." *Climate Policy* 20 (10): 1322–35. https://doi.org/10.1080/14693062.2020.1777928.

In the Irish Citizens' Assembly, climate policy ideas that were repeated by multiple speakers were more likely to be adopted, likely via easier recall and perceived social proof. A caveat is that the proposals that were most repeated were more general ones (such as wind energy and electric vehicles) compared to more sector-specific or technical proposals. This may imply that it may not be repetition itself, but rather the nature of the proposals that are repeated, that leads to uptake.

So, Jiyeon, and Hyunjin Song. 2023. "Two Faces of Message Repetition: Audience Favorability as a Determinant of the Explanatory Capacities of Processing Fluency and Message Fatigue." *Journal of Communication* 73 (6): 574–86. https://doi.org/10.1093/joc/jqad025.

The authors tested five different climate change messages and found that repetition affects people differently depending on their starting attitudes. For favourable audiences, repetition built familiarity and increased persuasion. For unfavourable audiences, it bred fatigue and had the opposite effect. The takeaway: repetition is not a universal strategy, knowing your audience's starting point matters.

Jiang Y, Schwarz N, Reynolds KJ, Newman EJ. 2024. "Repetition increases belief in climate-skeptical claims, even for climate science endorsers". *PLoS ONE* 19(8): e0307294. https://doi.org/10.1371/journal.pone.0307294

Experiments showed that climate science endorsers were more likely to believe claims that were consistent with their prior beliefs, but repeated exposure increased perceptions of truth for both climate-science and climate-skeptic claims to a similar extent. Even counter-attitudinal claims benefit from previous exposure, highlighting the insidious effect of repetition.

4. Link it to other societal concerns

Uppalapati, S., Ansah, P., Campbell, E., Gour, N., Thier, K., Kotcher, J., & Maibach, E. 2023. "A global review of research on effective advocacy and communication strategies at the intersection of climate change and health". George Mason University. https://doi.org/10.31219/osf.io/6w3qh

This comprehensive review from George Mason University's Center for Climate Change Communication synthesises findings from 195 peer-reviewed research studies. It found strong evidence that framing climate change in terms of public health rather than environmental risk alone significantly increases public support for climate action, including among people who are not otherwise concerned about climate change.

Doley, Deepa Moni, and Paramananda Barman. 2023. "Importance of Communicating Biodiversity for Sustainable Wildlife Management: A Review." *Journal of Environmental Studies and Sciences*, ahead of print, February 7. https://doi.org/10.1007/s13412-023-00819-8.

The review argues that biodiversity communication becomes more effective when it connects to what people already care about. Rather than speaking in abstract ecological terms, communicators should link biodiversity to tangible benefits like food security, clean water, disease regulation, and economic resilience, ecosystem services that affect people's everyday lives. Framing biodiversity loss in terms of consequences for health, livelihoods, and local culture is more likely to shift attitudes and motivate action than appeals to nature alone.

Folke, C., and others. 2011. Reconnecting to the Biosphere. *Ambio* 40: 719–738. DOI: 10.1007/s13280-011-0184-y and Rockström, J., Steffen, W., Noone, K., Persson, Å., and others. 2009. "A safe operating space for humanity." *Nature* 461: 472-475 DOI 10.1038/461472a

Researchers at the Stockholm Resilience Centre have long argued for connecting ecological concerns to human survival and wellbeing. The Planetary Boundaries framework and the concept of "reconnecting to the biosphere" exemplify this approach: rather than framing biodiversity conservation and climate stability as environmental concerns in isolation, these frameworks relate them to human societies, economies, and human health. They translate complex sustainability science into messages with direct relevance to people's lives, making the case that protecting nature is ultimately about protecting ourselves.

5. Inspire collective action

McLoughlin, Niall. 2021. "Communicating Efficacy: How the IPCC, Scientists, and Other Communicators Can Facilitate Adaptive Responses to Climate Change without Compromising on Policy Neutrality." *Climatic Change* 169 (1–2): 5. https://doi.org/10.1007/s10584-021-03232-8.

The author argues that communicating climate threats must go hand in hand with boosting people's sense of efficacy – their belief that action is possible and worthwhile. Three types matter: confidence in one's own ability to act, belief that actions actually make a difference, and trust in collective capacity to create change together. The author recommends that IPCC communicators use language that strengthens all three, alongside highlighting health risks and framing climate action as socially normal.

Brosch, T. 2025. "From individual to collective climate emotions and actions: a review". *Current Opinion in Behavioral Sciences* 61, 101466, ISSN 2352-1546, https://doi.org/10.1016/j.cobeha.2024.101466.

This review summarises the current state-of-the-art of our knowledge about group-based and collective emotions and their link to collective climate action. The evidence illustrates that individual actions matter, but the collective ones are more likely to make an impactful change. Inspiring collective actions through communications involves the process of linking an individual's role in collective actions with the "constructive hope".

Andre, P., Boneva, T., Chopra, F. et al. 2024. Globally representative evidence on the actual and perceived support for climate action. *Nat. Clim. Chang.* 14, 253–259. https://doi.org/10.1038/s41558-024-01925-3

This is the study showing that more people than you might believe want their governments to take stronger action on climate change. In fact, it is a majority: 89 percent according to this study that surveyed nearly 130,000 people across 125 countries. Overall, 89 percent call on their national governments to take stronger political action to stop global warming.

6. Highlight solutions

De Vries, Gerdien. 2020. "Public Communication as a Tool to Implement Environmental Policies." *Social Issues and Policy Review* 14 (1): 244–72. https://doi.org/10.1111/sipr.12061.

The author suggests providing an action perspective when communicating environmental issues.

An action perspective can increase perceptions of self-efficacy and effectiveness if it clarifies to the audience how they can contribute to solving environmental problems. Furthermore, it can reduce the occurrence of cognitive biases and cognitive dissonance (and the strategies used to reduce these). Telling people how they can minimise their carbon footprint (e.g., "take the bus") can empower them.

Voci, Denise, and Matthias Karmasin. 2024. "Sustainability Communication: How to Communicate an Inconvenient Truth in the Era of Scientific Mistrust." *Journal of Communication Management* 28 (1): 15–40. https://doi.org/10.1108/JCOM-05-2022-0060.

The authors caution against focusing too much on solutions and argue that sustainability communication tends to over-emphasise the positive solutions, opportunities, and co-benefits. This risks glossing over what change actually requires: giving up privileges, breaking comfortable habits, and challenging the market-oriented systems that underpin modern life. They identify a specific audience group they call "whitewashers", people who accept the science but only communicate its upside, quietly omitting the harder truths.

7. Navigate emotions

Becker, A. and Anderson, A.A. 2019. "Using humor to engage the public on climate change: the effect of exposure to one-sided vs. two-sided satire on message discounting, elaboration and counterarguing". ***JCOM*** **18(04), A07. https://doi.org/10.22323/2.18040207**

This research shows how humour can be a transformative tool in science communication and have a positive impact on people's understanding of climate change. The study explored exposure to one-sided vs. two-sided satire about climate change. One-sided satire, ironically claiming that global warming is a hoax, encouraged viewers to engage in greater message elaboration and counterarguing. In contrast, two-sided satire, making jokes about those who believe in vs. reject human involvement in climate change, was quickly discounted.

De Vries, Gerdien. 2020. "Public Communication as a Tool to Implement Environmental Policies." ***Social Issues and Policy Review*** **14 (1): 244–72. https://doi.org/10.1111/sipr.12061.**

The paper notes that people who process information in a fast and intuitive way tend to be vulnerable to emotional responses that override more deliberate reasoning. The author further compares negative emotion and positive emotion in environmental communication. She also raises an ethical question: should public communicators deliberately trigger emotions, even for a good cause? The takeaway is that emotional appeals can be powerful, but should be used with care.

Galaz, Victor, Hannah Metzler, Caroline Schill, et al. 2025. "Artificial Intelligence, Digital Social Networks, and Climate Emotions." ***Npj Climate Action*** **4 (1): 23. https://doi.org/10.1038/s44168-025-00225-6.**

The authors argue that emotions around climate action are largely collective and play out over long time periods. Two dynamics stand out: first, collective emotions can fuel either climate movements or opposition, as seen in both Fridays for Future and anti-climate campaigns like #yes2meat. Second, AI introduces new forms of digital empathy that could strengthen emotional bonds to climate issues and extend concern to non-human species and future generations, but may equally erode connections to the natural world and local knowledge that underpin social resilience.

Brosch, T. 2021. "Affect and emotions as drivers of climate change perception and action: A review." ***Current Opinion in Behavioral Sciences*** **42: 15–21. https://doi.org/10.1016/j.cobeha.2021.02.001**

This review illustrates the extent to which affect and emotions are powerful drivers of climate change perception and actions. The key conclusions are that both positive and negative emotional communications can promote sustainable behavior, and that triggering a positive emotional feedback loop may induce sustained behaviour change.

Wormbs, N., and Wolrath Söderberg, M. 2021. "Knowledge, Fear, and Conscience: Reasons to Stop Flying Because of Climate Change." ***Urban Planning*** **6(2), 193–203. https://doi.org/10.17645/up.v6i2.3974**

A qualitative study of people who have stopped flying for climate reasons. Contrary to common assumptions, fear (for the consequences of future climate change) stimulated behavioural change for many, while "flight shame" played a surprisingly minor role. Stopping flying instead generated a sense of agency and moral responsibility. A useful corrective for communicators: negative emotions do not necessarily paralyse, and shame is not a reliable lever for sustainable behaviour change.

8. Make it personal

Vitting-Seerup, Sabrina, and Lea Ellen Matthiessen. 2025. "Storytelling Science for Sustainability – Using Storytelling to Communicate the Science of Sustainable Food Systems." ***Environmental Communication*****, May 9, 1–17. https://doi.org/10.1080/17524032.2025.2493331.**

The article proposes storytelling as a way for scientists and publics to co-produce narratives about sustainable futures, using food system transition as an example. Beyond communication, storytelling is also seen as a tool for researchers to deepen their own understanding of their data. The authors are careful not to frame it as an easy fix (some participants worry about oversimplification) and they raise an important ethical question: should sustainability communication aim to persuade, or to enable democratic participation?

Fine, Julia, Joshua Ettinger, Sri Saahitya Uppalapati, John Kotcher, and Edward Maibach. 2025. "Role Model Narratives Are Underutilized in Instagram and TikTok Climate Action Posts." *Oxford Open Climate Change*, November 19, kgaf028. https://doi.org/10.1093/oxfclm/kgaf028.

This paper synthesises evidence that role model narratives are a proven but underused tool for encouraging socially beneficial behaviour. It argues that such narratives can lower perceived barriers and increase efficacy when role models are similar and credible, but warns that poorly chosen or overly heroic examples risk backfiring by making sustainable lifestyles seem unattainable.

Sabherwal, A., and others. 2021. "The Greta Thunberg Effect: Familiarity with Greta Thunberg Predicts Intentions to Engage in Climate Activism in the United States". *Journal of Applied Social Psychology*. DOI: 10.1111/jasp.12737

Using a nationally representative U.S. survey, the authors find that greater familiarity with Greta Thunberg is associated with stronger intentions to engage in collective climate action, with this relationship mediated by a heightened sense of collective efficacy, the belief that ordinary people working together can make a difference. This effect was present across all age groups and across the political spectrum, though it was stronger among liberals than conservatives.

9. Visualise it

Scapucci, Liliana, Yue Wu, Yi Wang, et al. 2025. "The Colours of CO2 Fluxes: Enhancing Public Understanding of the 'Breathing' of Ecosystems." *ARPHA Conference Abstracts 8* (June): e156743. https://doi.org/10.3897/aca.8.e156743.

The paper describes an art–science collaboration translating CO_2 flux data into intuitive colour-based visuals. By representing complex atmospheric measurements through accessible design, the project demonstrates how aesthetic approaches can make abstract climate data easier to grasp for non-scientists, without compromising scientific content.

McLoughlin, Niall. 2021. "Communicating Efficacy: How the IPCC, Scientists, and Other Communicators Can Facilitate Adaptive Responses to Climate Change without Compromising on Policy Neutrality." *Climatic Change* 169 (1–2): 5. https://doi.org/10.1007/s10584-021-03232-8.

The study argues that IPCC communications could increase efficacy by making greater use of imagery depicting solutions and people taking action. Research shows that images of climate impacts, e.g., melting ice, flooding, and wildfires, can increase awareness but also leave audiences feeling overwhelmed and powerless. Solution-focused imagery, by contrast, has been shown to boost self-efficacy and generate more positive emotional responses, making people more likely to engage and act.

Monoyios, K., Carlson, K., Litwak, T., Marien, T., Martin, F. 2024. "Visuals as a Catalyst for Climate Science Communication." In: Coren, E., Wang, H. (eds) Storytelling to Accelerate Climate Solutions. Springer, Cham. https://doi.org/10.1007/978-3-031-54790-4_11

The study shows that visualisations are essential ingredients in sustainability science communication because they make complex, interconnected issues easier to understand, remember, and act upon. In particular, the study focuses on climate information and concludes that visuals can make climate information more culturally accessible, ultimately resulting in broader community engagement.

Barriers and Challenges

Other crises and conflicting interests/values

Moore, S. 2024. "Climate Action in the Age of Great Power Rivalry: What Geopolitics Means for the Climate." University of Pennsylvania Kleinman Center for Energy Policy. https://kleinmanenergy.upenn.edu/research/publications/climate-action-in-the-age-of-great-power-rivalry-what-geopolitics-means-for-the-climate/.

An analysis of climate action under great-power rivalry argues that rising U.S.–China and Russia–West tensions complicate diplomacy, risk sudden breakdowns in cooperation, and can delay collective emissions reductions. At the same time, it notes that geopolitical rivalry can be framed as a driver of accelerated investment in clean technology and climate finance (e.g. using climate finance to compete for influence with China), showing how security frames can be harnessed to bolster, not weaken, environmental agendas.

World Economic Forum. 2026. "The Global Risks Report 2026." Geneva: World Economic Forum.

Recent risk surveys show that in the short term, decision-makers now rank geoeconomic confrontation, state-based armed conflict and misinformation above environmental risks, which pushes climate and biodiversity somewhat down the immediate agenda despite their long-term severity. This creates a communication trade-off: media and political attention are absorbed by security and economic crises, widening the gap between short-term priorities and long-term environmental dangers, even though these risks are already material (e.g. extreme weather losses).

Misinformation, mistrust in science, and polarisation

Ekberg, K., Forchtner, B., Hultman, M., & Jylhä, K. M. 2022. "Climate Obstruction: How Denial, Delay and Inaction are Heating the Planet." Routledge. https://doi.org/10.4324/9781003181132

This interdisciplinary book draws on environmental history, sociology, media studies, and psychology to map how meaningful climate action has been obstructed. It ranges from outright denial of scientific evidence to subtler forms of delay and inaction. The authors trace how corporations, conservative and far-right actors, and ordinary citizens have deployed arguments against environmental protection since the 1960s, and provide tools to identify and counter these strategies.

Rödl, M. B., and Haider, J. 2025. "'Google this!' How performative links and search engines organise information disorders in a climate obstruction network." *Information, Communication & Society* 28, 2462–2482. https://doi.org/10.1080/1369118X.2024.2445640

The study shows how a climate obstruction network exploits gaps in search engine results to steer users toward denial content through strategically recommended search queries. A concrete and technically grounded account of how misinformation is actively manufactured through digital infrastructure, not just rhetoric.

Ekström, B., and Haider, J. 2026. "A methodology for analysing informational textures: Skipping stones and noticing the ripples." *Journal of Documentation* 82(7): 150–169. https://doi.org/10.1108/JD-06-2025-0163

The article proposes a method for mapping how climate obstruction narratives fragment and spread across multiple digital platforms simultaneously, including search engines, podcasts, and AI tools. A useful methodological resource for understanding why misinformation is difficult to trace or counter through any single channel.

Nicolosi, E., Medina, R., Brewer, S., Vorkink, M., Allred, A. 2025. "The new denial: climate solution misinformation on social media". *Global Sustainability* 8, e31, 1–13.

Climate misinformation has shifted. Rather than denying that climate change exists, the so-called "New Denial" focuses on attacking climate solutions and their supporters – framing them as ineffective, risky, or part of a political agenda. This discourse is closely tied to far-right politics and thrives on social media through memes, short videos, and charged search terms. Counter-strategies include humanising the issue, providing transparent information, and paying particular attention to the formats and political actors driving the misinformation.

Tactical Tech. 2026. "The RePlaybook: A Field Guide to the Climate and Information Crisis."

The RePlaybook was released in 2026 by the international climate and technology nonprofit Tactical Tech as a free digital book. It brings together a collection of insights to help communicators, campaigners, journalists, and researchers to navigate today's climate and information crisis. Drawing on contributions from 30 organisations and practitioners, the book explores how attention driven algorithms, AI generated content, and profit fuelled manipulation shape public opinion on climate issues. https://tacticaltech.org/replaybook-a-field-guide-to-the-climate-and-information-crisis/

Lack of background knowledge

Jones, M.D., and Crow, D.A. 2017. "How Can We Use the 'Science of Stories' to Produce Persuasive Scientific Stories?" *Palgrave Communications* 3(53).

The study argues that science communicators rely too heavily on the 'Knowledge Deficit Model', the assumption that simply providing people with more facts will change their minds and behavior. This fails because people don't process information purely rationally; emotion, identity, and pre-existing beliefs all shape how evidence is received. As an alternative, scientists should communicate through storytelling, using characters, plot, and moral framing to make evidence resonate. The key is crafting stories that align with the audience's existing values rather than simply bombarding them with data.

Myths about humans and hopelessness

MacKinnon M, Davis AC and Arnocky S. 2022. "Optimistic Environmental Messaging Increases

State Optimism and in vivo Pro-environmental Behavior". *Front. Psychol.* 13: 856063. doi: 10.3389/fpsyg.2022.856063

Shows that optimistic environmental messaging temporarily raises environmental optimism, which in turn promotes pro-environmental behaviour. Also finds that such optimistic messages increase awareness of and support for techno-centric climate solutions (e.g. geoengineering), illustrating how message framing can channel support toward technological fixes. Raises concerns that certain optimistic framings may bolster techno-optimism and complacency if not paired with critical discussion of limits and trade-offs.

Bregman, R. 2020. "Humankind: A hopeful history." Bloomsbury Publishing.

Drawing on history, psychology, and anthropology, Bregman challenges the deeply ingrained assumption that humans are fundamentally selfish and short-sighted. He argues that cooperation, empathy, and collective problem-solving are in fact more characteristic of human behaviour than cynicism suggests, particularly in times of crisis. A useful counter-narrative for communicators seeking to motivate collective climate action without reinforcing fatalism.

Solnit, R. 2004. "Hope in the dark: Untold histories, wild possibilities." Haymarket Books.

Written in the aftermath of the Iraq War, Solnit argues that hope is not passive optimism but an active and deliberate orientation toward possibility, something we wield rather than wait for. Drawing on overlooked histories of social change, she shows that transformation often happens in ways that are invisible until suddenly they are not. Relevant for sustainability communicators navigating despair and fatigue, and for grounding hope in agency rather than wishful thinking.

Wolrath Söderberg, M., and Wormbs, N. 2022. "Internal Deliberation Defending Climate-Harmful Behavior." ***Argumentation: An International Journal on Reasoning*** **36 (203–228). https://doi.org/10.1007/s10503-021-09562-2**

Examines how well-informed people nonetheless justify continued climate-harmful behaviour through internal deliberation, effectively offsetting climate sins with green savings. A sobering complement to more optimistic accounts of human nature: people are not simply ignorant or irrational, but often skillfully rationalise inconsistency. Relevant for communicators who risk overestimating the power of positive narratives alone.

Climate fatigue and techno-optimism

Riemens, R. 2024. "Fixing the earth: whole-systems thinking in Silicon Valley's environmental ideology." ***Internet Histories*** **8(4): 294–311. https://doi.org/10.1080/24701475.2024.2416295**

The study examines how Silicon Valley has shaped climate discourse through a techno-optimistic ideology known as ecomodernism – the belief that human progress can be decoupled from environmental decline through innovation and technology. Tracing this narrative from the 1960s to the present, the author argues that this "whole-systems" thinking offers a seductive but ultimately misleading framing of the climate crisis, built on a misconception of Earth as a system that can be datafied and engineered its way out of trouble.

Other references

Planetary Health Check. 2025. Planetary Boundaries Science (PBScience). Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany. DOI: 10.48485/pik.2025.017

Richardson, K., Steffen W., Lucht, W., Bendtsen, J., Cornell, S.E., and others. 2023. Earth beyond six of nine Planetary Boundaries. *Science Advances* 9, 37.

Rockström, J., Steffen, W., Noone, K., Persson, Å., and others. 2009. A safe operating space for humanity. *Nature* 461: 472-475 DOI 10.1038/461472a

Steffen, W., Richardson, K., Rockström, J. & Cornell, S.E., et.al. 2015. Planetary boundaries: Guiding human development on a changing planet. *Science* 347: 736, 1259855

Wang-Erlandsson, L., Tobian, A., van der Ent, R., Fetzer, I., te Wierik, S., Porkka, M., Staal, A., Jaramillo, F., Dahlmann, H., Singh, C., Greve, P., Gerten, D., Keys, P., Gleeson, T., Cornell, S., Steffen, W., Bai, X., Rockström, J. 2022. A planetary boundary for green water. Nature Reviews Earth and Environment.

Appendix: Case studies

Here below we present a number of case studies that show how the nine ingredients in the planetary communications model can be used to evaluate what made your communication efforts impactful or not.

CASE 1

Sweden's first national citizens' assembly on climate 2024

Audience: General public and decision makers

Planetary Comms mix: High on "Highlight Solutions", "Link it to other societal concerns", and "Be Factful", but also "Inspire Action" and "Simplify"

In 2024, Sweden convened its first national citizens' assembly on climate, emphasising the power of dialogue to bridge divides and address sustainability issues. The assembly was part of FAIRTRANS, a research program involving Stockholm Resilience Centre, University of Gävle, Uppsala University, Lund University, and IVL Svenska Miljöinstitutet.



Sixty participants, selected through a "democratic lottery" to reflect Swedish society, met over nine sessions to discuss how the country could meet the goals of the Paris Agreement. The process demonstrated that meaningful communication is not just about disseminating scientific results but fostering respectful exchanges that engage diverse perspectives and values.

The assembly presented 22 proposals, including making climate change a mandatory school subject, investing in high-speed trains, and making public transport more reliable, affordable, and equitable. "If we can agree, our elected representatives should also be able to do so," the assembly stated in its joint declaration.

All proposals gained majority support, with highlights such as:

- Cross-party collaboration on climate issues.
- A national ticketing system and high-cost protection for public transport.
- A climate-smart product labeling system.
- Nationalised train services and expanded cycling infrastructure.

This dialogue-driven approach enriched the climate conversation. Supported by leading researchers and guided by mentors Sverker Sörlin and Carolina Klüft, participants learned from one another and considered different arguments. "The participants' commitment and collaboration make them role models for us all," Klüft remarked.

Tim Daw, the project leader, underscored the importance of dialogue: "Seeing people with such different views exchange ideas and find common ground shows how citizens' assemblies can help address difficult societal challenges."

The proposals were presented to Swedish parliamentary representatives, who praised the initiative and pledged to advance the ideas. This groundbreaking effort, part of the Fairtrans program, highlights how respectful, inclusive dialogue can turn sustainability communication into action, reaching through to inspire both public and political engagement. Full details are available at medborgarradomklimatet.se.

Research repeatedly shows that one of the most effective ways to build climate awareness and action is through conversation, not debate. Open, structured, and respectful forums with time to reflect foster engagement and increase the chances of compromise, even between ideological opponents, are key. This has been demonstrated by the FAIRTRANS project, and other citizen climate assemblies worldwide.

In planetary communications terms, the assembly was high on "Highlight Solutions", "Link it to other societal concerns", and "Be Factful", but also "Inspire Action" and "Simplify".

> **Impact:** The assembly got a lot of media attention in Swedish national television and leading newspapers. The proposals from the assembly were presented to politicians from the Swedish parliamentary parties, all of whom had been invited to the meeting to engage with the citizens' assembly members. They thanked the assembly for the proposals and confirmed the importance of cross-party cooperation. They promised to take the proposals forward in various ways.

CASE 2

Campaign on Climate Action #Earthstatement COP21, 2015

Audience: General public and indirectly decision makers

Planetary Comms mix: High on "Inspire Action", "Make It Personal", and "Be Factful"

In 2015 ahead of the United Nations climate conference COP21 in Paris, Stockholm Resilience Centre together with the agency BVD launched the #Earthstatement campaign, cheering for world leaders to listen to science and create real change. In a social media campaign people all over the world were invited to sign, show support and join the movement to save the climate based on eight essential insights from climate science. Sign, selfie, share! And the results were beyond the wildest expectations of all involved.

Earlier that year, Johan Rockström and colleagues published the Earth Statement, outlining the eight essential ingredients of a successful agreement in Paris. This was signed by business, political and religious leaders including Richard Branson, Arianna Huffington, Mary Robinson, Desmond Tutu, Al Gore and Paul Polman. In the weeks before the Paris summit, the social media campaign This Is My #EarthStatement was launched to build public support. Instead of signing an online petition, people could sign their own bodies and post photos online to show not just a strong support for science and message



to politicians, but also personal commitment to act. It resulted in support from sports stars such as Olympic skier Julia Mancuso, musicians, business leaders and politicians, including 15 mayors from major capital cities. The photos from Instagram and other social media channels were then wrapped around a special issue of New York Times which was handed out for free to all delegates at the COP21 meeting in Paris.

In planetary communications terms, the campaign was high on "Inspire Action", "Make It Personal" and "Be Factful" but also simplified, personalised, and visualised. Timing was also key and deliberate as the world leaders gathered in Paris during COP21.

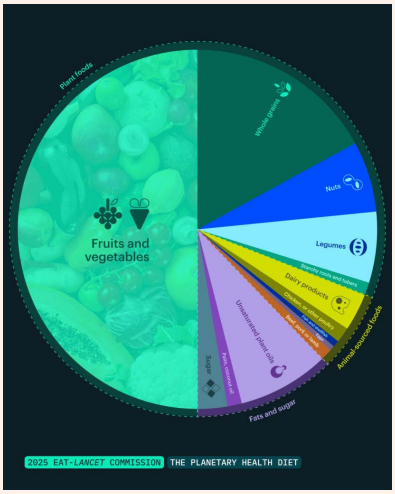
> **Impact:** The campaign reached a large number of people through SoMe and also attracted a lot of attention in Paris – leading to a full house when a press conference was held to listen to a panel of leading scientists commenting and giving feedback on the first draft of the Paris agreement. Many actually think this was a key moment during COP21 contributing significantly to a more progressive final version of the Paris agreement being adopted a day later.

CASE 3

The EAT Lancet report and its dietary recommendations

Audience: General public and stakeholders with power to change what we eat

Planetary Comms mix: High on "Inspire Action", "Make It Personal", and "Highlight solutions"



In 2019, Stockholm Resilience Centre together with The EAT-Lancet Commission presented a global planetary health diet that is good for both people's health and the planet. It was followed by an update in 2025, based on rigorous scientific work by some of the world's leading food sustainability and health researchers, and landed in scientific targets for healthy diets allowing for individuals to prepare and consume meals in the total amount, composition and proportions that fit within the ranges of different food groups. The dietary pattern allows for flexible application of these criteria with room to tailor foods and amounts to the different preferences and contexts to reduce the risk of poor diets and environmental degradation. In the communication of these research results the emphasis was on solutions, action and what individuals can eat that is good both for themselves and the planet, rather than the opposite message that humanity at large is eating our way to sickness and a destroyed planet. Collaborations with chefs has always been central to the work by the EAT foundation, for example through the "Chefs' Manifesto", crafted by more than 150 chefs around the world, launched in 2018 at the EAT forum in Stockholm. It was tied to the UN global goals, and actions for "cooking food without cooking the planet". It also included a recipe database, 'Cooking the Manifesto', aimed at eating sustainably.

In planetary communications terms, the campaign was high on "Inspire Action", "Make It Personal" and "Highlight solutions," but also associated with positive culinary emotions rather than guilt.

> **Impact:** The EAT Lancet report and diet from 2019 and 2025 has significantly shaped the global conversation on food, health, and sustainability. It helped move the idea of a "planetary health diet" from a niche academic concept into mainstream public, policy, and industry debates. It has influenced national dietary guidelines, inspired food industry innovation, and guided global discussions on climate, biodiversity, and public health. By collaborating with chefs and focusing on positive, aspirational messaging, it helped turn abstract sustainability goals into everyday food choices.

CASE 4

The Herds – a global art manifestation for climate and biodiversity

Audience: General public and the media

Planetary Comms mix: High on "Navigate emotions" and "Visualisation"

In 2021, a 3.6-metre-tall puppet of a 10-year-old Syrian girl, Little Amal, walked 8,000 kilometres from Turkey to the UK to raise awareness of the urgent plight of refugees. In the spring and summer of 2025, the same team launched The Herds – a 20,000-kilometre art-led journey from the Congo Basin to the Arctic Circle, featuring a group of life-sized animal puppets symbolising species on the move due to climate change and biodiversity loss.

Along the way, The Herds passed through cities such as Kinshasa, Nairobi, Cairo, Athens, Berlin, Warsaw, and Stockholm – finally reaching the northern edges of Scandinavia. In each place, the animals were met not with speeches or signs, but with silence, ceremony, music, and movement. The artistic manifestation was deliberately sparse in explicit information. There were almost no explanatory texts or formal addresses. Instead, the experience leaned heavily on atmosphere, beauty, and emotional presence. It invited audiences to feel something first – curiosity, empathy, awe, grief – and only then, if they wished, to seek out more context through Instagram, websites, and other digital platforms.



Traditional climate and science communication has often relied almost entirely on facts and pedagogy. But The Herds shows how emotions, aesthetics, and lived experience are vital components in truly reaching people. Communicating the climate and biodiversity crises is not only about data – it's about navigating human emotion, storytelling, and connection.

Animals are already moving from their ancient habitat because the Earth is too hot. The Herds wanted to dramatise this to express the way life is already being strongly affected by what's happening to the climate.

In that sense, The Herds reflects a growing recognition: scientific truths must also be emotionally legible if they are to inspire deeper understanding and meaningful change.

In planetary communications terms, the campaign is high on "Navigate emotions" and "Visualisation".

Impact: The Herds had both emotional and cultural impact across the regions it passed through. People lined the streets in cities from Kinshasa to Stockholm, amazed and moved by how the animals seemed to come alive through the puppeteers' movements – despite being made only of cardboard and recycled materials, fragile and almost weightless, yet full of presence. Reactions ranged from tears and goosebumps to spontaneous music and rituals. The King of England greeted the procession during its UK leg – an indication of the project's symbolic power. Moreover, it sparked widespread engagement in traditional media as well as on social media. Clips circulated widely, especially on Instagram, TikTok, and Facebook, where they were shared with messages of awe, grief, and hope. The march reached millions online, expanding its emotional impact far beyond those who experienced it in person.

CASE 5

Planetary boundaries fresco: interactive workshop to understand environmental interactions

Audience: Anyone from the general public to executive groups, who want to translate a systemic understanding of Planetary Boundaries into engagement and strategy.

Planetary Comms mix: High on "Be factful", "Simplify it", "Link it to other societal concerns", "Inspire collective action", "Visualise it" and "Make it personal"



The Planetary Boundaries Fresco workshop invites participants to discover all the processes compromising the habitability of our planet and adopt a systemic vision to limit one's impact. In a half-day workshop, participants engage in a series of systems-thinking activities, including a card game that explores the planetary boundaries and maps the links between human activities and environmental pressures, as well as an accounting exercise focused on identifying the co-benefits of actions and avoiding problem shifting. The format also creates space for discussion, creativity and reflection to help participants process complexity and emotions.

The workshop is meant to be a tool for translating a systemic understanding of Planetary Boundaries into engagement and strategy and could be used for project kickoffs, strategic seminars and team building events. Inspired by a similar format, "Climate Fresk", the Planetary Boundaries Fresco workshop is a community-developed and owned initiative with the intention to make Earth system science locally accessible, relatable and actionable. Supported by the 1er degré association, this grassroots effort is facilitated by a growing global community of trained volunteers who share a commitment to bringing the science to their own communities, classrooms and organisations.

In Planetary Communications terms, the fresco's game and workshop format scores high on many of the nine ingredients (see above). By using professionally illustrated decks of cards, facilitators engage participants to draw causal and consequential linkages between different boundaries and open up the discussion that is linked to societal concerns, as well as inspire reflections for individual, organisational and group actions. The whole workshop is based on the latest science of the planetary boundaries, while the scientific explanations are simplified and made accessible to wider public outside academic communities.

> **Impact:** The Planetary Boundaries Fresco workshop was intentionally designed to be scaled globally and make Earth system science locally accessible, relatable and actionable. It has been facilitated in more than 20 countries and made available in more than 10 languages, with additional translations underway.

> Science alone cannot save us – how we communicate and act upon it will determine the fate of our planet.
>
> – Johan Rockström

Stockholm Resilience Centre | Stockholm University

Advancing science for a liveable planet