Chapter 6

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Long wooden corridor with exposed timber beams. By McKlin

Chapter 6 | Perceptions and communication

Effective deployment of CDR depends on public perceptions and responsible communication to publics and potential adopters. Research reveals that familiarity with CDR remains low, but there are clear conditions for support and lessons for communication.

Key insights

- Public attitudes towards CDR are strongly driven by concerns about the impacts of CDR on ecosystems and biodiversity, the need for good governance, the expectation of co-benefits, trust in relevant actors, broader values and beliefs and a preference for low costs and financial benefits.
- Peer-reviewed perceptions research has increased significantly since *The State of CDR 2nd Edition*. The focus of that literature has shifted from drivers of attitudes towards CDR with an already existing strong evidence base and more theoretical considations to less-studied, more practical aspects.
- New lessons for responsible communication of CDR include providing guidance, training and administrative support to adopters such as farmers; communicating inclusively through education and structured stakeholder dialogue; developing local, trusted and context-aware approaches to communication of CDR; and communicating stable, fair and transparent long-term policy signals.
- Recent developments in CDR communication show declining trends, partly tied to decreasing attention to climate overall. Newspaper coverage of CDR has decreased since 2021 by 24% annually. Most newspaper articles follow recommendations for responsible communication of CDR, for example by emphasizing the need to reduce emissions and not framing CDR as an alternative solution to mitigating climate change.
- Attention to CDR has decreased since 2023 by 16% annually on Twitter/X but fluctuated at a high level on Reddit. Sentiments in CDR posts differ significantly between three social media platforms, being more positive on Bluesky and more negative on Reddit, compared to Twitter/X.
- Learnings from perceptions and communications research can be applied to design community engagement for project siting and thus enable equitable and sustainable CDR deployment.

Whether CDR deployment can be successful at scale depends on public understanding and support as well as technological advances. This chapter assesses the peer-reviewed literature to distil important factors driving attitudes towards CDR and conditions under which CDR deployment is acceptable. It also provides updated and expanded analyses of how newspaper sources are communicating about CDR and how users on social media engage with CDR topics.

6.1 Why public perceptions matter

Public perceptions and communication play a crucial role in the development, scaling and adoption of carbon removal methods. Previous research on renewable energy and carbon management technologies demonstrates that communities may block or delay projects they perceive as risky, unfair, environmentally damaging or imposed without proper engagement.[1–4] On the other hand, community engagement that provides space for deliberation and the raising of concerns can increase support.[5–8] Research shows that public attitudes are driven not only by technical assessments but also by social and psychological factors such as trust in those deploying the methods, perceived risks and benefits[9,10] and the sociotechnical contexts in which implementation ultimately unfolds.[11–13] The development of CDR will, therefore, depend not only on technological advances but also on effective societal engagement and responsible communication. Indeed, this is already visible in real-world examples of CDR development (see Box 6.1).

Box 6.1 Public engagement case studies

- An examination of public engagement in the Dominican Republic focused on how a project sought to build collaboration and participation from the outset in a climate-vulnerable coastal community.[14] By documenting local responses over two years, it identified local concerns and development priorities that, in turn, informed outreach and community development efforts around a proposed coastal enhanced weathering trial. It also showed how ideas of climate justice, vulnerability and local socioeconomic development shaped how people understood and engaged with the project. The case illustrates how governance choices, outreach and community development efforts can influence both the social acceptance and practical trajectory of CDR trials.

- Research in the United Kingdom showed how local communities actively shaped the debate around an ocean alkalinity enhancement field trial, challenging how scientists and developers defined both the experiment and the "public" it was meant to benefit.[15] Through protests and place-based actions, people around St. Ives Bay reframed the trial as something that would directly affect their livelihoods, ecosystems and everyday coastal life, rather than a purely scientific or benign research trial. The case highlights how public engagement can surface overlooked risks, question who gets to speak for the public and influence how CDR demonstrations are designed and governed.

- A study in Iceland looked at how local communities responded to a carbon storage project involving some CO_2 captured from ambient air, which serves global climate goals but offers few clear local benefits, particularly in terms of economic opportunities.[16] Focusing on an international CCS hub in Iceland, it revealed how concerns about risk, fairness and importing other countries' emissions shaped public unease and resistance. The case underscores how meaningful engagement, especially listening to local framings and discussing local concerns, matters for building trust and dialogue around CDR projects.

Two aspects of perceptions of and communication about CDR are especially important for future CDR development.

First, publics can organize political support for or opposition to CDR, whether through direct actions or expressions of either approval or disapproval. CDR deployment can only scale under a "social licence to operate", which requires some active support or at least passive acceptance from various societal groups. Public attitudes can therefore shape broader debates around CDR, for example in relation to legislative processes at a national level or in response to specific CDR projects in local contexts. In more general or national-level political debates, a better understanding of public perceptions and relevant concerns can inform the development of well-designed policies and ensure that any investments and deployments align with societal values.[17] Publics can also hold policymakers and businesses

accountable for delivering on net-zero targets. The broader sense that segments of the public are predisposed against CDR can motivate further opposition or disengagement, as well as discourage participation by investors or policymakers.[13]

In the context of local CDR projects, negative attitudes and risk perceptions can motivate criticism of proposed deployment, for example leading to rejection of permits in permitting processes or conflict in planning boards. Engaging local populations early on in planning processes can help adapt CDR deployment to local needs and circumstances and ensure that major concerns are addressed. Local communities provide important knowledge about historical and social contexts.[15] Apart from being normatively advisable, proactive engagement of local populations has been shown to be beneficial for environmental and social outcomes.[18] Failure to meaningfully engage with communities might lead to backlash, as the examples of other novel technologies such as renewable energy and CCS have shown[5,19–21] (see Box 6.1).

Second, specific CDR methods require that certain groups adopt technologies or change their practices. For instance, CDR methods that involve farming or forestry – such as soil carbon sequestration, enhanced weathering or biochar soil amendment – require that farmers or landowners directly participate in schemes and implement changes in their land management practices.[22,23] Successfully communicating potential co-benefits and risks can mobilize those groups to adopt CDR practices. However, without well-designed engagement, communities that tend to distrust new technologies and practices – viewing them as potentially risky, unfair or undesirable – may push back on their adoption or force delays in their implementation. Furthermore, potential adopters may perceive the opportunities and challenges of such innovations differently from what technology developers or policymakers might expect – and thus may not adopt CDR as envisioned. While the importance of public engagement and support within broader decision-making processes might depend on the political system – it can be less crucial in non-democratic states – the need to engage potential adopters and other involved parties is valid across different political and social contexts. The various societal groups and modes of engagement that may shape the future of CDR development (see Figure 6.1) depend on the specific CDR method proposed and the political system in which it will operate. Aside from substantive, instrumental and normative reasons for public engagement, research has shown that publics want to be engaged to various degrees.[24,25] Responsible communication and community engagement, therefore, becomes essential to building trust, addressing concerns and enabling carbon removal to scale in ways that are effective, sustainable and publicly supported.

Societal groups and modes of engagement shaping CDR outcomes

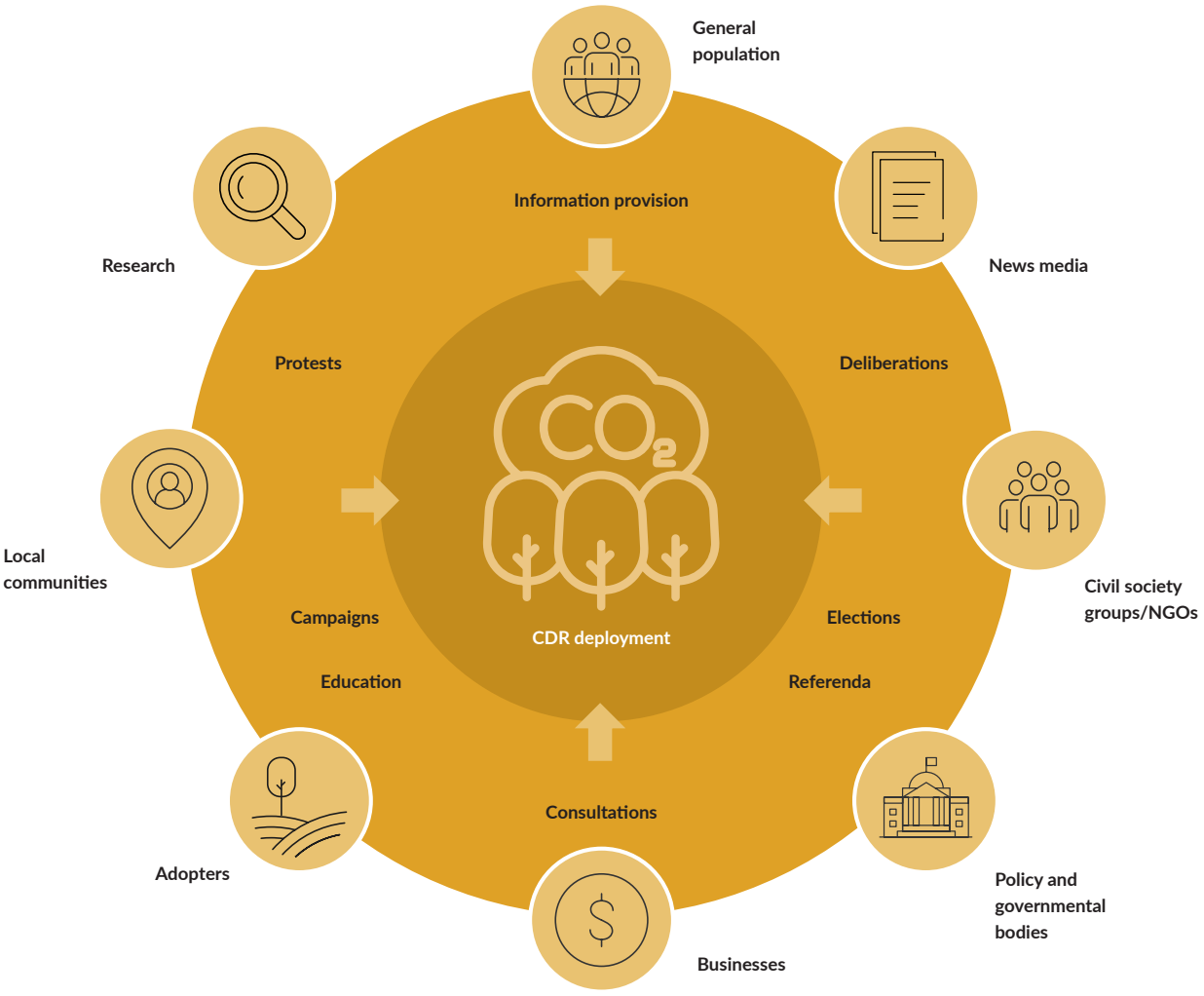


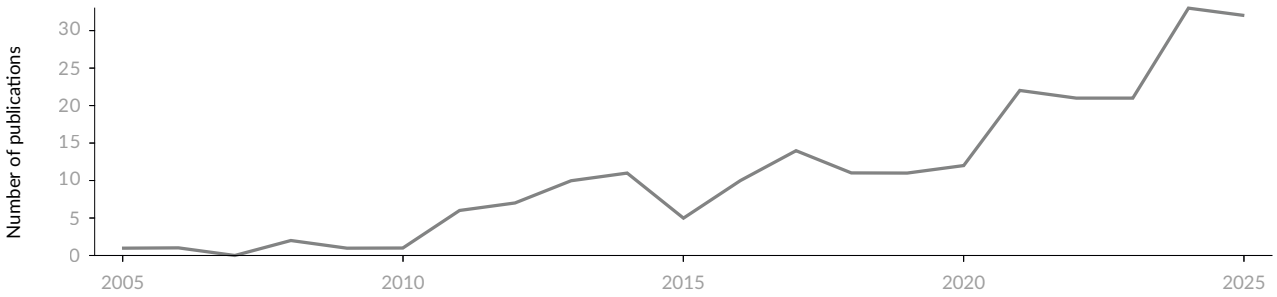
Figure 6.1 *A non-exhaustive map of societal groups or sectors and modes of engagement important for CDR deployment.*

6.2 Literature assessment: what do we know about perceptions of CDR?

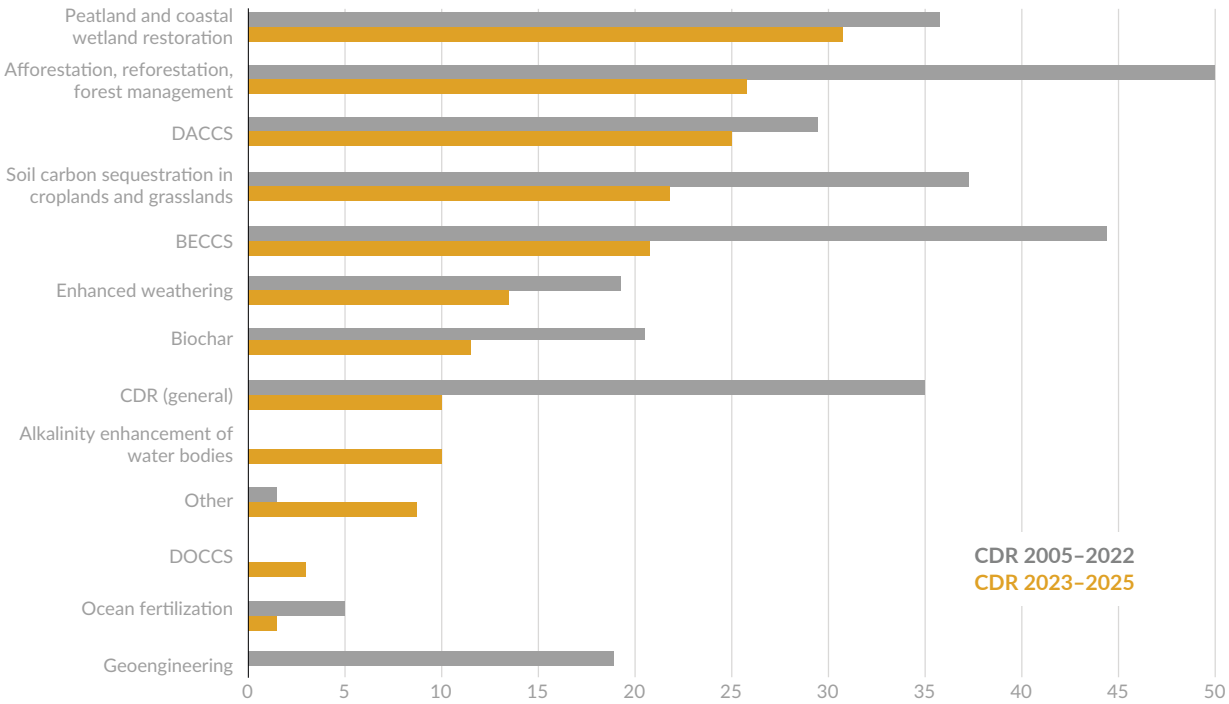
To assess the state of knowledge on perceptions of CDR, we update the systematic review of the academic literature on public perceptions and communication that we undertook during *The State of CDR 2nd Edition*. This review draws on empirical research using various methods including but not limited to surveys, focus groups, deliberative workshops, interviews and media analyses (see the Technical Annex). We find a notable increase in the annual volume of publications, with the numbers for both 2024 and 2025 about 50% higher than the average for 2021 to 2023 (see Figure 6.2). Furthermore, the focus of the studies is changing from a general CDR or geoengineering framing to one that includes a comparative analysis of multiple CDR methods within a single research design. We also observe a higher share of studies focusing on DACCS, coastal wetland restoration and alkalinity enhancement of water bodies.

Overview of studies on perceptions of CDR

a) Number of publications on perceptions of CDR, 2005–2025



b) Number of publications by CDR method



c) Number of perception studies by region of analysis

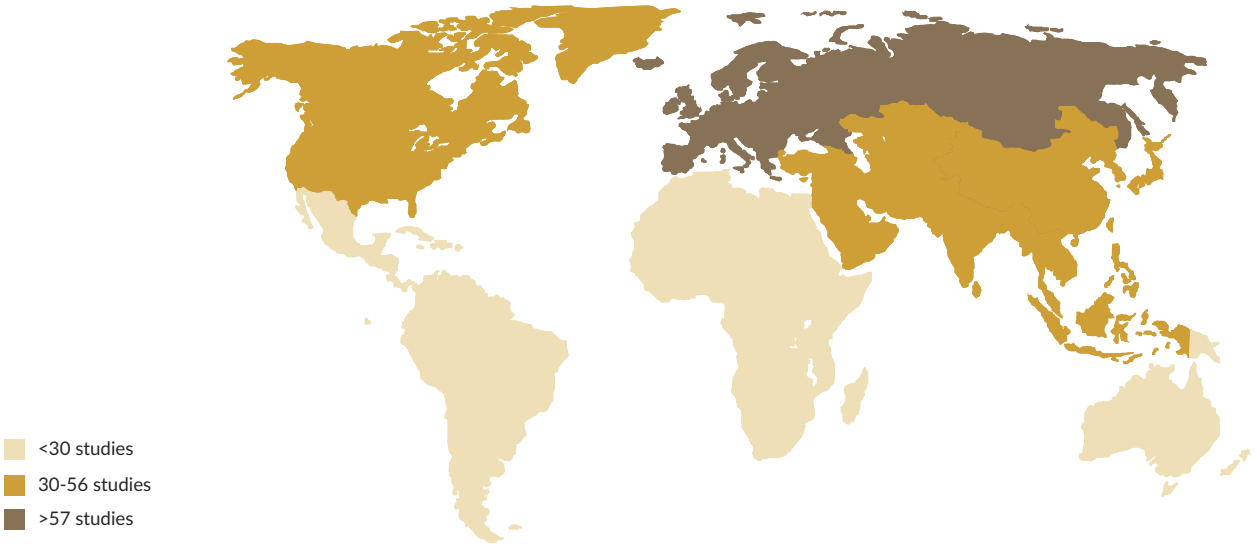


Figure 6.2 *(a) CDR perceptions studies over time and (b) number of publications focusing on different CDR methods. These numbers sum to more than the total number of studies, as many studies cover several CDR methods. (c) Number of publications by the region(s) they focus on. An additional 48 studies are international in coverage and not displayed in panel (c).*

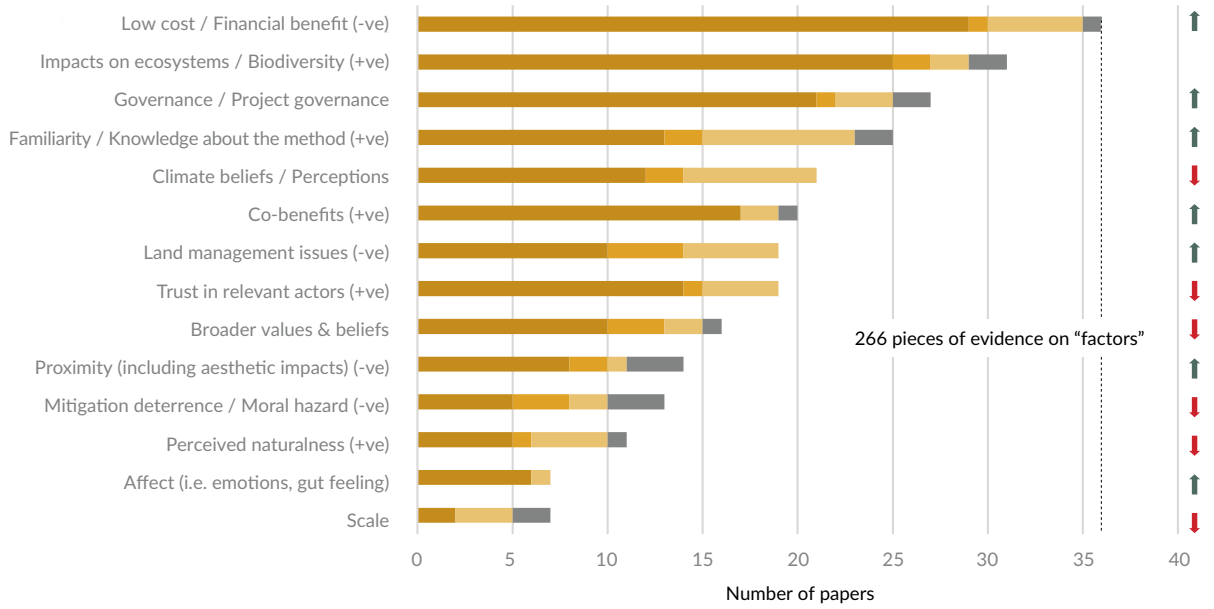
Studies report low to moderate levels of public awareness, familiarity or knowledge about CDR. Surveys often find low familiarity with many CDR methods, with afforestation and reforestation being the most well-known.[26,27] However, it is difficult to compare numbers on public awareness, familiarity and knowledge because the number of articles presenting such data remains low, and studies often measure these factors and report aggregate results in various ways. An immediate implication of low familiarity is that opinions expressed in surveys might be highly susceptible to change.

Factors driving attitudes and conditions for deployment

Studies on public perceptions reveal the reasonings that underlie attitudes towards CDR methods. Assessment of the evidence base reveals 14 distinct "factors" driving public attitudes towards CDR and 12 distinct "conditions" for deployment of CDR (some indicators are both factors and conditions) (see Figure 6.3). Our assessment found 266 pieces of evidence on factors and 174 pieces of evidence on conditions across 75 papers published between June 2023 and December 2025 (see the Technical Annex). This marks a significant increase in peer-reviewed perceptions research since *The State of CDR 2nd Edition* and reveals several new developments.

Evidence on drivers of attitudes and conditions for deployment

a) Factors shown to drive attitudes towards CDR



b) Conditions for the deployment of CDR

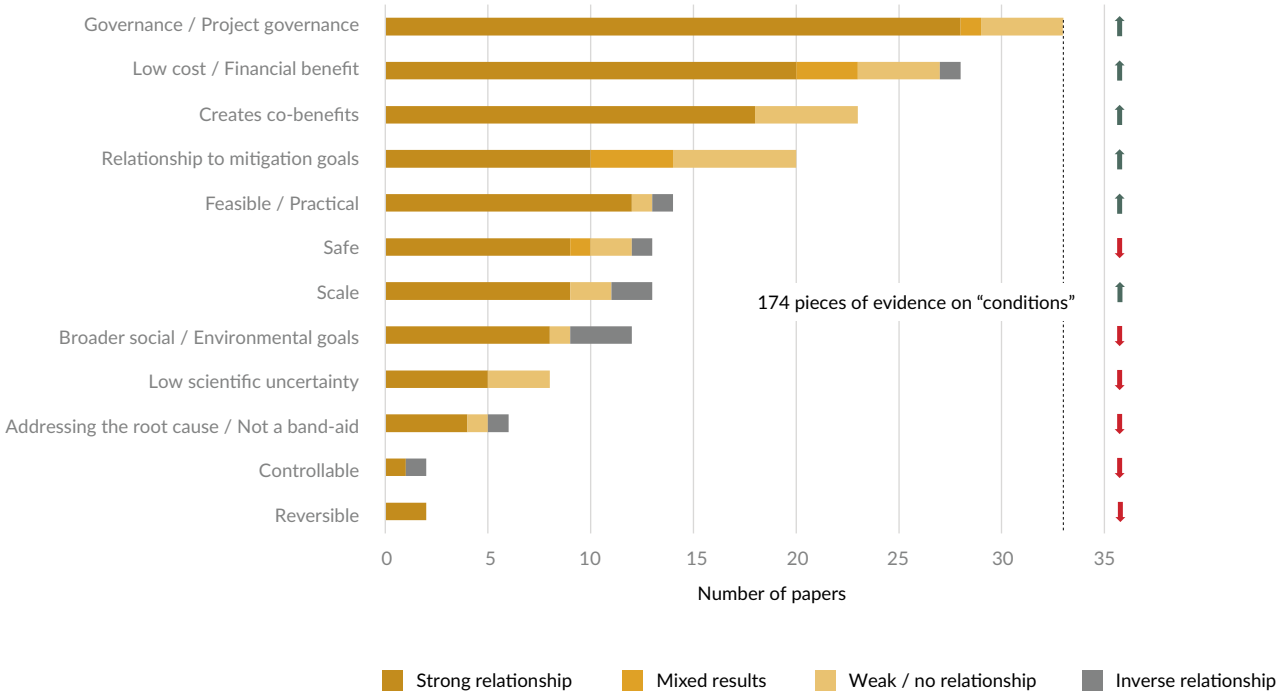


Figure 6.3 *(a) Factors shown to drive attitudes towards CDR and (b) identified conditions for the deployment of CDR, from the peer-reviewed, English-language literature on public perceptions from June 2023 to December 2025 (75 papers). Papers were scored according to whether they provide empirical evidence for a strong relationship between the factor or condition and public attitudes, mixed results, a weak relationship/no relationship or an inverse relationship. Where appropriate, the direction of the relationship is labelled +ve (positive) or -ve (negative). Pieces of evidence = total number of papers discussing the listed factors or conditions (most papers cover more than one topic). Upward arrows = higher rank order according to assessment of pieces of evidence compared to The State of CDR 2nd Edition assessment; downward arrows = lower rank order according to assessment of pieces of evidence compared to 2nd Edition assessment.*

Several factors driving public attitudes towards CDR and conditions for deployment have received proportionately more attention since 2023 than before it, while others have received proportionately less attention. Notably, since 2023, costs and financial benefits, good governance, and co-benefits are among the most-studied factors and conditions, having previously received less attention. Concern about the impacts of CDR on ecosystems and biodiversity remains the second most-studied factor. Among the conditions, the connection of CDR to broader social and environmental goals remains only moderately studied. Other factors that were previously among the most studied have since received less attention, notably perceived naturalness (how "natural", as opposed to "technological", a CDR method is seen to be), mitigation deterrence or moral hazard (the risk that CDR delays emissions reductions) and broader values and beliefs (such as cultural worldviews). Similarly, other conditions that were previously among the most studied have since received less attention – notably safety, controllability, the desire for low scientific uncertainty and the need to address the root causes of climate change. These shifts reflect a need to broaden understanding by focusing on less-studied factors and conditions. Moreover, it reflects a shift from theoretical considerations to practical ones, as an increasing number of CDR approaches are becoming technologically mature, commercially viable and closer to broad deployment.

Overall, the evidence shows that multiple issues strongly drive public attitudes towards CDR including low costs and financial benefits, concerns about the impacts of CDR on ecosystems and biodiversity, good governance, the prospects of co-benefits, trust in relevant actors and broader values and beliefs. Evidence remains mixed on familiarity and knowledge about CDR methods, beliefs about climate change, land management issues and mitigation deterrence or moral hazard.

Lessons for responsible communication

Public engagement is an opportunity to learn about ways in which CDR methods and policies can be made more effective in particular contexts and to make more legitimate decisions by involving those who are affected. However, with levels of awareness about CDR still low, such communication remains a challenge. Would-be communicators about CDR – such as scientists, entrepreneurs, activists, politicians, the media and others – must, therefore, approach the challenge carefully.[28] *The State of CDR 2nd Edition* synthesized seven lessons for responsible communication about CDR from the peer-reviewed literature on perceptions and described them as follows: be careful with terminology; talk about CDR in context; give – and receive – information about CDR; talk about (co-)benefits; also talk about negative attributes; do not weaken support for emission reductions; avoid framing CDR as natural (or otherwise).

A synthesis of the literature published between 2023 and 2025 provides further detail on some of these lessons:

- Increase awareness of CDR. Government media programmes could increase awareness of CDR and improve public learning.[26,29–33]

- Frame issues with care. Framing CDR as "geoengineering" lumps it together with controversial solar radiation modification technologies and can evoke negative sentiments.[34] By contrast, framing CDR in terms of urgency can evoke both positive and negative emotions, either justifying the use of CDR or raising concerns that it may distract from the need for emissions reductions, and therefore requires caution.[35]

- Provide balanced communication. Communicate what is known and acknowledge what is not known,[36] including about risks, benefits and the scale of CDR required in domestic contexts.[24,37–40] Make data from field trials readily accessible.[33]

- Facilitate dialogue. More and different kinds of dialogue[25] are needed among stakeholders in general[41,42] – and with those located in different regions in particular[43,44] – to offer alternative framings, raise important concerns and considerations and strengthen decision-making.[45]

In addition, three new lessons have been drawn from the literature published between 2023 and 2025 for *The State of CDR 3rd Edition*. First, groups with a stake in CDR methods, such as farmers, should be provided with tailored, context-specific guidance – delivered through trained advisors – paired with practical training in carbon-focused land management, dedicated time and resources for on-farm adaptation, and hands-on support with scheme administration.[46–48] Similarly, CDR policy processes should be developed as inclusive, participatory systems that actively engage marginalized and vulnerable groups – supported by accessible, context-appropriate education – so they can meaningfully contribute to shaping fair and effective regulations.[14,49] Second, CDR should be communicated through clear, stable and transparent policy signals that reduce uncertainty – by clarifying long-term benefits, confirming sustained public support and funding and explicitly defining fair and inclusive carbon rights within robust regulatory frameworks.[50–52] Third, CDR communication should be positioned as a coordinated, interdisciplinary effort that combines locally grounded impact evidence, strong interpersonal engagement skills and trusted community messengers – while explicitly addressing the social, behavioural and political contexts shaping public responses.[53–57]

6.3 Empirical analysis of communication about CDR

Responsible communication of CDR in news media

The news media, with their broad reach, shape perceptions of climate change, influencing the actions that individuals and societies take and the policies they choose to support.[58,59] While radio and television broadcasts are beginning to include stories about CDR, we are focusing solely on newspapers in this section, summarizing recent research and analysing how CDR is represented in newspaper articles. With their ability to disseminate information widely, newspapers can influence government agendas and shape public opinions and attitudes. Because people have little prior knowledge on many CDR methods, their role in opinion formation around CDR is critical.

There has been much research into news media portrayals of climate change.[60,61] That includes studies of climate denial discourses and "false balance" in reporting, which occurs when media, in an effort to be "fair", presents each side as equally credible despite evidence favouring one position.[62,63] In the past 15 years, studies on media representations and discourses on CDR and adjacent technologies have emerged. This scholarship often lumps together CDR with climate mitigation technologies such as fossil CCS, or groups them under umbrella concepts like "geoengineering" or "climate engineering".[64–68] The analyses thus often lack nuance regarding the specificities of individual methods.

A considerable body of literature has examined media coverage of both CCU and CCS.[69–77] Analyses of how media report about CDR are fewer and are focused on a small number of CDR methods, with multi-method and multi-country analyses remaining scant. These include analyses of media coverage of BECCS,[53,78] DACCS,[79] restoration of coastal and marine ecosystems, afforestation and related practices,[80–82] and biochar.[45,45] Studies often provide insights into the storylines, frames and narratives used in media coverage on selected CDR methods, for example finding that the use of particular frames is influenced by the political leaning of media outlets[45] and the actors (e.g. scientists, industry or politicians) involved in presenting them.[53] Studies have also traced how framings of CDR can change over time, which has been observed in media representations of DACCS in Europe, where a shift from conflict frames to frames emphasizing co-benefits can be detected.[79] Furthermore, the intensity of media coverage of CDR has been shown to vary over time and to be tied to specific events such as climate summits[45] and the consideration of specific CDR methods, like DACCS, in IPCC reports.[79] Geographically, the scholarship on media communication about specific CDR methods has been concentrated in a few European countries, particularly the United Kingdom[45,45,53,81] and Nordic nations,[78] and in North America.[79]

We update the analysis of CDR in news articles established in the 2nd Edition. Our data is based on a search for CDR keywords in the LexisNexis Newspapers and Wires database, followed by an automated screening and classification process using pre-trained CDR

machine-learning classifers.[83] Further methodological information is available in the Technical Annex to this chapter.

The data shows a steady increase in the number of mentions of CDR methods in newspaper articles over time, punctuated by reporting tied to COP events (see Figure 6.4). A wave of articles was published in the run-up to COP26 in Glasgow in 2021, a period during which "net zero" entered the public discourse and attention started to turn to the types of methods that could be used to reach it. Still, there is a longer history of CDR discourse, particularly going back to early discussions on how forests should be integrated into the Paris Agreement.[84] Since 2021, the volume of published newspaper articles has decreased substantially by around 24% annually. This is a much steeper downward trend than the decrease observed in the Media and Climate Change Observatory data on the coverage of climate change in media sources across the world,[85] with only 12% annually. As a result, by 2025, the volume of CDR articles had fallen to its lowest level in seven years.

News articles mentioning CDR by method, 2005–2025

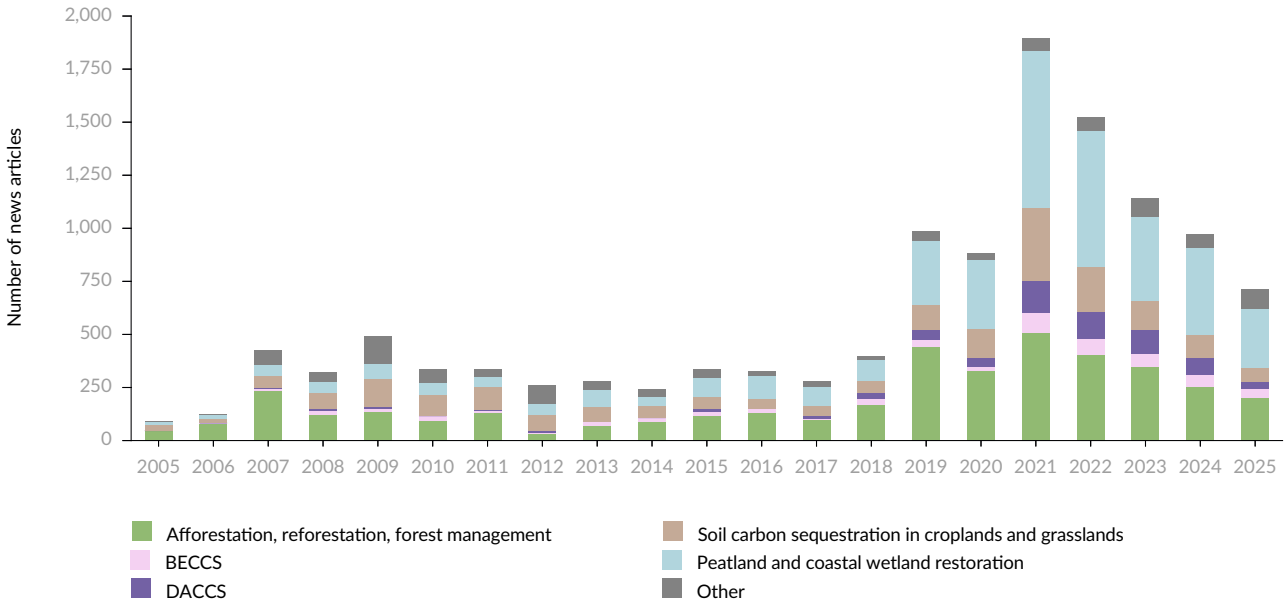


Figure 6.4 *The number of news articles per year that mention a particular CDR method (see the Technical Annex for details on the analysis). The "other" category comprises ocean fertilization, enhanced weathering and biochar soil amendment.*

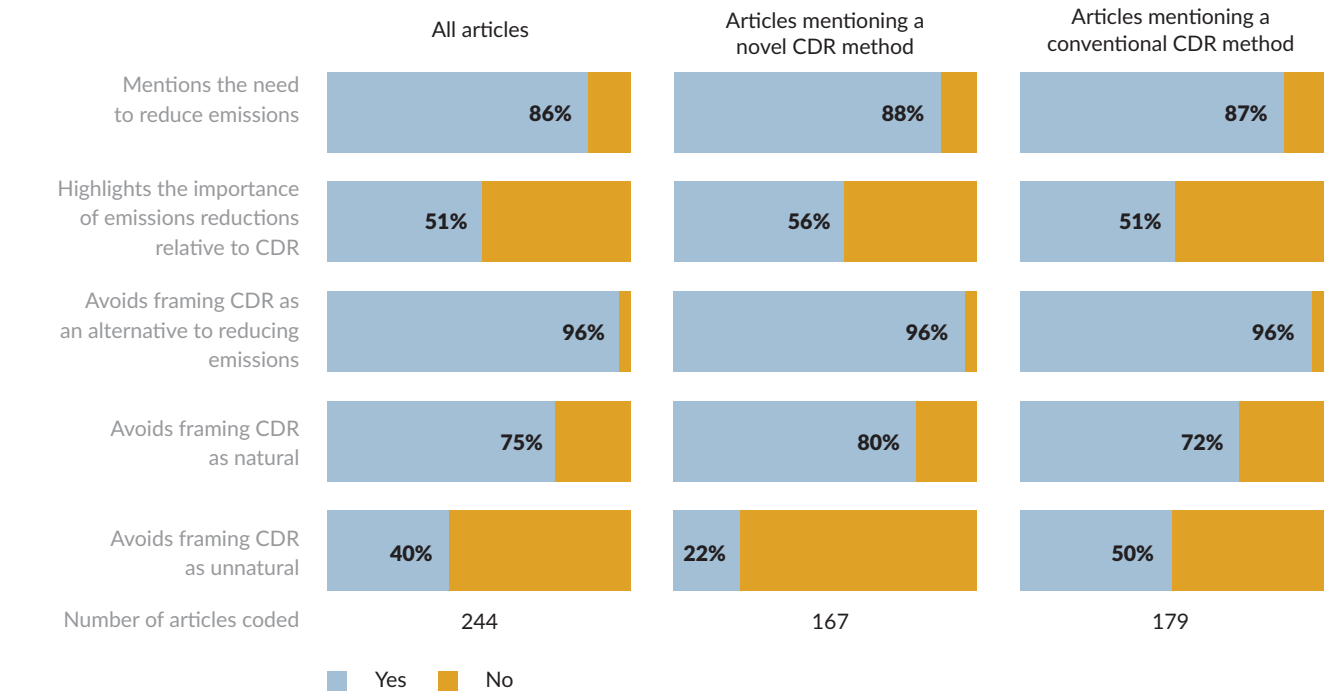
The literature[28] emphasizes challenges in communicating about CDR and mirrors those – such as low public awareness – that arise when communicating about other areas of science and public policy. Because public awareness is low, the way in which newspapers frame and describe CDR methods can strongly influence how they are perceived and spur either opposition or support when they are deployed. Suggestions include never framing CDR as a substitute for emissions reductions and avoiding framing these technologies as either "natural" or "unnatural". As well, care should be taken in how they are described relative to other technologies and actions such as fossil CCS or adaptation (see Section 6.2).

Here we closely examine a sample of articles from eight major newspapers in the United States, the United Kingdom and Australia, covering primarily DACCS, BECCS, afforestation and reforestation, soil carbon sequestration and "general" discussions of CDR not linked to any specific method. We coded articles on whether they adhere to the recommendations mentioned above (see the Technical Annex). We find that most articles do, indeed, emphasize the need to reduce emissions, with over three-quarters mentioning at least some key sources of emissions that would need to be addressed (see Figure 6.5). The framing of CDR as an explicit alternative to reducing emissions is relatively uncommon in our sample (accounting for less than 5% of articles). On the other hand, we do find many examples of articles that make some CDR approaches appear more attractive through a "natural" framing (25%), or less attractive through an "unnatural" framing (60%). As expected, there is a tendency to deploy unnatural framings more in the case of novel CDR methods (78%). Perceived "naturalness" is

known to increase acceptance of CDR, whereas perceived "tampering with nature" is known to lower acceptance. However, the line separating a "natural" from an "unnatural" method is arbitrary and diverts attention from the actual qualities of CDR methods.[28]

Assessment of newspaper articles along different dimensions of responsible communication

a) Alignment of newspaper articles with general recommendations for responsible communication of CDR



b) Use of conflating terminology in newspaper articles

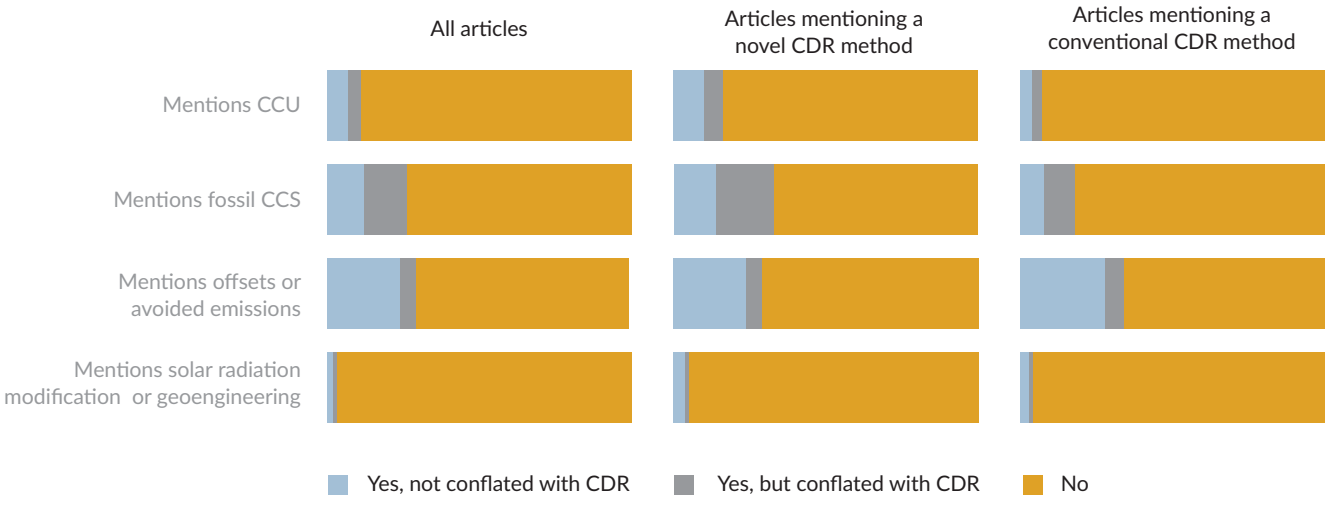


Figure 6.5 *Shares of analysed newspaper articles that (a) align with recommendations for responsible communication of CDR and (b) use conflating terminology. Panel (b) differentiates between articles that discuss CDR alongside non-CDR technologies (such as fossil CCS or avoided emissions) and whether they clearly distinguish these technology types (blue) or fail to do so (grey). Note: articles mentioning more than one technology are counted more than once.*

How well do articles distinguish CDR from other mitigation actions? Researchers distinguish CDR from other types of mitigation, such as fossil CCS (see Chapter 1). But newspaper articles do not always make such differences clear. We find that when fossil CCS is mentioned (which occurs in 25% of our sample), it is clearly distinguished from CDR in just over half of the cases. One example is when an article fails to note that in the case of CDR, the CO_2 must be captured from the atmosphere (see Figure 6.4). CCU/S, offsets or avoided emissions projects, and solar radiation modification are other areas of potential conceptual overlap. Again, we see that when these methods are mentioned, articles often do not clearly distinguish them from CDR.

This analysis suggests that journalists and editors have room to deepen their understanding of CDR and improve their reporting. While framings of CDR as an alternative to mitigation are largely – but not entirely – avoided, problematic use of nature versus technology framings and a lack of conceptual clarity with respect to other types of climate change mitigation should be corrected. These issues are not trivial insofar as interest groups, such as oil and gas companies, are known to emphasize their climate credentials by engaging in "natural climate solutions" and promoting fossil CCS projects, many of which are associated with enhanced oil recovery practices.[86] Building public trust in CDR will require guarding against such obfuscations across multiple channels of communication.

CDR mentions and sentiments on social media

Communication on social media provides a complementary perspective to CDR communication in newspapers and can serve as a direct source of information to learn about people's attitudes towards new technologies and practices. While news media provide professionally written and edited content, social media comprises content from a diverse range of users. However, there are overlaps, as journalists are often active on social media and users share content from media websites on social media. The previous editions of *The State of CDR* provided insight into several topics including: the rapid growth of user engagement with CDR on Twitter/X; the sentiments attached to comments on CDR; the patterns of engagement across geographies; and the types of users engaging with CDR communication on the platform. These insights are also discussed in more detail in the academic literature.[34,87] The 3rd Edition updates the Twitter/X analysis, focusing on English-language posts that mention CDR, and draws comparisons with two other social media platforms – Bluesky and Reddit – that have publicly accessible data and different user profiles.

Recent years have seen massive shifts in public social media communication patterns, driven by several main developments. First, Elon Musk's acquisition and subsequent modification of Twitter/X led some users – especially, but not only, from the environmental community[88] – to leave the platform in favour of alternatives, while other users remained and engaged more strongly. Second, several new Twitter/X-like social media platforms have

been established, namely Bluesky and Threads (the latter by Facebook parent company Meta). Third, platforms with new media formats and concepts have gained in popularity, including Instagram and TikTok, which are built around pictures and short video clips, but also professional networks such as LinkedIn, which are increasingly used for public debates and announcements. Established social networks like Facebook still play a major role, but most of their communication is not publicly oriented and instead occurs through direct or group-based channels. One recent Facebook-based study found little influence of CDR-related messaging.[89] Only messages with more extreme framings or presented by more extreme messengers had any influence at all. Finally, policies to reduce or control the prevalence of misinformation on social media have been reversed in recent years. Especially for climate-related topics, this poses a threat to the integrity and accuracy of information and the foundations of deliberative debate, potentially leading to the spread of climate denial and pushback to climate solutions.[90,91]

These developments have implications for analyses of social media messages. A few years ago, Twitter/X was the go-to platform for researchers wanting to conduct such analyses – due both to high data accessibility and the strong representation of socially, economically and politically influential people of various political leanings. Today, the publicly accessible social media landscape has become more polarized and fragmented, infused by politics, culture wars and generational differences. Furthermore, parent companies of social media sites are more frequently restricting access to the data because it is a lucrative resource for training AI models.

These changes, in turn, have led us to broaden our analysis of the social media landscape in *The State of CDR 3rd Edition*. In addition to evaluating data from Twitter/X, as was done in previous editions, we employed the same search strategy to review data from Bluesky and Reddit, as both allow access to publicly available comments and posts (see the Technical Annex for further details on methodology). For Bluesky, which now hosts a significant community of environmental researchers, we filtered a large collection of all posts from 2023 to 2024[92] to find about 6,500 posts mentioning CDR. This is, of course, much less when compared to Twitter/X's up to 100,000 relevant posts per year. However, in relation to the size of its user base, the number of CDR-related posts per user is six times as large as for Twitter/X. Reddit data was collected from all climate-related subreddits, resulting in 12,500 CDR-related submissions and comments from 2010 to 2025.

User engagement with CDR on Twitter/X increased between 2010 and 2022 (see Figure 6.6a). From 2023 onwards, the number of posts mentioning CDR steadily declines. However, compared to the decrease in posts mentioning "climate change" at 24% annually between 2023 and 2025, this decrease in CDR mentions is less strong at 16% annually. While about one-third of the engagement is related to general CDR keywords, the rest mentions specific CDR methods. The share of posts related to DACCS has increased noticeably in recent years, though most of the methods-specific posts relate

to conventional CDR methods, such as afforestation and reforestation, soil carbon sequestration and peatland and coastal wetland restoration. By comparison, novel CDR approaches – such as biochar soil amendment, enhanced weathering and BECCS – continue to receive minimal attention. While mentions of most CDR methods decreased on Twitter/X after 2022, mentions of afforestation and reforestation slightly increased. Mentions remained relatively stable for some of the other CDR methods that receive relatively less attention, such as biochar and enhanced weathering.

In comparison, the engagement level of Reddit users fluctuates more strongly over time (see Figure 6.6b), with peaks in 2019 (coinciding with the peak of climate protests by Fridays for Future and adjacent groups), 2023 and 2024. Most Reddit posts mention CDR in general, followed by afforestation, DACCS and enhanced weathering. Compared to Twitter/X data, novel CDR methods receive relatively more attention in Reddit posts, particularly DACCS and enhanced weathering. Soil carbon sequestration and peatland and coastal wetland restoration receive less attention on Reddit. Data from Bluesky cannot yet be used to analyse developments over time, given its more recent establishment in 2023 (compared to Twitter in 2006 and Reddit in 2005). Still, the share of posts mentioning CDR in general, and afforestation and reforestation in particular, is even larger on Bluesky than on the other platforms. But even on Bluesky, other specific CDR methods are only mentioned infrequently.

Overall, sentiment on Twitter/X towards CDR is more positive (24%) than negative (14%), though a majority of posts are neutral (see Figure 6.6c). Some specific CDR methods are, however, more negatively discussed (e.g. ocean fertilization) while others are associated with much more positive sentiment (e.g. afforestation and reforestation, biochar and peatland and coastal wetland restoration). Overall, sentiments for all methods, except ocean fertilization, are net positive on Twitter/X. The share of both negative and positive sentiments has increased over time, pointing to increasingly polarized debates on CDR topics along with a potentially greater level of nuance and understanding. Updated sentiment data from 2022 to 2025 exhibit very similar patterns to those reported in *The State of CDR 2nd Edition*. The main difference is that the share of positive sentiments has increased for some CDR methods by around 5–10 percentage points. However, this trend could also be driven by increases in emotional engagement on social media, as this is boosted by algorithmic feedback loops.[93,94]

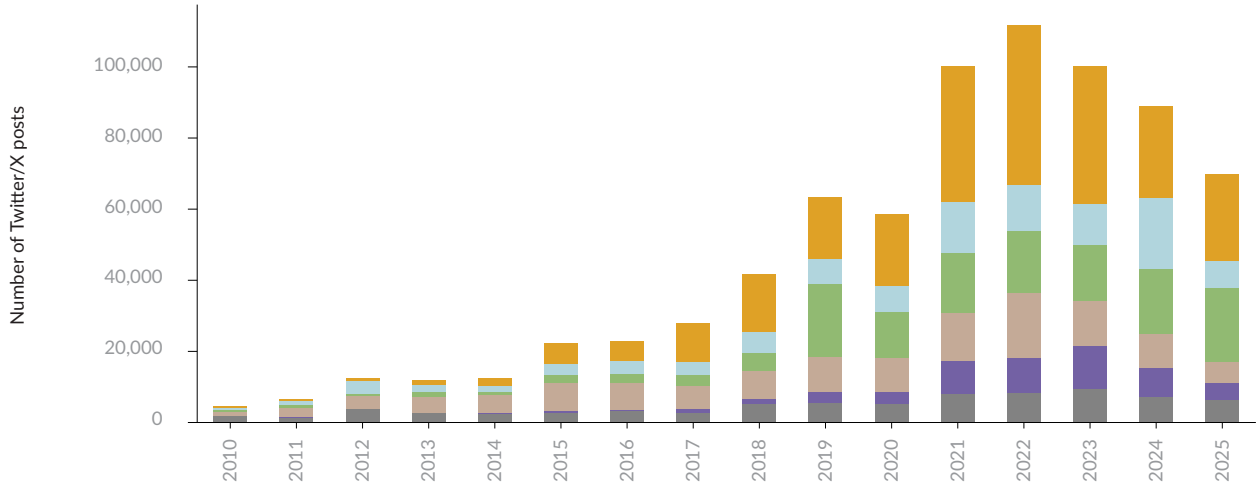
Sentiments about CDR expressed on Reddit are much more negative (25%) and less positive (11%) compared to Twitter/X, though the two are similar in that most posts reflect more neutral sentiments. There is also less variation between sentiment shares for different CDR methods on Reddit. For example, for afforestation and reforestation, there are more posts with negative than positive sentiments on Reddit, in contrast to being overwhelmingly positive on the other platforms. In fact, the only method for which there are more positive than negative sentiments on Reddit is enhanced weathering.

Of the three social media platforms included in this analysis, it is Bluesky's users who tend to engage most positively with CDR: 30% of the posts have a positive sentiment versus 23% that are negative. In part, this pattern is driven by the relatively higher share of posts on afforestation and reforestation and its overwhelmingly positive depiction on this platform. At the same time, there is greater variation in sentiment across CDR methods on Bluesky. In contrast to the very positive sentiment about afforestation and reforestation, more novel CDR methods – such as BECCS, ocean fertilization and, to a lesser extent, DACCS – are viewed more negatively. Even soil carbon sequestration is associated with quite negative sentiment on Bluesky. Besides afforestation and reforestation, only enhanced weathering and peatland and coastal wetland restoration are accompanied more by positive than negative sentiments in Bluesky discussions.

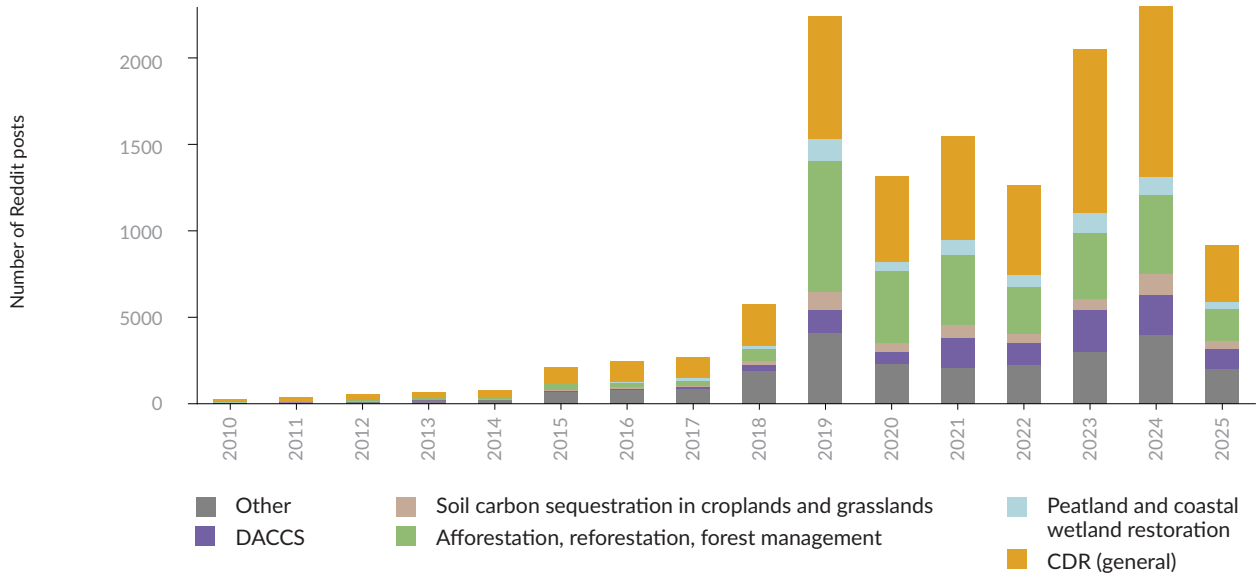
In general, the comparison of different social media platforms reveals similar foci in terms of the CDR methods users tend to engage with. Differences in sentiments between CDR methods have some similarity across platforms, but the overall share of positive and negative comments differs rather strongly between platforms. This may be explained partly by differences in the platforms' discussion cultures, user bases, algorithmic personalization approaches and interaction mechanisms. At the same time, certain CDR methods arouse different sentiments depending on the platform, such as soil carbon sequestration and BECCS, which are perceived much less positively on Bluesky vis-a-vis Twitter/X.

Overview of CDR content on three social media platforms

a) Posts on Twitter/X



b) Posts on Reddit



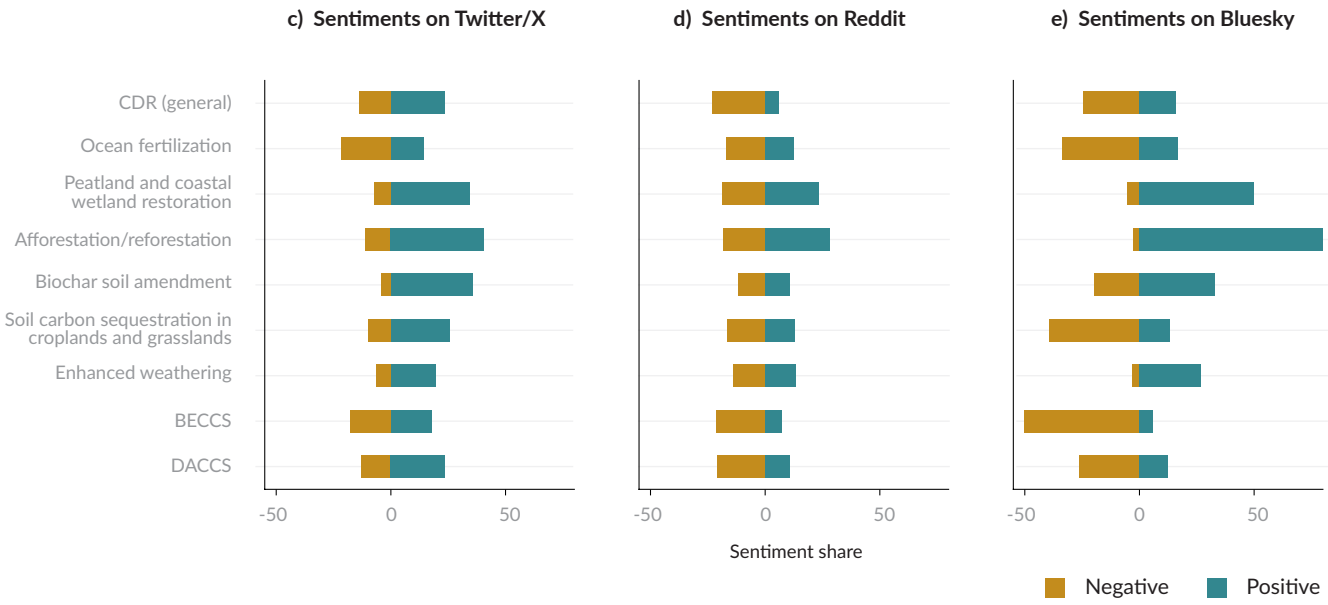


Figure 6.6 *CDR content and sentiments on Twitter/X, Reddit and Bluesky. Panels (a) and (b) show the engagement of Twitter/X and Reddit users with different CDR methods over time. Panels (c) to (e) display differences in sentiments associated with CDR methods. The category "other" in panel (a) and (b) includes ocean fertilization, enhanced weathering, BECCS and biochar soil amendment.*

Box 6.2 Limitations and knowledge gaps

- People's emotions and gut feelings, project scale and proximity – including aesthetic impacts – continue to be relatively understudied factors driving attitudes to CDR, while reversibility continues to be an understudied condition for CDR deployment. For other factors and conditions, results about their influence on perceptions are ambiguous and warrant further research, including familiarity and knowledge about CDR methods, mitigation deterrence or moral hazard, and the relationship of CDR to mitigation.

- Perceptions of certain CDR methods are also understudied, notably agroforestry, durable wood products, bio-oil storage, mineral products, biomass burial, biomass sinking and DOCCS.

- Our analysis focuses on the English-language literature on public perceptions. While this covers a large part of the academic literature, we certainly miss important insights disseminated in other languages, especially from countries with a strong publishing culture in their native language. The restriction of the communication analysis to posts and articles in English also misses trends in other languages and might bias results to perspectives most reflective of the global north.

- Our news media analysis focuses on newspapers and online text media. However, radio and television may also be important media channels through which perceptions of CDR are influenced. Equally, the imagery accompanying CDR reporting is likely to influence how people think about CDR and warrants further research.

- This chapter has taken a first step towards evaluating the extent to which CDR is being communicated in newspaper articles in accordance with lessons for responsible communication synthesized from the peer-reviewed literature on public perceptions. But further research is required to explore this in other regions, languages and forms of media, or through other forms of communication.

- The social media analysis of Reddit and Bluesky data used methods developed for the previous Twitter/X analysis. However, especially on Reddit communication patterns are different, and thus future analyses could take the structure of discussions on the platform into account. Future research could also complement the sentiment analysis with an analysis of actual stances or attitudes towards different CDR methods.

6.4 Outlook

There has been a significant increase in peer-reviewed research on perceptions of CDR since *The State of CDR 2nd Edition*. New evidence shows that low costs and financial benefits, concerns about the impacts of CDR on ecosystems and biodiversity, good governance and project governance, co-benefits, trust in relevant actors and broader values and beliefs are all strong drivers of public attitudes towards CDR. Other factors such as mitigation deterrence and perceived naturalness have received less attention in the most recent literature. The already existing strong evidence examining more theoretical considerations of CDR has thus been expanded to include less-studied, more practical aspects in recent years. New lessons for responsible communication of CDR include communicating farm-specific guidance with training and administrative support; communicating inclusively through education and structured stakeholder dialogue; communicating stable, fair and transparent long-term policy signals; and communicating interdisciplinarily using local, trusted, context-aware approaches.

The chapter identified several decreasing trends in newspaper and social media communication about CDR, which are coinciding with declines in news reporting and online discussions about climate change in general. These factors, together with the continued low awareness found in surveys, are indications that CDR remains a niche topic in public debates. Responsible communication in news media has the potential to increase awareness and strengthen nuanced engagement of publics with the topic, but actual reporting can be improved by avoiding strong nature-versus-technology framings to deliver balanced information on CDR.

Research gaps exist on how perceptions form and evolve over time, especially as CDR moves from the multiple stages of R&D to demonstration and deployment. Project-based research on the perceptions of local communities and potential CDR adopters in real-world settings and how these are embedded and informed by local circumstances and concerns will be especially important for understanding and tailoring future CDR deployment to local and regional contexts. Methods developed in social science research can help build understanding of how and why historical concerns and injustices emerge and are replicated.[25,95,96] This will enable their consideration in discussions around planning, decision-making and community involvement. Research can also help to inform siting decisions and planning processes by better combining geophysical factors with a rich and granular appreciation of socioeconomic considerations.[97]

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