Climate security narratives among ClimBeR partners

A web analytics approach to measure influence and reach of ClimBeR's WP2

November 2024

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CGIAR | INITIATIVE ON Climate Resilience

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Executive Summary

This report presents the main findings from a web analytics evaluation of the reach and influence of the CGIAR Climate Resilience Initiative, ClimBeR, specifically focusing on Work Package 2 (WP2), which addresses climate security by exploring the intersections of climate, peace and security in five countries: Guatemala, Kenya, Philippines, Senegal and Zambia.

Work Package 2 aims to enhance the climate resilience of agricultural systems in vulnerable communities by raising awareness of climate security risks and supporting the integration of these risks into policy and programming. This evaluation assesses the initiative's influence on partners' public communication and positioning related to climate security through the employment of digital methods, a research approach that leverages online content and data-driven techniques such as Natural Language Processing and Network Analysis to explore social trends.

Key Findings

1. **Increased Awareness and Engagement with Climate Security**
   The analysis of social media and website content revealed that ClimBeR's messaging on climate security has gained traction among partners. The TPI analysis showed a measurable increase in the use of climate security terms following the initiative's launch, indicating that the program has succeeded in raising awareness and fostering alignment with its climate security goals.

2. **Geographic Variations in Impact**
   The initiative's influence was observed to vary by region. Countries like Kenya, the Philippines, and Senegal showed particularly high increases in climate security engagement, suggesting a stronger programmatic impact in these areas compared to the other two.

3. **Influence within Partner Networks**
   CGIAR is positioned as a prominent figure in discussions on climate security among its network of partners. Network analysis of social media mentions highlighted ClimBeR's close associations with regional governments, international organizations, and civil society, affirming its role as a key facilitator in advancing climate security narratives.

Recommendations

1. Enhance Regional Efforts

- Further understanding and addressing specific regional climate security concerns will strengthen initative outcomes.
- Building regional hub capacity will ensure effective dissemination of messaging and sustained focus on climate, peace and security.

2. Strengthen Monitoring of Digital Engagement

- Continuous monitoring of digital content will help track how effectively its messaging reaches and influences partners.
- Monitoring will also enable the initiative to stay attuned to emerging issues and adjust its strategies in real-time.

3. **Leverage Network Mapping for Targeted Engagement**

- Leveraging network analysis, ClimBeR can prioritize outreach efforts, identifying gaps and targeting regions and partners that require more engagement.

4. **Triangulate uncovered narrative with policy coherence and expert insights**

- While awareness of climate-peace-security issues has increased, it's crucial to assess if this translates into policy action.
- Triangulating network analysis with policy reviews and local expertise will help align ClimBeR's messaging with existing frameworks and identify opportunities for integration. This ensures ClimBeR's message resonates with policymakers and fosters coherent policy development.

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1. Introduction

The CGIAR Initiative on Climate Resilience (ClimBeR) tackles the challenge of helping food and agricultural systems in low- and middle-income countries better prepare for climate change. Climate impacts, such as extreme weather and temperature shifts, are especially challenging for countries in the Global South. These impacts often lead to loss of resources, reduced human capacity, and increased uncertainty in agriculture, which makes it difficult for small-scale farmers to improve their livelihoods. This, in turn, can worsen poverty and social tensions.

Countries partnering with this initiative are facing specific climate risks: Kenya, Senegal, and Zambia frequently deal with droughts, floods, and high temperatures; Morocco and Guatemala are vulnerable to drought and heat; while the Philippines faces frequent floods and rising temperatures.

In recent years, there's been a shift from simply understanding climate impacts to actively developing solutions and funding to meet ambitious climate and food security goals. Standalone efforts to boost crop yields or market access are no longer enough. To truly improve resilience, productivity, and fairness, a broad transformation of these systems is needed.

Program Objective

ClimBeR aims to significantly improve the capacity of food, land, and water systems to adapt to climate change across six low- and middle-income countries. The goal is to enhance the resilience of smallholder farming systems, enabling them to better withstand extreme climate events like droughts, floods, and high temperatures.

Work Package 2 – Climate Security (WP2): building resilient agricultural systems by understanding the connections between climate, peace, and security

Climate Security is a key focus area for ClimBeR. International, regional, and national organizations are increasingly recognizing the crucial connection between climate, peace, and security. However, there remains a notable gap in comprehensive research that unpacks the intricate dynamics of this relationship. Many donors and governments recognize that climate change acts as a "threat multiplier," meaning it can exacerbate existing risks and insecurities in agricultural communities, increasing the chances of conflict and instability.

To address the lack of strong, localized, and policy-focused evidence about these risks, researchers led by the Alliance of Bioversity International and CIAT, through CGIAR FOCUS Climate Security, have developed analysis, tools and guidelines to characterize the climate security nexus and provide recommendations for policy and programming that aims to tackle this issue. A central element of the activities was the establishment of strategic partnerships with local and regional government bodies, civil society and organizations to raise awareness on climate security and advance this agenda at regional, national and local levels.

Two years after the launch of the initiative, this evaluation sought to understand the influence of ClimBeR in motivating actors to address climate security in the five countries where WP2 activities were

developed: Guatemala, Kenya, Philippines, Senegal and Zambia. It employed an innovative approach based on the Digital Methods epistemology and Machine Learning techniques to assess digital content that could provide insights about the reach of the initiative at various levels. This report describes the methodology and presents the main findings from the research carried out between June-November 2024.

The Digital Methods approach

The pervasiveness of the internet in people's lives is undeniable. According to the latest data[1], more than 66 percent of the world's population now use the internet, with the latest data putting the global user total at 5.35 billion. Statistics also show that active social media user identities have passed the 5 billion mark, with the latest user figure equivalent to 62.3 percent of the world's population[2].

The internet has been increasingly integrated into existing offline practices and social relationships, rather than existing as a separate dimension. This hybridization of online and offline realities has effectively established the internet as a space for research on social phenomena. Among various epistemological approaches, 'Digital Methods' (Rogers, 2013, 2015) is defined as the provision of techniques to explain social phenomena through online dynamics, with the web as the data set.

Online spaces offer ample opportunities for analyzing and visualizing trends in contemporary issues due to several aspects: issue traces are accessible online; the analytics leverage on the dynamic features and affordances of online media; and digital platforms provide data (for instance, metadata, links, hashtags, mentions, etc.) that can be structured for systematic analysis (Carneiro, Resce, & Sapkota, 2022).

Employing Digital Methods to assess the influence of WP2 – Climate Security

Relying on innovative research methods that leverage digital platforms as proxies for wider public discourse and engagement, this study explored the influence of ClimBeR's WP2 through data analytics, with the application of machine learning techniques primarily focused on text mining and network analysis of content disseminated on the web (social media and websites).

Based on the analytical framework employed to map the policy influence of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) (Carneiro, Resce, Läderach, et al., 2022) and CIMMYT's climate change research portfolio (Carneiro, Resce, & Sapkota, 2022) the research assesses the process of knowledge dissemination of WP2 activities and changes in the discourse of initiative partners by considering online networks and narratives as evidence of "offline" program influence.

The main questions we explore are:

1. *Has ClimBeR helped raise awareness of the linkages between climate, peace, and security?*
2. *Has the initiative motivated its partners to adopt a climate security lens in their public communications?*

[1] https://datareportal.com/reports/digital-2024-global-overview-report
[2] *We note that social media user identities may not represent unique individuals*.

2. Methodology

While ClimBeR outcomes monitoring includes reporting on the number of policies, legal instruments, and investments that have been informed by the Initiative's research, these indicators may not be capturing the full extent of the program's influence, as it does not consider the processes that enable policy or investment decisions. In such cases, 'soft power' plays an important role in raising awareness and shaping perceptions of climate security implications to adaptation. The analysis provides a current perspective on the institutional and policy discourses that have not yet been translated into formal documents.

Based on this notion, the text mining approach proposed by Carneiro et al (2022) was adapted to account for the specificities of ClimBeR's WP2. Two main adjustments were made. First, the taxonomy development combined a data-driven technique with expert consultation to ensure the appropriate concepts were captured in the text analysis. Secondly, the text mining analysis included data from social media (the platform X, formerly Twitter) and websites of initiative partners.

Mapping partners' online presence

As a starting point, the regional hubs of CGIAR FOCUS Climate Security identified the partnerships and institutional engagements developed over the course of the initiative's WP2 implementation. Figure 1 presents the distribution of partners identified, 114 in total, with Zambia and Philippines presenting the lowest numbers due to activities in those countries beginning at a later stage in the initiative.

A digital platforms mapping exercise was carried out to identify the main platforms used by these partners, which determined that a significant majority maintained institutional websites and active profiles on X (formerly Twitter). In total, 107 partners had websites (94%) and 104 has X profiles (91%).

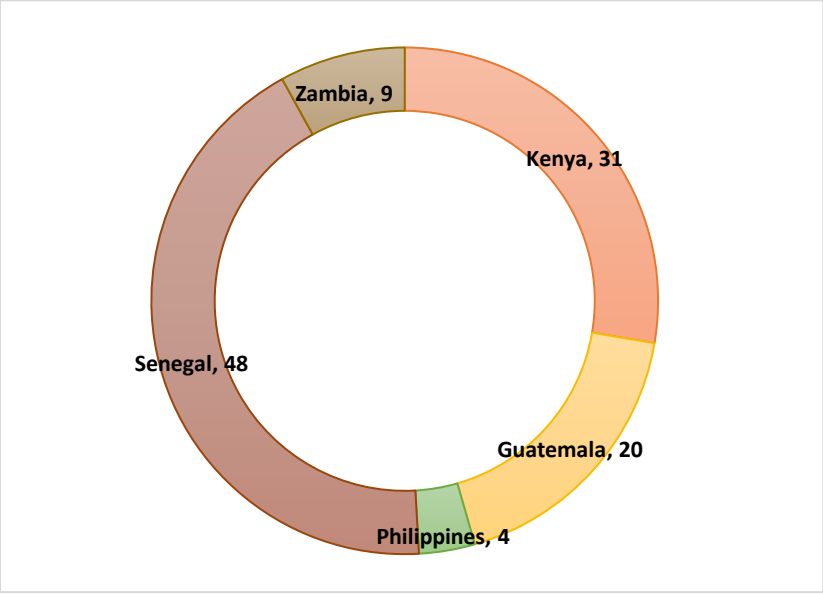


Figure 1 Distribution of partners identified, by country.

Data Collection

Social media: X (formerly Twitter)

Data was collected from X profiles affiliated with project partners to gain insights into social media discourse across diverse geographic regions. The platform was chosen due to its importance as a digital forum for information exchanges and dialogue, and its role in hosting discussions on climate and environmental issues (Pearce et al., 2019). The dataset includes 134 Twitter/X accounts connected to partners in the five countries considered in the analysis. This figure is higher than the number of partners as some institutions maintained more than one profile.

Data acquisition was achieved using a custom Python script that accessed platform endpoints. The script was designed as an ETL (Extract, Transform, Load) pipeline, utilizing the Luigi package to manage workflows. The script takes as input the list of 134 accounts from a JSON file and, for each account, creates a task that scrapes the entire timeline. Each tweet is parsed for relevant information, and the results are saved in a TSV file. This design allows for the efficient recovery of data collection after any failure or interruption, ensuring that the process can resume seamlessly from the last completed operation.

Partner Websites

As part of the analyses' multi-faceted data collection strategy, a specialized web-scraping process was employed to gather text data from partner websites. Data was collected from over 100 websites associated with the ClimBeR project. In order to retrieve data from websites in the past, we utilized the internet archive Wayback Machine[3]. This tool enables users to navigate through time and observe the evolution of websites over the years.

A specialized scraping tool, developed using Shell scripting, was employed to automate the extraction of text data. The tool was configured to perform the following tasks:

- Content Download: The tool downloaded only the PDF files and HTML from the web pages linked from the home page of each website. This approach ensured that all text content from the homepage and first-level links was retrieved.
- Web Page Content Extraction: Text was extracted by first cleaning up the HTML.
- PDF File Content Extraction: The tool also identified and extracted text from PDF files linked directly from the home page.
- Storage: The extracted content was then concatenated and compressed before being stored.

This methodology allowed for efficient and thorough data collection.

[3] https://web.archive.org

Description of datasets

Twitter

The data collection process yielded 134 .tsv files, each corresponding to one of the X profiles analyzed. Together, these files occupy approximately 635 MB of storage and contain a cumulative total of 1.43 million tweets, covering a date range from April 2008 to September 2024. Each file holds structured data on the tweets from a specific account, capturing a comprehensive snapshot of social media activity over time.

For each tweet in the dataset, the following fields are included:

- Tweet ID: Unique identifier of the tweet.
- Permalink: URL linking directly to the tweet.
- Date: Timestamp indicating when the tweet was posted.
- Body: Text of the tweet (comprehensive of hashtags, mentions, links)
- User Information: Details of the user who posted the tweet.
- Reply Count: Number of replies to the tweet.
- Like Count: Number of likes received by the tweet.
- Retweet Count: Number of retweets.
- Language: Language of the tweet content.

Partner Websites

The scraping of partner websites produced a dataset consisting of a file per website, each containing the concatenated text contents from all the pages and PDF files linked to the homepage of the website. To capture temporal snapshots, a new file was created for each scraping day, enabling the tracking of content changes over time. The use of the Wayback Machine guarantees the comparability of the contents over time, allowing for the analysis of changes in communication. This approach enhances the analysis of the partners' website content, enabling us to ascertain the timing and nature of any changes and their impact on the communication of the partners' activities.

Data analysis

Once the datasets were collected, the analysis was organized into three distinct work streams presented in Figure 2. The key method used was text mining, aimed at capturing and analyzing the multiple meanings embedded in textual data. By combining both qualitative and quantitative text analysis, it was possible to assess content disseminated across websites and social media of ClimBeR's WP2 partners to determine whether the initiative raised awareness about the linkages between climate, peace, and security.

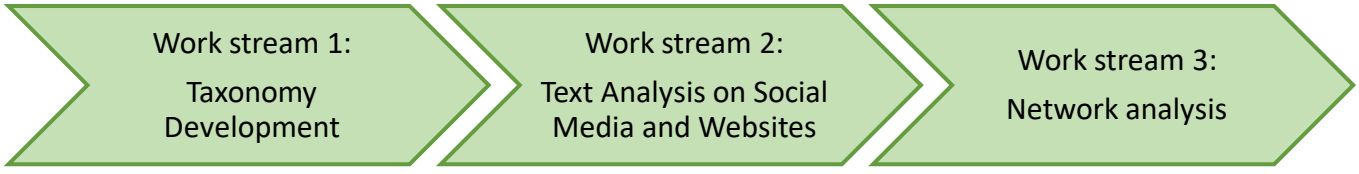


Figure 2: Work steams

Work stream 1: Taxonomy development

Our approach began with the creation of a custom taxonomy designed to identify key WP2 terminology from which to map the text from partner sources. For this, machine learning algorithms were applied to perform unsupervised text mining on the titles of 130 research outputs reported by WP2 in CGIAR's Performance and Results Management System (PRMS) from initiative inception until July 2024.

The algorithm used was the statistical measure tf-idf (term frequency-inverse document frequency), which adjusts the frequency of a term by considering its rarity. The aim of this metric is to assess the importance of a word within a document relative to a broader corpus of documents (Silge & Robinson, 2017). In our context, the tf-idf metric merges two aspects: term frequency, referring to how often a word appears in a title, and inverse document frequency, indicating how uniquely the word is tied to that specific title compared to the overall corpus (Hidalgo & Haussman, 2009).

To identify the most significant words among the most frequent ones, we applied a threshold where tf-idf values greater than or equal to the mean tf-idf plus 1.96 times the standard deviation were considered. This threshold helped highlight terms that are both common in the title and rare across the broader set of documents, making them particularly significant.

The words selected using this method, both unigrams and bigrams, were then assessed, complemented and validated by climate security experts to ensure the most important concepts disseminated by WP2 were captured in the analysis. This final, customized taxonomy forms the key terminology that guided the text analysis process. The final output is shown in Figure 3.

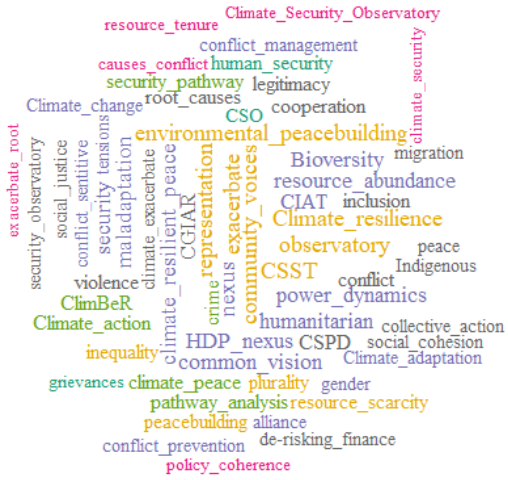


Figure 3: ClimBeR Taxonomy

Considering the languages spoken in the countries of analysis, as well as language detection in the X dataset identifying a significant presence of non-English content, the final step was to translate the taxonomy into French (5.25% of tweets) and Spanish (29.1% of tweets) by using Google Translate.

Work stream 2: Text analysis

Text mining techniques were applied to determine a similarity measure between the knowledge products generated from WP2 with the discourses of partners, on their websites and on X.

The first step in text mining is pre-processing data. The R package *tm* (Feinerer & Hornik, 2020) was utilized to clean the text by removing punctuation, stop words (e.g., ”the,” ”is,” ”of”), numbers and special characters and by converting the remaining words to lowercase.

Subsequently, an analysis was conducted to identify and quantify the taxonomic words within the text. Initially, this search was performed by considering only the absolute frequency of the taxonomic words. Following this, the metric *Taxonomic Prevalence Index (TPI)* was introduced, which indicates the prevalence of words from the taxonomy in relation to the total number of words present in the text. This index is expressed as a percentage, calculated by the ratio of the sum of taxonomic words to the total sum of words in the text.

The *Taxonomic Prevalence Index* was calculated for each X profile and each website separately, and subsequently aggregated to yield a single overall value for the entire dataset of X and for all the websites considered.

On X, to measure the influence of ClimBeR on its partners, we assessed the change in the Taxonomic Prevalence Index in the content of tweets before and after the initiative’s launch. For the websites, the TPI for 2024 was compared to that of 2020.

To provide an empirical measure of the correlation between ClimBeR taxonomy and text over time and to test whether the correlation after program launch is significant, a linear regression was performed.

Work stream 3: Network analysis

Using the dataset collected from X, it was possible to assess CGIAR’s place within its network of WP2 partners by analyzing profiled mentioned in partner tweets. A network analysis was performed to explore the relationship between accounts mentioned in the corpus. Network analysis techniques enable the visualization of relational data organized as matrices, where entities are the nodes – in this case, @mentions – and their relations are the lines connecting pairs of nodes. This means that accounts are connected if they are mentioned by another.

The network analysis considers only tweets in which words from the taxonomy were detected, ensuring that mentions are present in the context of conversations about climate security. A force-directed algorithm was used to construct the network displays. Force-directed graphs show the spatialization of nodes by mapping the proximity and the authority of categories in relation to each other (Jacomy et al., 2014). This means that linked nodes are drawn closer while unrelated nodes are pushed farther apart, thus allowing for a visual interpretation of the dynamics between actors in the network. A modularity algorithm (Blondel et al., 2008) was applied to identify “communities”, or clusters – as represented by nodes that are more densely connected together than to the rest of the network, and which were colored accordingly.

3. Key Results

Within the social sciences, content analysis methods enable researchers to identify patterns and changes in political agenda over time and across geographies (Brandt, 2019). Based on the principles of Digital Methods, social media activity can act as a proxy for how ClimBeR WP2 activity influences stakeholders, and how stakeholders in turn amplify the program's mission to a broader audience. The following section presents the results of our analysis of partners' X profiles and websites.

Social media (X)

The period of analysis for X data was from January 2019 to September 2024. From 134 profiles, a subset of 630 thousand tweets were considered. Figure 4 presents an example of a partner tweet with the presence of terms from the WP2 taxonomy.



Figure 4 Examples of partner tweets with the presence of the WP2 taxonomy.

The word cloud in Figure 5 highlights the most frequent terms used in tweets and allows us to identify the dominant topics of the conversation. In this representation, the largest words are those used most frequently. The most prominent words are *violence, security, and peace*, suggesting that a significant portion of discussions focused on the security dimension of climate security. Other frequent terms include *humanitarian, migration and gender*, highlighting the complex linkages between climate insecurity and other social dimensions.



Figure 5: Word cloud of most frequent taxonomy words in tweets

For each account, the Taxonomy Prevalence Index (TPI) was calculated, revealing that conversations about climate security were present in less than 5% of content disseminated by partners. While this figure may seem low, it is important to note that most institutions engaged with WP2 are not climate security-focused, but rather, operate in diverse fields across the HDP Nexus or at the governmental domain.

However, it is important to note that both the absolute word frequency and the TPI, in isolation, are not sufficient indicators of how WP2 has influenced partners' communication strategies. To assess whether there was an increase in awareness concerning climate, peace, and security, along with an evolution in the narrative surrounding these themes, a comparison was made between the TPI values before and after the launch of ClimBeR. This analysis was possible due to the availability of 118 accounts that published tweets in both periods under investigation.

As illustrated in Figure 6, the results demonstrate a marked increase in the TPI following the launch of ClimBeR, with 81 profiles (70%) showing an upward trend in their respective indices.

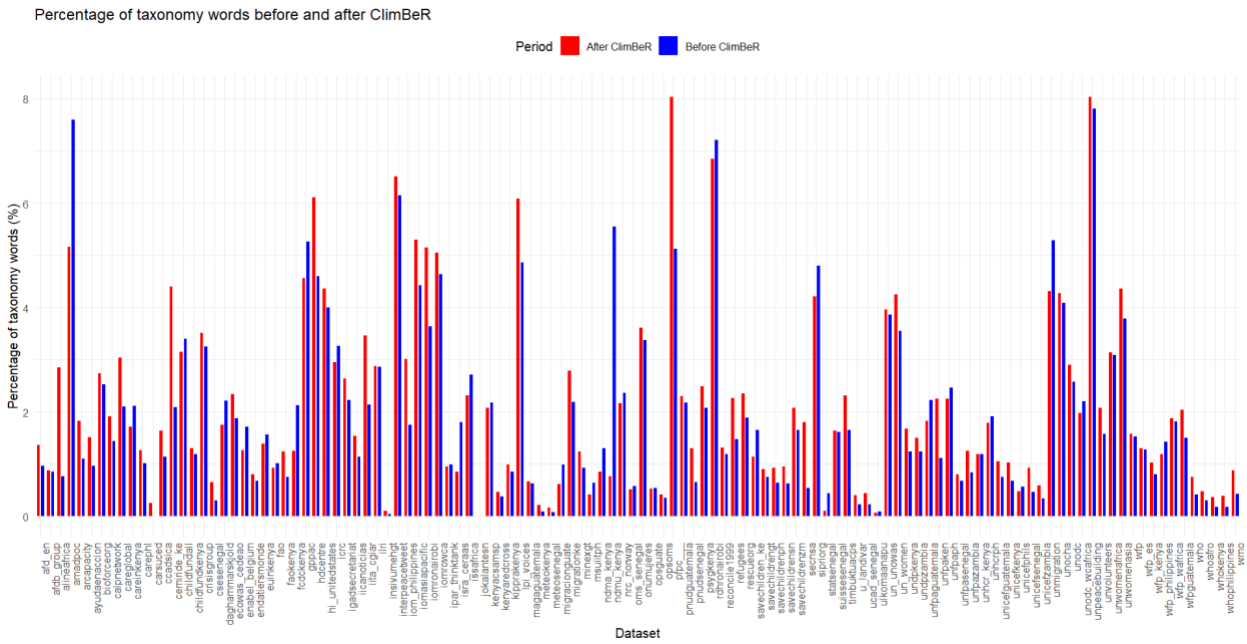


Figure 6: Comparison of TPI before and after ClimBeR launch on X

Aggregating the results without distinction by individual account, a slight increase is evident. The Taxonomy Prevalence Index (TPI) before 2022 stood at an average of 1.04%, while after the launch of the initiative it rose to 1.06%. Although small, considering the length of the program and a thematic focus that is still emerging and was novel to several local partners, this change indicates an achievement regarding increased attention dedicated by partners to issues around climate, peace and security.

To provide an empirical assessment of TPI over time and to evaluate whether the correlation observed after the project's inception is statistically significant, a linear regression analysis was conducted. Table 1 shows that on average, when moving from AfterClimber = 0 to AfterClimber = 1, the prevalence increases by approximately 0.0008percentage points, and the p value of 3,07e^-08 indicates this change is statistically significant.

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.0141942	0.0001015	139.841	<2e-16 ***
After ClimBeR	0.0008425	0.0001521	5.537	3.07e-08 ***
Signif. codes: 0 ‘***’ 0. 001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1				
Residual standard error: 0.0403 on 284051 degrees of freedom				
Multiple R-squared: 0.0001079, Adjusted R-squared: 0.0001044				
F-statistic: 30.66 on 1 and 284051 DF, p-value: 3.075e-08				

Table 1: Regression results for correlation between the launch of ClimBeR and the TPI on partner tweets.

Country analysis on X

Now that we've looked at how the Taxonomy Prevalence Index has changed for each partner account before and after the launch of ClimBeR, it is important to dive deeper into the analysis by breaking down the data by country. This will allow us to assess whether WP2 has been particularly effective in some geographic areas compared to others.

The breakdown by country will allow us to observe any local variations, highlighting whether there were regions where Climber had a more significant impact and whether, conversely, in some countries the effectiveness of the index was limited.

The graphs below illustrate how the Taxonomy Prevalence Index (TPI) has changed for each account since the project was launched, broken down by country. The results are generally positive: in all five countries, the index increased for at least half of the partner accounts. More specifically:

- Guatemala (Figure 9): 74% of partner profiles showed an increase in the prevalence of climate security terms;
- Kenya (Figure 10): 63% of partner profiles showed an increase in the prevalence of climate security terms;
- Philippines (Figure 11): 50% of partner profiles showed an increase in the prevalence of climate security terms;
- Senegal (Figure 12): 77% of partner profiles showed an increase in the prevalence of climate security terms;
- Zambia (Figure 13): 75% of partner profiles showed an increase in the prevalence of climate security terms.

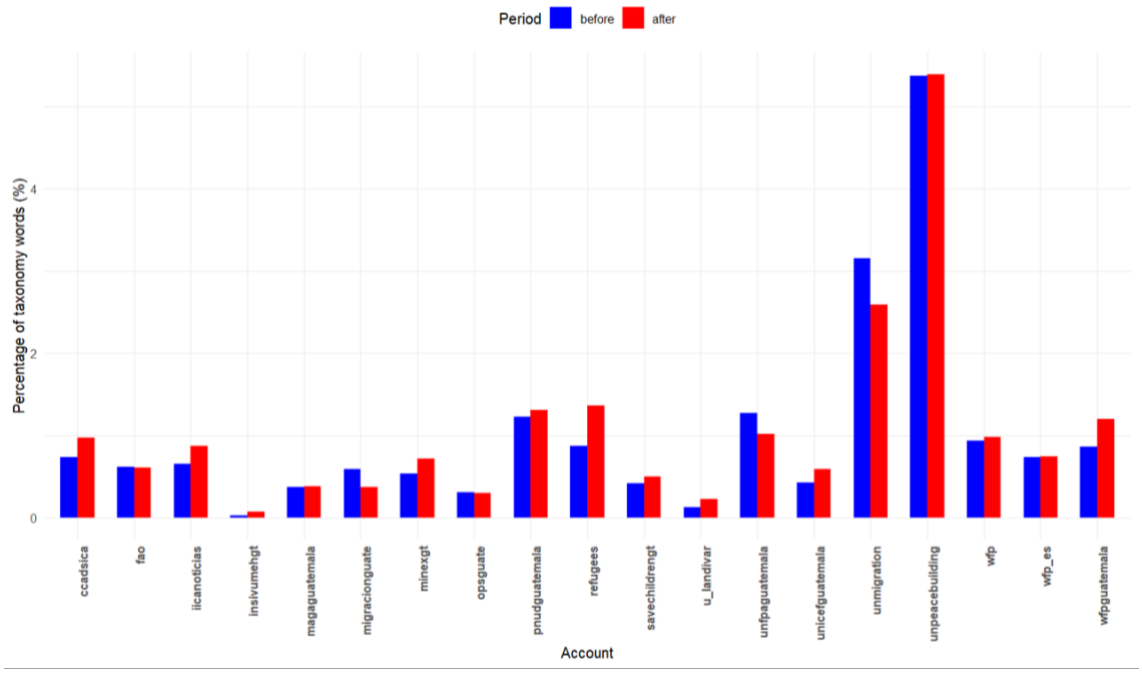


Figure 7: Guetemala, Taxonomy Prevalence Index before and after ClimBeR for each account

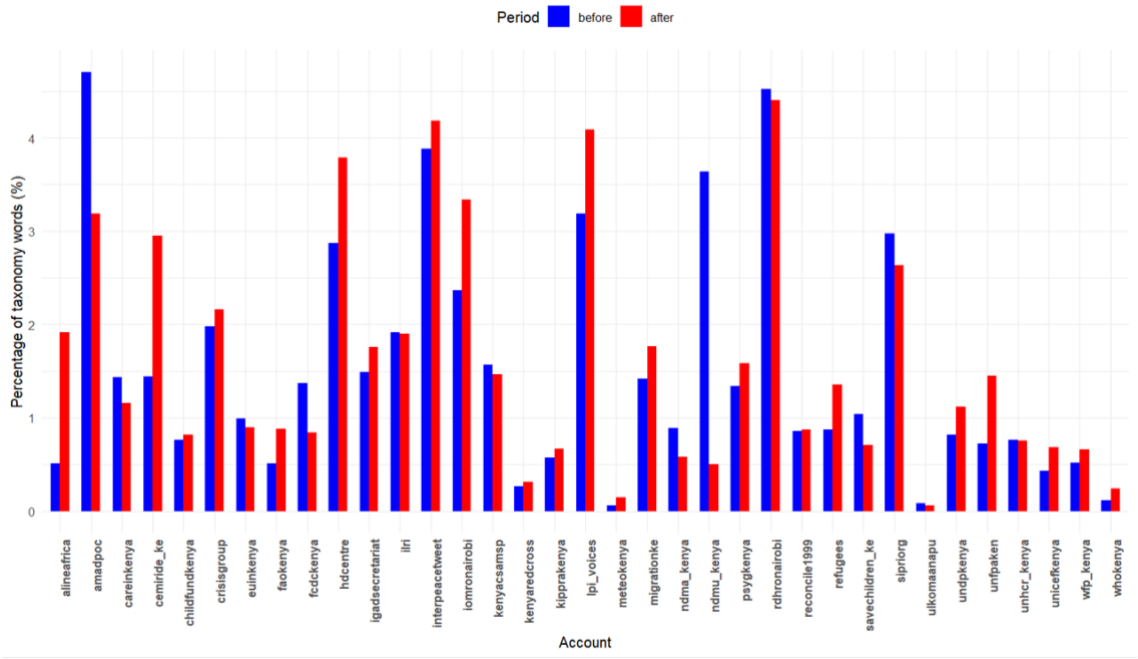


Figure 8: Kenya, Taxonomy Prevalence Index before and after ClimBeR for each account

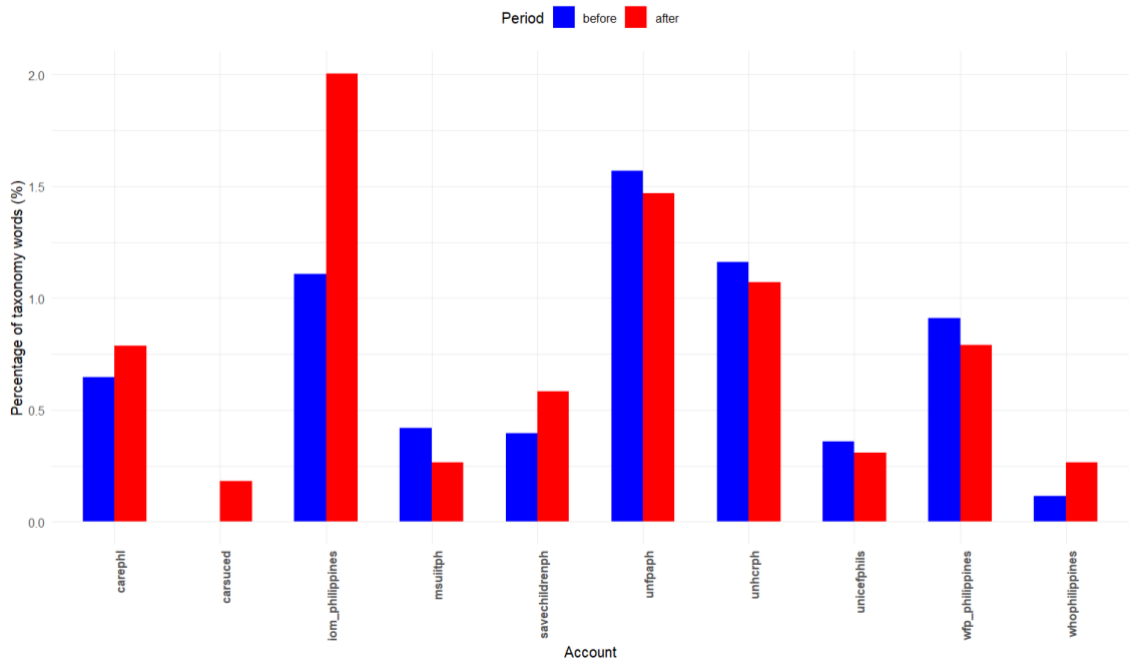


Figure 9: Philippines, Taxonomy Prevalence Index before and after ClimBeR for each account

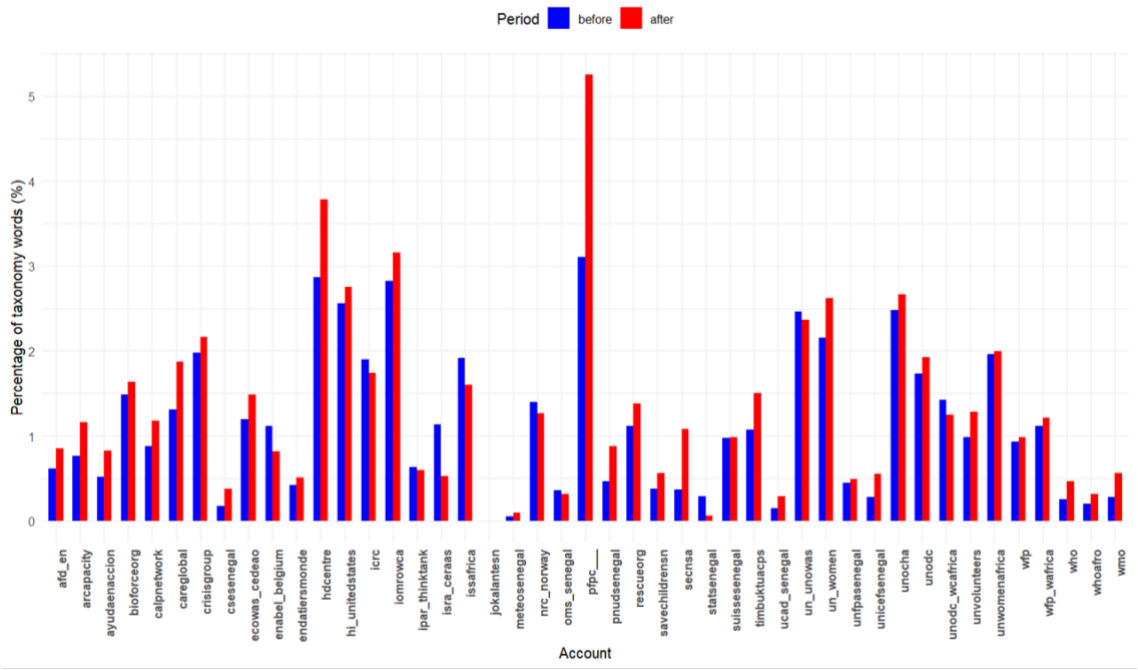


Figure 10: Senegal, Taxonomy Prevalence Index before and after ClimBeR for each account

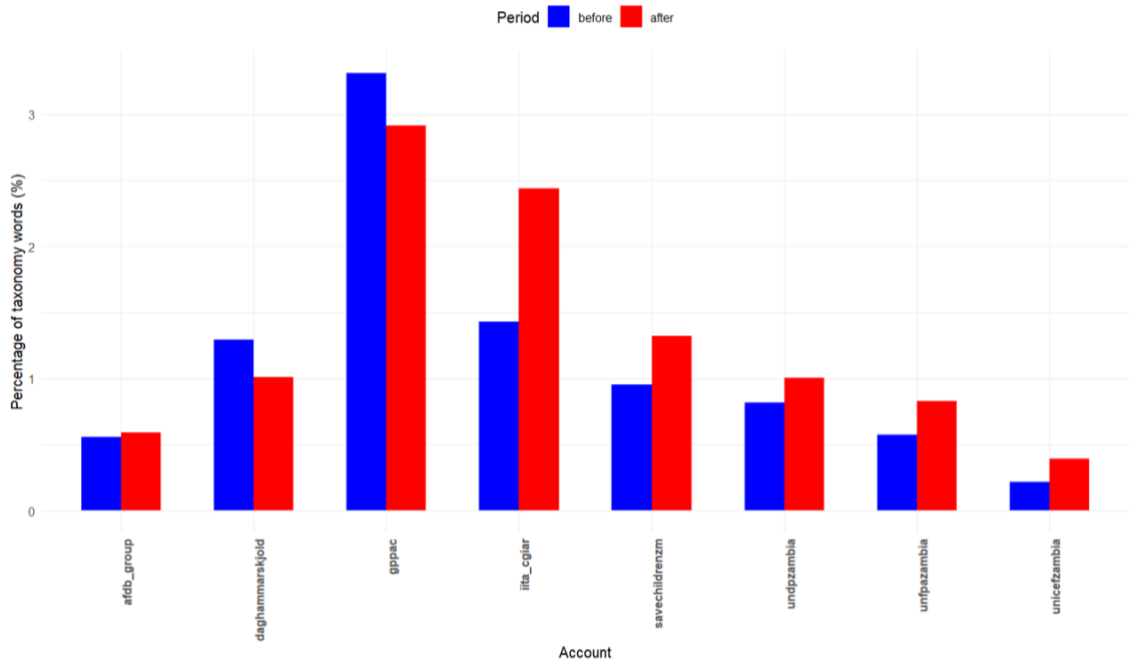


Figure 11: Zambia, Taxonomy Prevalence Index before and after ClimBeR for each account

Alternatively, looking at the overall national index, without distinguishing between individual accounts, it emerges that the most significant increase in the Taxonomy Prevalence Index was recorded in Kenya (from 0.99% to 1.17%), Philippines (from 0.55% to 0.71%) and Senegal (from 1.17% to 1.25%). These three countries showed a higher average growth of the index than the others, indicating a particularly strong effect of Climber in promoting the adoption and awareness of climate security terms at the

national scale. This observation reinforces the hypothesis that, although ClimBeR had a positive impact on all regions analyzed, some countries responded with greater sensitivity and integration of climate security issues in the post-launch period.

Institutional Websites

The same methodology was applied to 159 scraped websites, 12 of which contained no text. Figure 7 presents a Word Cloud highlighting the most frequent taxonomy terms. In this case, the term *humanitarian* is the most prevalent.



Figure 12: Word cloud of most frequent taxonomy words in partner websites

For each website, the Taxonomy Prevalence Index (TPI) was calculated. The analysis revealed that websites exhibited a higher prevalence than social media, with a maximum value exceeding 10%, though the majority stayed below 5%.

To assess changes in awareness around climate, peace, and security, as well as a shift in the narrative on these themes, a comparison was made between TPI values before and after the launch of the ClimBeR initiative. Unlike the Twitter dataset, which included publication dates in its metadata, a different approach was required for websites. This analysis compared the TPI of website content from two separate years: 2024 (two years post-launch of ClimBeR) and 2020 (two years prior to the initiative's launch). Using legacy website data collected through the Wayback Machine tool, text from 109 websites was examined.

As shown in Figure 8, the results indicate a significant increase in TPI following the launch of ClimBeR, with 74 websites (69%) showing a positive trend in their respective indices. When aggregating results without distinguishing between individual websites, it is possible to note that the presence of climate security messaging prior to the initiative's launch was virtually null, at 0,64%. By 2024, the average prevalence increased to 1.77%. This global increase suggests a growing focus among partners on the

themes of climate, peace, and security, indicating a notable impact of the ClimBeR project on the narrative dynamics across the analyzed websites.

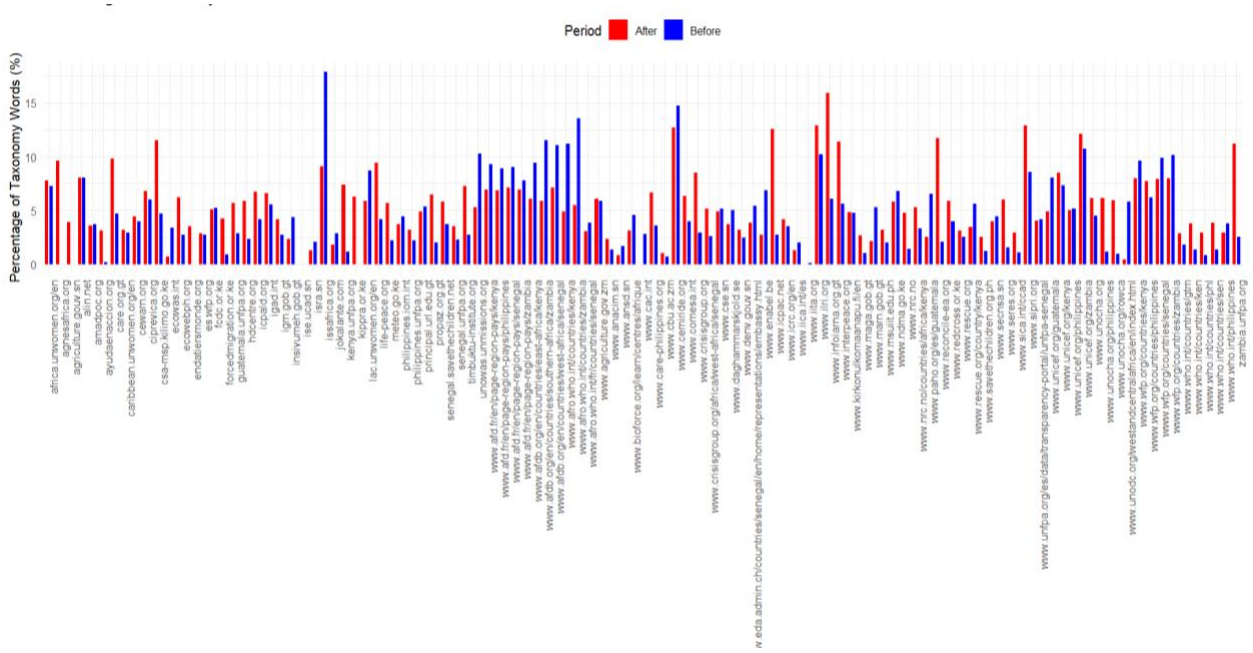


Figure 13 Comparison of TPI before and after ClimBeR launch on partner websites

While monthly aggregation was not possible due to the aforementioned issue of missing publication dates, the significance test confirmed a measurable increase in awareness on these themes. Table 2 shows that, on average, moving from "Before ClimBeR" to "After ClimBeR" results in a 0.8280 percentage point increase in TPI. The p-value of 0.0007 confirms that this change is statistically significant.

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	1.2464	0.1822	6.842	5.53e-11 ***
After ClimBeR	0.8280	0.2437	3.398	0.000784 ***
Signif. codes: 0 ‘***’ 0. 001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1				
Residual standard error: 1.962 on 261 degrees of freedom				
Multiple R-squared: 0.04237, Adjusted R-squared: 0.0387				
F-statistic: 11.55 on 1 and 261 DF, p-value: 0.0007838				

Table 2: Regression results for correlation between the launch of ClimBeR and the TPI on partners Websites.

How central is ClimBeR in its network of regional partners?

The entire mentions network is very large, as approximately 15 thousand accounts were mentioned in 88 thousand tweets over the period of analysis. Figure 9 presents a visualization of this network. It is already possible to observe some dynamics of proximity and regional clusters, such as Kenyan profiles (purple), Guatemala (blue), UN agencies (light green) and CGIAR centers (dark green).

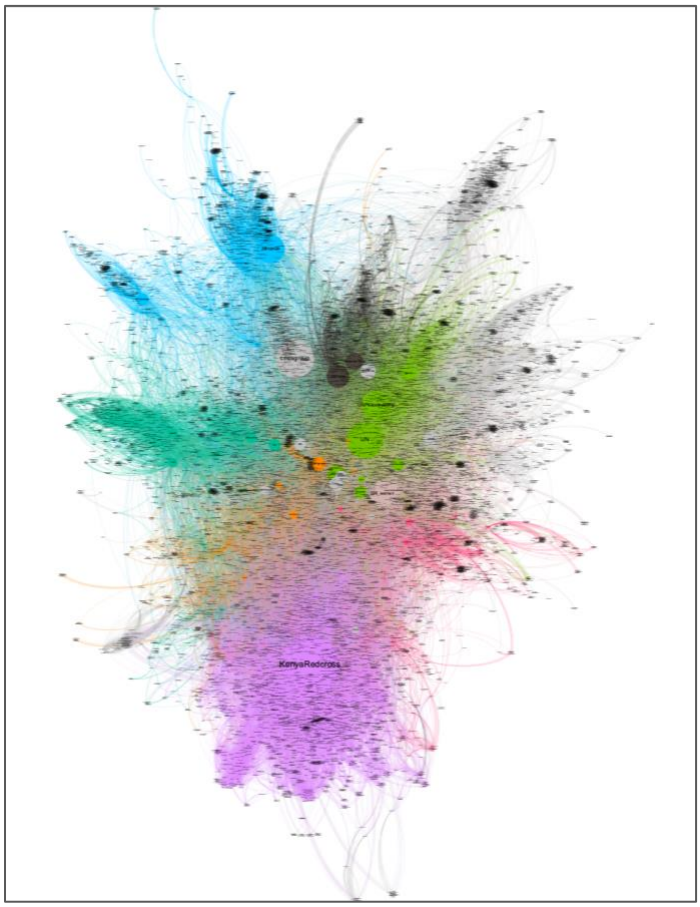


Figure 14 Overall partner network. Parameters: force-directed graph, with title size partitioned by Degree, colored by modularity class. Nodes = 15,338 accounts, edges = 88,341 connections.

However, to locate CGIAR within this network, figure 10 presents a combined 'ego network' for the main X profiles connected to ClimBeR and WP2, namely the central CGIAR account (@cgiar), the CGIAR Climate Impact Platform (@cgiarclimate) and the Alliance of Bioversity and CIAT's accounts (@biovintCIAT_eng and @biovintCIAT_esp).

There are 664 nodes in this graph, representing unique profiles that mentioned CGIAR accounts in more than six thousand tweets. The presence of diverse institutions is evident, indicating that ClimBeR is

engaging in conversations with regional governments, international organizations, and civil society. In all both network visualizations, ClimBeR is positioned among key local, regional, and international players.

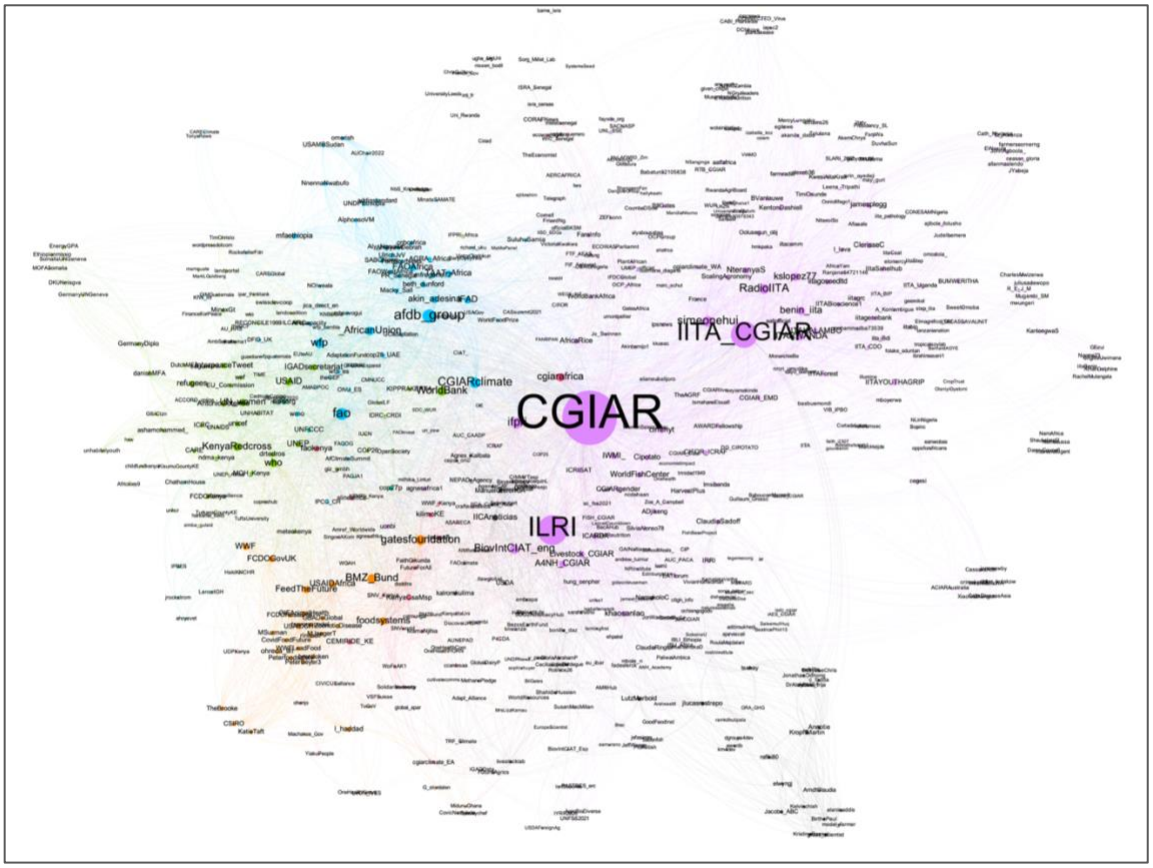


Figure 15 CGIAR ego network. Parameters: force-directed graph, with title size partitioned by Degree, colored by modularity class. Nodes = 664 accounts, edges = 6321 connections.

4. Conclusions and Recommendations

As research for development program, ClimBeR strategy is built on developing partnerships as key to achieve outcomes. The digital methods analysis shows that the initiative's WP2 – Climate Security has undoubtedly supported its regional partners to embrace a climate security lens in the context of climate adaptation. In addition, by publicly dialoguing with the topic, these direct stakeholders help amplify the initiative's messaging across countries and regions.

On both social media and their institutional websites, WP2 strategic partners aligned their messaging with the key concepts of the program. The positive correlation between the initiative's taxonomy and the institutional communications indicates that climate security is effectively on the radar of regional actors. Importantly, the heightened sensitivity around the topic supports the boundary spanning efforts of ClimBeR to bridge scientific research with policy and programming. Furthermore, considering the importance of strategic partnerships in WP2's Theory of Change, locating CGIAR within its network of stakeholders placed it among key regional players in research, development, and policy.

Finally, drawing back on the initiative's aim, our study shows that ClimBeR's WP2 has not only positively contributed to the diffusion of scientific evidence to support conflict-sensitive climate adaptation, but has also effectively engaged with central actors in the five countries it operated to raise awareness of climate security.

Recommendations and possible next steps

1. **Enhance Regional Efforts**

The evaluation revealed geographic variations in ClimBeR's influence. Tailoring engagement by addressing specific regional climate security concerns and creating targeted awareness campaigns could help reinforce the relevance of climate security to local stakeholders. Additionally, strenghening capacity of regional hubs enables deeper engagement, sustaining the focus on climate security and ensuring that the initiative's messaging is effectively disseminated and adopted.

2. **Strengthen Monitoring of Digital Engagement**

The digital analytics approach has provided valuable insights into how effectively climate security messaging has reached and influenced partners. To further enhance this, continuous monitoring to track the evolution of digital engagement over time – through regular analysis of digital content – would allow ClimBeR to assess real-time shifts in climate security narratives and adjust its strategies accordingly. The implementation of automated digital tracking tools, alongside periodic in-depth network analysis, could help ClimBeR stay attuned to emerging issues and respond promptly to changing needs within its network of partners

3. **Leverage Network Mapping for Targeted Engagement**

The network mapping on social media revealed that ClimBeR's climate security activities generated connections with diverse stakeholders, including regional governments, international organizations, and civil society groups. This suggests an opportunity to use network mapping as a strategic tool to identify strong connections as well as regions, partners, or sectors with lower engagement that require direct targeted efforts. By leveraging network analysis, ClimBeR can effectively prioritize and tailor its outreach strategies. For instance, insights point to gaps where relationships that need to be strengthened or to facilitate peer-to-peer exchanges within regional clusters where engagement is higher. This approach would ensure that resources and messaging are allocated efficiently, supporting a balanced and inclusive influence across all regions within its network.

4. Triangulate uncovered narrative with policy coherence and expert insights

While the digital narrative analysis has shown that discussions around climate, peace, and security have intensified among ClimBeR WP2 partnets, it is important to uncover if this heighened awareness is translating into cohesive, actionable policies and programming.To bridge this gap, findings from the present analysis should be triangulated with policy coherence assessments, as well as expertise from local actors. This approach would also help align the initiative's messaging with existing policy frameworks and identify potential inconsistencies or opportunities for integration. By engaging experts familiar with local governance and climate challenges, ClimBeR can further contextualize its climate security narrative, ensuring it resonates with policymakers and supports coherent policy development.

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