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QUANTITATIVE CONTENT ANALYSIS OF CLIMATE CHANGE COVERAGE IN THE NEWSPAPERS EGEMEN QAZAQSTAN AND THE NEW YORK TIMES

Kazakhstan has already warmed by about +2.9 °C. Central Asia is heating faster than the global average. In this context, clear and explanatory climate journalism is vital for shaping public understanding and informing new policy design. This research article therefore, examines how often climate topics appeared in Egemen Qazaqstan and The New York Times from 2015 to 2025, and how that frequency changed year by year. The study's scholarly contribution is to provide, for the first time in Kazakhstan, a stable, long-term quantitative dataset in this field. Its practical value lies in offering comparable indicators that editors and policymakers can use for communication planning.

Methodologically, data were collected in Python using expanded climate-related keywords in Kazakh and English and were grouped by year. Descriptive and quantitative comparisons were conducted for each annual indicator. This design enables tracking of long-term dynamics.

The main results reveal both a clear gap in publication volumes and a shared upward trend. Over the decade, Egemen Qazaqstan published 1,843 climate-related articles, while The New York Times published 63,408. Attention increased in both outlets. The Kazakhstani newspaper showed small, event-driven increments and then a sharp rise in recent years (peaking in 2024), whereas the U.S. outlet maintained a high and steady baseline. This suggests not merely coverage triggered by news events but an established editorial practice.

The study's value is in providing a decade-long quantitative climate dataset for Kazakh-language journalism and a foundation for future coding by frames, sources, and topics. Practically, newsrooms can plan a permanent «climate/environment» section, strengthen channels with scientists, meteorologists, and relevant authorities, and increase explanatory, solutions-oriented reporting grounded in local examples.

Keywords: climate journalism, content analysis, Kazakhstan, Egemen Qazaqstan, The New York Times.

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«Egemen Qazaqstan» және «The New York Times» газетіндегі климат өзгеруі тақырыбының қамтылуы бойынша сандық контент-талдау

Қазақстанда орташа ауа температурасы +2,9 °C-қа жоғарылады. Ал Орталық Азия әлемдік көрсеткіштен де жылдам ысып жатыр. Мұндай жағдайда климат өзгерісі туралы түсіндірмелі әрі айқын журналистика қоғамдық түсінік қалыптастыру және жаңа саясатты жобалау үшін маңызды. Сондықтан бұл зерттеу мақаласы 2015–2025 жылдар аралығында «Egemen Qazaqstan» мен «The New York Times» газетінде климат тақырыбының қаншалықты жиі көтерілгенін және бұл жиіліктің жылдар бойынша қалай өзгергенін талдайды. Зерттеудің ғылыми құндылығы – Қазақстан бойынша осы салада алғаш рет тұрақты, ұзақ мерзімді сандық база ұсынуы. Практикалық маңызы – коммуникацияны жоспарлауда редакторлар мен саясаткерлер пайдалана алатын салыстырмалы көрсеткіштерді ұсынуы.

Зерттеу әдістемесінде деректер қазақ және ағылшын тілінде климатқа қатысты кеңейтілген кілт сөздер бойынша Python бағдарлама жүйесінде жиналып, жылдар бойынша топтастырылды. Сондай-ақ әр жылдық көрсеткіштерге сипаттамалық әрі сандық салыстыру жүргізілді. Бұл дизайн ұзақмерзімді динамиканы бақылауға мүмкіндік береді.

Негізгі нәтижелер жарияланым саны бойынша айқын алшақтықты және ортақ өсу үрдісін де көрсетеді. Онжылдық ішінде «Egemen Qazaqstan» климатқа қатысты 1 843 материал, ал «The New

York Times» 63 408 материал жариялаған. Екі басылымда да назар артқан. Қазақстандық газетте оқиғалық сипатта аз-аздан, кейінгі жылы бірден мақала саны артса (2024 жылы шарықтау), ал АҚШ басылымы жоғары әрі тұрақты базалық деңгейді сақтаған. Бұл ақпараттық себептен туған мақала ғана емес, орныққан редакциялық рәсім екенін аңғартады.

Зерттеудің құндылығы – қазақтілді журналистика үшін онжылдыққа арналған климаттық сандық базаны ұсынуы; болашақта фрейм, дереккөз бен тақырып бойынша кодтау әдісімен ары қарай жалғастыруы. Практикалық тұрғыда редакциялар тұрақты «климат/экология» айдарын жоспарлап, ғалымдар, синоптиктер және уәкілетті органдармен байланыс арнасын күшейтіп, жергілікті мысалдарға сүйенген түсіндірмелі әрі шешімге бағытталған материалдарды көбейте алады.

Түйін сөздер: климат журналистикасы, контент талдау, Қазақстан, «Egemen Qazaqstan», «The New York Times».

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Количественный контент-анализ освещения изменений климата в газетах «Egemen Qazaqstan» и «The New York Times»

В статье исследуется динамика освещения темы климата в национальных и зарубежных печатных СМИ за период с 2015 по 2025 гг., а также изменение интереса к теме по годам. Цель работы заключается в сравнительном анализе алгоритмов освещения проблемы изменения климата в газетах «Egemen Qazaqstan» и «The New York Times».

Центральная Азия нагревается быстрее среднемировых темпов, а в Казахстане среднегодовая температура выросла примерно на 2,9 °С, что повышает значимость аналитической климатической журналистики для формирования общественного понимания и климатической политики. Научная новизна исследования заключается в создании первой для Казахстана долгосрочной количественной базы по медиаповестке климата, а его практическая ценность – в разработке сопоставимых показателей для стратегического планирования климатических коммуникаций.

Научная ценность работы состоит в том, что она впервые для Казахстана предлагает устойчивую, долгосрочную количественную базу по данной теме. Практическая значимость – в предоставлении сопоставимых показателей, которыми могут пользоваться редакторы и политики при планировании коммуникации.

Методологический дизайн исследования основан на автоматизированном сборе данных в среде Python с использованием расширенного набора ключевых слов, связанных с климатической тематикой, на казахском и английском языках. Материалы были агрегированы по временным периодам, что позволило провести описательный и количественный анализ и выявить долгосрочные тренды медиарепрезентации климатических изменений.

Результаты исследования выявляют значительный разрыв в объемах климатических публикаций при общем восходящем тренде в обоих изданиях. За десятилетие «Egemen Qazaqstan» опубликовала 1 843 материала, тогда как «The New York Times» – 63 408, что отражает как различия редакционных ресурсов, так и устойчивые практики освещения темы. Ценность работы заключается в создании десятилетней количественной базы для казахоязычной журналистики, которая может служить основой для дальнейшего тематического и фреймового анализа, а также для практического планирования редакционных климатических коммуникаций.

Ключевые слова: климатическая журналистика, контент-анализ, Казахстан, «Egemen Qazaqstan», «The New York Times».

Introduction

By 2025, climate change had become an immediate reality for nearly two billion people worldwide, with daily temperatures shaped by human-driven warming (Climate Central; TIME, 2025). Projections suggest even greater risks ahead: the

World Health Organization estimates that climate change will cause 250,000 additional deaths annually between 2030 and 2050. The Intergovernmental Panel on Climate Change (IPCC) warns that 9–15% of species could face extinction if warming reaches 1.5–2 °C (WHO, 2023; IPCC, 2021). Scientific consensus has long confirmed that anthropogenic

climate change – rooted in fossil fuel use since the Industrial Revolution – is one of the defining global challenges of the 21st century.

Recent data highlight the accelerating pace of warming. NASA and Berkeley Earth report that 2023 was the hottest year on record, with global surface temperatures averaging 1.47–1.54 °C above pre-industrial levels (NASA, 2024; Berkeley Earth, 2024). Yet warming is uneven across regions. Central Asia is heating nearly twice as fast as the

global average. In Kazakhstan, the mean temperature has already risen by +2.9 °C (Berkeley Earth, 2024). Southern and central regions are experiencing warming rates of 0.4–0.7 °C per decade (Kazhydromet, 2023). Regional estimates for Central Asia as a whole reach 0.36–0.39 °C per decade (Liu et al., 2020). In March 2025, Central Asia experienced an extreme heatwave, with temperatures up to 1.5 °C higher than normal, at least 4 °C of which was driven by human-caused climate change.

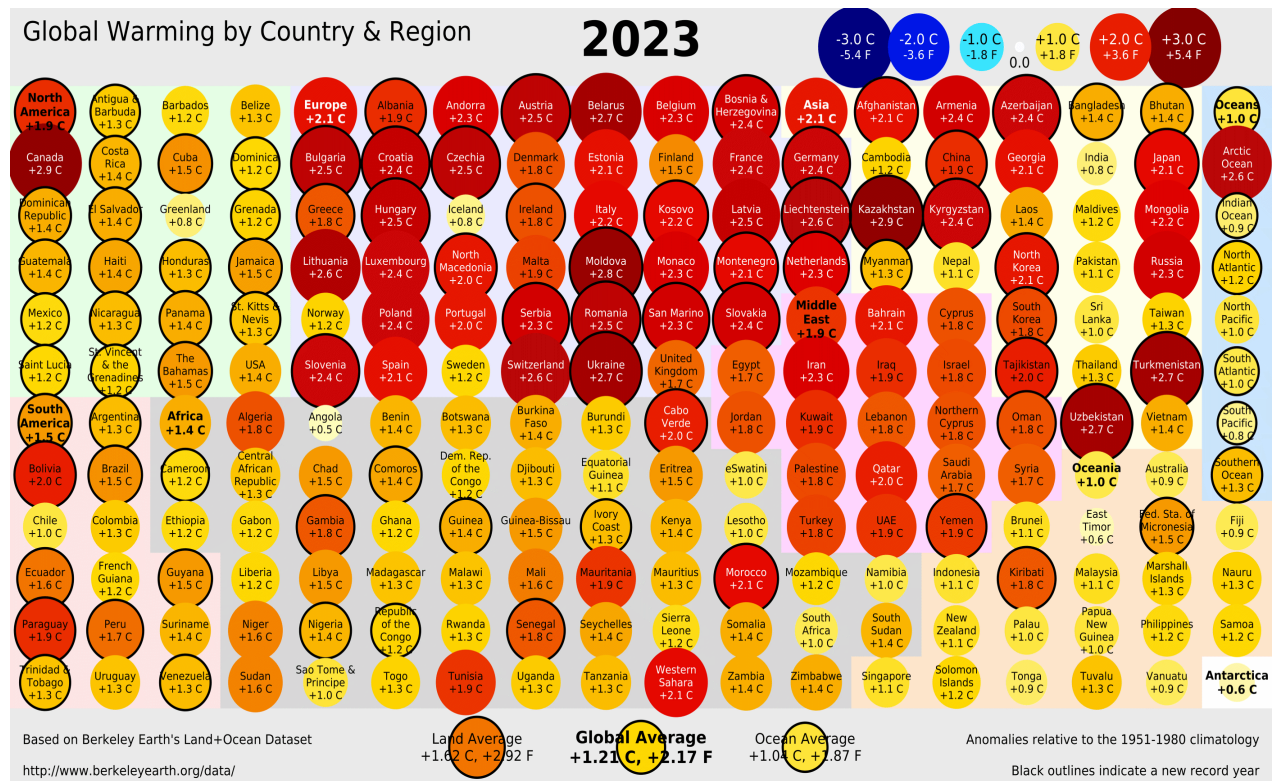


Figure 1 – Global warming by country and region, 2023.

Note – Visualization from Berkeley Earth's Land-Ocean dataset (Berkeley Earth, 2023)

Kazakhstan's climate vulnerability is compounded by its historical and environmental legacies. The country continues to face the consequences of Soviet-era ecological degradation, including the desiccation of the Aral Sea, widespread industrial pollution, deforestation, and nuclear testing in Semey (UNODA, 2024; Poberezhskaya et al., 2022). Combined with weak governance in the early years of independence, these legacies have intensified exposure to climate risks and slowed adaptation efforts. Today, Kazakhstan faces multiple overlapping threats: rising temperatures (UNDP, 2023; Ka-

zhydromet, 2024; World Bank, 2021), water scarcity (Earth.Org, 2023; UNDP, 2022; World Bank, 2022), biodiversity loss (UNDP, 2021), and public health risks (Oladejo et al.).

In this context, climate change is not only a scientific and policy issue (Poberezhskaya and Danilova, 2022) but also a matter of public communication and awareness (Chen and Liao, 2025). Media play a decisive role in shaping how societies perceive climate risks, frame their urgency, and connect them to everyday concerns (Stecula and Merkley, 2019). However, evidence suggests that ecological topics occupy

a marginal position in the Kazakh-language media landscape. A recent study showed that only 3.7% of Kazakh-speaking audiences identified ecological issues as an area of interest (Turdaqynqyzy, 2024). This communication gap highlights a pressing challenge: climate journalism must not only inform citizens but also engage their attention in ways that make climate change a visible and urgent national issue.

Against this backdrop, the present study investigates how climate change has been represented in Kazakhstani and American newspapers over the past decade. Specifically, it applies quantitative content analysis to compare *Egemen Qazaqstan* (Kazakhstan's leading Kazakh-language daily) and *The New York Times* (an internationally recognized U.S. outlet) between 2015 and 2025. These two newspapers were selected because they are both national, daily publications, but represent very different media environments. *The New York Times* frequently appears in climate-communication studies as a prominent source of environmental reporting (Boykoff and Boykoff, 2007; Schmidt et al., 2013; Painter, 2013). *Egemen Qazaqstan* is commonly used in scholarship as one of Kazakhstan's major national newspapers (Auyesbay, 2021; Slamgazhy et al., 2024; Kaliev and Ramazanova, 2018). Comparing them allows the study to measure the scale of climate coverage in Kazakhstan against a well-established international standard and to observe how different media systems communicate the climate crisis. By measuring the frequency of climate-related coverage across these two outlets, the study addresses a clear research gap: while Western media coverage of climate change has been extensively studied (Schäfer and Schlichting, 2014), systematic analyses of Kazakh-language journalism remain absent (Kumar, 2023). The findings are expected to provide both empirical data and comparative insights, situating Kazakhstani climate communication within a global context while highlighting the distinct features of its national media system.

Literature Review

Research on climate change and the media has grown extensively over the past two decades, especially in the Global North (Schäfer and Schlichting, 2014). Early U.S. scholarship revealed how journalistic practices shaped public perceptions of climate science (Boykoff and Boykoff, 2004; Antilla, 2005; McCright and Dunlap, 2000). Boykoff and Boykoff (2004, 2007) demonstrated that news-

papers often gave equal attention to skeptics and scientists, producing «balance as bias» that undermined communication of scientific consensus. In Europe, Carvalho (2007, 2010) showed that climate coverage frequently aligned with political agendas, highlighting how climate change functions not only as a scientific issue but also as a contested field of discourse. Comparative studies expanded this perspective: Schmidt, Ivanova, and Schäfer (2013) examined 27 countries and found sharp differences in coverage volume, while Schäfer and Schlichting (2014) confirmed that research has disproportionately focused on U.S. and European outlets. To provide systematic monitoring, Boykoff (2011) established the Media and Climate Change Observatory (MeCCO), which continues to track global coverage trends. More recently, Nossek and Katz (2024) demonstrated how Israeli media exhibited peaks in coverage around major UN summits, underscoring the link between political events and reporting frequency. These findings reveal the central role of quantitative content analysis in climate communication research, while also showing the field's heavy reliance on Western media sources.

Central Asia remains a significant gap in this scholarship, despite being one of the world's most climate-vulnerable regions. The area faces severe threats from glacier retreat, desertification, water scarcity, and extreme weather, yet systematic studies of media coverage are almost absent. Most existing research emphasizes state policy and elite discourse rather than journalism. Skalamera (2024), for example, analyzed adaptation strategies and found that regime stability and resource security often overshadow environmental priorities. Sabyrbekov et al. (2023) examined decarbonization pathways, concluding that dependence on fossil fuels continues to slow energy transitions. A smaller but growing body of work examines how climate change is framed discursively. Poberezhskaya (2021, 2022) showed that Kazakhstan presents itself as a climate leader internationally, while domestically framing climate issues through modernization and resource nationalism. Bychkova (2023) extended this analysis across Kazakhstan, Uzbekistan, and Kyrgyzstan, finding that political elites and institutional constraints heavily shape climate narratives. Collectively, these studies highlight the urgent need to examine how climate change is communicated within Central Asian media systems.

In Kazakhstan, domestic research on climate and communication is emerging but remains frag-

mented. Makhanov (2023) documented low levels of public awareness, while Oladejo et al. (2023) identified heightened health risks from heatwaves, respiratory illness, and pollution. Ecological studies have linked climate change to water insecurity (Kakabayev, 2023) and biodiversity decline, including impacts on saiga antelope populations (Nurushev et al., 2020). Media-focused scholarship reveals that environmental coverage is often shallow and inconsistent. Abdikappar (2024) found that reporting lacks depth and sustained attention, while Alimzhanova et al. (2025) argued that environmental journalism could advance sustainable development but is constrained by structural weaknesses in Kazakhstan's media system. Karimova (2018) noted that coverage still emphasizes legacy ecological crises, such as the Aral Sea and nuclear testing, rather than contemporary climate risks. *Egemen Qazaqstan*, the leading Kazakh-language newspaper, has been studied in broader contexts: Jurtbay's doctoral dissertation explored its ecological reporting, while Slamgazhy et al. (2024) analyzed its geopolitical narratives. Yet no study has conducted a quantitative, climate-focused content analysis of *Egemen Qazaqstan*. This absence is striking given Kazakhstan's climate vulnerability and the newspaper's central role in shaping national discourse. By systematically comparing *Egemen Qazaqstan* with *The New York Times* over the decade 2015–2025, the present study addresses this gap and situates Kazakhstani journalism within global climate communication research.

Materials and Methods

Research Design

This study applies quantitative content analysis (QCA), a systematic and replicable method for identifying patterns in large bodies of text (Neuendorf, 2017; Krippendorff, 2019). QCA is widely used in climate communication research, particularly to measure the frequency and salience of coverage (Boykoff & Boykoff, 2007; Schmidt et al., 2013; Schäfer et al., 2016). Its strength lies in producing empirical data that can reveal trends and facilitate cross-national comparison.

The study pursued four objectives:

1. To quantify the number of climate-related articles published in *Egemen Qazaqstan* and *The New York Times* (2015–2025).
2. To identify yearly frequency trends across both newspapers.

3. To compare overall reporting volume between the Kazakhstani and U.S. outlets.

4. To assess whether coverage grew more visible over time, reflecting global urgency.

From these objectives, the following research questions were formulated:

RQ1: How frequently did *Egemen Qazaqstan* and *The New York Times* publish climate-related articles between 2015 and 2025?

RQ2: What trends can be observed in yearly coverage volume?

RQ3: How do the two newspapers compare in reporting quantity?

Based on prior scholarship, three hypotheses were proposed:

H1: *The New York Times* published more climate-related articles than *Egemen Qazaqstan*.

H2: *The New York Times* coverage showed steady growth over time, reflecting sustained global attention.

H3: *Egemen Qazaqstan*'s coverage was lower and more irregular, with peaks around international events (e.g., COP summits, UN reports).

Data Collection

Before building the automated workflow, several digital options for data collection were tested. Initial Google searches with climate-related keywords in Kazakh and English showed that both newspapers had very large numbers of materials, making manual collection unrealistic. To handle this volume in a consistent and transparent way, we chose Python. It allowed the data to be collected automatically and handled both languages in the same way.

A Python-based web scraping workflow was developed to collect articles systematically. For *The New York Times*, the keywords «climate change» and «warming» were sufficient to capture relevant material. For *Egemen Qazaqstan*, initial searches with the same terms yielded limited results, prompting the use of a broader set of climate-related keywords: global warming, climate, drought, flood, hot summer, cold winter, severe storm, wildfire, smoke, air pollution, biodiversity, animal migration, clean water, climate summit, Paris Agreement, sustainable development and adaptation.

The script implemented three libraries:

1. Selenium – to automate browser navigation and dynamically load search results,
2. BeautifulSoup – to parse HTML structures and extract article details,

3. Pandas – to organize the data into tabular form and export it into Excel spreadsheets.

Articles were iteratively retrieved until all results for the period 2015–2025 were collected. The final dataset provides a reproducible corpus for cross-national analysis of climate journalism over a ten-year period.

This study contributes to climate communication scholarship in three ways. First, it expands the geographic scope by analyzing Central Asia, a region highly vulnerable to climate change but underrepresented in media studies. Second, it provides the first quantitative, climate-specific content analysis of *Egemen Qazaqstan*, thereby documenting climate reporting trends in Kazakhstan's leading Kazakh-language outlet. Third, by comparing *Egemen Qazaqstan* with *The New York Times*, it situates Kazakhstani journalism within global patterns, highlighting both parallels and divergences in how media systems communicate the climate crisis.

Findings and Discussion

Between 2015 and mid-2025, *Egemen Qazaqstan* published a total of 1843 climate-related articles, while *The New York Times* produced 63408 articles. This stark quantitative difference confirms H1, which anticipated that *The New York Times* would generate far more climate coverage than the Kazakhstani outlet. On average, *The New York Times* ran more than 6000 climate articles per year, compared to fewer than 200 per year in *Egemen Qazaqstan*. This contrast reflects not only differences in editorial priorities but also structural disparities in newsroom resources and audience scope.

The year-by-year data show both growth and fluctuation in coverage volume across the two outlets.

2015–2017: *Egemen Qazaqstan* began with modest numbers (31 in 2015; 58 in 2016; 93 in 2017), while *The New York Times* consistently published around 5600–5900 articles annually.

2018–2019: *Egemen Qazaqstan* coverage dipped to 73 in 2018, then doubled to 146 in 2019. *The New York Times* rose sharply in 2019 to 6933 articles, reflecting heightened global attention to climate protests and summits.

2020–2021: *Egemen Qazaqstan* output accelerated, reaching 245 in 2020 and 359 in 2021 – its highest level of the decade. These peaks align with climate-related national concerns and Kazakh-

stan's involvement in international negotiations. In contrast, *The New York Times* increased in 2020 (7023 articles) but showed an anomalous decline in 2021 (4095 articles). This dip likely reflects shifting editorial priorities during the COVID-19 pandemic.

Table 1 – Frequency of climate change coverage in Egemen Qazaqstan and The New York Times (2015–2025)

Year	<i>Egemen Qazaqstan</i>	<i>The New York Times</i>
2015	31 articles	5 897 articles
2016	58 articles	5 647 articles
2017	93 articles	5 699 articles
2018	73 articles	5 678 articles
2019	146 articles	6 933 articles
2020	245 articles	7 023 articles
2021	359 articles	4 095 articles
2022	172 articles	5 712 articles
2023	204 articles	6 467 articles
2024	383 articles	7 105 articles
2025 May	79 articles	3 152 articles
Total	1 843 articles	63 408 articles

2022–2023: *Egemen Qazaqstan*'s coverage fell to 172 in 2022 before recovering to 204 in 2023, indicating fluctuation rather than steady growth. *The New York Times*, however, rebounded strongly to 5712 in 2022 and 6467 in 2023, confirming its consistent long-term commitment to climate reporting.

2024–2025: *Egemen Qazaqstan* reached its maximum of 383 articles in 2024, more than twelve times its 2015 output. In early 2025 (January–May), it had 79 articles. *The New York Times* published 7,105 in 2024, its highest in the dataset, and 3152 in the first five months of 2025.

Overall, both outlets exhibited upward trajectories, though *Egemen Qazaqstan*'s pattern was more irregular and event-driven, while *The New York Times* showed a steadier baseline with occasional dips and rebounds. These results support H2 (coverage grew over time) and H3 (coverage volumes corresponded to international and national climate events).

In comparative perspective, *The New York Times* consistently outpaced *Egemen Qazaqstan* in volume, confirming its role as a global agenda-setter on climate issues. Even in *Egemen Qazaqstan*'s peak year (383 in 2024), output represented only about 5% of *The New York Times*' annual coverage. At the same time, *Egemen Qazaqstan* demonstrated remarkable growth from its low baseline, indicating that climate change gradually gained visibility in Kazakhstani media.

The findings thus show both convergence and divergence. Convergence is visible in 2024, when both outlets recorded their highest levels of coverage, reflecting the global salience of climate change. Divergence is reflected in scale and regularity: *The New York Times* produced a continuous high volume of climate journalism, while *Egemen Qazaqstan*'s reporting was intermittent, closely tied to extreme weather events and selected political developments.

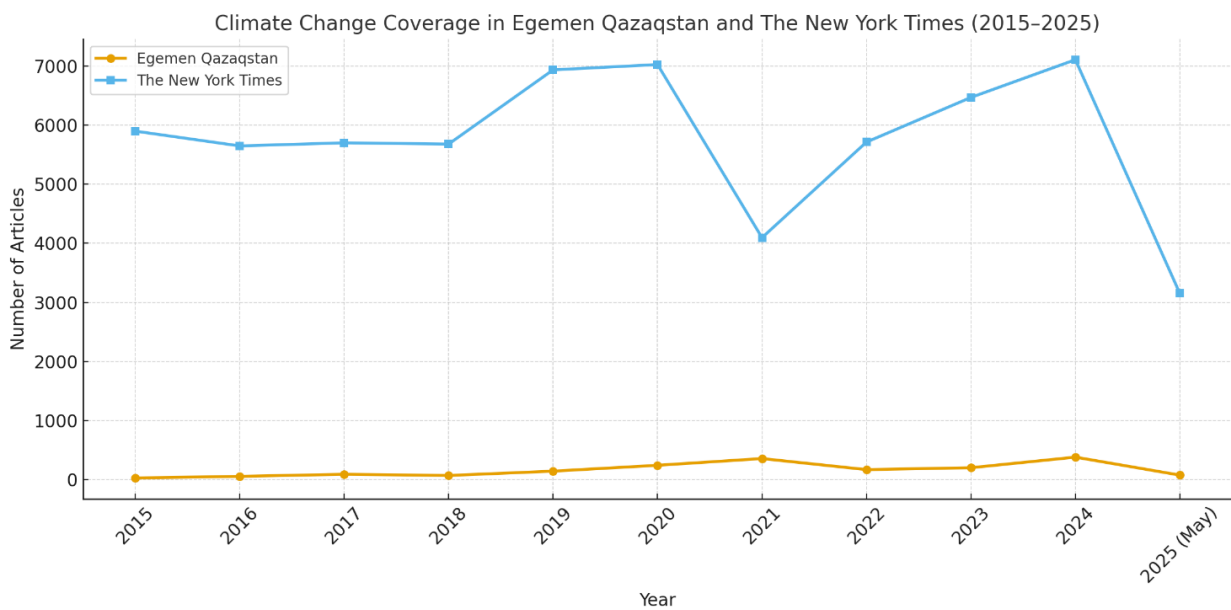


Figure 2 – Annual number of climate change articles published in Egemen Qazaqstan and The New York Times (2015–2025)

Although it may seem obvious that a global English-language outlet such as *The New York Times* would publish a higher volume of climate-related articles than *Egemen Qazaqstan*, the purpose of this study was not to restate a general assumption but to verify it empirically. The comparative analysis provides concrete numerical evidence over a ten-year period, showing how large the gap actually is, how it changed over time, and whether both newspapers followed similar or diverging trends. These findings establish a factual baseline that is essential for subsequent thematic and framing analyses.

Limitations

This analysis is subject to certain limitations. Keyword-based scraping may have included articles

that mentioned climate-related terms in passing, without being primarily about climate change. For *Egemen Qazaqstan*, broad terms such as *water* or *ecology* sometimes captured general environmental news or political activities, while for *The New York Times*, climate terms occasionally appeared in wider political or economic stories. In both cases, counts may slightly over- or under-estimate climate-specific reporting. Despite this, the comparative trends remain robust and provide valuable insight into how climate change has been covered in national versus international contexts.

Conclusion

This study set out to examine how two newspapers, *Egemen Qazaqstan* and *The New York Times*,

have communicated climate change over a ten-year period (2015–2025). By using quantitative content analysis to measure the frequency of climate-related coverage, it offered an empirical view of visibility, priority, and attention to climate issues in two very different media systems: one national and state-oriented, publishing in Kazakh for a primarily domestic audience; and one global, commercially driven, and widely studied in climate communication scholarship. The analysis confirms that climate journalism is not evenly distributed across countries and languages. Instead, it reflects structural, political, and economic conditions that shape what becomes “news,” how often it is repeated, and for whom.

First, the study finds a profound difference in volume. Over the period studied, *The New York Times* published 63,408 climate-related items, compared to 1,843 in *Egemen Qazaqstan*. This confirms H1. The difference is not marginal; it is systemic. *The New York Times* produced, on average, several thousand climate-related articles per year, while *Egemen Qazaqstan* typically produced fewer than a few hundred. Even in its strongest year (2024), *Egemen Qazaqstan* published 383 relevant articles – a major increase compared to its own early baseline in 2015, but still only a small fraction of *The New York Times*’ output in the same period. In other words, while climate coverage clearly exists in Kazakhstan’s leading Kazakh-language newspaper, it remains relatively scarce when evaluated against an international benchmark. This gap matters for public awareness in a high-risk region.

Second, despite the absolute difference in volume, both outlets show growth over time, which largely supports H2. Neither outlet treated climate change as a static or niche topic. Instead, climate change became more newsworthy across the decade. *Egemen Qazaqstan* increased its coverage more than twelvefold between 2015 and 2024, suggesting that climate issues have become more salient in Kazakhstani public discourse. This upward movement is meaningful: it shows that climate is not only “imported” as a topic from international agendas, but is gradually being internalized as a national concern. *The New York Times* also shows long-term growth and high baseline attention, despite fluctuations, including a notable dip in 2021. That dip likely reflects competing attention pressures during the COVID-19 pandemic, when health systems, vaccines, supply chains, and political management of crisis dominated news agendas. The broader trend, how-

ever, is that climate remains structurally present in *The New York Times*’ daily reporting, rather than episodic.

Third, the pattern of attention differs across the two outlets, which supports H3. *The New York Times*’ coverage is relatively continuous: climate is treated as an ongoing condition that affects politics, economy, energy, health, technology, law, migration, and international relations. Climate is not framed as a one-time emergency that appears and disappears. Instead, it is embedded into beats. This creates a steady stream of climate stories even in years without major summits or disasters. *Egemen Qazaqstan*, by contrast, shows a more irregular pattern. Peaks in coverage tend to correspond to visible events: heatwaves, water stress, environmental accidents, international climate negotiations, or domestic policy statements. This suggests a model of journalism that is reactive and event-driven. Climate change is often covered when it becomes immediately “relevant,” rather than as a constant structural force shaping agriculture, health, energy, and local livelihoods. That event-driven tendency aligns with previous findings in post-Soviet and Central Asian media, where environmental issues are often addressed through official statements, crisis moments, or developmental narratives rather than through continuous watchdog reporting.

These findings carry direct implications for Kazakhstan and for climate communication in Central Asia more broadly. Central Asia is one of the fastest-warming regions in the world. The temperature increases that exceed the global average and clear risks to water security, biodiversity, and public health. Kazakhstan in particular faces overlapping climate stressors: drought, reduced glacial meltwater, extreme heat, air pollution, and long-standing industrial contamination. Yet climate topics still occupy a relatively marginal space in Kazakh-language information diets, with only a small portion of the audience self-identifying ecology as an area of interest. In this setting, journalism is not just descriptive. It is infrastructural. It can either help build public literacy about climate risks and adaptation, or it can allow climate change to remain technically understood by experts but socially invisible to the broader population.

The results of this study indicate that Kazakh-language print journalism is moving, but not fast enough relative to the scale of the problem. *Egemen Qazaqstan* has already demonstrated capacity for growth in climate coverage, including a sharp

increase in 2024. That is a promising sign. But coverage is still lower, more episodic, and more dependent on agenda-setting moments than coverage in *The New York Times*. This matters because episodic reporting tends to treat climate as a series of isolated crises, rather than as evidence of an accelerating systemic transformation that requires planning, policy, and accountability. When climate is framed as exceptional rather than structural, the public may interpret it as temporary, local, or solvable with short-term fixes, instead of understanding it as a long-term reorganization of water, food, energy, infrastructure, and health systems.

For Kazakhstani media, one conclusion is practical: volume is not only a question of resources; it is also a question of newsroom routines. Climate will remain underreported if it is treated as a special topic that appears only when something “big” happens. It becomes visible and normal only when it is integrated into multiple beats. For example, energy stories can routinely include emissions and transition; agriculture stories can mention drought resilience; health stories can include heat stress and air quality; urban development stories can mention green infrastructure and water allocation. *The New York Times* model is not simply “publish more climate pieces.” It is “allow climate to enter many desks and story types,” which creates a constant informational baseline for readers. Translating that approach into the Kazakh-language media space would make climate change feel less abstract and more directly connected to everyday concerns such as food prices, electricity costs, workplace safety, and drinking water.

Another implication concerns trust and relevance. Surveys and previous studies suggest that environmental journalism in Kazakhstan sometimes struggles to connect with audience priorities because it emphasizes legacy ecological trauma (the Aral Sea, Semey nuclear testing) more than present-day, lived climate stress. That historical framing is understandable and emotionally powerful, but it can also unintentionally position environmental harm as something that happened “before independence,” rather than something unfolding now. More localized, practical, near-term climate reporting – for example, “How will heatwaves affect outdoor workers in Shymkent this summer?” or “What can small farmers do in a drought year when irrigation quotas are cut?” – could increase perceived relevance. It could also create demand for accountability, which

in turn can motivate editors to keep covering the issue.

This study also has methodological implications. The data were gathered using keyword-based automated scraping, which makes large-scale longitudinal comparison possible and reproducible. At the same time, this method has limitations. Keywords sometimes capture articles where climate terms are mentioned only briefly, and they sometimes miss relevant stories that use indirect language. This is especially true in Kazakh, where terminology for climate, ecology, environment, water stress, aridification, and adaptation can appear in varied forms and may overlap with political or economic narratives rather than scientific language. Future work will finalize the codebook with precise operational definitions and complete the coding, organizing content into three categories: media frames, sources, and topics: Which voices dominate (scientists, officials, foreign experts, local residents)? Which frames are most common (economic modernization, disaster response, moral responsibility, national image, public health, energy transition)? How are solutions described, if at all?

Finally, the findings point toward an agenda for future research and practice. From a research perspective, there is a clear need to extend analysis beyond a single Kazakh-language newspaper. Including other national outlets, regional press, online news portals, television, and social media channels would help map the full climate information environment in Kazakhstan. From a practice perspective, universities, environmental agencies, and newsrooms could collaborate to produce accessible climate backgrounders, data dashboards, explainer graphics, and training for reporters. Such partnerships could lower the cost of specialized reporting for understaffed newsrooms while improving accuracy and depth. In regions like Central Asia, where climate risks are immediate and adaptation is already a lived necessity, building this kind of public information infrastructure is not optional. It is part of climate resilience.

In summary, climate journalism in Kazakhstan is gaining visibility, but it is still uneven, reactive, and limited in scale. *The New York Times* demonstrates how high-frequency, integrated coverage can normalize climate as an urgent and permanent public issue. *Egemen Qazaqstan* shows that growth is possible, and is already happening, but also reveals how fragile that growth is when it depends on specific

events or political moments. Strengthening climate reporting in Kazakh is therefore not only a question of catching up to international media norms. It is a

question of public safety, democratic accountability, and informed adaptation in one of the world's fastest-warming regions.

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