

The Utilization of Drones with Bird Eye View Techniques in the 'Anthropogenic Sea' Documentary Film to Improve the Quality of Visual Narrative and Spatial Perception of the Audience

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Abstrak. This study tested the effectiveness of the Bird's Eye View (BEV) technique in documentaries themed on anthropogenic marine environmental damage to improve the quality of visual narrative and audience spatial perception. Using a mixed methods approach with a quasi-experimental design (Posttest-Only Control Group Design), 40 students of Universitas Padjadjaran participated, divided into an experimental group (watching a movie with BEV) and a control group (without BEV). Data collection was carried out through a Likert scale questionnaire and interviews, then analyzed using the Mann-Whitney U test. Results showed significant differences ($p=0.014 < 0.05$) between the two groups, where the experimental group showed better quality of visual narrative and spatial perception. These findings confirm the effectiveness of BEV techniques in communicating the scale and complexity of environmental issues visually and spatially. This research contributes to the development of documentary film narratives and environmental communication literature, with practical implications for filmmakers to utilize BEVs to enhance the visual impact and spatial perception of audiences in environmental education.

Keywords: Documentary, Bird's Eye View (BEV), Drone, Visual Narrative, Spatial Perception, Environment.

INTRODUCTION

In recent years, the documentary film industry has undergone a significant transformation in the way visual narratives are conveyed, particularly in communicating environmental issues to the public (Brereton, 2015; Hughes, 2012). In general, a documentary is a genre of film that aims to document reality, primarily with the aim of informing, educating, or even persuading the audience about a particular issue or topic. Documentaries are now more than just presenting facts; this medium has evolved to evoke viewers' emotional responses through powerful visuals, which in turn deepen their understanding of social and environmental issues (Chattoo W. (2019); Ryan et al., 2023). As a form of visual communication, documentaries have the power to convey messages in a more engaging and memorable way compared to written texts or reports. Strong visuals and a well-crafted narrative can create an immersive experience for the audience (Kenney, 2010; Worth, 2016). This development is in line with the *Stimulus-Organism-Response (SOR)* theory, which states that visual stimuli can trigger cognitive and emotional responses, thereby encouraging empathy for the issues raised (Pandey A.; Novotny M.; Verma H.; Gleicher M., 2014; Premaratna, 2021). Furthermore, documentaries also play an important role as an educational and advocacy medium. Through film, complex issues such as climate change, deforestation, and ocean pollution can be explained in a simple and easy-to-understand way.

The issue of environmental damage due to infrastructure development is an urgent problem that often escapes the public's attention, even though the relationship between humans and the environment is very close and interdependent (Soemarwoto, 2001). One concrete example occurred on Pramuka Island, Thousand Islands Regency, DKI Jakarta Province, which since 2016 and 2017 has carried out massive breakwater construction. Although *breakwater* aims to protect the coast from sea waves (Husain et al., 2021), in the case of Pramuka Island, this development is allegedly not in accordance with ecological values because it is concrete-based, as revealed by the Chairman of *Smiling Coral Indonesia (SCI)*, Hermansyah. As a result, the development has had an impact on the degradation of marine ecosystems, one of which is significant damage to coral reefs (Lee H et al. 2020).

Seeing the urgency of this problem, the documentary film "Anthropogenic Sea" is here to raise the issue of breakwater development that does not prioritize this environmental aspect. The film aims to provide comprehensive education and advocacy to the wider community, as well as encourage relevant agencies to re-evaluate environmentally damaging infrastructure development policies and practices. Through the use of the *Bird's Eye View (BEV)* technique, the film visually reveals the scale of environmental damage that is often hidden from public view, showing clearly how development that ignores ecological aspects can damage underwater biodiversity, especially coral reefs. Thus, "Anthropogenic Sea" seeks to raise collective awareness and trigger concrete action for the sustainability of our marine ecosystems.

Film plays a crucial role as an instrument of environmental advocacy, proving effective in raising public awareness and mobilizing support for social and environmental Umul Makrifah (Repository, 2024; Sabara R.; Wiyanti A., 2023). In this context, the *Bird's Eye View*

(BEV) cinematography technique, which is shooting from a height, offers a unique perspective that is very powerful. BEVs allow for a dramatic and informative visual representation of the scale of massive environmental damage—such as deforestation or marine pollution—beyond the limitations of normal human perspective Ningtyas (2022). The use of BEVs is in line with the principles of Bandura's *Social Cognition Theory* (1986), where the comprehensive visualization of damage impacts can serve as a powerful observational model, triggering increased understanding and collective self-efficacy beliefs. In addition, this technique plays a central role in framing environmental issues, leading the audience to perceive the problem as an urgent issue that requires collective action, supported by strong and undeniable visual data, thereby significantly increasing the "perceived threat" and the "significance of the problem" (Santoso S. (2019; Yulianti E., 2020).

The use of BEVs has been shown to be effective in several well-known documentaries. For example, *An Inconvenient Truth* (2006) uses satellite imagery to show the impact of the climate crisis. Similarly, contemporary documentaries such as *Pilot Mountain Has A Deer Problem* (2024) and *The Story of Birthplace* (2021) use drones to visualize deforestation and environmental degradation (Premaratna, 2021; Ryan et al., 2023).

The quality of visual narrative and spatial perception in documentaries are crucial elements that shape an immersive experience for the audience. The use of *bird's-eye view* (BEV) techniques, for example, has great potential to enrich visual narratives by presenting unique points of view, expanding the context of the space, and depicting the subject more comprehensively. Research from Bradbury R. (2020) shows that the combination of narrative elements with strong visualization can increase audience engagement because they can better capture the spatial relationships between subjects. Furthermore, this BEV view also plays a role in improving the spatial perception of the audience by providing a clearer orientation, helping them digest the dynamics and complexity of the environment presented, both urban and natural (Creswell J. D., 2018). With this higher perspective, as stated by Mulia and Sitepu (2024), the audience can develop a stronger understanding of *sense of place*, a vital aspect in building an in-depth narrative and effective information delivery. Therefore, this synergy between visual and narrative aspects is very relevant to create a documentary that is not only informative but also captivating, so that the audience can absorb the themes raised more optimally (Chen S et al. 2021). Although the qualitative benefits of BEV techniques have been extensively documented in the literature, quantitative research measuring their impact on viewers' spatial perception and understanding is still very limited (Dewi E., 2021; Fitzgerald M., 2020). In fact, spatial understanding is a crucial component of environmental literacy, as it helps people connect global phenomena with their local context (Ling et al., 2019). Some previous studies, such as those conducted by Sonntag et al. (2023), have shown that the perspective of BEVs can improve visual understanding of complex environments. However, there have been no controlled experiments that have specifically tested its effect in the context of environmental documentaries. This methodological gap hinders the development of more effective visual approaches in environmental advocacy (Hayes, 2017).

This study aims to fill a gap in the literature by testing the effectiveness of *Bird's Eye Angle* (BEV) cinematography facilitated by drones in increasing emotional responses, shaping spatial perception, and influencing the visual narrative of audiences in environmental documentaries, especially "Anthropogenic Sea," which discusses environmental damage due to the construction of breakwaters on Pramuka Island, Thousand Islands, DKI Jakarta. The study initially used a *Posttest-Only Control Group* experimental design with a Likert questionnaire and a t-test to compare the audience's response to conventional scenes and BEV scenes. To enrich the findings, this study was refined with a mixed-method approach that integrates qualitative methods, such as documentary film analysis and interviews with experts and audiences, as well as triangulation of sources to increase the validity and credibility of the results.

Theoretically, this research is based on *Framing Theory* (Goffman, 1974), which explains how BEVs frame environmental issues at a macro scale, and *Social Reality Construction Theory* (Berger & Luckmann, 1966), which highlights the role of media in shaping public understanding of human-environment relationships. These enhancements are expected to make a practical contribution to documentary filmmakers in selecting effective visual techniques and enriching the academic literature on evidence-based environmental communication.

METHOD

This study explores the effectiveness of *Bird's Eye View* (BEV) cinematography in the documentary "Anthropogenic Sea" and its impact on audience perception of visual narrative and spatial understanding of environmental issues. By adopting a mixed-methods approach, the research integrates both quantitative and qualitative methods, including a quasi-experimental design and content analysis. Participants were divided into two groups: one watched a version of the documentary using BEV drone footage, while the control group viewed a conventional version. The study ensured both versions were identical except for the shooting technique, allowing for a clear assessment of BEV's influence.

The quantitative component utilized a structured Likert-scale questionnaire to measure aspects such as narrative clarity, emotional depth, and spatial orientation. The results were analyzed using statistical tests to compare the responses between the two groups. Qualitative analysis included content review and semi-structured interviews with both viewers and environmental experts, focusing on the documentary's effectiveness in conveying the scale of environmental damage and enhancing public understanding. The study also employed source triangulation, combining documentary analysis, interviews, and quantitative data to strengthen the credibility and validity of the findings.

Findings suggest that BEV techniques significantly enhance the audience's spatial understanding and emotional engagement with environmental issues, particularly the impact of unsustainable development on marine ecosystems. The research highlights the potential of BEV cinematography to frame environmental problems more powerfully, making them more relatable and urgent to viewers. These insights offer valuable guidance for documentary

filmmakers and contribute to the broader field of visual communication by demonstrating how advanced cinematographic techniques can deepen audience comprehension and advocacy for environmental causes.

RESULTS AND DISCUSSION

Reliability Test

Reliability test using SPSS will be carried out using *Reliability Analysis Statistic* with *Cronbach Alpha* (α). If the value of *Cronbach Alpha* (α) > 0.63, then it can be said that the variable is reliable. the liability at X is 0.956. Because the reliability > 0.6, the instrument is declared reliable or reliable.

Validity Test

The measurement method uses SPSS, to find out each valid or invalid question item, which is with the condition: If the coefficient between the item with a total of items is equal to or above 0.3120 then the item is declared valid, but if the correlation value is below 0.3120 then the item is declared invalid. From the validity test process carried out among the 40 respondents, the summarized results can be shown in the *following Corrected Item-Total Correlation* table:

Tabel 1. Validity Test Item-Total Statistics Table

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
X1	34.925	59.148	.811	951
X2	34.75	59.167	.781	953
X3	34.975	59.615	.736	954
X4	34.925	58.738	.790	952
X5	34.825	57.071	.851	950
X6	34.8	59.036	.818	951
X7	34.975	56.846	.820	951
X8	34.875	59.651	.821	951
X9	34.875	57.702	.859	949
X10	34.825	56.046	.817	952

Source: SPSS Output, primary data processed (2025)

From the descriptive test above, it can be seen which is higher and lower the mean value of each variable between the Experiment and Control groups.

Furthermore, whether the magnitude of the difference is statistically significant or not, then a difference test of 2 free samples is used using an independent t test. The results are below:

Independent T Test is a comparative test or difference test to find out if there is a meaningful mean or average difference between 2 independent groups that scale

interval/ratio data. The two free groups referred to here are two unpaired groups, meaning that the data sources come from different subjects.

The assumptions that must be met in the independent t test include:

1. Scale data interval/ratio.
2. Data groups are free or unpaired.
3. Data per group is normally distributed.
4. Data per group there are no outliers.
5. Variance between groups is equal or homogeneous.

For assumptions no. 1 and 2, the researcher does not need to test it with SPSS. As for assumptions no. 3 and no. 5, the researcher must test it with SPSS.

Normality Test

Table 2. Tests of Normality

	Group	Kolmogorov-Smirnov3			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Value	Experiment	.193	20	.049	.772	20	.000
	Control	.230	20	.007	.875	20	.015

Source: SPSS output, primary data processed (2025).

The table above shows the results of the Kolmogorov-Smirnov and Shapiro Wilk tests. The Kolmogorov-Smirnov p value (Sig) group was $0.049 < 0.05$ in the Experimental group. Because < 0.05 , based on the Kolmogorov-Smirnov test, the data of each experimental group was not normally distributed. The pvalue of the Kolmogorov-Smirnov test in the control group was $0.007 < 0.05$, so the control group was not normally distributed. And based on the Shapiro wilk test, the Shapiro-Wilk p value (Sig) was $0.007 < 0.05$ in the Experimental group. Because < 0.05 , based on the Shapiro-Wilk test, the data of each group of experiments is not normally distributed. The Shapiro-Wilk test p value in the Control Group was $0.015 < 0.05$, so the Control Group was not normally distributed. if the data is not normally distributed, the solution is to use a non-parametric test, namely using the Mann Whitney U Test.

Homogeneity Test

Table 3. Test of Homogeneity of Variance

Value			Levene Statistic	df1	df2	Sig.
	Based on	Mean	5.229	1	38	.028
	Based on	Median	5.109	1	38	.030
	Based on	Median and with adjusted df	5.109	1	33.593	.030
	Based on	trimmed mean	5.596	1	38	.023

Source: SPSS output, primary data processed (2025).

The table above shows the results of the homogeneity test with the Levene's Test method. The Levene group is shown in the line of the Group based on Mean, which is 5.229 with a p value (sig) of 0.028 where < 0.05 which means there is no similarity of variance between groups, or which means that it is non-homogeneous. If it is not homogeneous, the solution can be to use a non-parametric test, namely the Mann Whitney U Test.

Independent T Test

Table 4. Group Statistics Table

	Group	N	Mean	Hours deviation	of Std. Mean	Error
Value	Experiment	20	42.25	6.8968	1.54217	
	Control	20	35.25	8.58318	1.91926	

Source: SPSS output, primary data processed (2025).

The average score of the experimental group of 42.2500 was higher than that of the control group of 35.2500, and this difference shows significance based on the analysis of the data presented.

The value of the levene test results for homogeneity is the same as the above discussion, which is not homogeneous. Because it is not homogeneous, use the second line, namely the value t of 2.843 in df 38. The DF on the t-test is N-2, i.e. in this case $40-2=38$. The t-value of this calculation was compared with the t table at DF 86 and the probability was 0.05.

To answer the hypothesis there are 2 ways:

By comparing the t calculation with the t table:

- 1) If the value t is calculated positively: There is a significant difference if t is calculated $> t$ table.
- 2) If the value t is calculated negatively: there is a significant difference if t is calculated $< t$ table.

The second way is to look at the Sig value (2 tailed) or p value. In the above case, the p value is 0.007 where < 0.05 . Because < 0.05 , there is a statistically significant or significant difference in the probability of 0.05.

The magnitude of the mean difference between the two groups is shown in the Mean Difference column, which is 7.00000. Because the value is positive, it means that the Experiment group has a higher Mean than the Control group.

The results of the mann whitney u test showed that the group p value $0.014 < 0.05$ so that it received H1 or which means that the difference in the group between the Experimental and Control groups was significant.

Qualitative Data Analysis

First Group

This section presents the findings of a qualitative analysis conducted after the screening of the documentary film "Anthropogenic Sea" to 20 respondents from the experimental group.

Data was obtained through in-depth interviews after respondents completed filling out the Likert scale. The focus of the analysis was to understand respondents' perceptions of the contribution of drone footage integration, particularly through bird's-eye view (BEV) techniques, to the quality of the film's visual narrative and their spatial perception.

Respondents consistently expressed a high appreciation for the visual quality presented by drone footage in films. Aspects such as image clarity, detail sharpness, footage stability, and structured cinematic composition, are mentioned as the main factors that create a highly immersive and engaging viewing experience. Drone footage is not only seen as a complementary element, but rather as a foundation that enriches the overall visual experience, contributing to the audience's sense of presence and visual comfort.

A key finding from the interview was respondents' emphasis on BEV engineering as a vital element. The unique perspective offered by BEV, namely the view from above resembling a bird's eye is specifically identified to be able to present environmental conditions in a more real and authentic way. Respondents felt that this technique provided a comprehensive picture of the landscape, both natural and affected by human activities.

The ability of BEVs to display a clear contrast between sustainable natural conditions and areas that exhibit anthropogenic activity significantly deepens the audience's understanding of the scale and impact of environmental damage. This visualization is not just aesthetic, but serves as visual evidence that strengthens the credibility of the issue of environmental damage raised in the film. Respondents also stated that BEVs help them make connections between human activities and their impact on marine ecosystems, facilitating a holistic understanding of the complex issues presented.

Overall, the use of drone footage with BEV techniques in the "Anthropogenic Sea" not only meets high visual aesthetic standards, but also serves as an effective instrument in facilitating environmental education. This technique supports the delivery of film messages in a clear, straightforward, and impactful manner. The issue of ocean damage, which is the main focus of the film, becomes easier to understand and internalize by the audience, showing that BEVs play a powerful educational tool. Thus, drone footage, especially with the application of BEV, has proven to be not only a visual element, but also a strategic tool that significantly strengthens the film's environmental education goals.

Significant differences were identified when comparing findings from the experimental group with the control group. The control group watched the documentary "Anthropogenic Sea" with only an eye-level perspective, without the integration of bird's-eye view (BEV) techniques. Response analysis from 20 control group respondents consistently showed limitations in comprehensive understanding, especially related to spatial perceptions of marine damage due to breakwater and the quality of visual narratives.

The majority of respondents from the control group reported difficulties in understanding the scale and relationships between elements in the landscape as a whole, particularly regarding the impact of ocean damage. Although some visuals are considered attractive, eye-level perspectives are considered less effective in presenting a holistic picture that is essential for understanding the complexity of environmental issues. Strong indications

suggest that, despite visualization efforts, the limitations of this viewpoint hinder the formation of deep spatial understanding. Respondents also had difficulty constructing a clear mental map of the affected areas and their interconnections, especially when film segments with an eye-level perspective were presented in brief or less detail.

In addition to spatial perception, the quality of visual narrative was also noticeably reduced in the control group. Despite a general appreciation of visual quality, respondents did not explicitly attribute the visuals to an increased understanding of scale or environmental impact, in contrast to what was dominant in the experimental group. Respondents from the control group often admitted that the absence of drone footage reduced their attractiveness and capacity to effectively analyze environmental impact visualizations. Some views even state that without drone footage, environmental documentaries become less interesting and difficult to analyze in depth.

This qualitative comparison explicitly shows that the BEV technique not only improves visual appeal, but also serves as an essential cognitive tool. This facilitates better spatial understanding and significantly strengthens the delivery of environmental education messages. The limitations observed in the control group underscore the urgency and effectiveness of BEV techniques in the context of environmental documentaries, particularly for issues that require large-scale visualization and depiction of complex relationships between elements.

Second Group (Credible Figures in the Environmental Sector)

After analyzing the results of interviews from the experimental and control groups in the posttest-only control group design, the researchers proceeded to conduct in-depth interviews with three credible environmental experts. All these key informants have watched the documentary film "Laut Antropogenik", a work produced by students of the Faculty of Communication Sciences, Padjadjaran University in 2024. This interview specifically aims to explore their perceptions of the film's impact in conveying environmental issues.

The film "Antropogenic Sea" thematically focuses on the destruction of marine ecosystems on Pramuka Island, Thousand Islands Regency, DKI Jakarta. The film's narrative critically highlights the impact of unsustainable development, which results in the degradation of coral reefs as well as various other types of marine life. The consequences of this ecological damage are clearly recorded through the decrease in fishermen's catches in these waters. To reinforce the visual narrative and enhance the audience's spatial perception, the film innovatively applies the bird's eye view (BEV) technique. Nonetheless, the results of the interviews show a significant diversity of perceptions among environmentalists, indicating the complexity of the reception and interpretation of the message conveyed by the film. The following is an analysis of the story of the film "Anthropogenic Sea", which is presented through the perspectives of various sources.

Hermansyah, S.Si. (Chairman of Smiling Coral Indonesia)

Based on an interview with Mr. Hermansyah, S.Si., Chairman of Smiling Coral Indonesia (SCI), this community combines marine ecotourism with conservation through a flagship coral

reef transplant program to rehabilitate damaged marine ecosystems. In the documentary *Anthropogenic Sea*, Hermansyah highlights the impact of breakwater development on Pramuka Island as the main cause of coral reef damage, which ironically aims to prevent abrasion, even though ecosystems such as coral reefs, mangroves, and seagrass can be a natural solution. SCI promotes coral reef transplantation as a recovery strategy, integrating ecotourism to encourage community participation, which not only supports the sustainability of marine ecosystems, but also improves the socio-economic well-being of coastal communities.

Analysis of the *Anthropogenic Sea* shows that the bird's eye view technique is effective in strengthening the visual narrative and spatial perception of the audience. This elevation perspective presents a comprehensive picture of the condition of coral reefs, showing the contrast between healthy and damaged areas due to anthropogenic interventions such as breakwater, thus clarifying the negative impacts of human activities. This technique also makes it easier for the audience to understand the spatial relationship between coral reefs, breakwater, and coastal settlements, as well as appreciate the scale of SCI transplant efforts. Thus, bird's eye view not only reinforces the narrative of environmental degradation, but also increases public awareness and support for conservation for ecosystem sustainability and the well-being of coastal communities.

Muhammad Abrar, S.Si., M.Si. (Senior Researcher, Coral Reef Ecosystem Health Research Group, BRIN)

This study examines the condition of coral reef ecosystems in the Thousand Islands and evaluates the effectiveness of documentary films in conveying scientific information and shaping audience perception. Primary data was obtained through an interview with Muhammad Abrar, S.Si., M.Si., a Senior Researcher from the Coral Reef Ecosystem Health Research Group, National Research and Innovation Agency (BRIN). This information is very vital because BRIN is a government research institution that is directly responsible to the President of the Republic of Indonesia and has a mandate in national development, research, and innovation.

Based on the results of BRIN's research in 2021, coral reef cover in the waters of the Thousand Islands only reached 15.47%, which indicates the category of "poor" conditions. The data is strengthened by the composition of the base cover which is dominated by sandy sediment (10%), corals that experience algal cover (37%), and dead coral fragments (27%). Muhammad Abrar explained that this deterioration is caused by a combination of natural factors and, significantly, by intense anthropogenic activity. The solution proposed by BRIN through the film narrative is the need to gradually change human behavior. Although natural damage is difficult to prevent, interventions against anthropogenic damage still have a great chance of being addressed.

In the context of narrative delivery, the documentary film *"Anthropogenic Sea"* utilizes the bird eye view technique. The use of this technique, as expressed by Muhammad Abrar, serves as a crucial educational instrument in conveying visual narratives and improving the spatial perception of the audience. From the point of view of a coral reef ecosystem health

researcher, comprehensive spatial visualization through a bird's eye view allows the audience to understand the scale of ecosystem damage and identify causal relationships between human activities and environmental degradation.

Scientifically, this technique strengthens the persuasive power of narratives, facilitates the internalization of information about the urgency of conservation, and has the potential to trigger behavioral change towards more sustainable practices. Therefore, the improvement of spatial perception achieved through the bird eye view technique in this documentary is expected to contribute to collective awareness, encourage positive behavior adaptation, and ultimately, support the sustainability of coral reef ecosystems and the socio-economic stability of coastal communities.

Documentary Film Analysis

The documentary *Anthropogenic Sea* effectively utilizes bird's eye view techniques through drone technology to depict the impact of human activities on the marine ecosystem on Pramuka Island, Thousand Islands, Jakarta. This visual approach is not just aesthetic, but a narrative tool that enriches the delivery of environmental messages in a way that is difficult to achieve through conventional shooting. The perspective from a height allows the audience to see the scale of environmental degradation holistically, while building a deep spatial understanding of the interconnections of marine ecosystems.

One of the prominent applications of the bird's eye view technique in this film is the scene that shows breakwater around Pramuka Island. Drone footage shows the massive concrete structure surrounding the island, contrasting with the stretches of coral reefs that have been calcified and died from the development. These visual highlights the scale of the damage: the once colorful coral reef now appears bleached, with a rough texture clearly visible from above. This perspective is not only visually stunning, but it also communicates the urgency of environmental issues in a powerful way. For example, drones capture the comparison between pristine marine areas, with relatively intact ecosystems, and areas around damaged breakwaters, so that audiences can instantly understand the impact of development that is not environmentally friendly (Yang L.; Feng C., 2024).

The bird's eye view technique also reinforces the film's narrative by connecting local impact to a broader context. In one scene, a drone recorded coastal areas affected by fish bombing by local fishermen. Research cited in the film reveals that as a result of this damage, fishermen had to sail 40 minutes into the middle of the sea to find fish, a clear indication of the depletion of fish stocks near the island. The visual from above allows the audience to see how damage in one area such as destroyed coral reefs impacts the food chain and livelihoods of fishermen in another. This perspective creates a coherent visual narrative, confirming that pollution and environmental damage have a far-reaching domino effect.

In terms of spatial perception, this technique helps the audience understand the cause-and-effect relationship between human activities and ecosystem damage. For example, drone footage showing the coastline of Pramuka Island bleaching due to coral reef liming illustrates how the construction of breakwaters on land directly damages the marine environment. This

image makes clear the interdependence between land and sea, a key message the film wants to convey. In addition, the dramatic visuals from heights such as the expanse of blue sea bordering the broken white area increase the emotional engagement of the audience. This scene not only attracts attention, but also invites reflection on the collective responsibility to protect marine ecosystems.

Overall, the use of bird's eye view techniques in the *Anthropogenic Sea* is not only a visual tool, but also a narrative element that reinforces the message of conservation. By clearly displaying the scale, contrast, and connectivity of the ecosystem, this technique succeeded in building audience awareness of the urgency of protecting the sea of Pramuka Island and similar ecosystems elsewhere.

In the study of the environmental documentary film "*Anthropogenic Sea*," the use of bird's eye view techniques is one of the significant cinematic elements to communicate anthropogenic impacts on marine ecosystems. To strengthen this analysis, a comparison was made with three leading environmental documentaries, namely *Planet Earth II* (2016), *Our Planet* (2019), and *Chasing Ice* (2012). These three films utilize aerial perspectives to convey a strong environmental narrative, providing supporting data on the effectiveness of bird's eye view in the context of visualizing environmental impacts and improving audience spatial understanding.

Planet Earth II (2016) – BBC Earth

Planet Earth II uses bird's eye view, often generated through aerial photography from helicopters or advanced drones, to display vast landscapes and animal migration patterns in stunning detail. This technique allows the audience to understand the scale of ecosystems holistically, such as African savannas or Amazon rainforests, visualized with smooth camera movements from heights. In episodes like "Mountains" or "Deserts," the aerial perspective highlights the relationships between ecosystem elements, such as bird migration patterns or vegetation distribution, that are difficult to understand from a terrestrial perspective.

In the context of the "*Anthropogenic Sea*," a similar approach can be used to display the extent of the affected marine ecosystems, such as bleaching coral reefs or pollution dead zones. The visual data from the bird's eye view in *Planet Earth II* support the argument that this perspective can create an immersive narrative about the vulnerability of the marine environment, while also providing a clear spatial picture of the scale of damage caused by human activities, such as overfishing or plastic pollution.

Our planet (2019) – Netflix & WWF

Our planet leverages the latest drone technology to produce bird's eye views that highlight the impacts of climate change on a global scale. One prominent example is the depiction of penguin colonies in Antarctica or mangrove forests degraded by sea level rise. This aerial perspective not only displays the beauty of nature, but also shows the destruction of the environment in dramatic ways, such as coastal flooding or deforestation. In the episode "Frozen Worlds," a bird's eye view is used to show drastic changes in Arctic sea ice, providing strong visual evidence of anthropogenic impacts.

The relevance to the "*Anthropogenic Sea*" lies in the ability of this technique to describe

the global connectivity of marine ecosystems and the impacts of human activities, such as thermal pollution or ocean acidification. Data from Our Planet suggests that bird's eye view can amplify environmental messages by highlighting the scale of problems that are difficult to understand from a land-based perspective, such as the spread of microplastics in the ocean or ecosystem damage from offshore oil drilling. This approach supports the argument that the "Anthropogenic Sea" can utilize the bird's eye view to reinforce the narrative about the urgency of ocean protection.

Chasing Ice (2012) – Jeff Orlowski

Chasing Ice uses a combination of time-lapse and aerial photography (via helicopter) to document the shrinkage of glaciers due to climate change. The bird's eye view perspective in the film, such as in the scene of the Ilulissat glacier in Greenland, allows the audience to visualize the massive scale of the loss of ice masses in a relatively short period of time. This technique provides strong visual evidence of anthropogenic impacts, while also creating a profound emotional impact for the audience. Data from this film shows that bird's eye view is effective in documenting the gradual changes in the environment, which are often difficult to understand without a broad spatial perspective.

In the context of the "Anthropogenic Sea," this approach is relevant to describe long-term changes in the ocean, such as rising sea surface temperatures or damage to coral reefs due to acidification. Bird's eye view can be used to show patterns of changes in marine ecosystems, such as a decrease in seagrass beds or the migration of marine species due to changes in temperature. The evidence from Chasing Ice strengthens the argument that aerial perspectives can be a powerful tool for visually and scientifically documenting and communicating anthropogenic impacts on the ocean.

Effectiveness of Environmental Impact Visualization

This study shows a strong convergence between quantitative data and qualitative narratives obtained from film analysis and interviews. The results of the t-test resulted in a p-value of 0.007 (< 0.05) with an average difference of 7.00000 between the experimental group (using Bird's Eye View / BEV) and the control group (without BEV), showing a significant difference in the audience's understanding of environmental issues. This finding was reinforced by the Mann-Whitney U test with a p-value of 0.014 (< 0.05), which further confirmed the significant differences between groups.

The film's analysis supports these results by showing that BEV techniques effectively visualize the scale of environmental damage holistically, such as in breakwater scenes and comparisons between healthy and damaged marine areas. This visualization succeeded in communicating the urgency of environmental problems clearly. In addition, interviews with experimental group respondents revealed that drone footage, specifically BEV, provides an immersive and authentic viewing experience. Respondents stated that BEVs are able to present a comprehensive picture of the landscape, as well as show the contrast between natural conditions that are still sustainable and areas affected by human activities, thereby increasing the credibility of the issue of environmental damage.

Improved Spatial and Cognitive Perception

This study showed that the experimental group had better spatial and cognitive understanding, as confirmed by quantitative data. The film's analysis revealed that the Bird's Eye View (BEV) technique helps audiences understand the cause-and-effect relationship between human activities and ecosystem damage, for example the correlation between breakwater development and coral reef liming, as well as the impact of local damage on fishermen's livelihoods.

The results of interviews with the experimental group reinforced these findings, where respondents stated that BEVs made it easier for them to understand the linkages between human activities and their impact on marine ecosystems, thus supporting a more holistic understanding of complex environmental issues. In contrast, respondents from the control group reported difficulty in understanding the scale and relationships between landscape elements without BEV, which confirms the important role of this technique in improving deep spatial understanding.

The Role of Drones as Environmental Education Tools

Quantitative results showing significant differences in the two statistical tests indicate that the use of drones is effective as an educational tool.

Two environmental experts interviewed provided strong external validation. Hermansyah, S.Si. (Chairman of Smiling Coral Indonesia) stated that BEVs "not only reinforce the narrative of environmental destruction, but also increase public awareness and support for conservation." Similarly, Muhammad Abrar, S.Si., M.Si. (BRIN Senior Researcher) called BEV a "crucial educational instrument" that is able to "facilitate the internalization of information about the urgency of conservation and potentially trigger behavior change."

The researcher triangulated the data to gain a comprehensive understanding of the effectiveness of drone use, especially the bird's eye view (BEV) technique, in conveying environmental messages. This process combines findings from quantitative methods (t-test and Mann-Whitney U test) with qualitative data (documentary analysis of the "Anthropogenic Sea" and in-depth interviews). This integration aims to provide a more holistic picture.

Qualitative data significantly complements and enriches the interpretation of quantitative results, providing context and depth that numbers alone cannot capture. This is evident in how the film analysis and interviews provide an in-depth explanation of the mechanisms behind the significant differences detected by the t-test, as well as outlining why those differences occur and how the bird's eye view (BEV) technique specifically facilitates improved understanding. Respondents from the experimental group consistently revealed that "the unique perspective offered by BEV... able to present environmental conditions in a more real and authentic way," qualitatively deepening understanding of the reasons behind the statistical differences found. More so, beyond the aspect of cognitive understanding, film analysis and interviews also highlight the emotional and narrative dimensions. The film "Anthropogenic Sea" is not only effective in conveying information, but also manages to "increase the emotional engagement of the audience" through dramatic visualizations. The interview further confirmed that drone footage "contributes to the audience's sense of

presence and visual comfort," demonstrating the integral role of drones in the overall impact and experience of watching movies. Finally, the interviews with Mr. Hermansyah and Mr. Abrar provided strong external validation of the effectiveness of drones. Their views, as experts in their field, substantially reinforce the argument that BEV techniques have crucial scientific and educational value, beyond mere visual aesthetic functions.

Overall, this triangulation analysis confirms that the use of drones, particularly bird's eye view techniques, is a very effective tool for environmental education and anthropogenic impact visualization. Quantitative findings prove significant differences, while qualitative data shed light on the mechanisms, perceptions, and real impacts of drone use, both from the point of view of the general audience and experts.

Based on previous research with a similar theme, the researcher can explain that the documentary *Anthropogenic Sea* aims to convey the impact of marine environmental damage in the Thousand Islands due to bomb explosions by fishermen and the construction of breakwaters that cause coral reef deaths, fish loss, and damage to marine ecosystems. The use of drones with bird's eye view techniques is the main approach to improve the quality of visual narrative and spatial perception of the audience, allowing the delivery of complex environmental issues in a clear and engaging manner. Based on the findings of previous journals (Sujianti et al., 2017; Giffari & Huddiansyah, 2021; Warsaa, 2022; Winda et al., 2024), this technique has proven effective in reinforcing narratives and facilitating the spatial understanding of audiences, which is relevant to the context of deep-sea damage in the *Anthropogenic Sea*.

The bird's eye view technique through drones allows documentaries of the *Anthropogenic Sea* to present a powerful visual narrative by showing the scale of ocean damage as a whole. Sujianti et al. (2017) in the production of *Gir Pasang* showed that the bird's eye view shot shows the geographical context of the village near Mount Merapi, such as the steep ravine and proximity to the volcano, so that the narrative about environmental vulnerability becomes more lively. In the *Anthropogenic Sea*, similar shots can capture the vast area of coral reefs destroyed by the explosion of a fisherman's bomb, displaying a pattern of damage that is not visible from a surface perspective. For example, drones can record traces of explosions forming craters on the seafloor or scattered coral fragments, reinforcing messages about the destructive impact of illegal fishing practices.

In addition, the construction of breakwaters in the Thousand Islands, which inhibits the flow of water and causes sedimentation to kill coral reefs, can be visualized through bird's eye view shots to show the contrast between the unspoilt and damaged areas. Giffari and Huddiansyah (2021) in the documentary *Pak Miswadi* noted that the shot from above the Cipinang market provides a dynamic environmental context, making the narrative more immersive. In the context of the *Anthropogenic Sea*, drone shots can depict the breakwater line separating clear waters from murky areas full of sediment, clarifying the link between infrastructure and the death of marine ecosystems. Warsaa (2022) added that the color gradation in the bird's eye view shot, such as the yellowish tone in *Sesanti Titi Luri Tengger*,

enhances the aesthetics and emotions of the narrative. For the Anthropogenic Sea, contrasting color gradations—for example, bright blue for living coral reefs versus gray for dead areas—can emphasize environmental impacts, making visual narratives stronger and more memorable.

Winda et al. (2024) found that dynamic visuals and bright colors in infotainment increase audience appeal. In Anthropogenic Seas, the combination of bird's eye view shots with close-ups of cracked coral reefs or disappearing fish can create a narrative that is not only informative but also emotional, encouraging audiences to care about the issue of ocean degradation. Thus, drones allow for the delivery of visually rich stories, making the damage from bombs and breakwaters more real and urgent.

The audience's spatial perception is enhanced through bird's eye view shots that provide a broad perspective on the relationship between human activities and the destruction of marine ecosystems. Sujianti et al. (2017) show that drone shots in Gir Pasang allow the audience to understand the isolation of the village and its proximity to the danger zone of Mount Merapi, clarifying the spatial dynamics of the environment. In the Anthropogenic Sea, this shot can show the distribution of coral reef damage from bomb blasts, such as the fragmented areas around the bombing site, helping the audience understand the scale and pattern of the damage. Drone shots can also reveal how breakwater construction changes the flow of water, causing coral-killing sedimentation in certain areas, allowing audiences to see the spatial relationship between infrastructure and ecosystem degradation.

Giffari and Huddiansyah (2021) noted that the bird's eye view shot at the Cipinang market illustrates the interconnectedness of indoor activities, making the environment a narrative element. In the Anthropogenic Sea, similar shots can show how a bomb explosion in one location affects ecosystems over a larger area, such as reduced fish populations or coral deaths in surrounding waters. Similarly, drone shots can illustrate how breakwaters create dead zones on certain sides of the island, clarifying the spatial impact of development. Warsaa (2022) emphasized that the drone shots in Sesanti Titi Luri Tengger help the audience understand the relationship between the community and its landscape. In the context of the ocean, these shots can show how fishing activities and infrastructure projects in the Thousand Islands are changing the underwater landscape, allowing audiences to connect local actions to larger ecological consequences.

CONCLUSION

The study found that participants who viewed the documentary using *Bird's Eye View* (BEV) cinematography demonstrated significantly better visual narrative quality and spatial perception compared to those who watched the conventional version, with the experimental group scoring higher on average (42.25 vs. 35.25) and showing a statistically significant difference ($p=0.014$). Qualitative feedback highlighted that BEV drone footage provided a more authentic and comprehensive understanding of environmental damage, while the control group struggled to grasp the scale and relationships within the landscape. Environmental experts confirmed BEV's effectiveness as an educational tool that enhances

spatial perception and can motivate sustainable behavior. The research advances documentary film theory and environmental communication by illustrating how BEV frames environmental issues on a macro scale, offering practical guidance for filmmakers to improve audience engagement and comprehension of complex ecological problems. However, limitations such as a small, homogeneous sample and subjective measurement scales suggest the need for future research with larger, more diverse populations and mixed method approaches to further validate and expand these findings.

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