

Perception and Satisfaction of Fishermen toward BMKG's Weather Literacy and Equipment Information Poster for Maritime Safety in SurabayaRatna Cintya Dewi¹, Lusiana Indahsari², Natasya Nuzulfana Rahmadhani³¹Badan Meteorologi Klimatologi dan Geofisika, Surabaya, Indonesia²Universitas Negeri Surabaya, Surabaya, Indonesia³Universitas Negeri Surabaya, Surabaya, Indonesia*Corresponding Author:* ratna.dewi@bmkgo.id**Submission:** 24 December 2025**Revision:** 28 December 2025**Accepted:** 30 December 2025**Abstract**

This study aims to analyze fishermen's perceptions and satisfaction toward educational posters on weather literacy and marine observation equipment provided by BMKG to support sailing safety. A descriptive quantitative approach was employed using a satisfaction questionnaire distributed to fishermen and coastal communities. The data were analyzed using descriptive statistics in the form of percentages and frequency distributions. The results show that all assessment indicators were dominated by agree and strongly agree responses, indicating a high level of acceptance of the poster. The poster was considered effective in delivering weather information, explaining the function of marine observation equipment, and increasing fishermen's awareness of the importance of protecting these instruments. Overall, the findings demonstrate that educational posters are an effective communication medium for improving fishermen's weather literacy.

Keywords: Weather Literacy; Fishermen Perception; Educational Poster; Marine Observation; Sailing Safety

Abstrak

Penelitian ini bertujuan untuk menganalisis persepsi dan tingkat kepuasan nelayan terhadap media poster literasi cuaca dan informasi peralatan observasi maritim BMKG sebagai upaya mendukung keselamatan pelayaran. Penelitian menggunakan pendekatan kuantitatif deskriptif dengan pengumpulan data melalui angket kepuasan yang diberikan kepada nelayan dan masyarakat pesisir. Data dianalisis menggunakan statistik deskriptif dalam bentuk persentase dan distribusi frekuensi. Hasil penelitian menunjukkan bahwa seluruh indikator penilaian didominasi oleh respons setuju dan sangat setuju, yang menandakan tingkat penerimaan poster yang sangat baik. Poster dinilai efektif dalam menyampaikan informasi cuaca dan peralatan observasi maritim serta meningkatkan kesadaran nelayan terhadap pentingnya menjaga peralatan tersebut. Secara keseluruhan, poster terbukti menjadi media komunikasi yang efektif untuk meningkatkan literasi cuaca nelayan.

Kata Kunci: Literasi Cuaca; Persepsi Nelayan; Poster Edukatif; Observasi Maritim; Keselamatan Pelayaran

INTRODUCTION

As an archipelagic nation, Indonesia has a high dependency on traditional fishing and navigation activities to support national food security and the livelihoods of coastal communities. The small-scale capture fisheries sector serves as the backbone of most coastal populations in Indonesia, making fishermen's maritime safety a critical aspect that cannot be overlooked.¹ Wirasatriya et al. explained that small-scale fishermen in Indonesia still rely heavily on empirical experience and local knowledge when determining the timing and routes of their fishing activities.² Such dependency has become increasingly risky due to climate change, which intensifies the variability of weather and sea conditions, leading directly to greater risks of accidents and economic losses at sea.

Under increasingly unpredictable weather conditions, maritime safety can no longer rely solely on seafaring skills. Subardjo and Wirasatriya emphasized that understanding maritime weather information is a key factor in making safe navigation decisions.³ The uncertainty of wind patterns, wave heights, and ocean currents demands an improvement in weather literacy so that fishermen can interpret risks and adapt their sailing activities accordingly.⁴ Therefore, weather literacy is an essential component of disaster risk mitigation efforts related to hydrometeorological hazards in Indonesia's coastal areas.

Several studies have shown that the level of weather literacy among Indonesian fishermen remains relatively low. Subardjo et al. found that most fishermen do not fully understand maritime weather parameters, such as significant wave height, wind direction and speed, or the meaning of early warnings for extreme weather.⁵ Nugroho et al. highlighted that this situation reflects a gap between the availability of maritime weather information provided by the Meteorology, Climatology, and Geophysics Agency (BMKG) and fishermen's ability to interpret and utilize such information as a basis for decision-making at sea. Ramadhan et al. further noted that the limited use of weather information is also influenced by the technical terminology employed and the information delivery media, which are not always aligned with the characteristics of traditional fishermen.⁶

Beyond information literacy, the presence of BMKG's maritime observation instruments—such as buoys, weather radars, and tide gauges—plays a strategic role in providing accurate data for maritime safety and coastal disaster mitigation. Subardjo and Wirasatriya emphasized that the reliability of weather forecasts and early warning systems strongly depends on

1 Food and Agriculture Organization of the United Nations, "The State of World Fisheries and Aquaculture" (Rome: FAO, 2018).

2 Agus Wirasatriya, Denny Nugroho Sugianto, and Pranowo Subardjo, "Climate Variability and Its Impact on Small-Scale Fisheries in Indonesian Waters," *Marine Policy* 132 (2021), <https://doi.org/10.1016/j.marpol.2021.104684>.

3 Pranowo Subardjo and Agus Wirasatriya, "Peran Informasi Cuaca Laut Dalam Keselamatan Pelayaran Nelayan Di Perairan Indonesia," *Jurnal Kelautan Tropis* 23, no. 1 (2020): 45–54.

4 World Meteorological Organization, "Guide to Marine Meteorological Services" (Geneva: WMO, 2019).

5 Pranowo Subardjo, Agus Wirasatriya, and Dimas Nugroho, "Literasi Cuaca Maritim Nelayan Tradisional Dan Implikasinya Terhadap Keselamatan Pelayaran," *Jurnal Ilmu Dan Teknologi Kelautan Tropis* 14, no. 1 (2022): 67–78.

6 Rizky Ramadhan, Pranowo Subardjo, and Agus Wirasatriya, "Pemanfaatan Informasi Cuaca Maritim Oleh Nelayan Tradisional Di Indonesia," *Jurnal Meteorologi Dan Geofisika* 22, no. 2 (2021): 85–96.

the continuous operation of these observational instruments.⁷ However, Prasetyo and Handayani found that low public understanding of the functions and benefits of BMKG's instruments has led to weak community ownership of these facilities.⁸ This condition has triggered various field issues, including equipment damage, vandalism, misuse of buoys as fish-netting spots, and theft of components for economic purposes—all of which ultimately reduce the quality of maritime weather observation data.⁹

To enhance weather literacy and coastal community awareness of the importance of maintaining BMKG's observation equipment, selecting an appropriate educational medium is crucial. An effective educational medium must be tailored to the social, cultural, and educational characteristics of traditional fishermen.¹⁰ Sari et al. stated that educational posters are effective tools for disseminating information to coastal communities because they are visual, concise, and easy to understand.¹¹ Visual media can simplify technical information into more communicative and contextually relevant messages for non-academic audiences.¹²

Although various educational programs, such as the *Sekolah Lapangan Cuaca Nelayan* (SLCN, or Fishermen's Weather Field School), have been implemented and proven to improve fishermen's understanding of maritime weather, previous studies have largely focused on increasing knowledge or comprehension. Research specifically identifying and analyzing fishermen's perceptions and satisfaction levels regarding educational posters that integrate weather literacy and information on BMKG's observation equipment remains scarce in the Indonesian context. Based on the authors' review of national literature, no empirical study has yet evaluated this aspect from the user's perspective as the primary target of the medium. Therefore, this study aims to analyze fishermen's perceptions and satisfaction levels toward BMKG's weather literacy and equipment information posters as an effort to enhance the maritime safety of traditional fishermen in Indonesia.

Method

This study employed a descriptive quantitative research design aimed at illustrating fishermen's perceptions and satisfaction levels toward the BMKG weather literacy and equipment information poster. The descriptive quantitative approach was chosen to portray phenomena based on numerical data without manipulating the research variables.¹³ The primary data were obtained directly from fishermen as respondents. Respondents were selected using a purposive sampling technique, which involved choosing participants who met specific criteria relevant to the research objectives, including being active traditional boat fishermen, residing within the coastal

7 Subardjo and Wirasatriya, "Peran Informasi Cuaca Laut Dalam Keselamatan Pelayaran Nelayan Di Perairan Indonesia."

8 Yudi Prasetyo and Rina Handayani, "Persepsi Masyarakat Pesisir Terhadap Keberadaan Alat Observasi Cuaca Maritim BMKG," *Jurnal Kebencanaan Indonesia* 13, no. 2 (2022): 155–66.

9 Klimatologi Badan Meteorologi dan Geofisika, "Informasi Cuaca Maritim Indonesia" (Jakarta: BMKG, 2023), <https://www.bmkg.go.id>.

10 UNESCO, *ICT Competency Framework for Teachers*, 2020.

11 Dian Puspita Sari, Lestari Rahmawati, and Andi Putra, "Efektivitas Media Poster Sebagai Sarana Edukasi Kebencanaan Di Wilayah Pesisir," *Jurnal Pendidikan Geografi* 25, no. 1 (2020): 45–54.

12 Richard E Mayer, *The Cambridge Handbook of Multimedia Learning*, 2nd ed. (Cambridge: Cambridge University Press, 2014).

13 Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, Dan RD*, Cet. ke 23 (Bandung: Penerbit Alfabeta, 2016).

area of the study site, and having received or viewed the developed educational poster.¹⁴ The number of respondents was adjusted according to fishermen availability and the fulfillment of inclusion criteria.

The research instrument consisted of a four-point Likert scale questionnaire designed to measure the respondents' levels of agreement with given statements. The Likert scale was chosen because of its effectiveness in assessing attitudes, perceptions, and satisfaction levels toward a specific medium or object.¹⁵ The questionnaire covered aspects such as information clarity, ease of understanding, visual appearance, usefulness, and relevance of the content to maritime safety. It was written in simple, easily understood language and underwent content validation by educational experts and marine practitioners to ensure the clarity and appropriateness of the items.¹⁶ Data were collected through direct distribution of questionnaires to fishermen, accompanied by brief explanations about the study's purpose and the completion procedure to minimize misunderstanding among respondents. Questionnaires were completed independently or with researcher assistance if reading or comprehension difficulties arose.

Data were analyzed using descriptive quantitative analysis, including the calculation of mean scores, percentages, and frequency distributions for each measured aspect. The results were categorized into four satisfaction levels—very satisfied, satisfied, moderately satisfied, and less satisfied—to facilitate interpretation. The analyzed data were presented in tables and charts to provide a clear overview of fishermen's perceptions and satisfaction toward the poster. These findings formed the basis for drawing conclusions regarding the acceptability and potential application of the poster as a supporting tool for enhancing the maritime safety of traditional fishermen in Indonesia.

RESULTS AND DISCUSSION

Fishermen's Satisfaction Survey

The results of the satisfaction survey showed that the BMKG weather literacy and equipment information poster received an overwhelmingly positive response from fishermen and coastal communities. Most respondents selected *agree* or *strongly agree* for all assessment indicators, while none expressed *strong disagreement*. This demonstrates a high level of acceptance of the poster as an educational medium for maritime weather information. The consistent agreement across indicators indicates that fishermen found the poster clear, relevant, and easy to understand. These findings reinforce previous studies emphasizing the need for accessible communication tools to bridge the gap between meteorological expertise and traditional fishing practices, which remain central to community livelihoods and national food security.

A summary of the fishermen's satisfaction survey results is presented in Table 1. The table shows that all indicators received positive feedback, with "agree" and "strongly agree" dominating responses across all categories. The indicators cover aspects such as clarity of information, understanding of equipment functions, usefulness, visual attractiveness, and relevance to maritime

14 John W Creswell and Cheryl N Poth, *Qualitative Inquiry and Research Design: Choosing among Five Approaches* (Sage publications, 2016).

15 Harry N Boone and Deborah A Boone, "Analyzing Likert Data," *Journal of Extension* 50, no. 2 (2012): 1–5.

16 Saifuddin Azwar, *Reliabilitas Dan Validitas* (Yogyakarta: Pustaka Pelajar, 2015).

safety. These results confirm that the poster's content and structure were well-received, aligning with the principles of participatory and visual-based education recommended by UNESCO.¹⁷

Table 1. Fishermen's Satisfaction Survey

No.	Assessment Aspect	Strongly Agree	Agree	Disagree	Strongly Disagree
1	The poster clearly and easily explains information about BMKG's marine instruments.	12	12	0	0
2	The functions of HF radar, buoy, and tsunami detection devices are easy to understand.	10	14	0	0
3	The information presented in the poster is useful for fishermen and coastal communities.	14	10	0	0
4	The poster increases my understanding of the importance of protecting BMKG's observation equipment.	14	10	0	0
5	The illustrations provided in the poster are attractive and make the content easier to understand.	13	11	0	0
6	The explanations about INA-WIS and WOFI through the QR Code are easy to recognize and understand.	12	11	1	0
7	The information in the wind and wave risk matrix is easy to understand.	14	10	0	0
8	The poster helps me realize the importance of checking BMKG information before going to sea.	13	11	0	0
9	The information about wind and wave risk is useful and applicable to fishing activities.	10	14	0	0
10	The poster design is attractive and supports effective information delivery.	13	11	0	0

Source: from Author

In terms of content clarity, respondents strongly agreed that the poster effectively explained BMKG's marine observation instruments, including HF radar, buoys, and tsunami detection devices. The use of simple explanations accompanied by intuitive visuals allowed fishermen to easily understand the purpose and operation of these tools. This indicates that technical concepts can be successfully simplified through visual communication media. According to Mayer, combining text and imagery enhances knowledge transfer among non-expert audiences.¹⁸ Therefore, the poster functioned as an efficient science communication medium that translated technical meteorological concepts into messages understandable to traditional fishermen with limited formal education.

17 UNESCO, "Education for Sustainable Development: A Roadmap" (Paris: UNESCO Publishing, 2020).

18 Mayer, *The Cambridge Handbook of Multimedia Learning*.

The positive responses also demonstrate that contextual and culturally adapted visual design significantly improved comprehension. The use of imagery familiar to fishermen—boats, waves, and coastal environments—helped them relate directly to the message. This finding aligns with WMO (2019), which emphasizes that localized visual media are essential for promoting weather literacy in coastal regions with limited access to formal meteorological training.¹⁹ The ability of respondents to understand risk matrix tables and wave indicators also reflects improved awareness of practical applications in daily sailing decisions. Thus, the poster effectively built connections between local experience and scientific understanding.

Another significant finding relates to fishermen’s perception of the poster’s usefulness. Most respondents recognized that the poster provided valuable information applicable to their maritime activities. The ability to connect weather information with safety decisions—such as determining safe sailing times or avoiding high-risk areas—illustrates how visual education can transform abstract data into practical knowledge. This finding echoes Nugroho et al., who noted that fishermen often face challenges interpreting BMKG data.²⁰ By simplifying the information, the poster helped bridge this gap and empowered fishermen to make informed, safety-oriented decisions based on reliable meteorological data.

Furthermore, the poster successfully increased fishermen’s awareness of the importance of maintaining BMKG’s observation instruments. Respondents agreed that understanding how these devices contribute to safety made them more likely to respect and protect the equipment. Prasetyo and Handayani found that community awareness is a key factor in preventing vandalism and misuse of meteorological instruments.²¹ Thus, by fostering a sense of shared responsibility, the poster not only improved individual literacy but also supported collective action in preserving observation tools that are vital for maritime safety. To further illustrate the distribution of satisfaction levels and facilitate visual interpretation, the data from Table 1 were visualized in Figure 1.

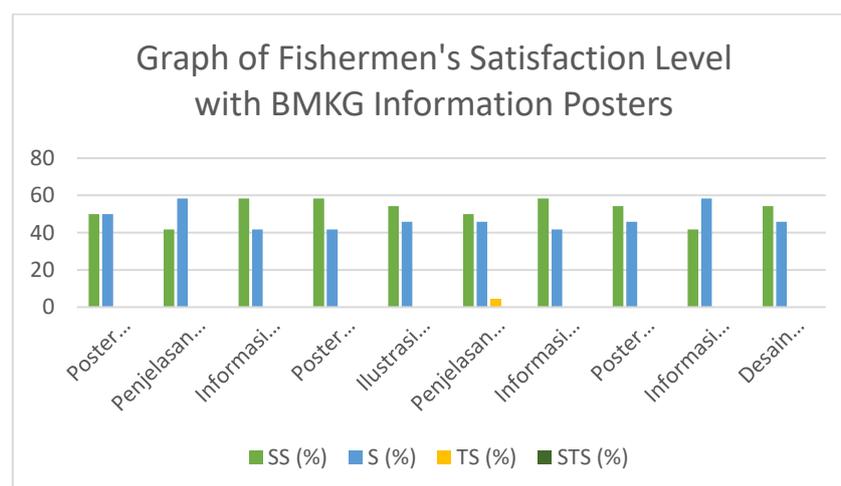


Figure 1. Fishermen’s Satisfaction Levels toward BMKG Educational Poster

Source: by Author

19 World Meteorological Organization, “Multi-Hazard Early Warning Systems: A Checklist” (Geneva: WMO, 2018).

20 Dimas Nugroho, Pranowo Subardjo, and Agus Wirasatriya, “Kesenjangan Pemanfaatan Informasi Cuaca Maritim Oleh Nelayan Skala Kecil Di Indonesia,” *Jurnal Sains Meteorologi* 8, no. 2 (2023): 101–12.

21 Prasetyo and Handayani, “Persepsi Masyarakat Pesisir Terhadap Keberadaan Alat Observasi Cuaca Maritim BMKG.”

Overall, the results indicate that fishermen perceived the BMKG educational poster as clear, credible, and highly relevant to their maritime activities. The poster effectively bridged the communication gap between scientific institutions and local fishing communities by presenting information in a format aligned with their needs and literacy levels. These findings affirm Subardjo and Wirasatriya's conclusion that improving access to comprehensible weather information is crucial for enhancing maritime safety.²² Consequently, the poster can be regarded as a model of effective public science communication designed for traditional fishermen in Indonesia's coastal regions.

Satisfaction with Visual Design and Practical Utility

The visual design of the BMKG educational poster played a central role in shaping fishermen's satisfaction and comprehension. Respondents consistently rated the poster as attractive, informative, and easy to interpret. The layout, color contrast, and font size were considered suitable for users with diverse literacy levels. The clear structure and logical flow of information made it easier for readers to follow key messages. The combination of visuals and short, simple text increased engagement and helped fishermen understand complex ideas more intuitively. Overall, the design elements supported clarity and encouraged users to absorb and retain information more effectively.

Fishermen appreciated that the poster used familiar imagery related to their daily experiences, such as boats, waves, and fishing tools. This visual familiarity helped them connect directly with the content and made the information feel relevant to their real-world activities. The illustrations captured common maritime situations and demonstrated the relationship between weather conditions and safety at sea. Respondents found that these visuals made the message easier to remember compared to text-only explanations.²³ The visual storytelling approach also made the learning experience more enjoyable, transforming the poster into an engaging tool rather than just an informational display.

In terms of practical use, respondents viewed the poster as a helpful reference for preparing before sailing. It provided simple guidance on interpreting wind and wave risks, reading early warning symbols, and checking weather updates through BMKG's channels. The poster's information was concise yet sufficient for decision-making, allowing fishermen to apply it directly in their daily activities. Many respondents stated that they had become more aware of the importance of checking weather information prior to departure. This suggests that the poster did not only deliver information but also encouraged positive behavioral change toward safer maritime practices.²⁴

Respondents also recognized that the poster improved their understanding of how BMKG's observation equipment works. By learning the functions of tools such as HF radar,

22 Subardjo and Wirasatriya, "Peran Informasi Cuaca Laut Dalam Keselamatan Pelayaran Nelayan Di Perairan Indonesia."

23 Chervin Lam, Zhongwei Huang, and Liang Shen, "Infographics and the Elaboration Likelihood Model (ELM): Differences between Visual and Textual Health Messages," *Journal of Health Communication* 27, no. 10 (October 3, 2022): 737–45, <https://doi.org/10.1080/10810730.2022.2157909>.

24 Susanne Stoll-Kleemann, "Feasible Options for Behavior Change Toward More Effective Ocean Literacy: A Systematic Review," *Frontiers in Marine Science* 6 (May 28, 2019), <https://doi.org/10.3389/fmars.2019.00273>.

buoys, and tsunami detectors, fishermen began to value these instruments as essential components of maritime safety. The poster helped them understand that such devices contribute directly to weather forecasting and early warning systems. This sense of awareness is important because it fosters respect and a shared responsibility among fishermen to protect public observation facilities.²⁵ As a result, the poster contributed to building both individual knowledge and collective awareness within the coastal community.

The overall layout and balance between visuals and text were also highly appreciated. Respondents stated that the use of bright ocean-related colors and clear section headings made the poster easy to read. Each section flowed logically from one topic to another, allowing fishermen to follow the information without confusion. The visual consistency helped maintain focus and prevented information overload. The combination of diagrams, symbols, and short explanations proved especially effective for users with limited reading ability.²⁶ In general, the poster's aesthetic appeal contributed to higher satisfaction and better understanding among the respondents.

Despite the positive feedback, a few respondents reported minor difficulties in using the QR code feature included on the poster. Some fishermen were unfamiliar with scanning codes or using smartphones to access digital information. This shows that while integrating technology is a positive step, it must be accompanied by guidance or community training. The digital element has strong potential for future development, but accessibility remains a challenge for certain user groups.²⁷ Improving digital literacy would allow all fishermen to fully benefit from online information linked through the poster.

Another important observation was that the poster made fishermen feel more confident in interpreting weather information. Many respondents said that after reading the poster, they could better assess sea conditions and make safer sailing decisions. They also became more consistent in checking BMKG forecasts before setting out to sea. This shift indicates that the poster successfully strengthened both awareness and practical application. It provided not only knowledge but also motivation for fishermen to take proactive steps in ensuring their own safety. Such behavioral outcomes demonstrate the poster's real educational impact.

Overall, the BMKG educational poster was perceived as a well-designed, relevant, and practical communication tool. It combined visual appeal, simplicity, and meaningful content to effectively reach its intended audience. Fishermen found it easy to read, useful for daily decisions, and aligned with their way of understanding information. The poster's success shows that visual-based educational media can enhance comprehension, awareness, and safety practices within coastal communities. With continued refinement—especially in improving digital accessibility—the poster can serve as a model for effective communication in other maritime literacy programs.

25 Sarah A. Ebel et al., "The Power of Participation: Challenges and Opportunities for Facilitating Trust in Cooperative Fisheries Research in the Maine Lobster Fishery," *Marine Policy* 90 (April 2018): 47–54, <https://doi.org/10.1016/j.marpol.2018.01.007>.

26 Julianne M Coleman, Erin M McTigue, and John A Dantzler, "What Makes a Diagram Easy or Hard?: The Impact of Diagram Design on Fourth-Grade Students' Comprehension of Science Texts," *The Elementary School Journal* 119, no. 1 (August 2, 2018): 122–51, <https://doi.org/10.1086/698819>.

27 Mukta Kulkarni, "Digital Accessibility: Challenges and Opportunities," *IIMB Management Review* 31, no. 1 (March 2019): 91–98, <https://doi.org/10.1016/j.iimb.2018.05.009>.

CONCLUSION

This research contributes to the development of effective communication strategies for maritime education in Indonesia. By integrating weather literacy with information about BMKG observation equipment, the poster bridges the gap between scientific institutions and coastal communities. The study provides evidence that visual, context-based media can enhance comprehension and awareness among users with diverse educational backgrounds. It also highlights the importance of participatory, culturally relevant approaches in disseminating scientific information. The findings offer valuable insights for policymakers, educators, and meteorological agencies in designing public outreach materials that are both educational and engaging for coastal populations.

Future studies are recommended to explore broader implementation of similar educational media across different coastal regions and user groups. Additional attention should be given to digital accessibility, particularly for fishermen who face technological barriers in accessing online meteorological information. Combining posters with interactive training or community workshops could further enhance learning outcomes and encourage consistent use of BMKG data for navigation decisions. Researchers are also encouraged to assess the long-term behavioral impact of such educational interventions on maritime safety practices. Strengthening collaboration between BMKG, local governments, and fishing communities will be essential for sustaining and expanding the success of this initiative.

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