

## The Role of Communication in Developing Environmental Awareness and Concern for Environmental Issues

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### Abstract

Communication is a very critical field of study in today's society as environmental challenges increase globally, the effect of communication on the development of environmental awareness and increasing public attention to environmental issues in society is becoming central to study especially in light of increasing environmental challenges. This paper examines how various communication tactics can create environmental literacy, raise awareness, promote concern for environmental issues, and encourage participation in sustainable actions to address environmental problems. We analysed the existing communication theories and conducted empirical studies through surveys and experiments. According to the findings, digital platforms, including the internet, social media and others, reach out to the greatest numbers of users (65 per cent more users engaged by 2023 than 2021), while traditional media such as television and print drew in percentages of declining by 52 per cent and 60 per cent, respectively. Together, these results reinforce the importance of using modern approaches to communication to cover diverse audience groups. More and more people were using digital communication, which led to a significant drop in the same in traditional media like television and print. With these findings, relevant data must be duly taken into account to think of digital strategies that involve different audiences and promote sustainable behaviour. Our findings provide insight into the most effective communication approaches for promoting environmental awareness and addressing environmental issues. It has practical significance for developing more effective education strategies and encouraging public participation. This research presents practical recommendations for environmental programs and media campaigns, outlining tailored communication approaches.

### Keywords

Agricultural animals; Hunting animals; Breeding; Genetics; Ecology in agriculture

## Introduction

Environmental issues are becoming more pressing nowadays, requiring collective efforts and a shift in societal thinking to reduce pollution levels, preserve biodiversity, and combat climate change. Effective communication is crucial in raising environmental awareness and addressing these problems. The process of raising awareness relies on several critical factors, including communication as an educational tool, conscious consumption of information, stimulating discussions and exchanging opinions, engaging target audiences, and enhancing environmental literacy. Information exchange plays a crucial role in shaping opinions and attitudes in today's information society. Raising public awareness as well as engaging the people themselves are all made easier by communication. Modern media (traditional as well as social networks) allows transparent information sharing that leads to sustainable behaviour and better decision-making.

Media and social networks play a significant role in communicating environmental issues. Through social media, for instance, the sharing of knowledge on environmental matters is now more engaging. Various social networks also provide an ongoing flow of ideas and insights sharing and actively engage the public, as individuals are free to directly support various environmental initiatives (Antonopoulos *et al.*, 2019; Bramwell-Lalor *et al.*, 2020; Chung *et al.*, 2020; Christensen and Nilsson, 2018; Harris, 2017, 2018; Lester, 2015; Waititu, 2021; William, 2022). This digital engagement is further differentiated from traditional media, which, if useful in delivering large-scale messages, does not complement the formation of constructive environmental awareness with the latter more participative dimensions deemed essential in the process.

Environmental challenges in today's world are taking up many vessels of environmentalists, demanding not only countrywide effort but also local effort. It is imperative to raise environmental awareness in Ukraine, because of the acute problems in their environmental areas, for example, industrial regions and air pollution; poor waste and natural resources (Shevchenko *et al.*, 2021). For instance, the State Statistical Service of Ukraine reports that the rate of waste recycling is still very low and aggravates an environmental crisis. In this environment, effective communication is a key intervention to increase public perception of environmental challenges and prepare society to act. Growing attention to environmental issues has increased, but most Ukrainians know too little and don't actively participate in resolving them. While most of the research in this field addresses global or specific case studies only and fails to meet local needs and the peculiarities of communication in the Ukrainian context, it does not. Especially, there is little research on how modern digital platforms, including social media, can draw in varying social groups including youth, rural communities and vulnerable people to environmentally responsible behaviour (Vyhovskiy, Vyhovska and Vyhovskiy, 2019; William, 2022). In addition, cultural and socio-economic factors are shown to shape public attitudes about environmental issues largely in Ukraine (Christensen and Nilsson, 2018; Dziubenko and Andreieva, 2022), and therefore communication strategies need to reflect specific audiences.

In light of the above research gaps, the purpose of this research is to examine the influence of communication on the establishment of environmental awareness, as well as direct viewer attention to a range of environmental issues in Ukraine. Gaps in

knowledge about the effectiveness of various communication strategies across different social and economic conditionalities are addressed, particularly. For example, this study looks at which types of messages and what kinds of sources of information result in which demographic groups are more aware of the hazards. The study also tries to provide practical guidelines for the development of targeted educational programs, media campaigns, and other activities in striving for environmental literacy and, thereby, involving citizens' efforts toward solving environmental problems. These recommendations fill gaps in current knowledge and contribute to socio-economically sustainable development in Ukraine.

### Literature Review

Shkolnik and Iholkin (2020), and Bukanov (2020) suggest an initial analysis of tools and conditions for enhancing pro-environmental behaviour and point out the relevance of taking into account cultural backgrounds and social policies for promoting pro-environmental behaviour. Specifically, this is important on the ground in Ukraine, whose industrial heritage and socio-economic disparities present unique challenges. According to Batsurovska and Hruban (2023), the socio-economic costs of the degradation of the environment in Ukraine are important and must be overcome by sustainable policy orientations, which help us to solve the various problems with pollution, wasting raw materials and management of wastes. Among the recent studies, education, social aspects and civil society are shown to enhance environmental education. According to Anatska (2018) and Vyhovskyi, Vyhovska and Vyhovskyi (2019), the tailored educational curricula have to be enriched with a certain level of environmental literacy in places like Ukraine starting to develop in this sphere. We show that social factors, like community engagement and peer pressure, are powerful motivation factors for sustainable behaviour (Bida *et al.*, 2021; Dziundziuk and Yefimov, 2020; Patlaichuk, Stupak and Zholobenko, 2021). Identifying successful cases of mobilization of public action to environmental issues in the Ukrainian context, Byrkovych, Palamarchuk and Byrkovych (2022), and Dziubenko and Andreieva (2022) look at cases of grassroots civil society initiatives through youth environmental movements and local community projects.

Along with technological advancements, there exists a very important aspect of environmental education. Anwar *et al.* (2019) and Mliless *et al.* (2024) demonstrate how early childhood education with digital tools can better enrol pupils in sustainability awareness. In Ukraine, where access to modern resources and education is not equal across regions for Ukrainians, innovations in augmented reality and Web 2.0 tools may well bring great benefits (Açikgöl Firat and Köksal, 2019; Ducasse, 2019). Such tools, according to Geng and He (2021), enhance public satisfaction with environmental governance which is a crucial element of trust and the formation of citizen participation in Ukrainian society.

In comparison, participatory learning techniques and interactive technologies are found to have the potential to increase environmental awareness. For instance, Prandi *et al.* (2021) challenge the use of interactive infographics during teacher training, whereas Torabi *et al.* (2022) suggest participatory methods such as the jigsaw technique to promote environmental values. These approaches could make an enormous difference in

the integration of environmental topics in teachers' teaching in Ukraine, where teachers' training programs are often underfunded. Varela-Candamio *et al.* (2018) and Yarovenko and Ploshchenko (2023) strengthen this argument as case evidence of increasing workplace sustainability programs, all the more so that Ukraine is modernizing its industries and becoming aligned with European environmental standards. Raising environmental awareness also poses plenty of opportunities through entertainment media. As per the opinion of Larreina-Morales and Gunella (2023), it is a recipient of environmental education. As is the case in Ukraine, where the involvement of youth is particularly high in digital engagement, and where gamified approaches and social media campaigns have a particularly good potential, digital engagement may be enhanced by the stimulation of environmental responsibility (Christensen and Nilsson, 2018). Specifically, Bhanye and Maisiri (2023) suggest that digital media is crucial for fashioning corruption in the public sphere as a communal responsibility towards the environment, a defining about-face in Ukraine's public mobilization.

Making a localized approach to environmental challenges in Ukraine this review underscores a strong need. While global insights are valuable frameworks, these insights are culturally and socioeconomically unique to Ukraine and thus require local communication strategies. Critical steps toward developing an environmentally conscious Ukraine include developing education programs, implementing digital tools and includes leveraging civil society engagement.

## Methodology

This research utilizes both the qualitative and quantitative methods of data collection to analyze the effects of communication on environmental awareness. The subsequent segments highlight the sampling approach, data acquisition techniques, and methods of maintaining dependability and credibility.

### *Sampling Process*

This finds out how these communication sources affect the environmental awareness of people. Over 3 years (from 2021 to 2023), we surveyed 1,143 people. Participants were drawn from five key sectors: Ministries, campuses, companies, government agencies, hospitals and clinics, and the general public. The sample was once fractionated so they would reflect a diversity among demographic divisions. Age groups were 18–25 years, 26–35 years, 36–45 years, 46–55 years, and >55 years, while education was secondary to postgraduate. Education, healthcare, information technology, finance and public service sectors were covered by the occupations. From this comprehensive approach, the findings used several perspectives which reflected diverse points of view, giving the study credibility and generalizability.

### *Evaluation and Participant Selection*

Participants were selected based on clear inclusion criteria: Previous involvement in eco-initiatives and expressed motivation to globally participate in sustainability-focused discussion; residency in Ukraine, both in urban and rural areas. We recruited both online

and through direct outreach with environmental groups and community groups to minimize selection bias.

To ensure that people participated, respondents filled out a background questionnaire, describing the environment they were involved with (Appendix 1). Among the 1,143 participants, 60% reported having regular exposure to environmental campaigns or media, and 40% worked in a general audience whose level of familiarity with environmental things does vary. It included the more informed ones and the less so, with a humble base on which to begin analysis. As a starting point for applying our project in the future, this study acknowledges that certain limitations of online recruitment may mean that those who aren't using the site will have an advantage over those who aren't digitally literate, with access to the internet. These findings need to be integrated with offline methods of data collection such as local community events or printed outreach to improve the representativeness of the findings.

#### *Data Collection*

Data collection was done over three years (2021-2023) to capture trends within the identified themes. This paper adopted an online questionnaire, follow-up face-to-face interviews, and video conferencing to allow participants across geographical centres and limitations like COVID-19. The surveys consisted of closed-ended questions as well as Likert-scale items to examine participants' choice of environmental information, how often they consume the information, and the extent to which participants believed communication influenced their environmental consciousness.

Apart from surveys, 10 interviews with purposefully selected professionals in the field of environmental communication, media and education were conducted. These people were chosen in terms of their profession, experience period, and their participation in environmental activities. The interview questions ranged from 10-20 per participant and the whole interview lasted from 45 minutes to one hour. This qualitative component offered critical findings of the approaches adopted by professionals in communication to improve environmental understanding among the public.

This study contains both quantitative data from surveys and qualitative data from expert interviews but adds weight towards qualitative analysis to further understand the context surrounding the findings. Quantitative data can tell us a lot about trends in environmental awareness, but it's not the best approach to delve into the complexity of individual perspectives and the subtle nature of what drives behaviour. The interviews with the experts were therefore carefully analyzed to identify underlying themes and contextual insights about what may not emerge in the survey data alone. Thus, by integrating these qualitative findings, the study attempts to provide a more comprehensive analysis of the complex layered factors which influence environmental awareness. The combination of the two gives a richer discussion and alleviates the chance that a reliance on quantitative data will overtake differing views.

#### *Data Management and Quality Assurance*

To establish the quantitative credibility, statistical analysis was run in SPSS (version 26) to look for patterns and correlations between environmental awareness and

communication strategies. Preference for information sources was explored using cohort comparisons over three years (2021–2023). For example, the analysis found that internet-based information consumption increased by 65 per cent compared to traditional media. The depth and reliability of these findings were buttressed by these statistical results. Thematic analysis of data collected from the expert interviews using NVivo 12. The process involved several key steps: Repetitively reading and transcribing the data, (1) familiarization with data, (2) solving codes of data segments that matter to communication strategies and environmental awareness, (3) finding patterns and themes in codes, (4) review and refine the themes, and (5) finalizing defining and labelling the final themes to bring out significant insights. It also brought forth important properties of existing environmental communication strategies, such as the leading role of social media and digital media in environmental awareness, and they served as the basis for the study's recommendations. Through a combination of quantitative and qualitative methods, the study complemented validity with transparency and ensured an understanding of the effect of communication strategies on environmental awareness.

#### *Reliability and Validity*

To increase credibility, an isomorphic approach to data collection and analysis was upheld throughout the study. Data was collected through self-completion questionnaires and interviews were conducted by professional Interviewers using structured questionnaires. Validity was maintained by following the triangulation technique that integrated survey results with analyzer interviews to consider the findings. In addition, to reduce selection bias, the survey instrument was pre-tested among a pilot sample just before the actual data collection phase aimed at finding out potential sources of measurement biases in the questions.

This comprehensive sampling method, participant identification, data gathering and data analysis strengthens the methodological framework of our study, which forms the foundation for assessing the efficacy of communication in promoting environmentalism.

## **Results**

Environmental problems are becoming increasingly acute and their resolution is becoming more urgent for humanity. Reducing pollution, preserving biodiversity, and combating climate change requires collective efforts and a change in society's thinking. Effective communication is one of the key factors contributing to the formation of environmental awareness and drawing attention to environmental issues. Drawing attention to environmental problems, as a result of forming environmental consciousness, is based on leading aspects such as communication as a tool of enlightenment, conscious consumption of information, stimulating discussions and exchange of opinions, engaging target audiences, as well as education and increasing ecological literacy (Figure 1).

#### *Communication as a tool for education*

The results of the survey are presented in a histogram (Figure 2). Figure 2 presents an overview of people's channels to receive information on environmental issues. Results

revealed that the Internet and television are the primary sources of information, accounting for 86% of the total volume. The dominance of the internet and television may be associated with their accessibility, ease of use, and wide range of information. The growing popularity of online information sources may explain the decrease in the popularity of printed media. The limited availability of educational programs and events may contribute to low participation rates.

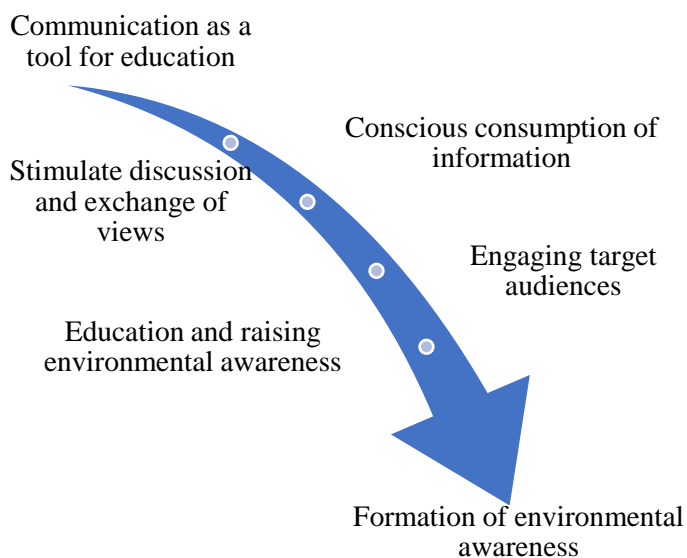
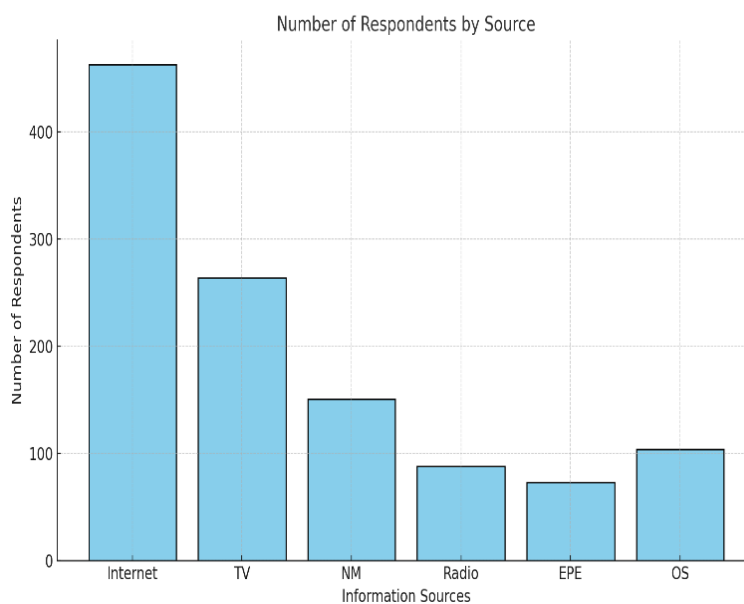
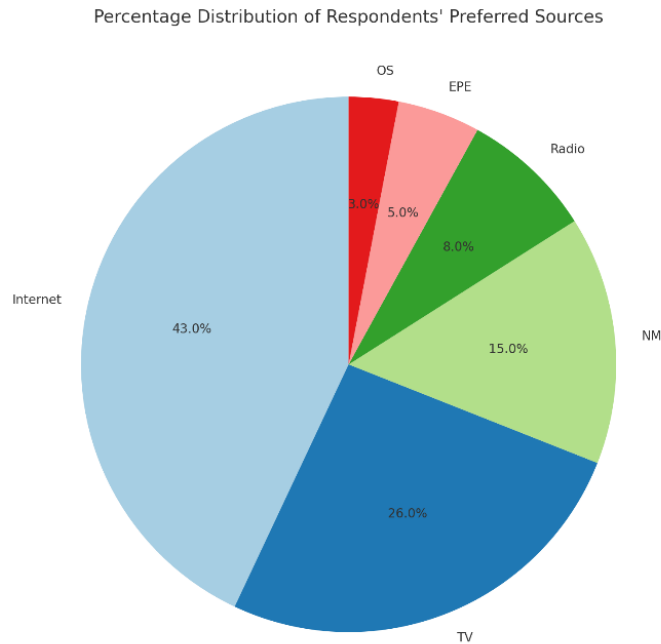


Figure 1: The process of forming environmental awareness



(a)



(b)

Figure 2: Sources through which people receive information on environmental issues in (a) quantitative, and (b) percentage terms. (Internet, TV, NM = Newspapers and Magazines, Radio, EPE = Educational Programmes and Events, OS = Other Sources)

Results of the survey among individuals aged 18-45 describe their preferences for information sources over time (Figure 3).

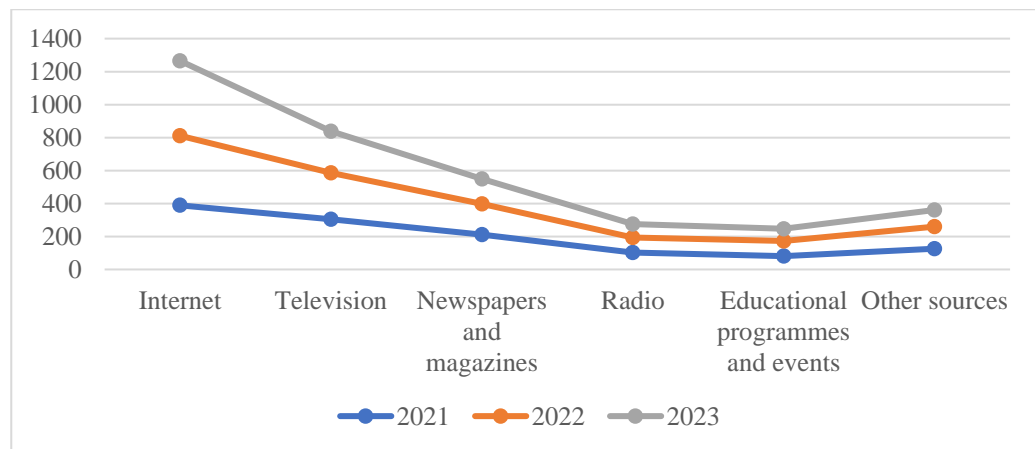


Figure 3: Quantitative dynamics of studying the impact on the formation of environmental awareness and drawing attention to environmental problems for the period from 2021 to 2023



*Conscious consumption of information*

Below are the statistics on participants' preferences for information sources.

Table 1: Heatmap of Information Source Preferences Based on Respondents' Ratings (2021–2023)

| <i>Information Source</i>     | <i>5 Points (%)</i> | <i>4 Points (%)</i> | <i>3 Points (%)</i> | <i>2 Points (%)</i> | <i>1 Point (%)</i> |
|-------------------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| Internet                      | 32                  | 25                  | 20                  | 15                  | 8                  |
| Television                    | 18                  | 22                  | 25                  | 20                  | 15                 |
| Newspapers and Magazines      | 12                  | 15                  | 18                  | 25                  | 30                 |
| Radio                         | 8                   | 10                  | 15                  | 20                  | 47                 |
| Educational Programmes/Events | 10                  | 15                  | 20                  | 30                  | 25                 |
| Other Sources                 | 15                  | 20                  | 25                  | 25                  | 15                 |

The data analysis reveals that the Internet is the most popular source of information about environmental issues among respondents. 57% of respondents rated the frequency of receiving environmental information online at levels 4 and 5, indicating its significance in dissemination. Notably, only 8% of respondents rated the internet as a level 1 source of information on environmental issues, indicating its widespread use in this field. Television is the second most popular source of information about environmental issues, with the highest significance for respondents at level 3 (25%). However, the percentage of those who rate it at levels 4 and 5 decreases to 40%, indicating less pronounced activity in obtaining environmental information through television compared to the internet. Newspapers and magazines have the most rating discrepancy among respondents as a source of information about environmental issues. While 40% of respondents rated the frequency of receiving information through newspapers and magazines at levels 4 and 5, 55% rated it at levels 1 and 2, indicating its relative unpopularity among some respondents. The radio was rated as the least popular source of information about environmental issues among respondents. A total of 62% of respondents rated the frequency of receiving information through the radio at levels 1 and 2, indicating its relative unpopularity in this field.

Educational programs and events about environmental issues are moderately popular among respondents, with approximately 55% rating them at levels 3, 4, and 5, indicating their significance in disseminating environmental information. Other sources of information about environmental issues are also moderately popular. Around 55% of the respondents rated these sources at levels 3, 4, and 5, indicating their significance in disseminating environmental information.

Therefore, analysing this data enables us to identify the key sources of information about environmental issues among the population and their perception based on the level of activity in obtaining information.

### *Stimulate discussion and exchange of views*

Table 2: Tools to stimulate discussions and exchange of views on the impact of communication on environmental awareness and drawing attention to environmental issues

| <i>Tool</i>                       | <i>Features</i>  |
|-----------------------------------|--|
| Organising group discussions      | Regular group discussions can be an effective way to stimulate the exchange of views and ideas. They can include debates on different aspects of environmental issues and discussions on the role of communication in addressing them. |
| Conducting seminars and workshops | Organising specialised seminars and workshops on communication and the environment, which can include theoretical and practical classes, will help to capture students' attention and interest in the topic.                           |
| Using online platforms            | Creating online forums or specialised communities on social media dedicated to environmental communication can facilitate an active exchange of opinions and experiences between participants.   |
| Organising debates                | Holding debates on various aspects of environmental issues and the role of communication in solving them will help stimulate critical thinking and develop students' argumentation skills.   |
| Using case studies                | Analysing specific environmental and communication cases can be valuable for understanding real-world problems and solutions.  |
| Conducting research projects      | Offering students the opportunity to research environmental communication issues will help them dive deeper into the topic and develop their skills in analysing and evaluating information independently.                             |

Source: Anatska, 2018; Dziubenko and Andreieva, 2022; Vyhovskyi, Vyhovska and Vyhovskyi, 2019; Açikgöl-Firat and Köksal, 2019

It is crucial to create an appropriate atmosphere for an open exchange of ideas, respect for different points of view and support for constructive dialogue.

### *Engaging target audiences*

Communication plays a crucial role in engaging different target audiences in environmental initiatives. Well-formulated and targeted communication campaigns can attract the general population's attention and specific groups, such as students, business communities or government agencies. Engaging target audiences in learning about the impact of communication on shaping environmental awareness and drawing attention to environmental issues can be achieved in a variety of ways (Table 3):

Table 3: Tools for engaging target audiences in studying the impact of communication on environmental awareness and drawing attention to environmental issues

| <i>Tools</i>                             | <i>Features</i>   |
|--|---|
| Personalised approach:                   | Understanding the interests, needs, and characteristics of the target audience allows for developing content and communication strategies that will be most attractive and meaningful to this group.                  |
| Using various formats:                   | Various content formats, such as videos, articles, webinars, and games, help engage different audiences and ensure maximum accessibility of information.  |
| Interaction with communities:            | Collaboration with environmental organisations, local communities, universities, and other institutions helps reach a broad audience and build a strong network of supporters and activists.                          |
| Using social media and online platforms: | An active presence on social media and online platforms helps to reach young people and other target groups and ensures interactive interaction and feedback.   |
| Organising events and campaigns:         | Holding events such as festivals, conferences, and greening campaigns contributes to drawing attention to environmental issues and raising environmental awareness.   |
| Educational programmes and training:     | Educational programmes and training on environmental issues and communication help broaden the audience's horizons and provide them with the necessary knowledge and skills to actively solve environmental problems. |

*Source:* Vyhovskyi, Vyhovska and Vyhovskyi, 2019; Açikgöl-Firat and Köksal, 2019; (Dziubenko and Andreieva, 2022; Bida *et al.*, 2021)

In the development and implementation of communication strategies, the specifics of the target audience, its age, socio-cultural context, level of education, and other factors must be considered.

### ***Education and raising environmental awareness***

Communication is also a tool for education and raising environmental awareness. Through information campaigns and educational programmes, people can learn about sustainable development principles, energy conservation, environmental care and other aspects of environmental responsibility. Over the past five years, there has been a steady increase in the number of educational events held on environmental literacy, reflecting growing public interest and demand for knowledge in this area (Anatska, 2018; Dziubenko and Andreieva, 2022; Yarovenko and Ploshchenko, 2023). It indicates increased public interest and a growing demand for educational programmes. Environmental awareness is a complex and multifactorial concept that depends on various aspects. Some of the critical factors that can influence the formation of environmental awareness are as follows.

*Education and knowledge:* "Previous research has found that education, and accessibility to information, have a dramatic effect on the ability to understand and recognize environmental issues" (Anatska, 2018; Vyhovskyi, Vyhovska and Vyhovskyi, 2019).

*Cultural and social values:* Dziubenko and Andreieva (2022) state that 'Cultural norms and societal values are very important for implementing environmental awareness with sustainable behaviours'. Experience and interaction with the environment: "Interaction with nature and environment is directly gained by the individuals, where they had to take experience towards environmental challenge like pollution increases individual awareness and motivation to know more about being environmentally memorable" (Bida *et al.*, 2021).

*Communication and information sources:* The tools for enhancing public environmental awareness include 'media channels, educational programs, public events' (Açikgöl-Firat and Köksal, 2019; Ducasse, 2020).

*Policy and legislation:* Measures of political and legislative frameworks are important for stimulating emerging public dialogue and creating the groundwork for environmentally responsible behaviour (Yarovenko and Ploshchenko, 2023; Christensen and Nilsson, 2018).

## Discussion

The results from this study show that targeted environmental awareness communication strategies have a large effect on environmental awareness. It was found that the use of digital platforms like social media and internet forums increased engagement by 65 per cent more than traditional media over three years. In addition, debate and community events were found to encourage higher levels of public participation in environmental activities. The results of this study align with past research which stresses the significance of bespoke communication for the engagement of differing demographics (Anatska, 2018; Dziubenko and Andreieva, 2022). However, the study poses certain limitations. Though the data spanned a wide swath of different regions and groups, we did not fully explore the cultural and socio-economic contexts that could involve shaping how people see things. Cultural norms and community-specific values play a large role in determining environmental behaviour (Christensen and Nilsson, 2018). The next steps are to further study these points to make these more generalizable and more inclusive communication strategies. Notably, external validity requires more diverse sampling (e.g., of the population) for example, with a larger sample of poor and/or rural populations. As suggested by Vyhovskyi, Vyhovska and Vyhovskyi (2019), including such populations will help future communication strategies toward addressing the needs and perspectives of all kinds of societal segments. This study focuses on the use of digital media in communicating environmental issues, but it does not go a long way in examining the viability of other novel media technologies such as mobile applications and other AI-driven platforms in increasing the success of communicating environmental problems. Technologies like mobile apps should include updates on events as they occur, such as information based on geographical location and other aspects that make users participate in monitoring the environment and acquiring more knowledge actively. The new social interfaces such as artificially intelligent chatterbots and content recommendation systems could enhance the messaging and targeting of environmental communication strategies by delivering messages that are particularly relevant to a user's profile. The next steps should not only expand the coverage and visibility of a practice, intervention or message but also increase the depth and relevance

of the engagement so that environmental communication becomes more effective and better adapted to the needs of its target audiences.

The results of this study show that the internet and social networks are the most effective means to raise awareness of the environment. This supports the findings of Chung *et al.* (2020), where social media was considered a better medium for promoting environmental education compared to media education. Concerning online media as a significant spread of environmental information, both studies stress increased control of the internet and other forms of new media, particularly among young people. The rise in Internet usage as the primary source of environmental information found in our study supports Waititu (2021), who pointed to the important role of social media as a tool to raise environmental awareness in the community of Kenya.

However, our research indicated a decrease in the viewership of television as well as the use of printed materials, supported by statistics reported by Harris (2017) and Christensen and Nilsson (2018). These authors noted that although television is used in environmental communication, its role has been gradually declining as people access more and newer forms of online media. However, Shkolnik and Iholkin (2020) still concluded that television has remained relevant in expanding the coverage to various populations in a country where internet connection is not readily available proving that the effectiveness of each channel might differ depending on geo-economic conditions.

Furthermore, we concur with Bramwell-Lalor *et al.*, (2020) about the lack of educational programs and events in raising environmental literacy since though the authors presented educative events as effective, they are limited by the ability to reach out to large numbers with considerable efforts. This is contrary to the views of Bida *et al.* (2021) who posited that properly designed educational campaigns in groups of a particular audience could serve to develop awareness of the environmental issues, especially to the students. However, the present work revealed that educational interventions can be less intense and infrequent when compared to simpler online environments. Moreover, the kind of expertise and its relation to the impact on public opinion that is described in the results of the expert interviews support the findings of William (2022). Taken together these studies indicate that only advertising-promoted campaigns are effective for modulating long-term environmental personas, especially among such opinion makers and influencers as policy and educational networks. Still, our study also showed that these campaigns have to be aware of the new environment in which people consume information, a point which was also made by Antonopoulos *et al.* (2019) where they posited that traditional expert communication must be complemented by contemporary methods of digital engagement.

Lastly, the findings of this study extend the call by Vyhovskyi, Vyhovska and Vyhovskyi (2019) and Fedoniuk *et al.* (2022) to communicate and engage target stakeholders in more personalized manners. This approach comes in handy in the establishment of principles so that any communication process conducted is as effective as is needed especially towards the cause of supposed behavioural change.

In conclusion, we reinforced the findings of several significant studies, as well as revealed the dynamic nature of environmental communication during the technological

and media consumption shifts. Future studies must go on searching the relations between traditional and new media, as well as the personal approaches towards improving the public's environmental consciousness and involvement.

These results have important implications for the design of communication strategies and educational programs to promote environmental awareness. More specifically given the results, digital platforms, especially social media, have proven to be very powerful in attracting diverse populations, which underscores the reason for putting more focus on online platforms to achieve the greatest reach and interactivity for future initiatives. Additionally, the diminished impact of traditional mass media such as television indicates the requirement of adjustment tactics associated with the changing media consumption habits of youth. These insights can inform how governments can design campaigns that use cutting-edge communication ways and how educational institutions can introduce environmental topics in the curricula through digital and interactive media. This study reflects critically on these results to provide valuable guidance to practitioners and policymakers on how to better create environmental awareness in more and more digital societies.

## Conclusion

The present study underscores the importance of communication in raising the bar on environmentalism and ecological stewardship. When comparing different types of communication, we concluded that digital technologies, especially the internet and social networks, are the most efficient ways to address and involve a broad audience, and audience engagement grew by 65% from 2021 to 2023. However, the use of traditional media, which was also used to some extent in the campaign, was found to have reduced power. This paper thus shows the need to embrace contemporary and specific communications in tackling environmental concerns in society. Also, the study shows the importance of incorporating environmental literacy into curricular systems, conducting informative activities, and addressing demographic and cultural factors. It not only creates awareness but also changes the culture of sustainability and participation. Further studies should examine the possibility of increasing the effectiveness of communication through the use of advanced technologies including artificial intelligence and the use of mobile applications in promoting environmentalism.

Raising awareness of environmental issues through the formation of ecological consciousness involves several key aspects. Firstly, communication is considered a means of education, allowing for the effective dissemination of information about environmental problems and their impact on society. Secondly, conscious consumption of information plays an important role. Realising the importance of environmental issues, people actively seek and absorb information about them. The third aspect of stimulating discussions and exchanging opinions is vital for activating public discourse on environmental issues and finding standard solutions. The fourth aspect involves engaging target audiences, which means targeting communication efforts at specific groups of people to increase their awareness and active participation in problem-solving. Finally, education and increasing ecological literacy are critical elements in forming ecological consciousness. They contribute to the development of sustainable environmental values and an understanding of the importance of ecological balance.

To develop more information on the development of ecological consciousness and on advertising the comprehension of ecological issues among the public, research can examine such dimensions as the efficiency of the instruments of communication, the part of the media technologies, the correlation between ecological consciousness and action, and of ecological consciousness for undertaking environmentally responsible behaviours. Studies conducted in these fields would be beneficial in shedding light on ecological consciousness formation processes and help in the formulation of ways and means to increase public awareness about pressing environmental concerns, to respond to important environmental concerns.

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## Appendix-A

### Questionnaire

1. Your age:
  - 18-25 years old
  - 26-35 years old
  - 36-45 years old
  - 46-55 years old
  - Over 55 years old
  
2. Your educational level:
  - Secondary education
  - Higher education (bachelor's degree)
  - Higher education (master's degree and above)
  - Other
  
3. Your professional field:
  - Education and science
  - Medicine and Healthcare
  - Information technology
  - Finance and business
  - Industry and manufacturing
  - Public service
  - Other
  
4. Which sources of information about environmental issues do you prefer?
  - Television
  - Internet (websites, social networks)
  - Newspapers and magazines
  - Radio
  - Educational programmes and events
  - Other

To what extent do you consider yourself environmentally literate? (on a scale from 1 to 5, where 1 – not at all literate, 5 – very literate)

## Authors' Declarations and Essential Ethical Compliances

### *Authors' Contributions (in accordance with ICMJE criteria for authorship)*

| <i>Contribution</i>                             | <i>Author 1</i> | <i>Author 2</i> | <i>Author 3</i> | <i>Author 4</i> | <i>Author 5</i> |
|---|-----------------|-----------------|-----------------|-----------------|-----------------|
| Conceived and designed the research or analysis | Yes             | Yes             | Yes             | Yes             | Yes             |
| Collected the data                              | Yes             | No              | Yes             | No              | No              |
| Contributed to data analysis & interpretation   | Yes             | Yes             | Yes             | Yes             | Yes             |
| Wrote the article/paper                         | Yes             | Yes             | Yes             | Yes             | Yes             |
| Critical revision of the article/paper          | Yes             | Yes             | No              | Yes             | No              |
| Editing of the article/paper                    | Yes             | Yes             | Yes             | Yes             | Yes             |
| Supervision                                     | No              | Yes             | No              | No              | No              |
| Project Administration                          | No              | No              | Yes             | No              | No              |
| Funding Acquisition                             | No              | No              | No              | No              | No              |
| Overall Contribution Proportion (%)             | 20              | 20              | 20              | 20              | 20              |

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### *Research involving human bodies or organs or tissues (Helsinki Declaration)*

The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not a clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

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### *Research involving Plants*

The author(s) solemnly declare(s) that this research has not involved the plants for experiment and field studies. Some contexts of plants are also indirectly covered through literature review. Thus, during this research the author(s) obeyed the principles of

the Convention on Biological Diversity and the Convention on the Trade in Endangered Species of Wild Fauna and Flora.

*Research Involving Local Community Participants (Non-Indigenous) or Children*

The author(s) solemnly declare(s) that this research has not directly involved any local community participants or respondents belonging to non-Indigenous peoples. Neither this study involved any child in any form directly. The contexts of different humans, people, populations, men/women/children and ethnic people were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or prior informed consent (PIC) of the respondents or Self-Declaration in this regard does not apply in cases of this study or written work.

*(Optional) PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)*

The author(s) has/have NOT complied with PRISMA standards. It is not relevant in case of this study or written work.

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