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**Media image of the environmentally vulnerable territory:
eye-tracking analysis of the impact
of the environmental media agenda on youth audiences**

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Abstract. Issues of the environmental media agenda are acute in the media space and particularly relevant for the image of environmentally vulnerable territories. The impact of the environmental agenda on youth audiences of these territories is poorly studied, which actualizes the research topic. The purpose of the work is to study the impact of the environmental agenda on the image of the environmentally vulnerable region and youth audiences using eye-tracking technologies aimed at measuring the audience’s unconscious reactions. It is the first time when the topic is studied theoretically and empirically from the standpoint of a cognitive approach and the use of eye-tracking technologies aimed at analyzing the audience’s cognitive and affective reactions to the environmental agenda. It is established that messages of negative content, such as air pollution, waste management, and pollution of water bodies, predominate (74%) among the selected issues of the environmental agenda. These data are consistent with the results of eye-tracking studies, which show that the patterns of the audience attention are concentrated on these issues and a negative attitude is formed towards the territory image. The results obtained will make it possible to adjust the media ecovoice to neutralize conflictogenicity.

Keywords: mass media, information agenda, territory image, eye-tracking technologies

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Имидж территории экологического риска в СМИ: айтрекинг-анализ влияния экоповестки медиа на молодежную аудиторию

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Аннотация. Вопросы экологической повестки СМИ остро звучат в медиaprостранстве и имеют особую актуальность для имиджа территорий экологического риска. Существует проблема фрагментарности знаний о влиянии экологической повестки на молодежную аудиторию данных территорий, что актуализирует тему исследования. Цель работы – изучение влияния экоповестки на имидж региона экологического риска и молодежь. Применялись айтрекинговые технологии, направленные на измерение неосознанных реакций аудитории. Впервые представлены результаты теоретического и эмпирического изучения темы с позиции когнитивного подхода и применения айтрекинговых технологий, направленных на анализ когнитивных и аффективных реакций аудитории на экоповестку. Установлено, что среди выделенных тем экологической медийной повестки преобладают сообщения негативного содержания (74%): загрязнение атмосферы, управление отходами, загрязнение водных объектов. Эти данные коррелируются с результатами айтрекинговых исследований, показывающих концентрацию внимания аудитории на указанных проблемах, что формирует негативные отношения к имиджу территорий. Полученные результаты позволят откорректировать экологическую повестку медиа для нейтрализации конфликтогенности.

Ключевые слова: массмедиа, информационная повестка, айтрекинговые технологии

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Introduction

Mass media play an active role in shaping the image of an environmentally vulnerable territory. The image is a competitive advantage of the region. Economic, social, and environmental aspects are distinguished in its structure (Stolbov, Tezhikova, 2019, p. 110). At the same time, environmental issues are acute in the media space and relevant for the development of industrial territories. In the context of mediatization, the ecology of territories and the ecology of the homo of these territories themselves are also important. Many scholars (Pearce, 2005; Saleem, 2007; Lazutova, Volkova, 2017; Matthes, 2019; Erofeeva et al., 2021; Urazova, 2021; Mocatta et al., 2022; Almeida, Almeida, 2023; Lopes, Azevedo, 2023; Yuan, Kuehl, 2023, etc.) studied the formation of the media image of the territory from different standpoints. Modern research shows that mass media are important for notifying and involving citizens in the solution of environmental problems. However, the impact of the environmental information agenda of mass media on youth audiences living in environmentally vulnerable regions is not fully studied. The gap between the way environmental issues are covered in mass media and the audience response is a relevant problem (considering human ecology). On the one hand, the recognition of environmental issues as a priority of the information agenda and improving the quality of their media coverage will contribute to the formation of an adequate environmental image of a vulnerable region and the social well-being of the population. On the other hand, it is important to assess the degree of conflict potential of environmental media discourse, taking into account the perception of the digital generation, which will make decisions in the future. To this end, the purpose of the work is to study the formation of an environmental information agenda in the context of the environmental image of the region and its impact on youth audiences using state-of-the-art eye-tracking technologies.

Research methods

The reliability of this research is provided by extensive empirical material and the system of its study. Methodological aspects of the work are implemented through the use of a cognitive approach. The work is based on a set of methods: comparative analysis, document analysis with elements of content analysis, eye-tracking, and a survey.

Special attention was paid to eye-tracking technologies, which allow recording eye movements and determining the degree of attention concentration using video recording. The main indicators of eye tracking are the number of gaze fixations and the average duration of fixations.

We selected the mass media of Chelyabinsk (74.ru, 1obl.ru) and Yekaterinburg (e1.ru, Obltv.ru) to study the information agenda. Based on a continuous sample for the period from October to December 2022, we selected 73 media materials: Chelyabinsk – 36; Yekaterinburg – 37. In this research, all stimulus materials were divided into areas of interest: image, title, text. The eye-tracking study was followed by a survey. 100 university students aged 18 to 22 years old took part in the experiment. This research can be designated as a pilot.

Results and discussion

Mass media do not only provide information on the territory, but also contribute significantly to the formation of its image. The territory (destination) image is considered as “the sum of beliefs, ideals and impressions people have of a particular place” (Kotler et al., 2002). The theory of the formation of the territory image distinguishes several models. M.A. Belyaeva and V.A. Samkova propose (2016) to consider the territory image through the main components: the history of development and geography of the territory, climatic living conditions and environmental safety, the image of the authorities, etc.

It is important to understand that the territory image is not only a set of competitiveness factors, but also the result of perception, cognitive assessment, and the attitude of target groups. Information on the territory (destination) passes through mental processes to become a stable territory image most fully represented as a cognitive model (Figure 1).

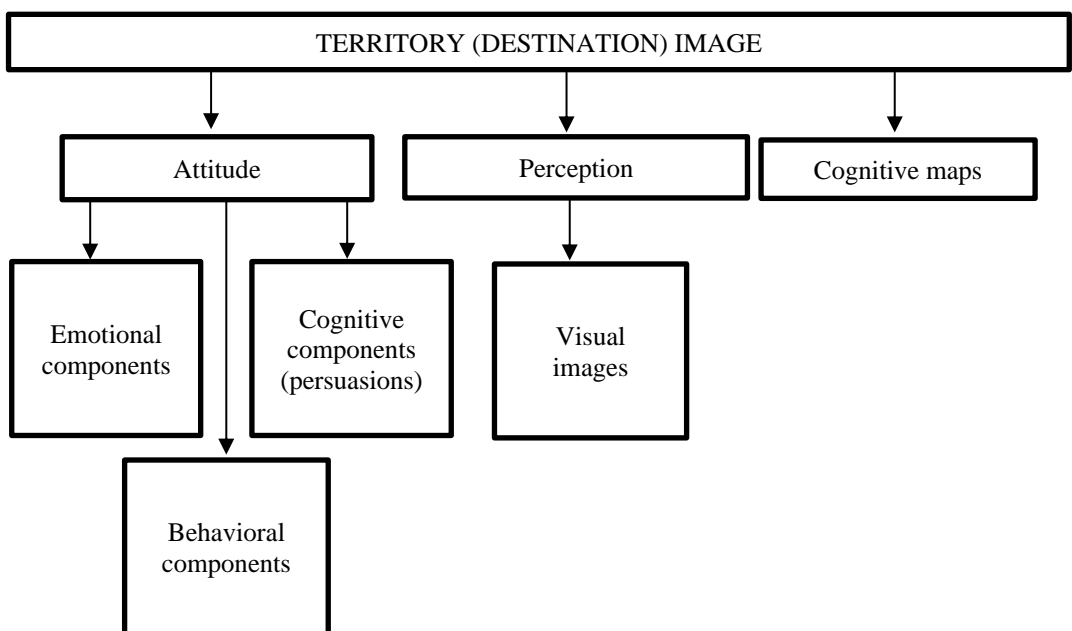


Figure 1. Model of the territory (destination) image

Source: Pearce, P.L. (2005). *Tourist behaviour. Themes and conceptual schemes*. Channel View Publication.

The territory image is related to what information on the region gets into mass media. N.R. Peters and N. Heinrichs note (2005, p. 2) that “news media are the central “interpretation system” of modern society”. Since global environmental changes lie outside the living space of most people (Moser, 2010), the knowledge of them is spread mainly through public communication.

The environmental imperative contributes to a certain extent to the growing capitalization of the territory by increasing its social attractiveness. At the same time, the environmental image is a cumulative perception of environmental efforts and the quality of a destination (Chen, 2010). Although environmental issues have recently entered the agenda of news media, they are particularly acute in the information agenda. Environmental journalism (Mocatta, 2015, p. 12) tends to include long life stories.

Mass media can generally influence the audience, form attitudes and stereotypes. In these conditions, it seems relevant to study environmental media effects on the audience’s ideas. Media effects are understood as “conscious and unconscious short-term and long-term intrapersonal changes in cognitions, emotions, attitudes, beliefs, physiology and behavior that result from the use of media” (Valkenburg, Peter, 2013, p. 222). This paper will consider the impact of media on the individual within the framework of interrelated models: agenda-setting and framing – the impact of mass media on society and the individual through the information submission form.

Notably, a key problem in media impact research is concealing the true feelings of the audience. To this end, the use of eye-tracking technologies recording the person’s gaze motion becomes relevant to study media effects. The data from the device allow determining the mental state of the subject, as well as the level of interest and attention.

In the context of perceiving information on environmentally vulnerable territories and the subsequent formation of their image, it is important to understand what constitutes the perception of media messages and what areas of the message become essential for the audience.

The study involved three stages: to define the key topics of the news agenda; to conduct a study using eye-tracking technologies; and to conduct a survey.

The first stage of the research involved distribution of 73 news reports into 8 thematic sections¹ (Table).

The most represented topics in the information media agenda are air pollution and protection (32.9%), waste management (27.4%), water pollution and protection (13.7%).

The second stage involved analyzing the patterns of young people's attention to the presented messages based on the results of the eye-tracking study. The obtained data revealed the leading stimuli in each of the eight thematic blocks in descending order of values:

– the topic “Waste Management” in Yekaterinburg media is the leading, while in Chelyabinsk media it is in the second place. The largest number of fixations was caused by stimuli S7 (“Residents of single-family houses in Yekaterin-

¹ Results of the eye-tracking studies of news items. Retrieved July 24, 2023, from: <https://docs.google.com/document/d/1BAazhaKceccTFagAI28-pLcMs1yqd6j/edit>

burg suffer from multi-storey apartment buildings erected next to them”, 57.579 units) and S4 (“Photo traps will help to fight unauthorized dumps in the Middle Urals”, 55.541 units);

– the stimulus S71 (“The Chelyabinsk region is the leader among the regions where the air quality increases the number of asthma patients”, 56.713 units) was the most popular in “Air Pollution and Protection” topic;

– the stimulus S02 (“the National Project *Ecology* supplied more than 3,000 people in the Urals quality drinking water”, 54.903 units) received the highest number of fixations within the topic “Pollution and Protection of Water Bodies”;

– the stimulus S20 (“More than 9 billion rubles will be used to improve ecology and preserve natural resources of the Sverdlovsk region”, 54.641 units) is the leader in the number of view fixations within the topic “General Issues of Environmental Protection and Ecological Culture”;

– the stimulus S24 (“Nature Ministry: gatherers are related to forest fires in the Middle Urals”, 54.927 units) aroused the greatest interest within the topic “Impact of anthropological changes”;

– the topics “Environmental Pollution Control”, “Soil Pollution and Protection”, “Environmental Safety” are rarely covered in mass media. The stimuli S30 (“We don't want to be in the magnetic field”, 54.301 units) and S60 (“A radioactive pole in Chelyabinsk... was buried”, 54.635 units) attracted the most attention.

Topics of environmental news agenda in online news outlets in Yekaterinburg and Chelyabinsk

No.	Topics	Parameters	Chelyabinsk		Yekaterinburg		Total
			74.ru	1obl.ru	e1.ru	Obltv.ru	
1	General issues of environmental protection (environmental culture)	Quantity, %	1 (5.55%)	5 (27.8%)	–	3 (12.5%)	9 (12.3%)
		Code	S66	S38, S46, S51, S52, S53	–	S8, S10, S20	
2	Environmental pollution control	Quantity, %	–	2 (11.1%)	–	–	2 (2.7%)
		Code	–	S44, S54	–	–	–
3	Soil pollution and protection	Quantity, %	–	–	–	1 (4.2%)	1 (1.4%)
		Code	–	–	–	S3	–
4	Pollution and protection of water bodies (water)	Quantity, %	3 (16.7%)	1 (5.6%)	1 (7.7%)	5 (20.8%)	10 (13.7%)
		Code	S56, S68, S72	S45	S33	S2, S11, S12, S15, S21	–
5	The impact of anthropological change (fires)	Quantity, %	1 (5.55%)	–	–	4 (16.7%)	5 (6.9%)
		Code	S65	–	–	S14, S22, S23, S24	–
6	Air pollution and protection (air)	Quantity, %	11 (61.1%)	6 (33.3%)	4 (30.8%)	3 (12.5%)	24 (32.9%)
		Code	S57, S58, S59, S61, S63, S64, S67, S69, S70, S71, S73	S41, S42, S39, S40, S47, S48	S26, S28, S29, S35	S1, S9, S17	–
7	Waste management (wastes)	Quantity, %	1 (5.55%)	4 (22.2%)	7 (53.8%)	8 (33.3%)	20 (27.4%)
		Code	S62	S43, S49, S50, S55	S25, S27, S31, S32, S34, S36, S37	S4, S5, S6, S7, S13, S16, S18, S19	–
8	Environmental safety	Quantity, %	1 (5.55%)	–	1 (7.7%)	–	2 (2.7%)
		Code	S60	–	S30	–	–
Total			18 (100%)	18 (100%)	13 (100%)	24 (100%)	73 (100%)

Source: compiled by the authors.

Further in the work we analyzed the frames by three areas (headline, text and image). The data of eye-tracking research were based on the indicators (the average number of fixations (units), the average viewing time (ms), the percentage of the total viewing time (%), and heat map data) and identified the areas of attention fixation. The area of *text* was in the first place (Figure 2) (from 18.6 units to 34.969 units); the *headline* area was the second (Figure 3) (from 7.833 units to 23.258 units); and the *image* area was the third (Figure 4) (from 6.677 units to 14.750 units).

The media messages S30 “We do not want to be in the magnetic field” (23.258 units), S33 “Fish were launched in the Urals pond” (23.226 units), S9 “A key eco-object was launched in Nizhny Tagil” (22.194 units) from Yekaterinburg became the leaders by the number of fixations in the *headline* area (Figures 5–7).

The stimuli S34 “Too much good” (14.750 units), S40 “An apple alley was planted in Chelyabinsk” (14.531 units), S36 “We should not throw garbage on ancestors” (13.710 units) from two media outlets of Yekaterinburg and Chelyabinsk (Figures 8–10) became the leaders in the number of fixations on the *image* area.

The stimuli S7 “The wastes collecting rates were raised in the Sverdlovsk region” (34.969 units), S6 “Waste collection... is refused in the Urals” (33.419 units), S5 “The residents of single-family houses in Yekaterinburg suffer” (31.742 units) based on the media materials from Yekaterinburg became the leaders in the *text* area (Figures 11–13).

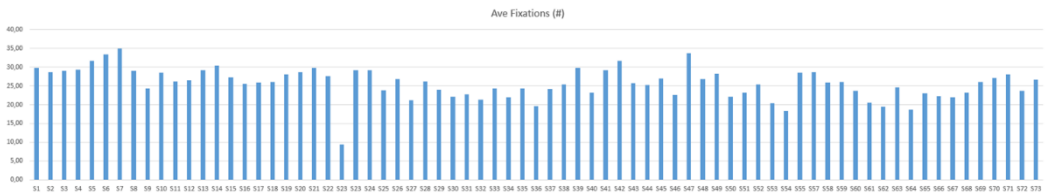


Figure 2. The number of fixations in *text* area

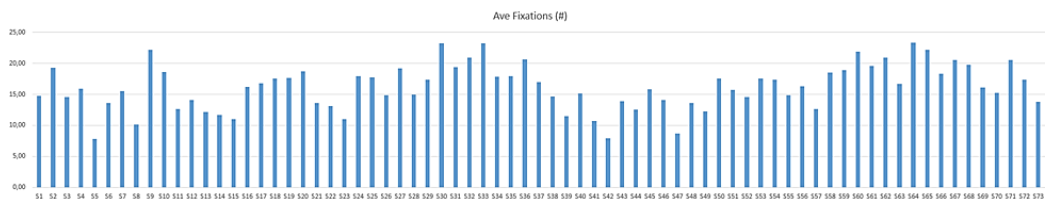


Figure 3. The number of fixations in *headline* area

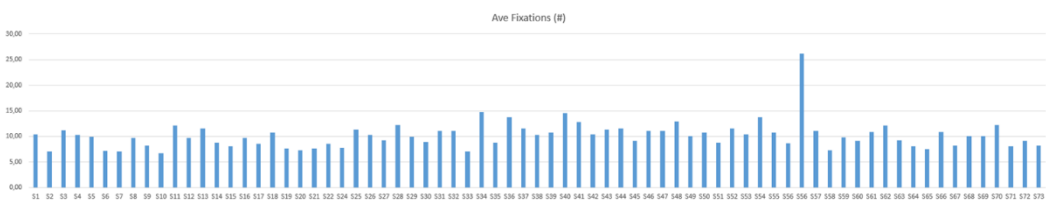


Figure 4. The number of fixations in *image* area



Figure 5. S30

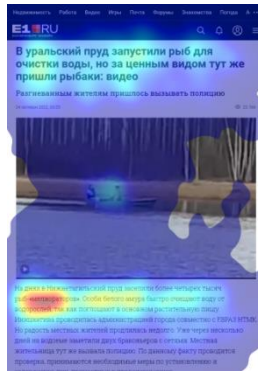


Figure 6. S33

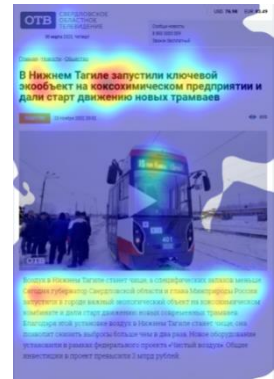


Figure 7. S9



Figure 8. S34



Figure 9. S40



Figure 10. S36

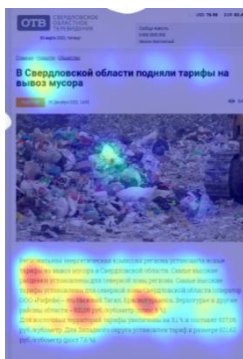


Figure 11. S7

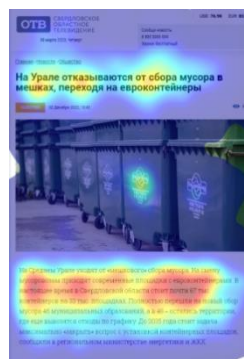


Figure 12. S6



Figure 13. S5

The survey according to the Gallup-Robinson Impact test (Biryukova et al., 2014) was an important point to check retained knowledge. The questionnaire consisted of 11 questions including cognitive, emotional, behavioral blocks.

The respondents were most interested in the problems of air pollution (34.8%), recycling and waste disposal (23.0%), greening the city (18.5%), and water pollution (16.3%). The survey participants noted that they primarily paid attention to headlines (75.6%) and images (20%). More than 70% of respondents noted that they partially trust the information in media materials, while 26.7% of them fully trust it.

The stimulus material evoked a range of emotions, such as concern (24.3%), hope (16.8%), indignation (14%), disappointment (12.6%), and anxiety (12%). The media materials caused the respondents to develop a negative attitude to the environmental image of Chelyabinsk (56.7%) and Yekaterinburg (61%). The survey respondents noted that the material they saw changed their behavior in the field of ecology (46.7%).

Almost all the respondents (86.7%) noted that the material they had seen made them ponder over environmental issues. It provoked a desire to study alternative sources of information on the problem (18%), to join the environmental community (12.3%), to donate funds for the development of environmental movements (8%).

Thus, the comparative analysis of the research results using eye-tracking technologies and the survey showed that youth audience is highly interested in the problems of environmentally vulnerable regions.

Conclusion

Environmental issues are of particular relevance for the formation of the image of an ecologically vulnerable territory. The comparative analysis of the environmental information agendas of Yekaterinburg and Chelyabinsk mass media identified eight key topics. However, the thematic concentration of the mass media news is focused on negative publications (74%): air pollution, waste management, pollution of water bodies.

The study of the influence of environmental media messages on the youth audience using eye-tracking technologies revealed a special concentration of respondents' attention on three topics, namely air pollution, water pollution, and waste management. The analysis of audience attention patterns by areas of interest showed that *text* area took the first place by “average number of eye fixations”, headline area took the second place, and image area took the third place.

In general, the majority of respondents (from 56.7% to 61%) developed a negative attitude to the environmental image of Chelyabinsk and Yekaterinburg under the influence of the presented media materials. Thus, this study has shown the significant influence of the environmental information agenda on the formation of the territory image and its impact on young people.

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