Perception of Natural Disasters as a Threat Against Rural Communities in Poland

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Abstract

The purpose of this article is to analyze the results of quantitative research conducted as part of the "Rural Crime in Poland" research project, which allow us to determine the extent to which the inhabitants of Polish rural areas are concerned about natural disasters and to try to explain the factors that may influence these concerns. The survey was conducted in late 2023 and early 2024 with a representative sample of 1,006 people, all residing in rural areas. The results indicate that natural disasters are the second most frequently expressed concern (34.9% of the respondents declared their concern), just ahead of a fear of serious illness (44.1%). These concerns were more often declared by women and older people, especially those over 45, which may be due to, among other things, previous experiences, the difficulty of dealing with the effects of such disasters, and the influence of the media publicizing such events. In addition, residents of peripheral rural areas are more likely than those living closer to cities to perceive natural disasters as a threat, which may be related to limited access to infrastructure and emergency services and greater reliance on agriculture, which is vulnerable to natural disasters. The article describes the extensive flooding in Poland's southern regions in 2024 as an example that shows the consequences of such disasters can be and why inhabitants of rural areas may perceive them as a serious threat. The article also points to the need for an interdisciplinary approach to diagnosing and mitigating these negative phenomena, which should combine insights from criminology, sociology, and environmental science.

Keywords: natural disasters; sense of security; risks; rural areas; quantitative research

Introduction

In Poland, rural areas are defined as areas located outside the administrative boundaries of cities that consist of rural municipalities and rural parts of urban-rural municipalities. In the rural areas in Poland there are 52,400 localities inhabited by 15.3 million people (40.4% of the country's total population). These areas cover 29.0 million hectares, or 92.8% of the country's total size (Statistics Poland, 2024a). In these rural areas, agriculture remains an important sector of the Polish economy. Approximately 10% of Poland's rural population relies mainly or exclusively on agriculture (Wilkin, 2022), which accounted for 2.92% of the country's GDP in 2023. The impacts of natural disasters may be particularly severe for the agricultural sector, both economically and socially. Moreover, such events affect the environment, infrastructure, and the basic living conditions of local populations—including health—as well as social dynamics and residents' sense of security(Kundzewicz, Matczak, 2010).

The purpose of this article is to examine the level of fear of natural disasters in rural communities and to identify factors that may affect the level of perceived threat. The analyses presented herein are based on the results from a representative sample of 1,006 rural residents as part of the "Rural Crime in Poland" research project. The discussion is supplemented by a case study on the 2024 flood in southern Poland and its implications for rural areas and their residents, which and how the flooding may affect their sense of security.

The article attempts to answer the following research questions: (1) To what extent do inhabitants of rural areas in Poland perceive natural disasters as a threat? (2) What socio-demographic factors are related to fear of natural disasters felt by inhabitants of rural areas? (3) To what extent does the location of a village where respondents live affect the level of fear of natural disasters? (4) To what extent can fear of natural disasters in rural areas affect their sense of security? (5) Another key question to answer is to determine whether crime is likely to increase in rural areas amid the chaos and weakened control mechanisms that accompany natural disasters.

Climate and extreme weather events in Poland

Understanding Poland's specific climatic characteristics and the ways in which climate change is modifying weather patterns is crucial for assessing its impacts on rural communities. Today, climate change exhibits multidimensional impacts across both physical and social systems, interacting with vulnerability and exposure to shape the ultimate socio-environmental outcomes. The concept of cascading climate change risks is often discussed, which means that risks from one system can be transferred to others. In order to understand the risks posed by disasters resulting from climate change, among others, examples of risk cascades that also affect rural communities are such as illustrated by the following six areas (European Environment Agency, 2024):

1. food: temperature and precipitation variability and more frequent occurrence of violent weather events tend to negatively affect agriculture, which can cause instability in food production and increase food prices; this condition can cascade to

sources of livelihood in rural areas, the health of vulnerable social groups and the broader economy;

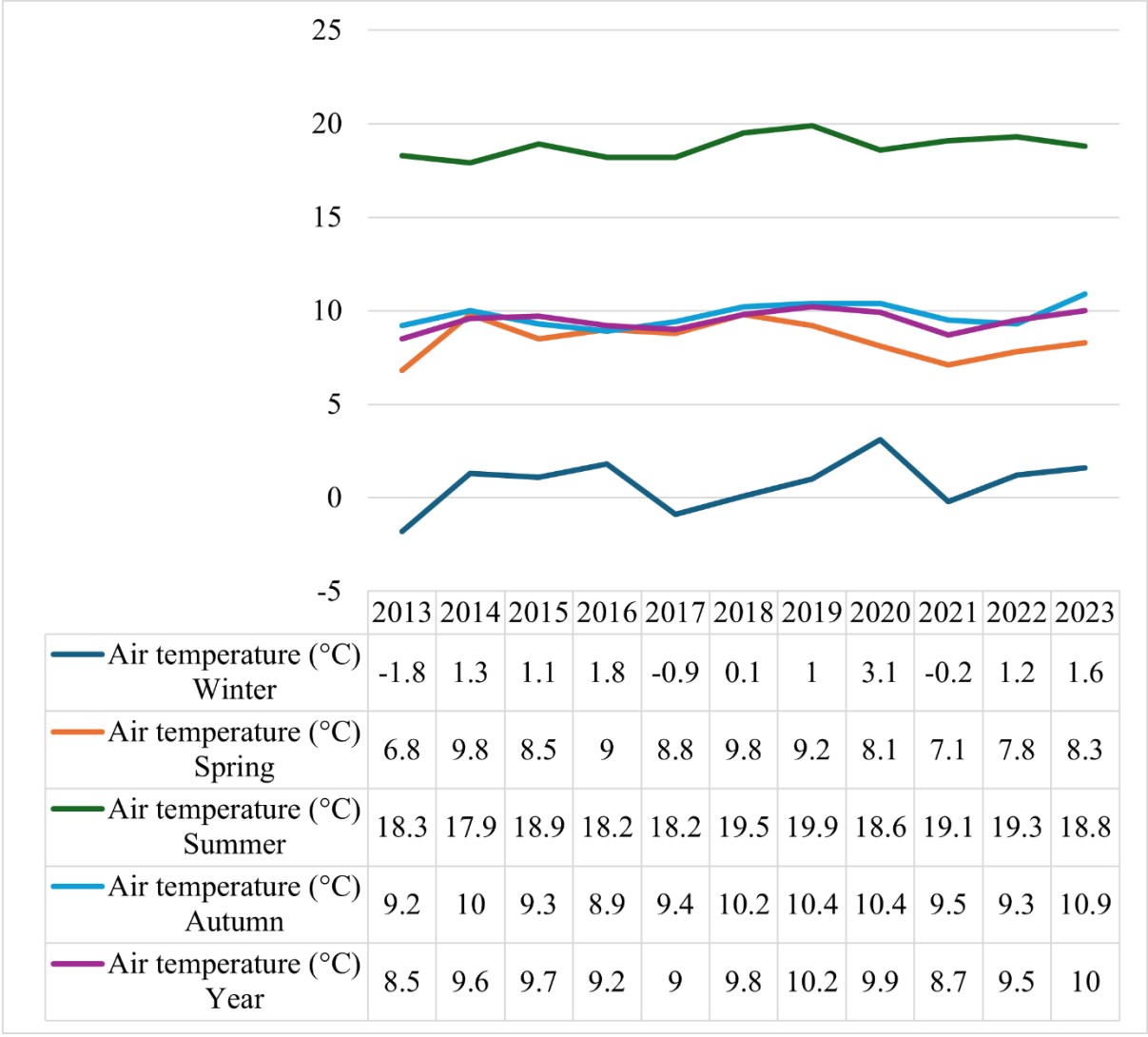
2. health: the observed and upcoming changes in climate conditions will be characterized by more frequent extreme weather events, including heat waves, for example, which significantly increase the risk of health problems; in addition, climate effects on the health and well-being of people, including workers, may negatively affect labor productivity and demand for healthcare system resources;
3. infrastructure: climate effects on critical infrastructure, such as energy, water or transportation infrastructure, can negatively affect almost all aspects of society, from human health to the broader economy and financial systems; there is already talk of rural transportation exclusion in Poland (Kaczorowski, 2019), and climate change can only exacerbate this problem;
4. economy and finance: many climate effects can negatively influence the economy and the financial system; this can result in the expansion of areas of social exclusion and poverty from economically well-off parts of Poland (Kalinowski, 2023);
5. ecosystems: climate impact on land, freshwater and marine ecosystems can cascade to food production and food security, human and animal health, infrastructure, land use, and the broader economy; and
6. security: threats from, for example, rising sea level and intense precipitation that can cause flash floods pose a threat to both infrastructure and lives; extreme droughts can lead to water shortages and to the aforementioned food insecurity, disruption of critical infrastructure, and threats to financial markets and financial stability; moreover, climate change can also force population migrations and even lead to conflicts over resources, such as water and farmland.

Climate and climate change effects in Poland

Poland is located in the zone of transitional temperate climate, characterized by variability of weather conditions. Take 2023 as an example: in that year, the warmest month was August, with an average temperature of 19.6 °C, or 1.1 degrees higher than the multi-year average temperature for that month. February, on the other hand, was the coolest month, with a monthly average temperature of 1.5 °C, or 1.6 degrees higher than the climatological norm. January, September, and October were particularly warm compared to the multi-year norm, with anomalies exceeding +2.0 °C. Large temperature variability brings numerous risks to the natural environment and infrastructure, especially roads, utilities, and energy infrastructure, as well as to agriculture and human health and life.

Figure 1

Air temperature in Poland (2013-2023)



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Air temperature (°C) Winter	-1.8	1.3	1.1	1.8	-0.9	0.1	1	3.1	-0.2	1.2	1.6
Air temperature (°C) Spring	6.8	9.8	8.5	9	8.8	9.8	9.2	8.1	7.1	7.8	8.3
Air temperature (°C) Summer	18.3	17.9	18.9	18.2	18.2	19.5	19.9	18.6	19.1	19.3	18.8
Air temperature (°C) Autumn	9.2	10	9.3	8.9	9.4	10.2	10.4	10.4	9.5	9.3	10.9
Air temperature (°C) Year	8.5	9.6	9.7	9.2	9	9.8	10.2	9.9	8.7	9.5	10

Source: prepared by the author based on data from Institute of Meteorology and Water Management – National Research Institute (2024).

As for precipitation, the area-averaged total precipitation in 2023 in Poland was 656.2 mm, which constituted 107% of the norm determined by measurements from 1991 to 2020. However, from May 2023, a distinct period of precipitation deficit was noted, resulting in a decrease of below average values in early June. This trend continued during the summer season. In the following months (September, October) increasingly negative anomalies were recorded again. The year 2023 was considered a wet year in terms of total precipitation (the value slightly exceeded the multi-year norm), with precipitation below normal for most of the year, making it similar to dry years. Only the last months of the year, with high precipitation levels, contributed to exceeding the multi-year norm. It should be noted that in Poland, heavy rainfall is an uncommon weather phenomenon, but when it does occur it causes local flooding, inundating roads, causing problems with the operation of transportation systems.

It should also be mentioned that Poland sometimes experiences hail, which is one of the most dangerous phenomena associated with convection (Institute of Meteorology and Water Management - National Research Institute, 2024). Hail poses risks to infrastructure (flooded, impassable roads), agriculture (damaged crops), and human life (broken trees and branches) alike. Winds, especially storm winds (wind force 8 on the Beaufort scale), also have similar effects. During strong winds, sea waves reach a height of about 5 meters, and on land tree branches may be broken and vehicles may have difficulty staying in their lanes on roads. This threat is particularly common in Poland between October and March.

It is evident that climate change can lead to a wide variety of weather anomalies, such as intense, torrential rains, floods (including flash floods; Franczak, et al., 2017), hailstorms, hurricanes, and, on the other hand, periods of prolonged drought and fires. These climate changes are accompanied by an increase in the frequency and severity of natural disasters (European Environment Agency, 2024) that affect the socioeconomic lives of inhabitants of Poland's rural areas. Natural disasters bring serious consequences not only for the agricultural sector, but also for entire rural communities.

The impact of climate change and natural disasters on the socio-economic life of inhabitants of rural areas in Poland

The pattern of climate change described above and the resulting natural disasters affect the lives of all Poland's residents, but especially those living in rural areas. The extent to which these severe weather events affect particular groups of inhabitants in rural areas depends very often on their occupations. Therefore, it is worth briefly describing the specific characteristics of the labor market in Poland, and then in rural areas. In 2023, only 7.6% (8.1% in 2021) of working people in Poland declared themselves to be working in agriculture, forestry and fishing, 29.5% (in 2021 - 30.6%) - in the industry and construction sector, and 62.4% (in 2021 - 60.7%) - in various services (Statistics Poland, 2024b).

Compatible data for rural areas is not available, but Statistics Poland's publications show that in 2022 more than half of those working in rural areas worked in business entities operating in the service sector (71.6% in urban areas). Nearly one in three workers in rural areas was employed in industrial sector jobs (26.4% in urban areas), and nearly one in five in the agricultural sector (2.0% in urban areas) (Statistics Poland, 2024a; Stanny et al., 2023). Accordingly, the primary sources of income for the rural population today include paid employment, self-employment outside a farm, agricultural activities, and social benefits. For most inhabitants of rural areas, the primary source of income is work outside agriculture (Rosner, States, 2018). The period after Poland's accession to the European Union was characterized by an increase in the importance of non-agricultural work, which was reinforced by migration from cities to the countryside. More and more people who work in the city are choosing the countryside as a place to live because of, among other reasons, its environmental advantages. This is facilitated by the spread of the Internet, the possibility of remote work, etc. Another important source of income for the average rural family is social benefits, which consist of social security, including pensions and disability payments, and social assistance benefits (e.g. temporary or permanent allowance). Self-employment income is also on the rise (Chmielewska, Zegar, 2024).

The urbanization process taking place in the rural areas of Poland means (Czapiewska, 2021) that the non-urban population is no longer as tightly linked to agriculture as it once was. This does not change the fact that it is very often the farmers who are most at risk to natural disasters, affecting both their lifestyles and their ability to make a living off the land (Cheng et al., 2024). The attitudes of rural residents, especially those linked to agriculture[1], toward climate change and its effects can be learned from the report "Rośliny się nie oszuka" [Plants cannot be fooled] (Sadura et al., 2023). Inhabitants of rural areas emphasize that weather is now more unpredictable and difficult to adapt to due to more extreme and violent weather events than in the past, such as thunderstorms, torrential rains, and gusty winds.

It seems that the most difficult weather condition for rural residents and farmers are increasingly frequent droughts, which have a negative impact on agricultural work. Farmers' statements presented in the report show that climate change is no longer an invisible problem, as it is increasingly noticeable and felt in their daily lives.

Farmers recognize the difficulties associated with both droughts and torrential rains. They associate torrential rains with rotting of vegetables in the ground or washing out of sown fields, with consequent crop losses, lower profits, and increased labor requirements. They point to difficulties resulting from droughts, such as wells drying up and smaller crop yields, resulting in an inability to feed all animals on the farm, which in turn is linked to lower profitability in agriculture. Rural residents point to overflowing rivers and flooding, which they believe is related to poorly managed fields (without adequate watercourses), as well as the lack of surrounding forests and groves that could retain the water. In farmers' opinion, another challenge is the blurring of the differences between the seasons, which is particularly evident in the changes to the growing season and the too-short process of plants' preparation for flowering, which is made possible by a sufficiently long period of cold weather. Respondents also consider high temperatures, which favor the development of previously unseen pests and plant diseases, to be a challenge. The activity of pests increases due to warm winters - without frosts - and the extinction of birds. Farmers also emphasize that some animals are not adapted to such high temperatures; for example, they point out that some breeds of chickens are dying because of heat (Sadura et al., 2023). Furthermore, dry conditions are required for the planting, cultivating and harvesting of many crops, such as winter wheat.

Despite seeing the many negative consequences of climate change and the resulting natural disasters, farmers are reluctant to make changes. They feel fear of a possible agricultural transformation and reform, which they often associate with the possibility of losing their jobs, and this in turn can show a lack of trust in the state, local governments, the European Union, and other actors responsible for the introduction of sustainable agricultural production and breeding (Sadura et al., 2023).

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[1]The research was conducted in the following forms: 1) observations during a convention of leaders rural organizations - in 2021; and 2) individual and focus interviews with village heads, leaders of rural organizations, and farmers - in 2023.

In the conclusions of the report, the authors emphasize that inhabitants of rural areas - including farmers - are convinced that climate change will only become more severe, and that the accompanying adverse climate conditions (droughts, violent storms etc) will become more frequent (Sadura et al., 2023). However, this does not necessarily translate into a willingness to make changes in the operation of farms, and it is not easy for farmers to change the cultivation or farming methods that have worked for years.

Climate change in Poland also affects animal husbandry, particularly intensive livestock farming. The growing demand for low-cost meat – especially pork – has led to an expansion of large-scale farms, while the number of small farms continues to decline. This shift contributes to biodiversity loss, water and soil pollution, and increased water consumption (e.g., up to 15,000 liters per kg of beef). As a result, rural areas face environmental degradation, reduced agricultural employment, and growing socio-economic disparities (Śpiewak, 2019; PwC, 2023; Holdinghausen, 2022; Statistics Poland, 2024a).

Other aspects of life that natural disasters can affect are transportation and infrastructure. One should keep in mind that almost 26% (about 11,000) of the villages[2] in Poland are not directly connected by public transportation, either rail or road, to the municipalitycapital, without the need for a transfer. Therefore, it is often pointed out that rural areas, especially those in peripheral locations, are affected by transportation exclusion, that is, the inability to travel beyond one's locality due to poor road and bridge condition (Guzik, Kolos, 2021). Transportation exclusion, sometimes referred to as "transport disadvantage" (Stopher & Stanley, 2014), occurs when people experience a lack of transport options and/or limited ability to use existing options, resulting in restricted mobility and consequently reduced access to goods and services. Thus, transportation exclusion encompasses not only limited access to public transport but also the broader social inequalities that arise from difficulties in reaching essential service facilities such as hospitals and schools (Wierzbicka & Prościak, 2024).

The unpredictability of weather conditions also makes an impact on the daily lives of all rural residents. Sudden rainfall can destroy private properties, heat waves can be difficult to bear for the elderly, strong winds can cause damage to buildings or power outages, snowstorms can contribute to cutting off homes from the outside world, etc. The list of consequences of natural disasters and sudden changes in weather is long, but all of them result in difficulties in life and additional costs, as well as stress and a sense of fear, danger, or uncertainty. All this is not insignificant for the sense of security.

Taking the above into account, surveys conducted among rural residents included questions not only about fear of crime and other threats but also about concerns related to natural disasters. The analysis of these survey results is presented below. It is important to clarify that the present discussion is based on quantitative research - specifically, surveys administered to rural populations - which encompassed questions regarding fear of crime, perceived threats, and concerns about personal safety. These dimensions are central to victimization studies, where respondents are typically asked about their fears or anxieties

[2] Village – an auxiliary unit of a municipality in modern Poland, characteristic mainly of rural areas.

concerning specific crimes or hazards. Such questions enable researchers to capture a broader understanding of perceived risk and insecurity. Accordingly, in this article, the terms *fear* and *concern* are used somewhat interchangeably to reflect their conceptual overlap.

Climate change and natural disasters as a source of threats in rural areas – an analysis of research results

Methodology

Implementation of the "Rural Crime in Poland" research project, funded by the National Research Center, involved among other things, quantitative research conducted on a sample of inhabitants living in rural areas. The research was carried out in late 2023 and early 2024 using face-to-face computer assisted personal interview (CAPI) method, which included interviews conducted directly with respondents using a tablet computer (Groves et al., 2009). Participation in the survey was entirely voluntary and based on informed consent. At the beginning of each interview, the interviewer provided respondents with detailed information about the study. Respondents were informed that they had been selected randomly, that participation was fully anonymous, and that their answers would be used solely for scientific purposes in aggregated form. They were also assured that no personal data would be linked to their responses and that any identifying information collected temporarily for quality control purposes would be destroyed after the completion of the research and the verification of interviewer work. The survey questionnaire was divided into three parts, each of which addressed: (1) a sense of security and fear of crime; (2) experience related to crime (victimization questions); and (3) preventing and combating crime and evaluating the work of the police.

The target population for this study comprised adults aged 18 and over residing in rural areas of Poland, defined as rural municipalities and the rural parts of mixed urban–rural municipalities (excluding residents of urban areas within these municipalities). A stratified, three-stage random-route sampling procedure was employed. In the first stage, rural municipalities were randomly selected; in the second stage, localities (villages) within those municipalities; and in the third stage, starting addresses within those localities were randomly drawn. From each starting point, interviewers followed a predefined random route and conducted one interview per household until the assigned quota was fulfilled. To ensure independence of observations, only one respondent per household was interviewed.

The sample was proportionally allocated to reflect the structure of the rural adult population, using: (1) cross-stratification quotas based on gender (2 strata), age (6 strata), and educational attainment (3 strata), resulted in 36 cross-classified cells; and (2) edge quotas based on voivodeship (similar to a province in many other countries) (16 strata) and degree of peripherality (4 strata), operationalized according to the DEGURBA classification (Types 2 and 3: rural and small-town areas).

The final sample consisted of n = 1,006 successfully completed interviews, defined as respondents who completed the entire questionnaire (excluding questions legitimately skipped due to filter logic) and whose interviews passed all quality control procedures,

including both field-based and office-based validation. This number reflects the total number of completed and valid interviews, not the total number of contact attempts.

Table 1

Characteristics of the survey sample (sex, age, education)

		Age (in years)					Educational status		
	Total	18-23	25-34	35-44	45-64	65+	higher education	secondary or post-secondary	Basic vocational or lower
Total	1,006	101	171	201	331	202	194	342	470
female	508	47	83	98	161	119	122	177	209
male	498	54	88	103	170	83	72	165	261

Source: prepared by the author

An almost equal number of women (50.5%) and men (49.50%) participated in the survey. As for the distribution of age groups, the largest group were persons aged 45-64 (32.9%), followed by those aged 65 and over (20.1%) and 35-44 (20%); a slightly smaller group was composed of those aged 25-34 (17.0%), and the least numerous were persons aged 18-24 (10.0%). It is worth noting that the distributions of age, sex, and education in the sample are proportional to the distribution of these characteristics in the population covered by the survey, i.e. residents of rural municipalities and rural parts of rural-urban municipalities (as well as intersections of these characteristics).

All respondents are residents of rural areas in Poland, which, for the purpose of the survey, were defined based on the criterion of peripherality according to the DEGURBA (degree of urbanization) classification, which is used to classify local administrative units (in Poland, the classification is based on division into municipalities) into three groups of units: "cities," "towns or suburbs," and "rural areas." With reference to this classification, for the purpose of this survey, it was assumed that the type of municipality defined as DEG2 (according to the DEGURBA classification) includes rural municipalities and rural parts of rural-urban municipalities that are located closer to urban centers. DEG3 includes these types of municipalities that are located in remote areas. The surveys involved 205 people living in municipalities classified as DEG2 and 801 people living in municipalities classified as DEG3. Among the respondents, 40.0% of women and 39.7% of men lived in remote areas, and 10.5% of women and 9.8% of men lived in areas closer to cities.

Survey results

Knowing from the previous part of this article what climate change and resulting natural disasters occur in Poland, as well as their impact on various areas of rural residents'

lives, it is important to look at whether they are perceived by rural residents as threats. An analysis of selected results of the quantitative research will help answer this question, since the respondents were asked, among other things, about what they feared as residents of rural areas. The questions about various types of threats, including crime, included those about their concerns regarding natural disasters, with an indication that these should be understood to mean, for example, fires, droughts, and floods. In their response to the question "As a resident of a rural area, are you concerned about…?," they were allowed to select one of the following answers:

- I am definitely concerned;
- I am rather concerned;
- I am neither concerned nor not concerned;
- I am rather not concerned; and
- I am definitely not concerned.

For this question, the interviewers could also mark a different answer (they did not read it to the respondent right away) as not applicable (when the respondent was unable to experience such a problem, e.g., he could not be concerned about the theft of a tractor because he did not own one); and I don't know.

As shown in table 2, natural disasters rank among the foremost concerns for rural residents in Poland, second only to the risk of serious illness affecting the respondent or a family member. Other threats, including crime, are mentioned notably less frequently. Regarding natural disasters, 10.4 % of respondents reported being "definitely" concerned, and 24.5 % "rather concerned," combining to 34.9 % who expressed any level of concern. This finding suggests that natural disasters evoke legitimate anxiety within a substantial segment of the rural population, although strong fear is not predominant.

Table 2

Responses to the question "As a resident of a rural area, are you concerned about…?"

As a resident of a rural area, are you concerned about…?:	% definitely concerned & rather concerned*
myself or my family member becoming seriously ill	44.1%
a natural disaster	34.9%
drunk or intoxicated drivers	34.0%
involvement in a serious traffic accident	25.5%
identity theft	25.0%
hacking into an email account, on a social network website, or on an auction website	23.3%
an internet scam	21.4%
aggression by drunk or intoxicated persons	20.6%
a burglary	18.2%
a phishing scam by fraudsters	16.8%
an aggressive behavior on the part of youth groups	15.9%
an act of vandalism, such as destruction of property	15.4%
bicycle theft	14.7%
theft of things other than those mentioned in this question	13.0%
robbery (assault and robbery)	12.5%
theft of a car, truck, or van	11.8%
activities of organized criminal groups	11.2%
persistent harassment by another person	10.9%
noisy, rudely behaving neighbors	10.1%
being beaten, wounded	9.7%
discrimination motivated by other persons' prejudices	9.1%
being in a situation that forces me to give a bribe	8.7%
a sexual assault	8.7%
theft of a farm tractor or other farm machinery	7.1%
death by homicide	8.1%
theft of a motorcycle, scooter, or moped	7.8%
physical and psychological violence	7.1%
theft of fuel	6.7%
theft of livestock	5.7%
theft of bales of hay or straw	5.1%

*The percentages do not add up to 100%. The table presents the summed responses: definitely concerned and rather concerned from the five possible response categories.

Source: prepared by the author.

From a theoretical standpoint, this pattern aligns with the Health Belief Model (HBM), which posits that individuals' perceived susceptibility and severity of a threat influence their concern and protective behaviours (Rosenstock, et al., 1988; Alyafei, Easton-Carr, 2024). In this context, rural residents' past experiences with extreme weather events – or the absence thereof – may shape their perceived risk and consequent concern levels. This may explain why respondents perceive natural disasters to be potentially severe, but not highly probable, especially given their relatively infrequent occurrence in Poland. Furthermore, the Theory of Planned Behavior (Ajzen, 1991) posits that individuals' intention to engage in protective behaviours is shaped by their attitudes towards the behaviour, perceived social norms, and perceived behavioural control, which together influence how people respond to environmental risks such as natural disasters. Additionally, Social Cognitive Theory (SCT) places further emphasis on the role of self-efficacy and observational learning in shaping fear and preparedness regarding disasters (Bandura, 2004). Research has demonstrated that high self-efficacy can act as a buffer against excessive anxiety by enhancing individuals' confidence in managing hazards. SCT also emphasizes that cognitive factors, environmental context, and behavior interact (reciprocal determinism), which helps explain why exposure to flooding can heighten threat perception locally, whereas those without such experiences feel comparatively less threatened.

Integrating these theoretical perspectives provides a more nuanced understanding of how rural residents in Poland perceive disaster-related risks. This insight is essential for designing effective risk communication strategies, strengthening community resilience, and informing crime prevention policies within the framework of rural criminology.

The analysis of the survey results indicates that women accounted for 54.7% and men for 45.3% of the respondents expressing concern about natural disasters (table 3). This distribution reflects general patterns of risk perception as well as gendered social roles and responsibilities. Previous research consistently shows that women tend to report higher levels of fear and risk perception than men, which is often attributed to a combination of physical vulnerability, social roles related to caregiving, and limited access to resources that facilitate coping with crises (Ceccato, 2016; Neumayer & Plümper, 2007). Villarreal and Meyer (2020) further highlight that women's disaster experiences are shaped by gendered power dynamics and childcare responsibilities, which influence their protective actions and recovery processes. Furthermore, their participation in household and community decision-making is often limited, exacerbating vulnerabilities and shaping distinct gendered responses to disasters.

These findings collectively underscore the importance of considering gender in understanding risk perception and designing effective disaster preparedness and crime prevention strategies in rural communities.

Among those who indicated that they were concerned about natural disasters, 32.2% were aged 45-64, 21.4% were 65 and older, 20.8% were between 35 and 44, 16.5% were in

Table 3

Sex and age of the respondents answering the question "As a resident of a rural area, are you afraid of natural disasters?"

	Sex		Age				
	woman	**man**	**18-24**	**25-34**	**35-44**	**45-64**	**65+**
Total (N=1,006)	508	498	101	171	201	331	202
I am definitely concerned	56	49	6	15	19	38	27
I am rather concerned	136	110	26	43	54	75	48
I am neither concerned nor not concerned	108	103	21	35	42	72	41
I am rather not concerned	120	132	27	34	55	85	51
I am definitely not concerned	69	85	17	37	21	47	32
Not applicable	3	3	0	0	2	3	1
I don't know	16	16	4	7	8	11	2

Source: prepared by the author.

the 35-44 group, and 9.1% were the youngest respondents age group (18-24 years). The fact that the youngest respondents do not show as much fear of natural disasters as older respondents may be associated with the fact that they are less aware of the consequences of natural disasters and are less likely to own farms or property that could be affected. The greater concern of natural disasters as a threat among people 45 and older may be associated with: (1) experience with effects of natural disasters in the past, which can heighten anxiety or stress about future threats (Gaffney et al., 2024); (2) concerns about coping with the effects of possible natural disasters, which may be related to physical and health limitations; (3) more limited access to information about current threats, ways to deal with them, or institutions from which one can request help; (4) greater inability to use social media, which today is often used not only as a tool for communicating current information about emergency situations, but also for obtaining data that can be an important element in the planning and implementation of rescue and relief operations (Kosowski, Luzar, 2020); and (5) influence of the media, which publicize and escalate topics of natural disasters, and emphasize their dramatic effects ("availability heuristic" effect), which can increase the sense of danger, especially among the elderly (Prajzner, 2007; Lytle et al., 2020).

Of the survey respondents who considered natural disasters as a threat, only 20.2% live in localities close to cities (DEG2), while the majority, 79.8%, live in remote rural areas (DEG3). In the latter group, 67.2% are residents of remote rural places, while 12.5% are residents of rural parts of remotely located rural-urban communities. It seems that the concerns of the residents of these municipalities (DEG3) are justified. These areas are located

farther from urban centers, and it is more difficult for emergency services to reach them, if only because of less developed road infrastructures. Limited access to paved roads, for example, can make residents of remote areas consider the effects of floods, windstorms or even snowstorms as more acute, and evacuation or delivery of aid in those areas can be difficult. Moreover, rural people living in remote areas and very often relying on agriculture as their livelihood, as indicated above, are vulnerable to any kind of natural disaster, hence, the percentage of respondents living in DEG3 areas concerned about this threat is the highest.

For the question related to threats, response patterns can also be demonstrated. Due to the subject matter of this article, only those regularities that relate to natural disasters will be discussed. As many as 62.2% of those who said they were definitely concerned about natural disasters (e.g., fire, drought, or flood) indicated that they had heard about water, air, or land surface pollution with harmful substances at least 5 times in recent years. At the same time, 19.4% of those who are definitely concerned about natural disasters indicated that they had heard several but less than 5 times about such environmental pollution, 12.8% had heard about it once or twice, and 7.3% had never heard about it. On the other hand, among those respondents who answered that they were "rather" concerned about natural disasters, 16.2% had heard at least 5 times in the past 5 years about water, air, and other pollution in their village or the immediate area, 47.2% had heard about it several but less than 5 times, 52.0% had heard about it once or twice, and 19.5% had never heard about such pollution. As can be seen, those who had heard/talked about environmental pollution are more likely to declare concern about natural disasters. It is difficult to explain this relationship without a more in-depth research, but it seems reasonable to assume that those who declared concern about natural disasters were simultaneously attentive to the topic of environmental pollution in their immediate surroundings. Of course, more in-depth analyses, such as to determine whether the respondents live in an area that can potentially be affected by natural disasters, whether they actually have experienced such a danger, or whether they equate environmental pollution with natural disasters, could allow a better understanding of the answers given and confirm whether, for example, natural disasters are more often feared by people who are interested in the environment and talk about it (and therefore have learned about its pollution).

In general, the surveys showed that greater concern about different categories of threats is generally accompanied by more frequent declarations that respondents have heard about those or other types of threats occurring in their village and the immediate area in the past 5 years. This may mean that, first, rumors/discussions about threats create fear of them, and second, people who are more concerned about threats have a "more sensitive ear" for information regarding such situations and events (Farral et al., 2007). It has already been repeatedly pointed out in the literature that better social control - characteristic of more coherent communities in which interpersonal relationships, identification with the neighborhood, and possession of shared values and goals are present - can have an impact on reducing crime and increasing the sense of security. However, such communities can also involve more frequent exchanges of information about neighbors' negative experiences and thus increase anxiety and perceived threats (Wyant, 2007).

The 2024 flood as an example of a real threat to inhabitants of rural areas (analysis of the course of the disaster, the losses, and the response to the crisis)

About a year after the completion of the survey, a significant natural disaster struck southern Poland — the 2024 flood. Including this event as a case study helps to contextualize the survey findings by illustrating the real and immediate threat that natural disasters pose to rural communities. September 2024 brought a catastrophic flood, reminiscent of the dramatic events that took place more than 25 years earlier (Guardian, 2024; Gozzi et al., 2024; Stezycki et al., 2024). Heavy rainfall resulting from a cyclone named Boris (which came out of what is known as a "Genoa low". It is a low-pressure system of Mediterranean origin that originates in the area of the Gulf of Genoa, from where it begins its north-eastward migration towards central Europe. It caused an emergency situation in many regions of Poland. Flooded homes, destroyed infrastructure, and dramatic rescue operations became a daily occurrence in localities that faced a similar disaster in 1997. The World Weather Attribution (WWA) showed that this flood was the result of global climate change. In a report compiled by the WWA, scientists pointed to a link between human activity and an increase in the likelihood of disasters such as the 2024 flood that hit Central Europe. According to their research, the probability of similar atmospheric phenomena has doubled as a result of human-induced climate change. The precipitation in Poland between September 12 and 15, 2024 was not only 10% more than usual, but also about twice as likely as in pre-industrial times, when humanity did not yet emit such huge amounts of greenhouse gases. The conclusions are alarming: according to the WWA, the Earth's warming has already reached 1.3 °C, which has significantly increased the risk of extreme weather events (Kimutai et al., 2024).

The 2024 flood was predicted accurately in advance, and the death toll was significantly lower compared to the floos of 1997 and 2001, with 54 fatalities (State Fire Service, 2024). In contrast, the 2024 flood led to 9 confirmed fatalities (State Water Holding Polish Waters, 2025). This indicates the improvement of emergency management systems and the effectiveness of investments in forecasting, early warning systems, and forecast-based activities, including evacuation, flood defenses, and preventive release of water from reservoirs. However, in many cases, infrastructure and emergency management systems were overwhelmed by the scale and magnitude of this flood, leading to significant damage and even fatalities.

The flood caused widespread destruction affecting both urban and rural populations. So how did rural areas cope with this disaster? The characterization of the 2024 flood has to start with a description of how farmers were affected by the disaster. In one of its communications on the floods, the Agency for Restructuring and Modernization of Agriculture (ARMA)[3] indicated that some 80,000 hectares of agricultural land were inundated by flood waters (PPA, 2024). Of this area, about 27,000 hectares of the land had crops (corn, sugar cane, tobacco, sunflowers, among others) that had not been yet been harvested. According to ARMA, more than 4,300 farms were harmed by the floods, with

[3] ARMA deals with the implementation in Poland of instruments co-financed from the budget of the European Union and provides assistance using domestic funds. It is the main institution supporting the processes of transformation and activities in support of the development of Polish agriculture and rural areas.

some 3,400 farmers reporting losses of more than 30% of their agricultural production (ARMA, 2024). The agency immediately launched relief efforts intended for those farmers who suffered losses due to the flood, planning for the possibility of applying for financial support.

Buildings, agricultural machinery, and grain stores were also affected. Agricultural crops were destroyed bcause, due to the flooding, they were unsuitable for human and animal consumption and, moreover, had to be disposed of in a certain way. A huge loss for both farmers and the environment was the loss of some 100,000 bee colonies in the flooded areas. The flood destroyed many hives and much of the beekeeping infrastructure. Some of the bees that survived were found in a state of hypothermia and covered with mud. On the other hand, the surviving bees faced a reduction in available resources, as many hectares of fields with honey-producing plants such as rapeseed, acacia robinia, and willows were flooded. In the future, this could negatively affect the amount of honey produced (Pilarczyk, 2024). New challenges also emerged, e.g., the supply of drinking water or access to electricity to enable the milking of animals on many livestock farms.

When writing about the flood, one cannot help but mention the looting (Frailing & Harper, 2017) . There were numerous examples of this criminal practice described by the media. One farmer recounted a situation where a delivery truck carrying animal feed fell into the water along with the driver. A joint broke in the vehicle, so it was left in the water overnight. The next day, when the truck owner's workers arrived at the site to attempt to pull it out of the water, they noticed that it had broken windows and a ransacked interior (Malinowski, 2024). There were also reports of fraud, extortion, and theft by criminals claiming to be emergency service workers (soldiers). There was one case in which a person wearing in a military uniform passed out false information about an alleged plan to blow up a levee, which created a feeling of great concern among residents of flooded areas (Stępień, 2024).

Events such as natural disasters also often exacerbate the existing exclusion and marginalization. As recently as in November 2024, the media showed dramatic scenes in rural areas affected by the floods. A volunteer helping flood victims in southern Poland described the situation in that village as follows (Chrzanowski, 2024):

> *I was in a house that could be accessed by a bridge before the flood - now there is only a makeshift footbridge made of old doors, installed by soldiers. A man and his two disabled sons live there, and they are completely separated from the outside world. The ambulance has no way to get there, and neither do other services. When I was inside that building was, I swear, I thought I was on the set of some horror movie. It looked awful, these houses are ruined. It's a landscape like one after the war.*

A special hotline was also set up for affected farmers and businesses, with staff providing information on settlements and tax relief for flood victims. Also free land tests performed by regional chemical and agricultural stations are also planned. Provisions allowing deferral of VAT taxes, changes related to income tax, and gift tax exemptions came

into effect. Flood victims could also apply for non-refundable funds to repair or rebuild damaged buildings (Wieści Rolnicze, 2024).

Uniformed services such as the fire brigade, police, and military helped the flood victims. Police officers organized additional patrols in places from which people were evacuated so as to best secure temporarily abandoned houses, apartments, etc. Prime Minister Donald Tusk asked law enforcement and the judiciary to make all crimes committed in the flooded areas a priority in their work. He wanted to bring perpetrators to justice and impose punishments as soon as possible so that any attempts to conduct criminal activity would be quickly suppressed.

It should be noted that flood victims also received assistance from other citizens. In particular, it should be emphasized that farmers from all over Poland organized the collection of fodder, hay, straw, etc., and their transportation to farmers who were unable to feed their animals in this difficult period. Simultaneously, reports emerged in public spaces, including social media, about alleged, possibly fraudulent, fundraising campaigns for flood victims. Police immediately launched warning measures, informing people about the need to treat such collections with extreme caution, especially if they were organized on unknown social media profiles or websites (Mazowsze Police, 2024).

This example of a flood in southern Poland, which affected many rural areas, provides a good explanation for why inhabitants of rural areas so often mention natural disasters among possible threats. Media reports often contained claims by rural residents that better care is taken of cities than of villages during floods. Rural residents indicated that it is a common stereotype to say that "country folk can survive." The above description of the measures that were taken to save rural residents and their belongings from the flood, and what aid was organized. However, this cannot be viewed indiscriminately, because very often this assistance arrived too late, was insufficient, etc. All of this was due to the remoteness of some localities, the lack of adequate infrastructure, including emergency infrastructure, and the inability of emergency services to reach the site or their insufficient number. Many of these failures are related to the difficulties mentioned in this text that exist in Polish rural areas.

Discussion

Given the identified gap in research on rural areas within Poland, comparative studies examining disaster-related risk perceptions exclusively in rural contexts—and contrasting these with urban counterparts—would be highly beneficial. Such efforts could both strengthen rural criminology as a research field in Poland and bring it in line with global academic developments. Researchers who have studied the subject of natural hazards and their public perception point to differences in the role of local and family networks in community life. They emphasize that the role of one's own observations in gaining knowledge about risks decreases as the size of the locality increases. A study conducted by Biernacki et al. (2009) shows that rural residents whose social environments are more vulnerable to disruption due to greater dependence on nature (e.g., fields, meadows, drainage canals) very often identify their own observations as the source of knowledge about the

functioning of the local environment, which is not true in the case of urban residents, whose personal lives are rarely disrupted in so many important spheres and often for a shorter period (Biernacki et al., 2009). The aforementioned authors aptly note that it is not only the characteristics of extreme weather events, but also the characteristics of communities affected by natural disasters, that affect the perception of danger. As an example, they cite the impact of strong winds and windstorms on the sense of insecurity of urban and rural residents. The fact that the latter show more concern about these phenomena may be due to the nature of buildings in rural areas, with many single-family houses,and outbuildings (barns and sheds), for which each owner is responsible (for example, it is the owner of a barn who has to repair the roof torn off by a storm). Such concern is not felt by those living in cities in blocks of flats, because the responsibility for such buildings rests with the administration - the owner that manages the building. Moreover, as already highlighted in this study, rural residents who depend on work on farms for their livelihoods are at greater risk of losses from extreme natural events. Phenomena such as drought or frost, for example, may be virtually unnoticed by urban residents, while farmers may consider them a natural disaster that has destroyed their crops (Biernacki et al., 2009).

Taking the above into account, in order to be able to take appropriate measures to prepare rural residents for the risks of natural disasters, and thus to be able to reduce their sense of threat associated with these phenomena, it is necessary to undertake multi-faceted activities. This includes the implementation of a comprehensive risk management policy in rural areas, effective early warning systems, educational activities (leaflets, instructional videos, training meetings to inform residents how they should prepare for emergencies and what they should do when they occur), and improving access to aid funds. For this to be possible, the perspectives of rural residents must be known in advance and taken into account, and their concerns should form the foundation of future security strategies. Thus, analyses and research carried out by researchers - including criminologists - should be a key tool for authorities and relevant services to effectively solve security problems in rural areas of Poland.

Conclusion

The sense of security of rural residents is a complex issue influenced by many factors. Social, financial, economic, as well as infrastructural factors can be pointed out, but one cannot forget about natural disasters and crime. The study conducted as part of the “Rural Crime in Poland” project demonstrated that natural disasters are one of the most frequently cited threats by rural residents. Rural residents’ sense of security is not only shaped by the actual risk of emergency events, but can also be related to previous experiences, and the impact of information presented on the media, among other factors.

The flood that hit southern Poland in 2024 had far-reaching consequences, not only material, but also social, which lead, among other things, to a deepening sense of marginalization in rural communities. Moreover, the 2024 flood showed that previous strategies to combat the negative effects of floods are insufficients in terms of restricting development in flood plains and focusing on technical measures such as the construction of water storage reservoirs, among others (Supreme Audit Office,2023).

In the criminological context, an important finding of the study is the impact of natural disasters on increasing levels of victimization and sense of insecurity, which can lead to changes in attitudes toward the law and institutions responsible for security. Another risk is an increase in certain forms of crime, such as theft and fraud, which can be exacerbated by the chaos caused by a disaster.

However, the aftermath of natural disasters may bring not only heightened fear of future events but also actual conditions that reinforce such fear. Research shows that during and after disasters, various crimes tend to increase, including burglary, looting, sexual violence, and even human trafficking (Pyles & Lewis, 2007; Frailing et al., 2015). These phenomena are often linked to the breakdown of social order and weakened law enforcement. This highlights the need for further in-depth research within the framework of disaster criminology, which can help better understand the interplay between disaster-related fear, social vulnerability, and crime (Frailing & Harper, 2017).

This study also shows the need for future research of a more in-depth nature that will allow a better understanding of the concerns of rural residents. Last but not least, attention should also be paid to the need to educate and build public awareness of disaster risks and the need for adaptation measures in agriculture in order to increase resilience to climate change and its effects.

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