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CITIZEN'S INVOLVEMENT IN THE SHAPING OF LOCAL SECURITY BY THE USE OF A DIGITAL CRIME MAPPING TOOL BASED ON GIS

ABSTRACT   More and more advanced crime mapping methods have been used for several dozen years for imaging, analyzing, and, consequently, preventing, and combating crime. Initially, they served only specialized task units in charge of the fight against crime. Subsequently, they became sources of public information on the level of security in particular locations. The crucial requirement for the development of these methods in the third decade of the 21st century is related to the interaction with citizens, who turn from recipients of data into their co-creators by reporting threats occurring in their neighborhood. This article analyzes the National Map of Security Threats (Krajowa Mapa Zagrożeń Bezpieczeństwa, KMZB) implemented in Poland as a GIS-based tool to involve citizens in creating local security and a source of knowledge about the perception of personal safety by KMZB users.

Keywords: security, threats, citizens, crime mapping, GIS, Poland

INTRODUCTION

Knowledge that certain areas are more prone to higher incidence of crime than others due to factors such as physical layout of an area or proximity to police stations has led the police and other uniformed services to map the areas in order to counter criminality more effectively. Identification of 'hot spots' is helpful because it allows better allocation of time for other police activities. As such, the ability to prioritize intervention through a geographic lens is appealing.[1] The spatial approach in the study of crime was possible thanks to such research concepts as the creation of crime patterns (the works of Patricia and Paul Brantingham[2]), recognition of the motivation of offenders based on rational choice (D. Cornish, R. Clarke[3]), situational prevention crime (R. Clarke[4]) or recognition of routine activities (L. Cohen, M. Felson[5]).

The first ever crime map was issued in 1829 in France by Adriano Balbi and André M. Guerry and showed the relationship between the educational level, violence and property crime in France.[6] Subsequently, Joseph Fletcher (in 1849) and Henry Mayhew (in 1861) produced maps that showed rates of male incarceration and county crime, respectively.[7] In the early 20th century, Clifford R. Shaw and Henry McKay mapped thousands of incidents of juvenile delinquency and analyzed the relationships between delinquency and various social conditions.[8] In the following decades several types of maps were developed:

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[1]   T.H. Grubesic, A.T. Murray, "Detecting Hot Spots Using Cluster Analysis and GIS", at http://www.tonygrubesic.net/hot_spot.pdf, 1 February 2022; S. Chainey, L. Tompson (eds), *Crime Mapping Case Studies: Practice and Research*, Chichester 2008, p. 11.

[2]   P.L. Brantingham, P.J. Brantingham, "Situational Crime Prevention in Practice", *Canadian Journal of Criminology*, vol. 32, no. 1 (1990), pp. 17-40; eidem, "Environment, Routine, and Situation: Toward a Pattern Theory of Crime", in R.V. Clarke, M. Felson (eds), *Routine Activity and Rational Choice*, New Brunswick 1993, pp. 259-294.

[3]   D.B. Cornish, R.V. Clarke, "Understanding Crime Displacement: An Application of Rational Choice Theory", *Criminology*, vol. 25, no. 4 (1987), pp. 933-947; eidem, *The Reasoning Criminal: Rational Choice Perspectives on Offending*, New York 1986.

[4]   R.V. Clarke, "Situational Crime Prevention", in R. Wortley, L.G. Mazerolle (eds), *Environmental Criminology and Crime Analysis*, Devon 2008, pp. 178-194.

[5]   L.E. Cohen, M. Felson, "Social Change and Crime Rate Trends: A Routine Activity Approach", *American Sociology Review*, vol. 44, no. 4 (1979), pp. 588-608.

[6]   J. Hunt, "From Crime Mapping to Crime Forecasting: The Evolution of Place-Based Policing", at https://www.ncjrs.gov/pdffiles1/nij/252036.pdf, 1 February 2022; B.D. Dent, "Brief History of Crime Mapping", in L.S. Turnbull, E.H. Hendrix, B.D. Dent, *Atlas of Crime: Mapping the Criminal Landscape*, Phoenix 2000, p. 5.

[7]   S. Chamard, "The History of Crime Mapping and Its Use by American Police Departments", *Alaska Justice Forum*, vol. 23, no. 3 (2006), p. 6.

[8]   C.R. Shaw et al., *Juvenile Delinquency and Urban Areas: A Study of Rates of Delinquents in Relation to Differential Characteristics of Local Communities in American Cities*, Chicago 1942; eidem, *Delinquency Areas: A Study of the Geographical Distribution of School Truants, Juvenile Delinquents, and Adult Offenders in Chicago*, Chicago 1929.

1. Dot maps: their structure is based on the physical marking of each case of a given phenomenon on a city plan, according to the availability of institutional data.
2. Zone maps: related to the determining of a focal point (marked as a concentric zone), outside which further zones appear.
3. Rate maps: show the ratio of the number of inhabitants affected by a specific phenomenon or a problem in relation to total population.
4. Radial maps: structured around a radial (unambiguously directed) change in a phenomenon, beginning with the city center as the starting point.[9]

In the 1990s, when computer processing speed increased, the limitations of traditional paper-wall maps were overcome. Traditional maps were valuable but had some serious limitations. First of all, they occupied a lot of space on walls or tables. Secondly, after being updated, the initial crime patterns were no longer available, which made it impossible to follow trends over time. And because of their static nature, they were resistant to manipulation.[10] Computers not only revolutionized the mapping of crimes, but also allowed uniformed services to shift from analyzing the collected data to crime forecasting.[11]

The use of GIS has been another revolutionary step in crime mapping. The geographic information system (GIS), using geography and computer-generated maps, has enabled the police to plan effectively for emergency response situations, determine mitigation, prioritize, and predict the future, and analyze past events. GIS helps to identify potential suspects, thereby increasing investigators' suspect base when no leads are evident.[12] Easy access and the quick processing of information displayed in a spatial and visual medium allows service providers to allocate resources quickly and effectively. This is why GIS remains the primary support for crime mapping.[13] GIS is used by police departments all over the world to provide mapping solutions for crime analysis, criminal tracking, traffic safety, community policing, intranet/internet mapping, and other tasks. Figure 1 presents different crime maps based on GIS from Chicago, New

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9   K. Czekaj, M. Zawartka-Czekaj, "Problemy społeczne, mapy badawcze, planowanie społeczne – perspektywa smart city", *Studia Ekonomiczne*, vol. 243 (2015), p. 41.

10   P. Polko, "Digital Crime Mapping and Its Challenges", in N. Dakovic, K. Radulovic, L.R. Mijatovic (eds), *Transmedia Storytelling and Digital Mapping: History, Memory, Identity*, Belgrade 2021, pp. 35-50.

11   J. Fitterer, T.A. Nelson, F. Nathoo, "Predictive Crime Mapping", *Police Practice and Research*, vol. 16, no. 2 (2015), p. 125.

12   C.P. Johnson, "Crime Mapping and Analysis Using GIS", Geomatics 2000: Conference on Geomatics in Electronic Governance, Pune, January 2000, at https://www.cdac.in/index.aspx?id=pdf_geom4, 1 February 2022; S. Mordwa, "Techniki GIS – w poszukiwaniu hot spotów przestępczości", *Archiwa Kryminologii*, vol. 37 (2015), pp. 279-302; R.B. Santos, *Crime Analysis with Crime Mapping*, Thousand Oaks 2017; M. Leitner, *Crime Modelling and Mapping using Geospatial Technologies*, Dordrecht 2013.

13   J.H. Ratcliffe, "Crime Mapping and the Training Needs of Law Enforcement", *European Journal on Criminal Policy and Research*, vol. 10 (2004), pp. 65-83; J. Ferreira, P. João, J. Martins, "GIS for Crime Analysis: Geography for Predictive Models", *Electronic Journal Information Systems Evaluation*, vol. 15, no. 1 (2012), pp. 36-49; M. Vijaya Kumar, C. Chandrasekar, "GIS Technologies in Crime Analysis and Crime Mapping", *International Journal of Soft Computing and Engineering*, vol. 1, no. 5 (2011), pp. 115-121.

York, and London. All of them provide users the visualization of a selected type of crime in a specified period, expressed in figures and percentages and in three formats: a precinct map, a crime location map, and a heat map. One can summarize the crime counts by police beat, district, ward, community area, and census tract. The crime data has been grouped into logical crime categories, which are visualized graphically on the maps to facilitate their identification. Dropping down a given category allows one to reach the description of a specific event.


(1)
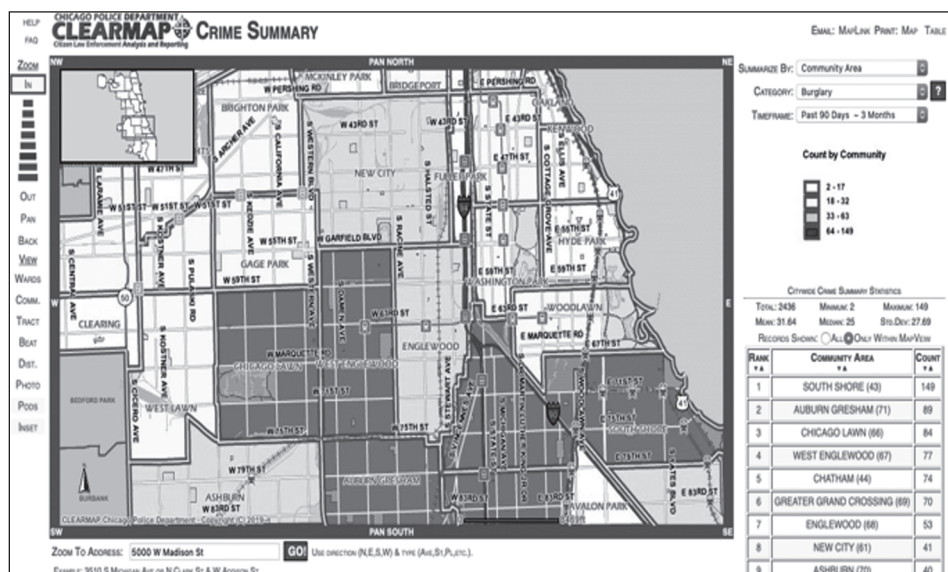
(2)
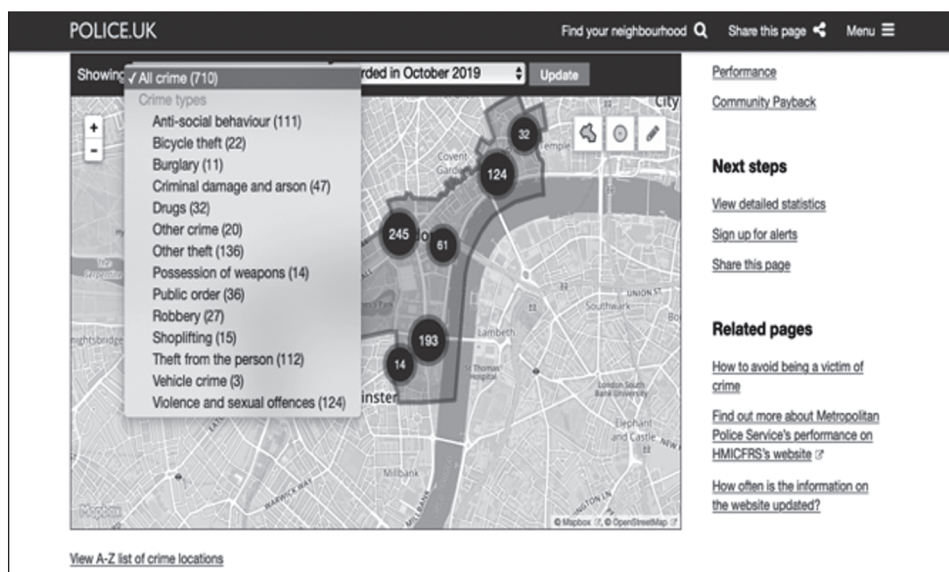
(3)

Figure 1. (1) New York City Crime Map showing: crimes per 1000 residents by precinct; (2) Chicago Crime Map; (3) The United Kingdom Police national crime map. Source: New York City Crime Map, at https://maps.nyc.gov/crime/, 1 February 2022; Chicago Police Department, at https://gis.chicagopolice.org, 1 February 2022; The United Kingdom Police, at https://www.police.uk, 1 February 2022

In Poland, the first attempt to create a map of threats was made locally, in Warsaw in 2003. The Warsaw Security Map was created using police statistics and meetings with the inhabitants of the capital city (a total of 350 meetings were attended by representatives of the city authorities as well as the Police and the City Guard). The tool was designed to give residents an opportunity to report dangerous places and events online (excluding those requiring immediate intervention). Further work on the project was suspended in 2005. Again in Warsaw, in 2010, the City Guard made a map available to residents that showed selected offences in which they intervened (robberies, fights, and thefts).[14] Similar local attempts to meet the expectations of residents appeared in other smaller cities. However, they were not comprehensive enough and did not meet the condition of interactivity. The analysis of crime hot spots using GIS techniques and tools was undertaken, among others, by S. Mordwa, N. Sypion-Dutkowska, and K. Kądziołka.[15]

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[14]   I. Rozmus, "Rozboje, bójki i kradzieże na Mapie Bezpieczeństwa Straży Miejskiej", Warszawa. Naszemiasto.pl, 7 July 2010, at https://warszawa.naszemiasto.pl/rozboje-bojki-i-kradzieze-na-mapie-bez pieczenstwa-strazy/ar/c4-482848, 1 February 2022.

[15]   S. Mordwa, "Zastosowanie GIS w badaniach przestępczości", *Acta Universitatis Lodziensis. Folia Geographica Socio-Oeconomica*, no. 14 (2013), pp. 77-92; N. Sypion-Dutkowska, "Bezpieczeństwo publiczne uwarunkowaniem rozwoju lokalnego. Skupiska rozbojów i bójek w Szczecinie", in M. Tarkowski, J. Mazurek (eds), *Wybrane problemy rozwoju lokalnego w Polsce*, Gdańsk–Pelplin 2010, pp. 170-183; K. Kądziołka, "Identyfikacja skupień obszarów wysokiej przestępczości z wykorzystaniem statystyki
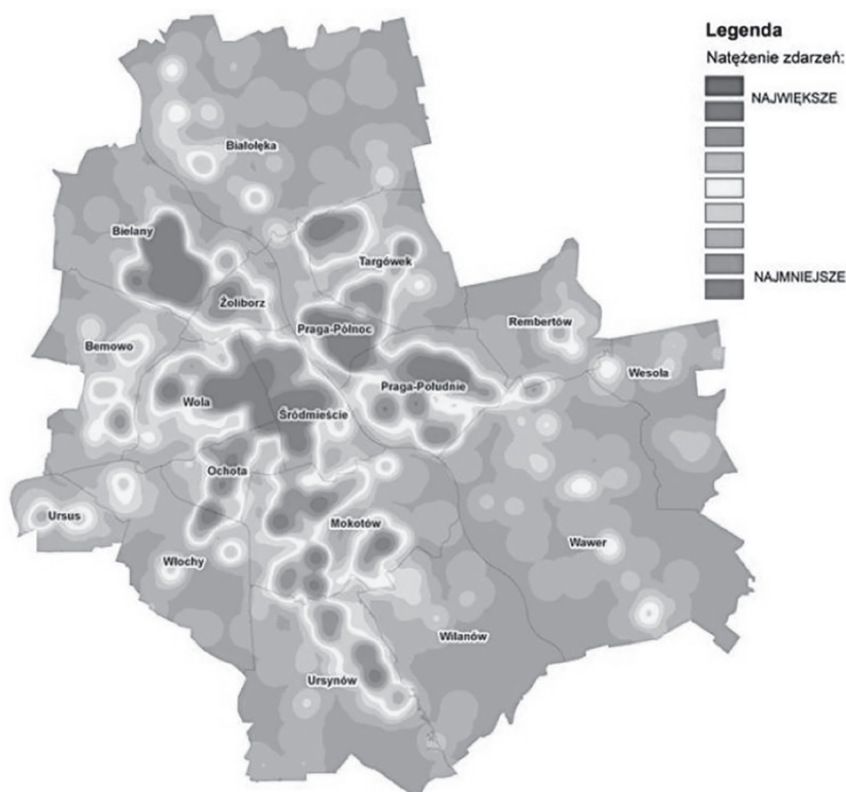
Natężenie zdarzeń dotyczących spożywania alkoholu w miejscach zabronionych

Figure 2. Warsaw Security Map provided by the Municipal Police, showing alcohol consumption intensity in prohibited places. Source: Private archive, press releases from 2017

Contemporary crime mapping is not only used to visualize crime and analyze already-collected records. It is also not enough to make the data available to the public (with some obvious limitations). Its key element now is to involve residents in reporting dangerous places and events (which do not require immediate intervention) in the neighborhood, thus taking part in the process of shaping local security.[16]

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przestrzennej", *Rola Informatyki w Naukach Ekonomicznych i Społecznych. Innowacje i Implikacje Interdyscyplinarne*, no. 2 (2014), pp. 110-121.

16   M.A. Andresen, "Crime Measures and the Spatial Analysis of Criminal Activity", *British Journal of Criminology*, vol. 46, no. 2 (2006), p. 261-262; M. Szyszka, P. Polko, "Interactive Maps of Social Problems and Security Threats Illustrated with the Example of Solutions Currently Used in Upper Silesia", *Sustainability*, vol. 12, no. 3 (2020), 1229.

SOURCES AND METHODS

The National Map of Security Threats (Krajowa Mapa Zagrożeń Bezpieczeństwa) is a tool implemented in 2016 by the Police in Poland. Previously, a trial version of the map had operated in the Silesian Voivodship. The map[17] is *a list of the specific, most common threats to the safety of human life and health, property, and public order, taking into account their spatial distribution, the occurrence of which is important from the point of view of society, the Police, as well as other bodies and institutions, and affects the feeling and enforcement of security in society*.[18]

The tool comprises two parts. The first part consists of statistical data from selected categories of offenses.[19] It presents official statistics on the crime revealed by police forces. The statistical data can be displayed by geographical breakdown (voivodeship, county, and municipality level). The second one is an interactive tool enabling citizens to report threats in their residential area.[20] Reports made by citizens are viewable down to the exact street and number (if this can be indicated). The map allows for reports to be made in 26 hazard categories, indicated in Table 1.

The reporting system is simple and intuitive. The user clicks the 'add report' button and selects the type from the list of categories and then indicates the location of the report on the map by clicking on the right place or by entering the address. In the report, the user can indicate the time of day or days of the week or if the threat occurs periodically and can describe it in detail and attach a photo. Each time, the person entering the report is informed that in the case of an emergency, the police should be contacted immediately by telephone at the indicated numbers. The report is anonymous.

Reports in a given location are marked with colors indicating their status: new (green), verification (yellow), confirmed (red), confirmed and transferred to other institutions (violet), confirmed and eliminated (blue), and unconfirmed (grey). After five years of operation of the National Map of Security Threats, at the end of 2021, 2,122,772 threats reports were recorded. Every day, on average, over a thousand new reports are submitted. According to police statistics, half of all reports are confirmed.

[17]   D. Minkiewicz, "Funkcje krajowej mapy zagrożeń bezpieczeństwa w kształtowaniu bezpieczeństwa społeczności lokalnej", *Kwartalnik Policyjny*, vol. 11, no. 3(42) (2017), pp. 69-74; L. Dyduch, "Krajowa mapa zagrożeń bezpieczeństwa w Polsce a realizacja interwencji policyjnych", *Kwartalnik Policyjny* vol. 11, no. 3(42) (2017), pp. 76-81; J. Stawnicka, "Regulacje prawne i funkcjonowanie krajowej mapy zagrożeń bezpieczeństwa – istotnego elementu procesu zarządzania bezpieczeństwem publicznym przez polską policję", *Roczniki Administracji i Prawa*, vol. 1, no. 18 (2018), pp. 255-270.

[18]   J. Stawnicka, I. Klonowska, *Krajowa Mapa Zagrożeń Bezpieczeństwa nową formą dialogu polskiej policji ze społecznością lokalną na rzecz bezpieczeństwa wewnętrznego. Aspekt społeczno-pedagogiczny*, Sosnowiec 2018.

[19]   Komenda Główna Policji, Krajowa Mapa Zagrożeń Bezpieczeństwa, at https://policja.maps.arcgis.com/apps/MapSeries/index.html?appid=b5fc08aaa8a54296b418383584313263, 1 February 2022.

[20]   Krajowa Mapa Zagrożeń Bezpieczeństwa, at https://mapy.geoportal.gov.pl/iMapLite/KMZBPublic.html, 1 February 2022.

Table 1. Categories of events that can be reported through the National Map of Security Threats

Acts of vandalism
Groupings of minors at risk of corruption
The location of dangerous entertainment activities
Unguarded bathing sites
Dangerous places on the water
Drowning
The burning of grass
Illegal waste dumps
Illegal logging
Destruction of greenery
Driving quads in forest areas
Speeding
Illegal car rallies
Improper parking
Unguarded track crossings
Unguarded railway crossings
Inappropriate road infrastructure
Traffic incidents involving forest animals
Poor traffic organization
A homeless person in need of assistance
Begging
Alcohol consumption in prohibited places
The use of drugs
Wandering stray dogs
Animal abuse
Poaching

Source: Krajowa Mapa Zagrożeń Bezpieczeństwa, at https://mapy.geoportal.gov.pl/iMapLite/KMZB
Public.html, 1 February 2022

The data available to an external user of the website is not complete: this level of access allows the user to see only threats placed within the last 30 days. Older ones are inaccessible to users outside the Police. Threats from the publicly accessible part of the map are removed depending on the threat status: threats considered as a joke or a mistake are removed when this status is granted, threats considered as unconfirmed are removed after seven days from granting such status, while the eliminated threats are visible for 30 days. 'The use of drugs' and 'animal abuse' categories are not available for external users of the map.[21] Figure 3 presents an example of the mapped threats in the center of Katowice.

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[21]   Information obtained as a result of an inquiry within the framework of access to information addressed to the Police Headquarters (11 January 2022).
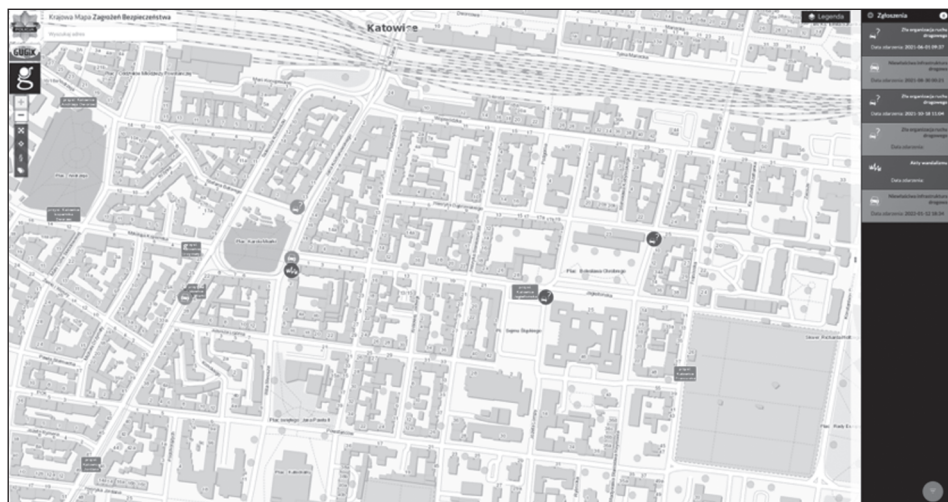
Figure 3. Threats reported by residents in the center of Katowice. Source: Krajowa Mapa Zagrożeń Bezpieczeństwa, at https://mapy.geoportal.gov.pl/iMapLite/KMZBPublic.html, 13 February 2022

Apart from the limitations of the tool described above, I decided to investigate how the tool is used by citizens to report threats occurring in their area, including, in particular, which categories of threats are most often reported, what proportion of reports is actually confirmed by the police, how much the Map supports the process of eliminating the existing threats, i.e., what its role is in the shaping of civic commitment to improve local security. The study utilized both statistical data obtained from the public part of the map (open data) collected on February 2, 2022 and data obtained from the Police Headquarters in terms of the functioning of the tool, its use and the sharing of data.

RESULTS

In order to deepen the analysis of the obtained data, the types of hazard incidents that can be reported via KMZB have been grouped into seven categories: (1) threats related to vandalism and demoralization, (2) hazards related to water, (3) hazards related to use green areas and their devastation, (4) traffic hazards, (5) poverty hazards, (6) alcohol and drug hazards, and (7) animal hazards. Table 2 presents all threats present on the map, grouped into categories, along with the number of reports, the status of their verification, including the truthfulness of their occurrence. The number 0 in the case of the threats 'the use of drugs' and 'animal abuse' does not mean the lack of their occurrence, but only the lack of disclosure of data about the places where they occur, which is dictated by operational reasons.

Table 2. List of notifications regarding possible categories of threats placed on KMZB

CATEGORY / HAZARD		Number of reports (general)	New reports	Reports under verification	Reports confirmed	Confirmed, transferred to other services	Reports confirmed and eliminated	Unconfirmed	Confirmed total	Confirmed % of all reports	Eliminated % of confirmed reports
DEMORALISATION/ VANDALISM	Acts of vandalism	1318	33	106	423	231	452	73	1106	83.91%	40.86%
	Groupings of minors at risk of corruption	1138	35	118	372	2	524	87	898	78.91%	53.35%
	The location of dangerous entertainment activities	254	0	0	0	0	0	0	254	100%	0
	Unguarded bathing sites	1	0	0	0	1	0	0	1	100%	0
WATER	Dangerous places on the water	55	1	4	5	18	24	3	47	85.45%	38.29%
	Drowning	0	0	0	0	0	0	0	0	-	-
	The burning of grass	27	3	6	6	5	5	2	16	59.26%	31.25%
GREENERY	Wild waste dumps	3932	66	165	649	2145	842	65	3636	92.47%	23.16%
	Illegal logging	46	3	14	2	15	5	7	22	4.82%	22.72%
	Destruction of greenery	275	9	28	79	25	118	16	222	80.73%	53.15%
	Driving quads in forest areas	171	2	10	46	27	72	14	145	84.79%	49.65%
TRAFFIC	Speeding	23281	404	1155	8166	304	12599	653	21069	90.49%	59.79%
	Illegal car rallies	797	19	91	265	9	315	98	589	73.90%	53.48%

CATEGORY / HAZARD		Number of reports (general)	New reports	Reports under verification	Reports confirmed	Confirmed, transferred to other services	Reports confirmed and eliminated	Unconfirmed	Confirmed total	Confirmed % of all reports	Eliminated % of confirmed reports
TRAFFIC	Improper parking	15731	295	895	6225	457	7135	724	13817	87.83%	51.64%
	Unguarded track crossings	30	1	2	9	3	13	2	25	83.33%	52.0%
	Unguarded railway crossings	41	0	3	5	27	5	1	37	90.24%	13.51%
	Inappropriate road infrastructure	7899	78	228	496	5014	1905	178	7415	93.87%	25.69%
	Traffic incidents involving forest animals	67	2	3	10	10	40	2	60	89.55%	66.67%
	Poor traffic organiation	2350	33	91	276	1312	567	71	2155	91.70%	26.31%
POVERTY	A homeless person in need of assistance	271	6	14	125	45	70	11	240	88.56%	29.17%
	Begging	176	7	11	58	7	83	10	148	84.09%	56.08%
ALCOHOL/DRUGS	Alcohol consumption in prohibited places	6688	136	294	2276	66	3684	232	6026	90.10%	61.13%
	The use of drugs	0	0	0	0	0	0	0	0	-	-
ANIMALS	Wandering stray dogs	594	24	87	178	80	148	77	406	68.35%	36.45%
	Animal abuse	0	0	0	0	0	0	0	0	-	-
	Poaching	70	5	15	14	17	9	10	40	5714%	22.50%

Source: own study, data from Krajowa Mapa Zagrożeń Bezpieczeństwa, https://mapy.geoportal.gov.pl/iMapLite/KMZBPublic.html, 2 February 2022

As indicated in Table 2, most reports concern hazards generated by road traffic. In this category, three types of incidents are in the first three places in the entire ranking in terms of the number of notifications. It is (1) speeding, (2) improper parking, and (3) inappropriate road infrastructure. The fourth place in this ranking is occupied by (4) alcohol consumption in prohibited places, and the fifth by (5) illegal waste dumps. High indications (over 1000 notifications) were also achieved by: (6) poor traffic organization, (7) acts of vandalism, and (8) groupings of minors at risk of corruption. It should be noted that residents reported the first three traffic-related hazards significantly more often than they reported other hazards, which may indicate the degree of nuisance such hazards present. Road traffic hazards generate 76.97% of all submissions, so they significantly predominate over other categories. Therefore, it seems to be a key threat, as well as burdensome, to local communities. Alcohol-related risks are the second-highest (10.25%; the map does not disclose data on drugs to the public), and the third place is occupied by the destruction of greenery (6.82%). These data are presented in Figure 4.

Figure 4. Number of reports (general) divided into categories. Source: Own elaboration based on the data from: Krajowa Mapa Zagrożeń Bezpieczeństwa, at https://mapy.geoportal.gov.pl/iMapLite/KMZB Public.html, 2 February 2022

The analyzed data show that – depending on the factor – the percentage of confirmation of the reported threats ranges from 47.82 to 100% (for all analyzed reports: 89.51%), but in the case of the events with the largest number of reports, only in one case it does fall below 90%. This means that particularly burdensome threats are a real problem for residents, especially since it should be borne in mind that some of the incidents are short--term ones – before the police patrol verifies the report appears, a poorly parked car may simply drive away. If despite this, the percentage of confirmations is high, it should be considered that these events are a real problem in the area where they are reported.

The percentage of eliminated events might also be considered an important indicator. In the case of all recorded and confirmed notifications, the percentage of eliminated ones was 49.01. However, the range between the individual threats is huge: from

0 cases eliminated to 66.67%. When analyzing this data, however, it should be remembered that not all types of threats are eliminated by the police themselves. This is the case, for example, of 'the location of dangerous entertainment activities', where local government units have authority in this regard, and the police can only apply for appropriate actions. This problem also concerns, among others, 'illegal waste dumps', 'inappropriate road infrastructure' and 'poor traffic organization'. An important signal confirming the lack of competence of the Police to eliminate the threat is the data in the column: 'confirmed, transferred to other services'.

DISCUSSION

Apart from some limitations, KMZB is a unique tool that allows residents to report dangers in a given area and at the same time have access to at least some of the data collected in this way. Most of the digital online systems for reporting crimes or threats are only a more up-to-date way to contact the police that supplements the traditional phone calls and visits to a police station. However, it serves only to forward the report, it does not provide the information to other citizens about its occurrence. In addition, the map is available only to citizens with a connection to the Internet, which limits access to it.

Obviously, the limitations of the map make it difficult to analyze the explicit data obtained from it. First of all, it only gives the current picture of the situation. To have a long-term perspective, data should be collected at regular intervals and submitted for comparative analysis. This would allow, for example, a user to assess the susceptibility to seasonality. Also, there is no information about re-reports in the place of already eliminated threats – only the Police have access to this data. Their public presentation would allow a user to assess the actual effectiveness in eliminating threats.

Secondly, some categories are not made public. The reasons for such a decision are indicated earlier, but they nevertheless limit the use of the tool by citizens. However, the question of the legitimacy of such a decision and the real threat to the operational work of the police remain an open question.

Thirdly, the design of the tool that allows reporting only threats from a given closed list of categories limits the type of threats that citizens can report. Although the Police declare that new types of threats can be added to the menu on the map, the map does not allow for reporting a threat from outside the closed list. It is an obvious limitation of the tool.

Despite all these limitations, the tool shows trends, and very clearly maps those threats that are really important to local residents. It is taken seriously by its users, as evidenced by a small part of unconfirmed reports. It is an important supplement to crime statistics, in which many of the mapped threats are not included or do not appear as separate categories. The map indicates to the local administration real problems that it is able to solve (ordering the parking system, traffic slowdown, repairing road infrastructure, etc.). It also involves residents in the process of shaping local safety, makes them carefully observe the neighborhood of their residence, and feel responsible for its safety. The anonymity provided by the reporting process may encourage communication of threats that

would otherwise not have been reported, which will contribute to increasing the level of security. In order for these advantages of the tool not to be wasted, it should be developed in the direction of: (1) the possibility of tracking long-term trends (access to older data), (2) the possibility of assessing the effectiveness of actions taken against threats (tracking the recurrence of the same threat in a given location), (3) the possibility of reporting threats from outside the list proposed by KMZB, (4) clear, legible information on how threats are eliminated by the police or other services or institutions, especially in the case of those threats that dominate the reports and seem to be ineffectively combatted.

CONCLUSIONS

Modern crime mapping should be characterized not only by the possibility of multidimensional presentation and analysis of the collected data, as widely available to the public as possible, but also by extensive cooperation with other security-providing services and citizens in the field of obtaining reliable information about existing and potential threats. The tools prepared for such functioning will allow for effective crime forecasting, which is a key element of subsequent preventive actions. GIS-based systems are very well suited for such use.

The essence of the good functioning of modern societies is the widest possible access to information collected and produced by public institutions. Such tools as KMZB make it possible to meet this condition while maintaining the necessary operational security. The interactivity of the tool supports building citizens' involvement in the process of shaping local security and relations with formations responsible for ensuring security.

Ensuring security in the next decades of the 21st century will depend not only on state-of-the-art tools and systems but also on the willingness of society to cooperate with the Police and other services. Interactive tools, such as KMZB, attractive to all communicators, can strengthen this relationship and thus contribute to increasing the level of security in local communities.

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