

## LOGISTICS MANAGEMENT IN A CRISIS SITUATION - A CASE STUDY

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### Abstract

In 1997, a flood occurred in Poland covering a large area of the country. It was called the flood of the millennium. There was a lack of effective coordination, especially in the field of logistics. The above, in 2007, resulted in the creation of a crisis management system in Poland, which was verified during the flood in 2010. The aim of the article is to present changes in logistics management on the example of floods that occurred in Poland in 1997 and 2010. The authors, in 2010-2015, applied quality methods in the form of interviews with experts in the field of crisis management (47 interviews). In addition, they analyzed legal provisions and documentation in the field of crisis management in force in the services.

**Keywords:** Security, crisis situation, crisis management

### 1. INTRODUCTION

The most frequent crisis situation that occurs in Poland is flooding. Over the years, there have been many floods. With each flood both the reaction to this phenomenon and the elimination of its effects involved a lot of people and equipment. There were often many problems. The flood in 1997 was the reason for a discussion to begin on the topic of crisis management. Over the years, the crisis management system was developed, logistics management is a part of the crisis system management. The aim of the article is to present the course of the floods of 1997 and 2010 in Poland and the presentation of changes that have taken place in the field of logistics management after the flood of 1997. The content of the article has been developed based on the principle of safety and quality the analysis of 1997 and 2010 floods reports was carried out, and 47 interviews were conducted during which the recommendations included in the reports were confirmed, and other areas that could improve logistics management in a crisis situation were presented. The experts were employees from the Town and Municipality Office in Bogatynia, the Lower Silesian Voivodship Office in Wrocław, the Crisis Management Center, the Powiat Starost's Office in Bogatynia, the Powiat Starost's Office in Zgorzelec, the Voivodship Police Headquarters in Wrocław, the Headquarters of State Fire Service in Wrocław, the Main School of Fire Service in Warsaw, the Border Guard Post in Zgorzelec, and the Armed Forces of the Republic of Poland. With regard to personal data protection (Act of 10 May 2018 on the protection of personal data), the authors do not provide the names and surnames of experts, only functions they held.

Professor Beniamin Więzik (vice-president of the Polish Hydrologists Association) and Dr. Wojciech Rędownicz from the Wrocław University of Technology published a lot of articles about floods.

### 2. THE ANALYSIS OF THE FLOOD IN 1997

The largest flood in Poland took place in 1997. It was caused by two waves of intense rainfall. The flood lasted for many days. In those days, there was no crisis management system. The Main Flood Prevention Committee, under the leadership of the Minister of Environmental Protection, Natural Resources and Forestry, was responsible for the state of security and reducing the threat of a flood in Poland. The province, by way of orders, could set up provincial, communal and company flood prevention committees. In the event that such a need arose, the province had the right to appoint district flood prevention committees that covered the area of several municipalities. In direct protection against floods, the units of the army, police and fire brigades were

entitled to take part under the control of the flood control committees, whose rules of appointment, organization and scope of action were defined by the regulation of the Council of Ministers [1]. A flood alert was announced on 6 and 7 July 1997 in most provinces and they remained under the alert for an average of 27 days. Many organizations became involved [2]:

- 1) The Armed Forces of the Republic of Poland:
  - carried out activities in the field of reconstruction,
  - they led in independent operations or assistance in rescue and security, food transport and other activities
  - they removed the effects of the floods;
- 2) The Fire Brigade (state and volunteer):
  - conducted rescue operations with the use of specialized equipment,
  - supplied people with drinking water,
  - participated in patrolling embankments and hydrotechnical facilities, as well as in reinforcing them,
  - drained flooded buildings, areas, and properties, etc.;
- 3) The Police:
  - fulfilled statutory obligations;
  - secured roads and access routes for emergency services, convoys; special transports, etc.;
  - participated in the evacuation of people, property and animals;
  - patrolled areas after the evacuation of the population.

There was the formation of a civil defense which was involved in such activities as [3]:

- The coordination of the activities of the army, the formation of the National Civil Defense and the coordination of other forces which were at the disposal of the Provincial Flood Prevention Committee;
- They organized and performed duties during flood actions;
- They participated in the evacuation and protection of property and removal of the results of floods;
- They disseminated and transferred information;
- They patrolled and reinforced flood embankments and distributed sacks, sand, etc.;
- They compiled a summary of reports of military involvement and the actions of the National Civil Defense in the flood
- They conducted air reconnaissance (including for countries in The European Union);
- They coordinated projects related to disinfestation and disinfection of areas;
- They coordinated the activities of the Polish Scouting Association, Water Volunteer Rescue Service, volunteers, the Polish Red Cross, etc.;
- They escorted or piloted transports with gifts or rescue teams from other countries;
- They removed the results of the floods.

Volunteers, the Polish Red Cross, the Polish Social Welfare Committee and scouts joined the activities. They carried out such activities as: delivery of equipment, food, clothing, medicines, and where possible they conducted evacuations from the most endangered places.

During the flood, humanitarian aid was also provided, as well as ensuring cooperation with Union experts in the work on damage assessment and the creation of a project for the reconstruction of flooded areas. The Union proposed to use all PHARE funds, previously allocated to Poland, for the reconstruction of areas after the flood [4].

Managing so many people and equipment was a huge challenge and caused a lot of problems. The consequence of this flood was the death of 55 people, economic losses estimated at 7 697 564 PLN (75.2 % - of the losses were in south-western Poland). It encompassed 38 provinces, 49, 754 houses were destroyed,

1 893 bridges, 5 991 km of provincial roads and 532 km of national roads, 4 494 km of embankments and river banks, as well as 227 356 hectares of arable land and 149 345 hectares of grassland [5].

### **3. THE ANALYSIS OF THE FLOOD IN 2010**

In 2010 in Lower Silesia, flooding occurred twice - once at the beginning of May -to June and again from August to September. Both floods had a completely different nature. The causes of these floods were heavy rainfall. The crisis management system has been functioning since 2007. The province of Lower Silesia is responsible for crisis management.

In both the first flood as well as the second flood the following organizations took action:

The State fire brigade, volunteer Fire Department, sub-units of the Armed Forces, the Police, prisoners from prisons. In the floods that occurred from August to September flooding took place along the borders, therefore the Border Guard was also involved.

The number of forces and resources involved in the floods was very high. 2,372 policemen took part in the May and June floods, 399 vehicles were used, 15 boats, 17 power generators and a water cistern, and in the flood from August to September 5,352 policemen took part as well as 1,390 vehicles, four boats and three power generators were used. The difference in the involvement of the number of police officers and equipment was due to the fact that these floods were of a different nature and also required taking some other actions at times.

The next organization is the Armed Forces. During the first flood of the Odra River from May-to June, 1,500 soldiers, 10 floating car transporters with service, 16 boats and a dozen other military equipment units were involved in flood prevention activities. During the second wave of flooding, more than 600 soldiers, four floating car transporters, four boats and other military equipment were used in the activities [6]. The soldiers and the equipment were most often engaged to strengthen the flood embankments. It is estimated that the strength and resources of the Armed Forces had been used in a rational manner in relation to the existing threat. The issue of effective use has been raised. As an example, in the Report on the flood action in May-June 2010, it was indicated that 400 soldiers were not assigned to duties one worker was assigned, to indicate the directions of action. This meant that some of the soldiers were dispatched much later than their colleagues. It should also be mentioned that the authorities of the city of Wrocław were not interested in the logistic security for soldiers [7].

In the August-September flood (from August 7 to September 2), 553 soldiers took part. Their tasks were [8]:

- 1) evacuation of people from flooded areas;
- 2) transport of food and uniforms;
- 3) the launch of an air bridge, which enabled transport of people and humanitarian aid to Bogatynia at critical moments;
- 4) freeing access roads;
- 5) help in removing items carried by water during floods;
- 6) protection and strengthening of embankments in the town of Radomierzyce;
- 7) organization of crossing the Witka River;
- 8) freeing culverts and the Miedzianka river bed;
- 9) unblocking the culvert at the Bogatynia water treatment station in cooperation with the fire brigade, pumping out the water from the treatment plant;
- 10) reconstruction and repair of roads and bridges;
- 11) food and water supply to areas cut off by floods;
- 12) unloading of transports with help for Bogatynia;
- 13) security of washed buildings;

- 14) strengthening and repairing damaged embankments on Nysa Łużycka
- 15) in the town of Porajów;
- 16) securing damaged bridges;
- 17) decontamination of facilities in the villages of Bogatynia and Radomierzyce.

Cooperation between the army and local authorities was good. It is also worth mentioning that the communication used during the coordination of rescue operations was improved through the use of radiotelephones of the Lower Silesian Provincial Office and the fire service rescue network.

The August-September flood affected the border areas, in connection with the fact of stationing Border Guard officers in these regions, this formation was also involved in activities, but only in this flood. The involvement of the Border Guard officers was limited to the implementation of such tasks as [9]:

- 1) securing buildings and landslides;
- 2) assistance in evacuating people and property;
- 3) protection of places threatened by flooding;
- 4) closing traffic on bridges on the Nysa Łużycka River in Zgorzelec, as well as securing against plundering of buildings from which residents were evacuated (together with the Police);
- 5) removing the effects of flooding in the Bogatynia Orphanage;
- 6) monitoring road traffic (information was sent to the Provincial Center for Crisis Management every hour);
- 7) establishing with the German side the route of access to Bogatynia through the territory of the Federal Republic of Germany (it was proposed that vehicles with aid for flood victims be marked with a card bearing the inscription "Bogatynia" and were prioritized by the services of the Federal Republic of Germany when they were being approached by flooded areas);
- 8) the telephone number of the People Reception Point was made public and the Regional Information Exchange in Görlitz - this point served as an information function regarding road traffic in the area covered by the flood.

The floods which occurred in 2010 brought a number of losses. They were divided into infrastructure losses, losses in private households and losses in agriculture. In the May-June flood loss, the losses amounted to PLN 263 503 748.87, and in August-September PLN 405 629 647.

In the August-September flood three people died.

Many forces and resources were involved in the implementation of tasks during the flood. Logistics management was simpler than in 2007 but also, as the research shows, there were a number of problems.

It appears from the studies carried out with the experts mentioned in the introduction that the problems mainly covered the area of logistics management. Logistic shortages included both logistics supply and logistics services. Problems of logistics support mainly related to supplies of water for drinking and commercial purposes, as well as food and consumer goods. The reason for this was cutting Bogatynia off other localities, and therefore it was not possible to deliver the required products there. What is more, there were problems with communication between both services (a lack of a common communication channel) and services and the public (no possibility of providing information via the mass media). Experts are convinced that, when it comes to the area of logistics services, there were not enough rescuers and specialized equipment (intended for rescue and evacuation purposes), transport services, or protective materials (e.g. bags) as a result of such a large-scale phenomenon. Residents were not warned about the impending flood early enough.

#### **4. RECOMMENDATIONS**

Although the nature of these two floods was different, joint conclusions and recommendations could be issued to improve the flood protection of the country and reduce flood losses.

It is necessary to introduce changes in the applicable law. Despite the fact that each of the floods indicates other elements, the analysis of individual elements allows to state in the context of problems that are perceived in the case of this threat, that they form a single entity.

In the context of the above, legislative changes should be made, namely [10]:

- 1) increasing supervision over spatial planning procedures in the area of delimitation of areas and development of flood areas (closer connection of land planning law with water law and construction law);
- 2) facilitating the process of land ownership in the construction sites of flood embankments;
- 3) clarification of the purpose for which self-governments can spend the money allocated for flood control and for the removal of the effects of floods;
- 4) clarification regarding the introduction of operational readiness, firemen's working time during long-term actions and financing of long-term rescue operations and operational reserves at the central level - due to the different interpretation of general provisions;
- 5) competence and responsibility,
- 6) defining the scope of duties of uniformed formations taking part in flood control,
- 7) identification of authorities responsible for sections of embankments, and other hydrotechnical devices;

According to reports and information obtained from the experts, the big problem was, first of all, the insufficient number of equipment that the organizations taking part in the crisis situation had at their disposal. The lack of, among others, was equipment such as: floating and lighting equipment, off-road vehicles, high-efficiency pumps, sandbag filling kits, power generators. In the Police and State Fire Service units, it was indicated that there was a need to purchase off-road vehicles [11].

The results from the conducted research (based on reports and interviews with the experts), show that it is possible to improve the situation by [12]:

- 1) improving the infrastructure (In 2010, it was found that approx. 70 % of embankments are in poor technical condition, which clearly indicates a threat to the safety of people, property and the environment);
- 2) access to technical information (implementation of remote monitoring on the relevant website);
- 3) maps. Preparation for flooding from various angles would also be facilitated by the creation, jointly a uniform cartographic material with a special assessment of threats and a list of weak points of hydrotechnical constructions. A digital map of areas of the potential flood hazard for extreme flows would also be helpful;
- 4) crisis management centers (assisted by maps and decision support systems operated by qualified staff such as meteorologists, hydrologists, specialists in the field of water engineering);
- 5) information exchange (a common information platform that all actors involved in activities will use) - in the opinion of the experts, information platforms are different in various services, which causes a problem in the same interpretation of information - an expert from the Border Guard Post in Zgorzelec;
- 6) expert teams (networks of local threat experts) - the experts (the Border Guard, the Police, the State Fire Service) also stressed the need for the creation of such teams, as their existence would facilitate communication between the society and the services;
- 7) public information (press spokespersons, alerting and warning system). The experiences from the flood in Bogatynia clearly indicated that warning and alerting of the residents was definitely too late [13]; the same view was expressed by the experts (the Lower Silesian Voivodship Office, the Poviast Starosty) who emphasized the essence of early warning systems that are to alert the population;
- 8) public education (in terms of procedures) - according to experts (the Lower Silesian Voivodship Office, the Poviast Starosty, the State Fire Service, the Polish Armed Forces, the Police, the Border Guard), the problem stems from the lack of knowledge of procedures related to behavioral skills in the case of a flood event.



- 9) international cooperation (mainly border areas) - the experts (the State Fire Service, the Polish Armed Forces, the Police, the Border Guard) claim there is a need for joint exercises since nowadays there is a major communication problem resulting from the lack of knowledge of the “language” of adjacent services.

## 5. CONCLUSION

Floods, regardless of their nature, are catastrophic in their consequences and are quite common in Poland. They require the involvement of large amounts of forces and resources of organizations implementing tasks for the benefit of state security, as well as for the safety of its citizens. The effectiveness of the measures taken depends on appropriate logistics management. Since 1997, many changes have been introduced the first was to establish a crisis management system and then improve it. Logistics management has also changed dynamically. The law has made it possible to undertake actions aimed at sorting out many issues. It should be pointed out, however, that there are still many areas that should be constantly improved. In accordance with the information obtained from interviews with the experts and reports on floods under discussion, despite the changes introduced in logistics management, it is still necessary to improve the following areas. These are first and foremost: legal regulations, public awareness in the area of flood risk occurrence, technological solutions, international cooperation, technological support, information exchange, selection of staff and experts, education of administration employees. Information technologies are also extremely helpful in logistics management.

## REFERENCES

- [1] valid until, 31 December 2001 Water Law, Article 75, paragraph 2, point 1 (Dz.U. z 2001, Nr 115, poz.1229).
- [2] *Dorzecze Odry Powódź 1997*, Wrocław: Międzynarodowa Komisja Ochrony Odry przed zanieczyszczeniem, 1999, pp. 20-21.
- [3] *Protokół z kontroli Wojewódzkiego Inspektoratu Obrony Cywilnej we Wrocławiu (kod 51-951) Pl. Powstańców Warszawy 1*, numer regonu 000514377, hereinafter referred to as WIOC in Wrocław being the organizational unit performing the assigned Voivode of Wrocław in the field of civil defense, pp. 49-50.
- [4] ŁASUT, E., Organizacja i przebieg akcji przeciwpowodziowej. In: DUBICKI, A., SŁTA, H., ZIELINSKI, J., eds. *Dorzecze Odry. Monografia powodzi 1997*, Warszawa: Instytut Meteorologii I Gospodarki Wodnej, 1999, pp. 224.
- [5] DUBICKI, A., BOROWICZ, A., TURZAŃSKA-CHROBAK, B., GIERCZA, J., LISOWSKI, J., Rzeczowe i finansowe straty powodziowe. In: DUBICKI, A., SŁTA, H., ZIELINSKI, J., eds. *Dorzecze Odry. Monografia powodzi 1997*, Warszawa: Instytut Meteorologii I Gospodarki Wodnej, 1999, pp. 177.
- [6] *Raport z akcji powodziowej maj-czerwiec 2010 r.*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, p. 21.
- [7] *Raport z akcji powodziowej maj-czerwiec 2010 r.*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, p. 22.
- [8] *Wojewódzki raport z akcji przeciwpowodziowych sierpień-wrzesień 2010*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 21-23.
- [9] *Provincial report on flood-related* December 31
- [10] *Raport z akcji powodziowej maj-czerwiec 2010 r.*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 29, *Wojewódzki raport z akcji przeciwpowodziowych sierpień-wrzesień 2010*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 28.
- [11] *Raport z akcji powodziowej maj-czerwiec 2010 r.*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 29-30, *Wojewódzki raport z akcji przeciwpowodziowych sierpień-wrzesień 2010*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 29.
- [12] *Raport z akcji powodziowej maj-czerwiec 2010 r.*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 27-30, *Wojewódzki raport z akcji przeciwpowodziowych sierpień-wrzesień 2010*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 27-29.
- [13] *Wojewódzki raport z akcji przeciwpowodziowych sierpień-wrzesień 2010*, Wrocław: Dolnośląski Urząd Wojewódzki, 2010, pp. 28.