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The Disaster as a Factor in the Development of Modern Tourism. A Study Case Based on the Chernobyl Nuclear Power Plant

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Abstract:

The destination which attracts tourists is the Chernobyl Exclusion Zone established in the area of radioactive contamination within a radius of 10 to 30 km around the plant. The main tourist attraction of the zone is the infrastructure of the inactive nuclear power plant, notably reactor no. 4 covered with a concrete and steel sarcophagus. The abandoned city of Pripyat, called the "ghost town", is also of unique value to tourism. The "Duga" radar station (also dubbed "The Eye of Moscow"), an artefact of the Cold War, also lies within the zone accessible to tourists. These sites, with their mysterious and dark history, are a magnet for an increasing number of tourist groups. In 1995 the zone was visited by 900 tourists. Subsequent years have brought a regular annual growth in the number of visitors to 17,800 in 2013. A decline came in 2014 (8400), which was caused by the political situation in Ukraine (e.g. Euromajdan). The last five years (2015-2019) are characterised by a very large annual increase in the number of tourists, and in some years, an almost a doubling of the humbers compared to the previous year (2015 – 16,400, 2016 – 35,100, 2017 – 46,136, 2018 – 71,869, 2019 – 124,001).

Keywords: dark tourism; industrial disaster; nuclear power plant; Chernobyl.

JEL Classification: Q54; Z30; Z31; Z32; R11.

Introduction

In the 21st century tourism, as a social phenomenon, has become an indispensable element of modern culture. The variety of forms and types of tourism makes it the most common way to spend leisure time. All social groups participate in tourist traffic, regardless of age, gender, economic status, place of residence, or origin. The progress of civilisation and the absence of barriers to accessing traditional tourist destinations causes tourists to search for places which are more and more extreme, unique, often prohibited, shrouded in an aura of mystery, and, above all, unexplored. One such place is the Chernobyl Exclusion Zone, established in the area of radioactive contamination around the Chernobyl Nuclear Power Plant. The tourism practised in this area is a relatively new phenomenon, defined in specialist literature as dark tourism – travelling to places of human suffering, death, and all sorts of tragedies (Lennon and Foley 1996, Seaton 1999, Miles 2002, Ozer *et al.* 2012, Stone and Sharpley 2008, Sharma and Nayak 2019, Choung and Choi 2020, Lennon and Tiberghien 2020, Martini and Buda 2020).

1. Research Background

The failure of the nuclear reactor in Chernobyl is widely considered one of the greatest environmental disasters caused by human activity. The negative effects of this event have had far-reaching consequences in the geographical environment, and in relation to human health (Glazko and Glazko 2011). For many years, the land around the power plant was seen as an area contaminated with radioactive substances which endanger human life and health (Hatch *et al.* 2005, Jaworowski 2010; Weiland *et al.* 2016, Hatch and Cardis 2017). In the long term, the disaster itself has been perceived in the minds of the general public as a phenomenon that significantly affects their mental health (Havenaar *et al.* 1997). The power plant and its adjacent buildings are still a living testimony to a real danger to people, an example of a scenario which could again be enacted in another plant. The failure of the nuclear reactor in Chernobyl has also produced unexpected results which at the time of the disaster no one was able to predict. In the contemporary world the term "Chernobyl" has somewhat worn off and acquired a new meaning, especially in popular culture.

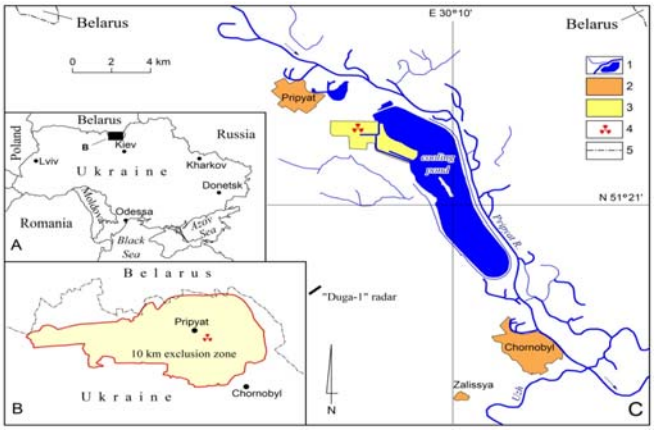
A striking example of the modern use of the power plant, in connection with the events that took place on 26 April 1986, is its role as a tourist attraction. There are still further reports documenting the growing interest in this type of tourist expedition, which must be treated as a kind of phenomenon on a global scale (Goatcher and Brunsden 2011, Bakota *et al*. 2018, Krupskyi and Temchur 2018).

The aim of this paper is to present the development of tourism in the area where the greatest environmental disaster of all time happened, becoming the basis for regarding this territory as a tourist attraction on a global scale.

2. Methodology

Chernobyl is a city located on the Pripyat river in the north of Ukraine, in the Kiev district, just over 10 km south-west of the border with Belarus. The town became notorious worldwide in the 1980s in connection with the major failure that occurred in a nuclear power plant located about 15 km north of Chernobyl (Figure 1).

Figure 1. Location of research area: 1 – watercourses and water bodies, 2 – major towns displaced after the nuclear power plant disaster, 3 – area of the former nuclear power plant, 4 – block of the nuclear power plant, damaged in the disaster, 5 – state borders.



Source: made by authors.

The devastating disaster occurred on 26 April 1986 (Labib 2014). The works on the construction of the plant began in the early 1970s. The first power unit was commissioned in 1977. The following year energy was also produced in unit no. 2. Every three years subsequent power units were put into operation. The reactor No. 4, involved in the accident, was commissioned in 1984. After the disaster, the Chernobyl Exclusion Zone was established over an area lying at a distance of approximately 10 km to about 30 km from the power plant, where, following the displacement of the population, strict supervision over the migration of people and movement of goods was introduced, including a dosimetric control at its borders.

Field studies were conducted in the years 2018 and 2019. During the studies a field mapping method was used which covered the sites associated with the failure of the nuclear power plant as well as modern tourist attractions. In addition to the registration and identification of the phenomena and locations subject to field mapping, an analysis was undertaken of the environmental factors determining the conditions of development of tourism in the closed zone.

In addition, a landscape heritage inventory method was used to describe the current state of the sites and sightseeing attractions in order to obtain the fullest, most reliable, and up to date information possible.

Some data was obtained as part of library research and online resources research (*i.e.* the State Agency of Ukraine for Exclusion Zone Management – http://dazv.gov.ua, Centre for Organisational and Technical Affairs and Information Management of the Exclusion Zone – https://cotiz.org.ua, State Statistics Service of Ukraine – https://ukrstat.org, Main Department of Statistics in the District of Kiev – http://kyivobl.ukrstat.gov.ua). Statistical data on the intensity of tourist traffic has also been obtained through direct interviews conducted in tourist offices and with the organisations involved in providing access to the premises within the zone. The data analysis used simple calculations and statistical indicators e.g. the correlation coefficient.

3. Results

3.1. The Nuclear Power Plant Disaster and Its Effects

Human error contributed to the failure of the power plant reactor. During the night shift some procedures were carried out involving the possible use of an emergency power supply to the equipment in the power block. Wrong decisions were taken that contributed to a rapid temperature rise in the reactor leading to an explosion of gases (not the reactor itself), and then graphite burning in the reactor.

As a result of the explosion radioactive materials were released into the atmosphere (Howieson and Snell 1987), which spread across areas in Europe and Asia (Figure 2). Fire fighting continued for about twelve days. At that time, the damaged reactor continued to emit harmful compounds and radioactive materials into the atmosphere. Some measures had already been taken during the fire fighting operation in order to reduce environmental pollution (Snell and Howieson 1991).

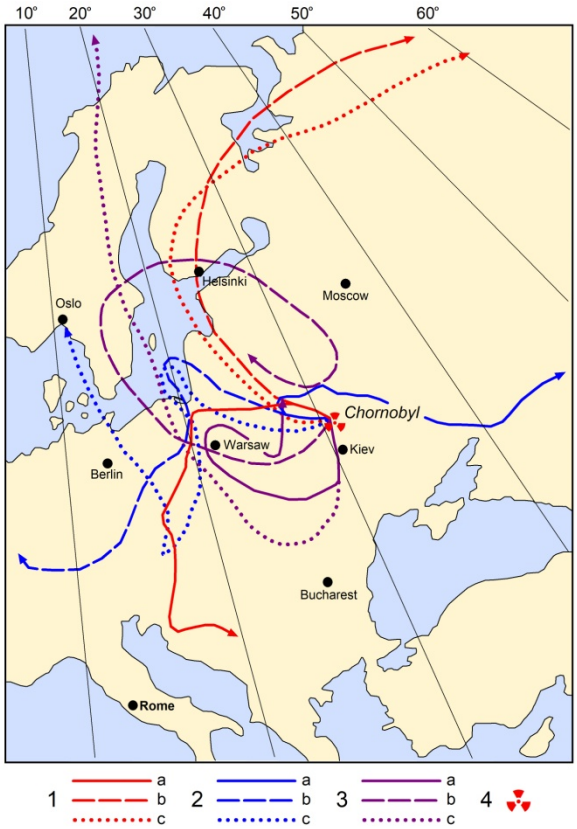
Over the next few months, a so-called sarcophagus was built over the reactor, which was intended to reduce harmful radiation. The construction was completed in November 1986. Due to the fast pace of the works, it was intended to be a temporary structure, however it survived more than 30 years. Although reactor no. 4 was isolated, the remaining reactors continued to operate and produce electricity. The last reactor was decommissioned at the end of 2000. In November 2016 the old sarcophagus, along with the reactor, was secured under a new installation, which is designed to protect people and the environment from harmful radiation (Figure 3).

The safety measures taken directly after the reactor accident did not prevent the negative effects of the disaster. The evacuation of Pripyat residents began immediately after the failure of the reactor. The displacement of nearly 50 thousand people took place on 27 April 1986. Some time later a decision was made to establish an exclusion zone up to a distance of approximately 10 km to 30 km from the power plant and to resettle all the people living in these areas. According to various sources, as many as about 286,000 people were evacuated as part of the resettlement programme that took place after 1986 (Jaworowski 2010, Report... 2000). A year after the disaster the city of Slavutych was built at a distance of about 50 km from the reactor. This provided shelter for part of the population forced to leave the zone where there was a danger of contamination.

The territories most affected by the accident are those in modern Ukraine, Belarus and Russia (Russian Federation) – at the time of the failure the area belonged to the Union of Soviet Socialist Republics (USSR). The impact of this event has not been limited solely to these countries, but it also concerns many other European states. Due to the geopolitical situation then pertaining, information about the accident was classified in its early stages. The first researchers to report the increased radiation were those from the Scandinavian Peninsula. On the morning of 28 April 1986, radiation over a dozen times higher than normal was detected at the Swedish research station located in Studsvik (75 km south of Stockholm). The measurements taken and observations

made allowed the researchers to determine the type of contaminants and the direction of their movement. It was found that the cloud of radioactive contaminants had reached Studsvik from the east as early as about 2 p.m local time on April 27, 1986 (Devel *et al.* 1986). Detailed analyses of weather conditions in Europe in the period following 26 April 1986 proved that pollution from the disaster area had indeed reached Finland, Sweden, Lithuania, Poland as well as Moldavia, Romania and Czechoslovakia in the early days (Figure 2).

Figure 2. The trajectories of the air masses contaminated in Chernobyl: 1 – from 00h.00 GMT on 26 April 1986. 2 – from 00h.00 GMT on 27 April 1986. 3 – from 00h.00 GMT on 5 May 1986; a – ground-level layer, b – at a height of about 800 metres, c – at a height of about 1,500 metres; 4 – location of the nuclear disaster.



Source: made by authors according to: Report... 1980, simplified, supplemented.

Figure 3. The new sarcophagus over the damaged reactor of the Chernobyl nuclear power plant – 3 June 2018.

Source: photo by M. Rzętała.

Among the different radioactive substances released during the disaster, it was radiocaesium ^{137}Cs that spread most widely. Radiation exceeding 0.04 MBq^{137} Cs/m^2 was found over an area exceeding 200,000 km^2 , with about 71% of this surface belonging to the Ukraine, Belarus and Russia (Environmental... 2006). However, most radioactive elements were deposited in the immediate vicinity of the power plant. The role of precipitation,

which left a deposit of contaminants on the surface of the land, was very significant in this respect. Radioactive materials from the Chernobyl reactor were identified in the waters of lakes and rivers in many parts of Europe, including such large rivers as the Rhine and the Danube. The level of contamination of surface waters in these cases was very low and negligible from the radiological point of view (Kryshev 1995). The greatest quantity of radioactive fallout spread over the Pripyat basin, which is an important tributary of the Dnieper. In turn, this river has many dams retaining reservoirs from which water is drawn for the public water supply. Therefore, the fear of using contaminated water following the disaster was well justified. Initially, a relatively high level of radionuclides was reported, but as soon as a few weeks after the incident, their presence decreased considerably because of their accumulation in the bottom sediments and their natural breakdown (Shestopalov *et al.* 2003).

The disaster at the Chernobyl nuclear power plant also produced positive effects. It may seem difficult to agree with such a statement. However, research conducted in the exclusion zone indicates that the ecological consequences of humans being absent from these territories are positive. This applies to the increase in the number of many species of mammals and birds which have found shelter in the contaminated zone (Baker and Chesser 2000). The exclusion zone also promotes the natural succession of woodland, which in combination with an absence of forestry management leads to a gradual transformation of the landscape. Dead wood and forest litter has accumulated in large quantities in these areas since the disaster. Current climate change causing an increase in temperature is conducive to more frequent droughts, and this makes the risk of fires higher. Uncontrolled fires in the forests in the contaminated zone are particularly dangerous and these have occurred. As a result of the burning of large areas of forest in 2010, radioactive materials deposited after the Chernobyl disaster were again reactivated and spread widely (Evangeliou *et al.* 2014). Large fires hit these territories again in April and in August 2015. Research conducted since has shown the reactivation of different types of radionuclides released during the accident at the reactor (Evangeliou *et al.* 2019).

The undisputed impact of the Chernobyl disaster on the geographical environment of a number of regions in Europe has also caused major consequences for human health. The fallout of radioactive contamination is commonly associated with many diseases. Those most frequently mentioned are increased rates of cancer (Jacob *et al.* 1998) or congenital malformations in children (Hoffmann 2001). The risk of diseases associated with elevated radiation does not deter the numerous tourists who choose the exclusion zone around the Chernobyl nuclear power plant as their travel destination (Goatcher and Brunsden 2011, Krupskyi and Temchur 2018).

3.2. Selected Tourist Attractions in the Exclusion Zone

With the gradual development of tourist traffic in the Chernobyl Exclusion Zone, many sites have been made available to the public (Figures 4 and 5). These are sites that meet the criteria for so-called dark tourism, directly associated with the power plant disaster, including abandoned rural settlements (*e.g.* Zellysia) and urban settlements (*e.g.* Pripyat), Duga radar structures, facilities at the decommissioned nuclear power plant, Chernobyl with its memorial park, and scattered sites with high radiation levels.

The biggest tourist attraction of the Chernobyl Exclusion Zone is undoubtedly the reactor no. 4 covered with its sarcophagus. The standard scenario of a stay in the zone provides for visiting the area in the immediate vicinity of the sarcophagus i.e. at a distance of about 200 metres from the structure. The interior of a former power station has been made available for tourist exploration as part of a special programme of visits. The closed power units are continually monitored by employees working shifts.

The city of Pripyat, which in the period of its greatest development had about 50,000 inhabitants, is located in the immediate vicinity of the Chernobyl Nuclear Power Plant. The city's residents were mainly employees and builders of the nearby power plant (Report... 1988). After the evacuation of residents in the aftermath of the disaster, the city became utterly degraded. Today it is a major tourist attraction with deserted residential infrastructure, abandoned shopping and business facilities, unused elements of public utilities, inoperative sports and leisure sites etc. The city, which provides a perfect example of a devastated landscape, is at the same time an example of the spontaneous succession of vegetation in urban areas.

The deserted village of Zellysia lies on the tourist route in the exclusion zone – one of many villages that were resettled after the nuclear power plant disaster. It is a complex of several dozen abandoned farms with housing units and farm buildings, a school, a kindergarten, shopping facilities etc. The abandoned village is overgrown with spontaneously encroaching forest, which is also colonising the area in the vicinity, formerly used for agricultural, horticultural and fruit-farming purposes.

Figure 4. Today's tourist attractions in Chernobyl and Pripyat: a – facilities at the decommissioned nuclear power plant in Chernobyl, b – abandoned city of Pripyat, c – former stadium in Pripyat – view from the stands onto the track and the pitch, d – remains of the amusement park in Pripyat,

Source: photo by M. Rzętała.

Figure 5. Today's tourist attractions in the exclusion zone: a – remains of the village of Zellysia displaced after the nuclear power plant disaster, b – remains of the Duga radar – a unique installation powered with energy from the nuclear power plant, c – designation of sites contaminated with radioactive substances in the exclusion zone, d – monument to the firefighters involved in the rescue operation in Chernobyl.

Source: photo by M. Rzętała.

A unique world-class tourist attraction is seen in the remains of strategic radar structures, called Duga, together with their accompanying facilities (command posts, guardrooms, training facilities, switchboards for electricity supplied from the nuclear power plant). The radar structures, which include about a dozen masts with a maximum height of nearly 150 metres and a length of several hundred metres, were an element of the installation used for over-the-horizon observations within the short-wave range (in cooperation with other devices of this type on the territory of the former USSR). Duga radar facilities constituted military sites, heavily guarded and inaccessible to unauthorised persons. Constructed at the end of 1960s, they were in operation until the nuclear power plant disaster, during which they became inactive, and then eventually closed. Nowadays, the remains of the Duga radar are one of the major tourist attractions in the exclusion zone.

In the Chernobyl region today, there are many other places with the status of sites important for the development of dark tourism, *e.g.* the Memorial Park in the centre of Chernobyl, monuments commemorating the

disaster and the liquidation of its effects, specially marked areas of high radiation. The traffic control station on the border of the so-called zone, and even the names of the settlements located on the outskirts of the town (e.g. Chernobyl, Pripyat) or numerous stationary and portable dosimetric control devices, are all also tourist attractions.

3.3. Tourist Traffic

The capital of Ukraine, together with the adjacent areas, is an important centre of tourism in the country. Over the course of nearly 20 years tourist traffic in Kiev and the District of Kiev has increased by almost 1,200%. At the beginning of the 21st century these areas were visited by 304,500 people whereas by 2018 the number had increased to as many as 3,616,500 tourists. One can generally observe an increase in the number of people visiting the capital for tourist purposes in the period examined. However, this trend is not constant and in some years (e.g. 2005, 2009, 2014 and 2015), a decline in the number of tourists was recorded. The situation with regard to tourist traffic in the Chernobyl Exclusion Zone is slightly different. This tourist attraction has continued to be popular, which is reflected by the increase in the number of tourists by a factor of nearly 6,000% in the 21st century. The visitors to Chernobyl are only a small percentage of the tourists who come to the District of Kiev and the capital of Ukraine. In the period under discussion their share showed a continuous increase to reach around 2% (Table 1). It is also demonstrated by the correlation coefficient of 0.76.

Table 1. Number of tourists to the Chernobyl Exclusion Zone, and to Kiev and the Kiev District in the years 2000-2018.

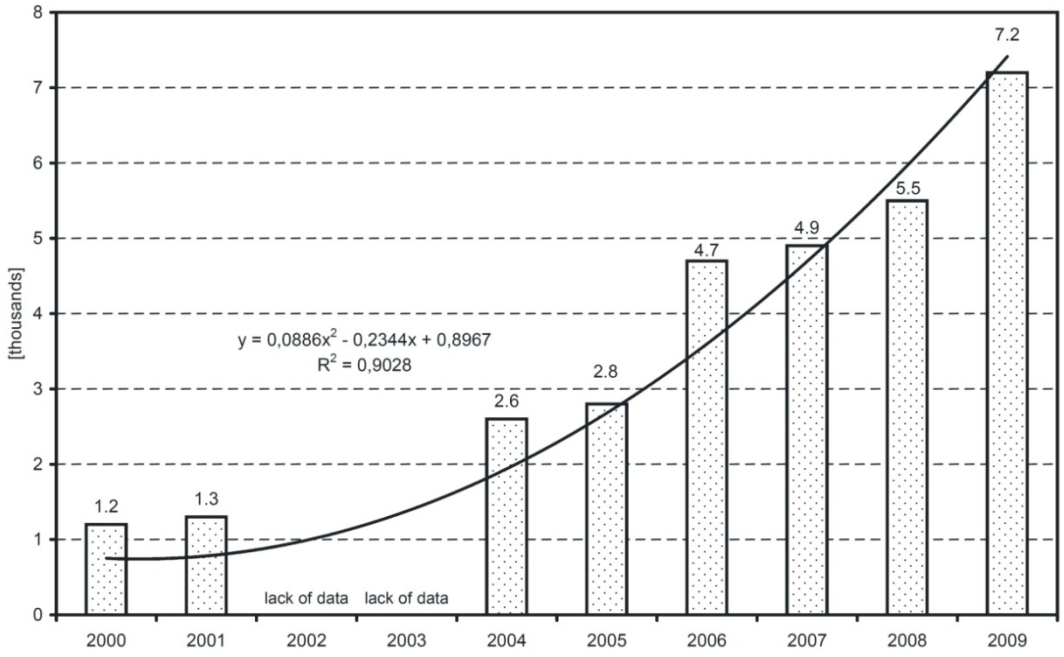
Years	Kiev and Kiev District		Chernobyl Exclusion Zone		
	[people in thousands] [a]	2000 = 100%	[people in thousands] [b]	2000 = 100%	% of the number of tourists in Kiev and the Kiev District
2000	304.5	100.0	1.2	100.0	0.39
2001	552.9	181.5	1.3	108.3	0.24
2002	603.3	198.1	–	–	–
2003	794.9	261.0	–	–	–
2004	1038.0	340.8	2.6	216.7	0.25
2005	955.3	313.7	2.8	233.3	0.29
2006	1507.5	495.0	4.7	391.7	0.31
2007	1834.3	602.3	4.9	408.3	0.27
2008	2115.7	694.7	5.5	458.3	0.26
2009	1609.5	528.5	7.2	600.0	0.45
2010	2077.4	682.1	8.4	700.0	0.40
2011	957.6	314.4	9.1	758.3	0.95
2012	1786.9	586.7	14.1	1175.0	0.79
2013	2195.6	721.0	17.8	1483.3	0.81
2014	1863.9	612.0	8.4	700.0	0.45
2015	1513.5	497.0	16.4	1366.7	1.08
2016	1866.0	612.7	35.1	2925.0	1.88
2017	2043.1	670.9	46.1	3716.7	2.26
2018	3616.5	1187.5	71.9	5991.7	1.99

Source: made by authors according to: [a)] Main Department of Statistics in the District of Kiev, supplemented; [b)] Centre for Organisational and Technical Affairs and Information Management of the Exclusion Zone, State Agency of Ukraine for Exclusion Zone Management, Pestushko and Chubuk 2010, supplemented; (–) – lack of data.

Official data on the number of tourists who visit the Chernobyl Exclusion Zone can be divided into two distinct periods (up to 2009 and the years 2010-2019). Initially, the nuclear power plant was not very popular as a tourist attraction. According to the data provided by the State Agency of Ukraine on Exclusion Zone Management, Chernobyl was visited by only 900 people in 1995. Over the next few years, the number of tourists remained at a similar level (1997 – 1100, 2000 – 1200). At the beginning of the 21st century – Chernobyl was visited as a tourist destination by up to 1300 people yearly. In the following years there was a steady yearly increase of a few hundred people visiting the disaster site. A sudden surge was recorded twice in 2006 and 2009, when the number of tourists increased by 1900 and 1700 respectively (Figure 6). In the second period distinguished (the years 2010-2019), tourist traffic in the exclusion zone intensified noticeably. Generally, the number of tourists was already at the level of tens of thousands per year with a maximum 124,001 in 2019. The year 2014 was exceptional in this respect since tourist traffic was greatly limited. This was a direct result of internal political

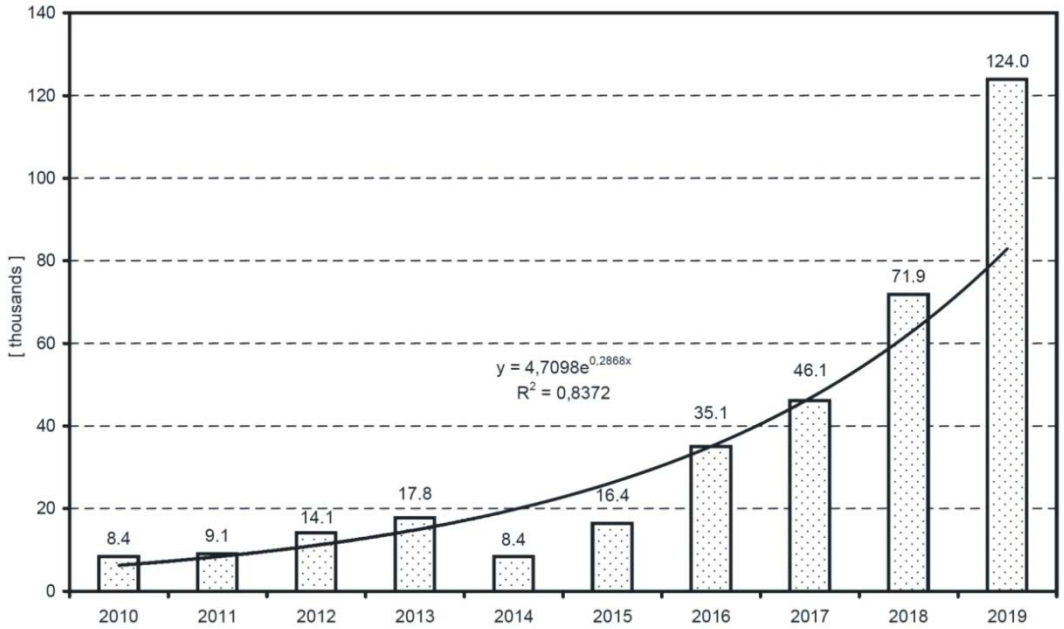
changes in the country and the Russian takeover of the Crimean Peninsula. From 2015 the number of tourists gradually began to rise again. In 2015 the Chernobyl Exclusion Zone was visited by 16,400 thousand tourists, in 2016 – 35,100, in 2017– 46,136, in 2018 – 71,869, in 2019 – 124,001 (Figure 7).

Figure 6. The number of tourists in the Chernobyl Exclusion Zone in the years 2000-2009.



Source: made by authors according to: Centre for Organisational and Technical Affairs and Information Management of the Exclusion Zone, State Agency of Ukraine for Exclusion Zone Management, Pestushko and Chubuk 2010, supplemented.

Figure 7. The number of tourists in the Chernobyl Exclusion Zone in the years 2010-2019.

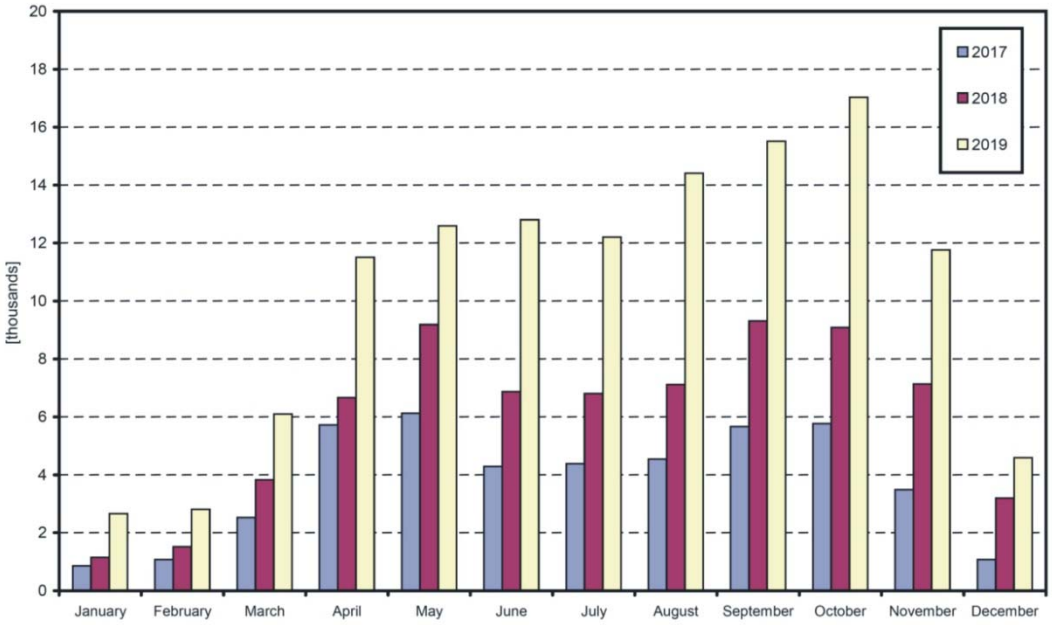


Source: made by authors according to data: State Agency of Ukraine for Exclusion Zone Management, Centre for Organisational and Technical Affairs and Information Management of the Exclusion Zone, supplemented.

A great variation in the amount tourist traffic is also observed over the seasonal cycle. One can distinguish some some periods of the year in which the popularity of Chernobyl is different. Taking into account the absolute value, the largest increase in the number of tourists is observed in April. In the summer period tourist traffic remains at a similar level. In autumn the number of people visiting the exclusion zone is again on the increase. An explanation for this situation could be its unique landscape assets. At this time the surrounding woods show a

multitude of colours as a result of the natural changes occurring in autumn. The winter months are the least popular (Figure 8).

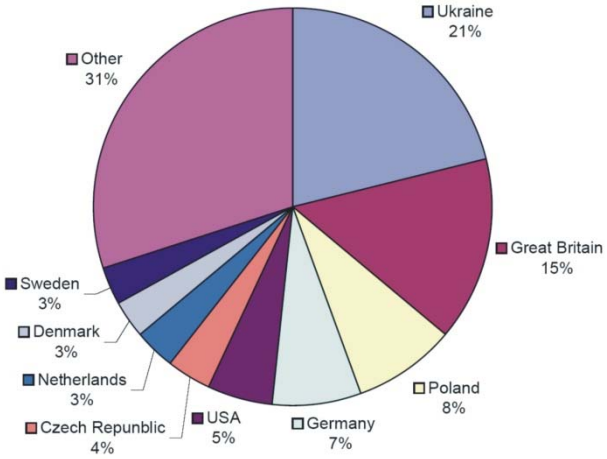
Figure 8. Seasonal variation of intensity of tourist traffic in the Chernobyl Exclusion Zone in the years 2017-2019.



Source: made by authors according to data: Centre for Organisational and Technical Affairs and Information Management of the Exclusion Zone, State Agency of Ukraine for Exclusion Zone Management, supplemented.

Tourists from a number of countries provide a major share of the total number of visitors to the nuclear power station disaster site. Among the 124,001 tourists visiting Chernobyl in 2019, the majority came from Ukraine, with the other countries occupying the following positions: United Kingdom, Poland, Germany, USA, Czech Republic, the Netherlands, Denmark and Sweden (Figure 9).

Figure 9. Tourists in Chernobyl by country of origin in 2019.



Source: made by authors according to: State Statistics Service of Ukraine, Inshe.tv, simplified and supplemented.

4. Discussion

What is the phenomenon underlying the fact that Chernobyl, a place which was potentially considered dangerous and unfriendly, has now become a destination for tourists from all over the world? It is because the accidents which occurred in nuclear power plants in the second half of the 20th century, *e.g*. Windscale (UK, 1957), Three Mile Island (USA, 1979), Tomsk (Russia, 1992) or Tokaimura (Japan, 1999), were not given as much publicity as the failure of the Chernobyl Nuclear Power Plant. Also, the tense political situation between the USSR and the USA at that time made the situation even more complicated. In addition, the number of victims and actual results of the disaster were uncertain. All of this created an aura of mystery around Chernobyl (Bakota *et al*. 2018).

Trips to Chernobyl Exclusion Zone are organised by various tourist sector bodies, including both Ukrainian and foreign companies, which often make use of the agency of local tour operators. Among Ukrainian travel agencies, SoloEast Travel must be mentioned (this operator organised the first trip to Chernobyl in 1999), Chernobyl Tour (founded by a liquidator of the effects of the disaster in 2008); and chernobylstore.com (Banaszkiewicz *et al*. 2017).

A noteworthy travel agency whose trips are recommended by the National Chernobyl Museum in Kiev on its official website, is the Slovak CHERNOBYLwel.come. This agency has organised two Chernobyling Festivals. The first was held in 2017 in Slavutych, and the second in 2018 in Kiev. Despite its extensive programme, the event was not widely attended which is why the Chernobyling Festival did not take place in 2019.

In 2019 Poles were among top foreign visitors. The first travel agency in Poland which organised a trip to the Chernobyl Exclusion Zone in 2007 was the "Bis-Pol" tour operator (Bakota *et al*. 2018). The Aliena Tours travel agency is also known for marketing organised excursions to Chernobyl. In turn, trips which are specifically research-related are organised by StrefaZero.org which was founded in 2007 on the initiative of Warsaw University of Technology students who wanted to go to Chernobyl to do scientific research. However, this soon transformed into a number of organised tours[27]. Another thriving group, Napromieniowani.pl, organises from 25 to 30 trips to the Chernobyl Exclusion Zone each year. It is also worth mentioning that Napromieniowani.pl organises aid programmes for people still living in the abandoned villages (Machnik – oral information, 2019).

Permission to enter the Chernobyl Exclusion Zone can be obtained with the help of the Department for Visits, Delegations and Events. It is to this department, among others, that travel agencies report their trips. The permits to enter the Zone are issued exclusively by the State Agency of Ukraine on Exclusion Zone Management. The tour, which participants have to pay for and requires the written consent of the State Agency of Ukraine on Exclusion Zone Management, takes place along certain routes that are considered non-hazardous to health. It is also essential to know that every visitor or group of visitors must be accompanied by a licensed guide and a representative of the zone (Kruczek 2017).

The main objectives of the development strategy for tourism in the Chernobyl Exclusion Zone area (Development strategy... 2017):

- creating a competitive tourist product that will satisfy the needs of contemporary Ukrainian society and foreign tourists;
- regular improvement in the quality of infrastructure and the level of tourist services;
- introducing and developing an information infrastructure for tourist services in the Exclusion Zone through establishing tourist information centres and the promotion of the tourist product at fairs, festivals and exhibitions;
- organising a system of quality training for qualified personnel providing tourist support and services in the Exclusion Zone;
- creating a recognisable tourist brand;
- providing comprehensive and efficient use of all available resources in the Exclusion Zone in order to develop different types of tourism – *e.g*. research-related, ecological, "dark", cognitive.

The implementation of the development strategy for the Chernobyl Exclusion Zone – as a special tourist zone – should coordinate and combine the efforts of many areas in the public sphere, which can be divided into three groups according to their specific characteristics (Table 2).

In 2019 there was a rapid increase in the number of visitors to the Chernobyl Exclusion Zone. This was an effect of several factors:

- the airing of the British-American miniseries "Chernobyl", which contributed to the popularisation of the place, particularly among foreign tourists (there was also a programme, “Chris Tarrant’s Extreme Railway Journeys”, which makes a visit to Chernobyl and which first aired on UK Channel 5 in January 2019, it has been retransmitted in Feb 5th 2020);
- the introduction of a transparent system of registration of tourists who want to visit the Chernobyl Exclusion Zone – currently electronic registration is possible on a special website;
- the creation of safe conditions for visiting the zone – tourists are encouraged to visit routes with relatively low levels of radioactive contamination;
- the presence of several tour operators who provide high-quality services related to travelling within the territory of the zone;
- the development and implementation of 21 tourist trails on the territory of the Chernobyl Exclusion Zone, which cater for the needs of different groups of tourists.

Table 2. Major elements in the implementation of a development strategy for the Chernobyl Exclusion Zone as a special tourist area.

Business element	Territorial element	Sector element
– tourist activity (tour operators, travel agencies); – tourist information centres; – conference rooms and conference centres; – transportation (air, rail, road); – insurance companies; – museums and galleries; – catering services; – accommodation services (collective accommodation, individual accommodation); – IT companies; – media companies.	– regions of the country; – districts; – regions; – territorial units.	– "dark" tourism; – extreme tourism; – cognitive tourism; – party tourism; – adventure tourism; – research tourism; – educational tourism.

Source: made by authors.

The number of visitors is bound to become even higher, because in July 2019 the President of Ukraine signed a decree on the development of the Chernobyl Exclusion Zone granting it a special tourist status and enabling transparent tourist activity in this place. In addition, waterways meeting all the necessary safety standards are ready to be used by tourists. Checkpoints have been prepared and support and dosimetric controls have been provided. These routes run along the river Pripyat and Uzh.

Conclusion

The research conducted has demonstrated the activation of tourism in the areas affected by the direct consequences of the disaster at the nuclear power plant in Chernobyl. An expression of the dynamic development of so-called dark tourism in the exclusion zone is a rapid increase in the number of tourists from 900 people in 1995 to 124,000 people in 2019. Most tourists in Chernobyl are citizens of Ukraine, United Kingdom, Poland, Germany, USA, Czech Republic, the Netherlands, Denmark and Sweden.

The level of radioactive contamination was highly dangerous in the first years after the disaster at the plant, but nowadays, with the observance of certain rules, it is safe enough in some parts of the area for the organisation and support of tourists along designated routes running through the exclusion zone.

Further dynamic growth in the number of tourists visiting the Chernobyl Exclusion Zone is expected and the factors conducive to the development of tourist traffic include e.g.: greater popularity of the site (thanks, among other reasons, to the airing of the series "Chernobyl"), enhanced accessibility of the site, improvements in the system of providing services to tourists, and improving safety conditions for tourist exploration of the site.

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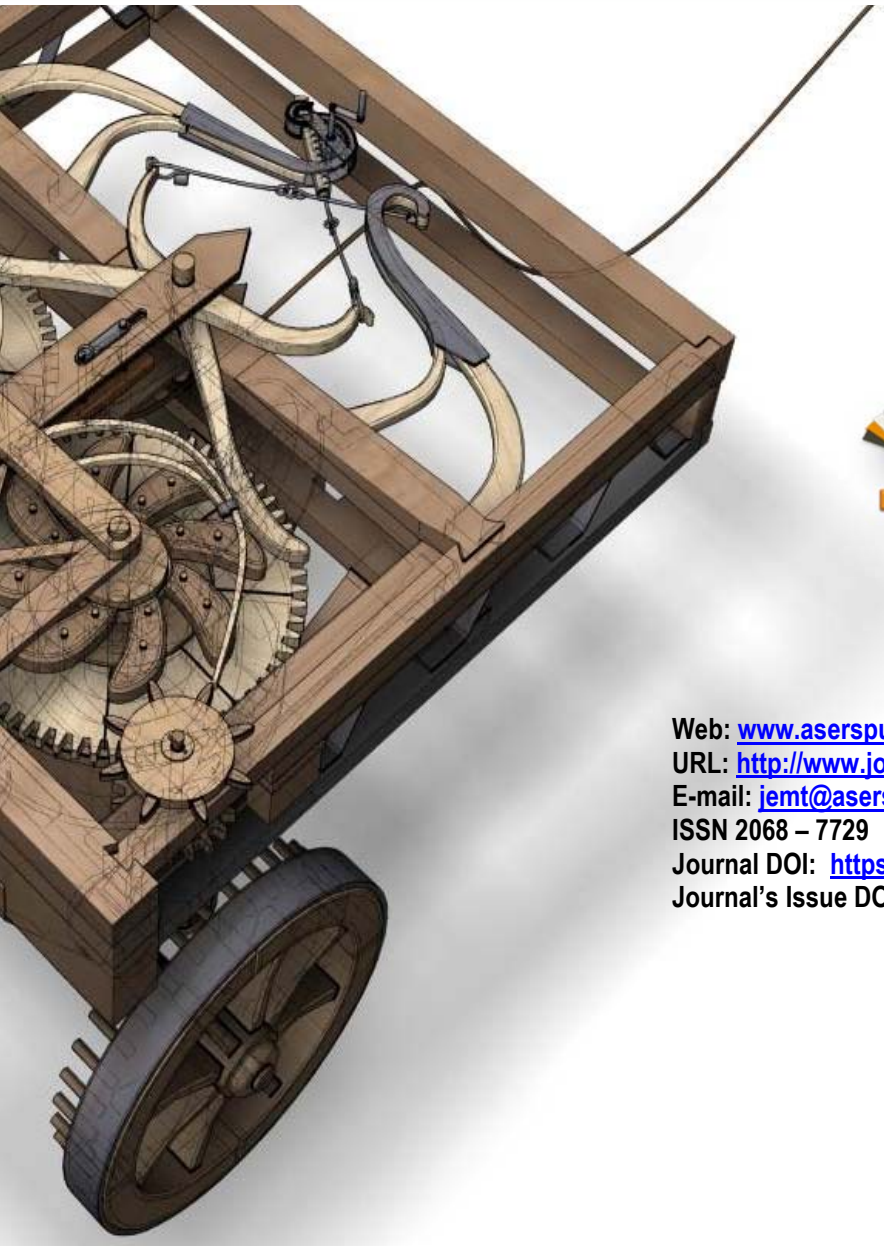

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