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Revitalisation of spoil tips and socio-economic polarisation – a case study of Ruhr area (Germany)

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ABSTRACT

The paper discusses issues about the revitalisation of spoil tips, socio-economic polarisation and social exclusion in the field of municipal recreational activities based on an example of the largest post-industrial region in Europe – the Ruhr area in Germany. Revitalisation of brownfield areas very often leads to the creation of leisure facilities of various types (with a range of entrance fees) and because of this it may mitigate, or exacerbate, the severity of these negative phenomena. In the Ruhr area there are 104 spoil tips of different origins (mine tips, slag heaps, rubbish dumps), sizes and shapes (from conical heaps, through table mountains shaped tips and intentionally shaped for landscape tips, to major tips) and state of preservation. The research has shown that it is possible to use the majority of these spoil tips in the Ruhr area (87 of them) as leisure facilities as they have been changed into green areas, parks, playgrounds, locations for sports activities and tourist attractions after their restoration. Furthermore, they are mostly accessible free of charge and may serve a wide range of people – from locals to visitors, from children to senior citizens etc., regardless of their income. As such they may mitigate the socio-economic polarisation tendencies in the region.

KEY WORDS: spoil tips, revitalisation, socio-economic polarisation, Ruhr area, leisure facilities

1. Introduction

In an era of growing poverty and widening divisions in society caused by increasing economic inequality some negative phenomena such as social exclusion and socio-economic polarisation are revealed. Socio-economic polarisation can be broadly defined as the widening gap between groups of people in terms of their economic and social circumstances and opportunities (DORLING & WOODWARD, 1996). According to SASSEN (1991) it is a result of restructuring the economy, especially the decline in manufacturing and the concurrent growth of the service sector, which leads to changes in the labour market such as an increase in the number of well-paid jobs and low-wage jobs, a reduction in the number of average-wage jobs as well as a parallel growth in unemployment. In addition another factor that enhances this phenomenon is globalisation (MARCUS & VAN KEMPEN, 2000). Social exclusion is the result

of socio-economic polarisation and is revealed through the existence of groups which lose the means to participate in society, for instance in the labour and housing markets, or access to some amenities such as education, recreation or leisure. Socio-economic polarisation may also be seen in spatial terms, due to socio-economic segregation, as illustrated by separate concentrations of the wealthy and poor (GALE, 1996; MUSTRED & OSTENDORF, 1998).

Socio-economic polarisation is one of the main research topics in social and urban geography in Western Europe and the USA (KNOX & PINCH, 2000, WEŁŁAWOWICZ, 2007). Processes connected with polarisation (social exclusion and spatial segregation) became clearly visible first in cities in the USA because of a more significant presence of low-wage jobs taken up mainly by groups already marginalised in society (HAMNETT, 1998, MCCARTHY, 1999). In addition, the result of an increased presence of gated communities as well

as ghettos in the USA is the development of so called partitioned cities (MARCUS & VAN KEMPEN, 2002). In Europe the discussion about socio-economic polarisation in urban society became especially heated when unemployment rates grew in the 1980s (FRIEDRICH & TRIEMER, 2008, cf. WIEGANDT, 2012) after the 1970s crisis. Another issue is the socio-economic polarisation in the megacities of less developed countries, which has already led to profound social segregation, like in Havana (COLANTONIO & POTTER, 2006). Strong socio-economic tensions have also been detected within those cities involved with worldwide trade, the global cities (SASSEN, 1991). Finally, these phenomena are particularly visible in regions in transition e.g. former industrial areas where the closing of unprofitable industrial plants result in rising unemployment rates and social fragmentation (see OTTO & CHMIELEWSKA, 2012, 2014).

The closing of unprofitable industrial plants in post-industrial areas has another consequence of brownfield areas seen in urban spaces which need revitalisation. The term revitalisation refers to a sequence of planned actions, aimed at social and economic recovery of degraded urban spaces. It is a complex, long-lasting and interdisciplinary process which includes comprehensive changes in the spatial, functional, urban, infrastructural, social and environmental structure of the area (KACZMAREK, 2001, LORENS, 2010). Brownfields are a special type of degraded urban space, characterized by a loss of function and exclusion from use, and also a lack of permanent inhabitants. The success of the revitalisation of such areas is dependent on external factors, in particular their spatial accessibility, and internal factors such as the size of the area and the type of building (DOMAŃSKI, 2000). The advantages of brownfield sites are their proximity to the city centre and the transport infrastructure (BEHR ET AL., 2003). However, the presence of environmental pollution, infrastructural barriers and ownership barriers may make them difficult to re-use (JARCZEWSKI, 2010).

Special types of brownfield sites, particularly hard to revitalize, are spoil tips, which have arisen as a result of the accumulation of overburden or other waste rock which was removed during coal and ore mining (mine tips) or as a waste by-product from foundries or furnaces (slag heaps). These artificial landforms are generally considered to lower the visual qualities of the landscape. For this reason, in the initial phase of industrial restructuring, many of them were liquidated, and their compositional material was used in mines as backfill, for levelling the area or for construction purposes. In time, however, people began to

appreciate them as part of their cultural heritage and it has been noted that after suitable reshaping even large tips can complement and enrich the landscape (LAMPARSKA-WIELAND & WAGA, 2003).

This paper discusses the issues around the revitalisation of spoil tips and their relation to socio-economic polarisation and social exclusion in the field of municipal recreation to which little attention has so far been paid (as these phenomena are commonly discussed in the field of residential segregation or access to the labour market). In this field, social exclusion and polarisation are revealed in an inequality in the access to leisure facilities some of which are really expensive and therefore exclude low-income households which spend a greater part of their income on rent and basic care. In turn the revitalisation of brownfield sites very often leads to the creation of different types leisure facilities (with a range of entrance fees). So some revitalisation projects may mitigate and others may exacerbate the severity of socio-economic polarisation and social exclusion. In this paper this issue is considered using the example of the largest post-industrial region in Europe – the Ruhr area in Germany. With over fifty years of industrial restructuring, this region has a lot of experience in the redevelopment of brownfield sites. This area has over 100 spoil tips, which are preserved as industrial monuments of the region's past, but which also needed revitalisation. This paper shows the potential of revitalised spoil tips for mitigating socio-economic polarisation in a region in conjunction with previously implemented redevelopment projects in the Ruhr area. The results presented here are part of wider research on the social consequences of the revitalisation of brownfield sites conducted by the authors.

2. Study area

The Ruhr area is located in western Germany in the state of North Rhine-Westphalia. It is the biggest urban agglomeration in the country previously famous for being one of the largest industrial regions in Europe. Its industrial history started in the 14th century when coal was first exploited on the surface, but the greatest development of mining and steel industries took place in the 18th and 19th centuries. This resulted in the development of an industrial landscape, consisting of mine shafts, coking plants, steelworks, factories, as well as mine tips and slag heaps. In the Ruhr area in 1960 there was a crisis of coal surplus, which was followed by a crisis in the steel industry in 1970, which resulted in the restructuring

of the industries within the region. As a consequence many mines and plants were closed down resulting in the creation of brownfield sites and this was the beginning of the revitalisation of this region. Nowadays the Ruhr area is a post-industrial region with developed services and high-tech industries as well as a postmodern place for tourism, leisure and culture, which are strongly attached to its industrial history (CHMIELEWSKA & OTTO, 2013).

In terms of its physical geography, the Ruhr region is situated in the Westphalian Lowland (ZEPP, 2004). The landscape has been heavily transformed by human activities, particularly through industrialization. There are over a 100 spoil tips of different origins throughout the Ruhr area of various, heights, shapes and states of preservation, which may be distinguished into 4 types. The initial phase of industrialization



Fig. 1. Rheinelbe mine tip in Gelsenkirchen (M. Chmielewska, 2008)

resulted in the creation of small conical heaps. The second generation of spoil tips were mounded into the shape of table mountains. The third form of spoil tips developed in the 1980s, according to the guidelines of the Upper Mining Authority and these were intentionally shaped to prevent them from standing out in stark contrast to the surrounding area, so they have a much larger basal area and have few sharp contours, smooth and round boundary lines and possibly several peaks. The fourth type of spoil tips, are called mayor tips, and occur when two or more formerly independent heaps have grown into one large one (www.ruhrgebiet-industriekultur.de/halden). Due to the flatness of this area these convex anthropogenic landforms are treated like hills and are used for hiking and other recreational activities. Furthermore, as they are clearly visible within the landscape they are often used as landmarks (Fig. 1).



Fig. 2. Steps and footpath on the Schurenbach tip (M. Chmielewska, 2008)

3. Materials and methods

The research was conducted on the basis of data collected during field observations and as a result of a literature review (Tab. 1). Attention was paid to the direction of the revitalisation of particular spoil tips especially their potential use for leisure and recreation and their accessibility (including the entrance fee). The consequences of such redevelopments in terms of their effect on socio-economic polarisation were then analysed and compared to the relationship with this phenomenon with other revitalisation projects implemented in the region and in other similar regions.

4. Results

In the Ruhr area 104 spoil tips were identified, the majority of which were mine tips (92) and in addition 5 rubbish dumps, 4 slag heaps, 1 ground landfill (which arose during the redevelopment of the post-industrial area) and 2 mixed types of tip (Tab. 1). They represent all 4 types of spoil tips

created during the course of history in the Ruhr area – from conical heaps, through table mountain shaped tips and intentionally shaped tips to landscape tips and major tips. Among them there are also totally flattened tips, the smallest of these are lower than 5 m and their area covers less than 0,5 ha. The highest one is the Oberscholven tip which is 137 m high. In turn the most extensive is the Hoheward tip with an area of 175 ha. Hoheward tip is also called the biggest one in the area, because it is also quite high (102 m) and the 3rd tallest in the region (Tab. 1).

Spoil tips are located all over the Ruhr area but especially in a line from Duisburg to Hamm with the highest concentration in the middle of the area. The majority are located in 3 towns: Gelsenkirchen (14), Dortmund (13) and Bochum (10). Others are found in: Gladbeck (8), Lünen (8), Oberhausen (5), Essen (5), Herne (5), Hamm (5), Bottrop (4), Duisburg (3), Marl (3), Castrop-Rauxel (3), Unna (3), Recklinghausen (3), Berkammen (3) and Witten (3), and some of the other smaller towns (Tab. 1).

Table 1. The Direction of revitalisation of each spoil tip in the Ruhr area, Germany
(own design on the basis of field studies and: www.ruhrgebiet-industriekultur.de/halden, Berke, 2011; Lange, 2005)

No.	Name of spoil tip	Location	Height [m]	Area [ha]	Origin	Direction of revitalisation	Leisure possibility (yes/no)	Entrance fee (yes/no)
1	Halde Alstaden (Solbadhalde)	Oberhausen	5	< 1	Mine tip	Greened over and covered with paths. Protected biotope with pounds.	yes	no
2	Alsumer Berg	Duisburg	42,2	15	Rubbish dump	Greened over and covered with paths. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
3	Halde Amalia	Bochum	13	?	Mine tip	Private property.	no	inaccessible
4	Halde Beckstraße (Tetraeder)	Bottrop	78	33	Mine tip	Greened over and covered with paths. Landmark - installation in shape of tetrahedron with viewing platforms. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
5	Halde Brassert I/II	Marl	15-18	4,3	Mine tip	Greened over and covered with paths. A playground at the top.	yes	no
6	Halde Brassert III (Lipper Höhe)	Marl	51	34	Mine tip	Greened over and covered with paths. A viewing point.	yes	no
7	Halde Brinkfortsheide	Marl	50	168	Mine tip	Still growing. Inaccessible.	no	inaccessible
8	Halde Brockenscheidt	Lünen	15	8	Mine tip	Greened over and covered with paths. Landmark - a wooden viewing tower. An element of the theme trail: 'Landmarks and Panorama Points' of 'Route Industriekultur'.	yes	no
9	Halde Caroline I/II	Bochum	?	?	Mine tip	Currently redeveloped.	no	inaccessible
10	Halde Caroline	Holzwickede	8	<0,5	Mine tip	Greened over and covered with paths.	yes	no
11	Halde Consolidation III/IV/IX	Gelsenkirchen	0	0	Mine tip	Levelled out and changed into a park.	yes	no
12	Halde Constantin IV/V	Herne	6	4	Mine tip	Changed into a park.	yes	no
13	Halde Constantin VIII/IX	Bochum	7	4	Mine tip	Greened over and covered with paths.	yes	no
14	Deusenberg	Dortmund	55	44	Rubbish dump	Greened over and used as a viewing point and for mountain biking - facilities: MTB-Arena, rails with ramps or steep curves.	yes	no
15	Halde Dorstfeld I/IV	Dortmund	19	2	Mine tip	A cultural monument because of the conical shape. Part of a nature conservation area. Accessible for walkers.	yes	no
16	Halde Dorstfeld II/III (Carlsglück)	Dortmund	10	4	Mine tip	Housing development.	no	no
17	Halde Eickwinkel	Essen	21	5,3	Mine tip	Greened over and covered with paths.	yes	no
18	Halde Ellinghorst	Gladbeck	5	22	Mine tip, rubbish dump	Densely vegetated and a nature conservation area. Accessible for walkers.	yes	no
19	Emscherhalde	Gelsenkirchen	20	6,5	Mine tip	Greened over and covered with paths. A part of the Nordsternpark	yes	no

						Landscape Park.		
20	Halde Erin	Castrop-Rauxel	0	0	Mine tip	Leveled out and change into a park.	yes	no
21	Halde Eulenbaum	Bochum	3	<0,5	Mine tip	Greened over and covered with paths. An element of the 'History of Mining' Trail through Bochum.	yes	no
22	Halde Ewald-Fortsetzung	Oer-Erkenschwick	54	46	Mine tip	Greened over and covered with paths. A 'green classroom' – great stone blocks arranged in a circle.	yes	no
23	Halde Friederica (Alter Hellweg)	Unna	6	<0,3	Mine tip	Private property - grounds of a farm.	no	inaccessible
24	Halde Friederika	Bochum	0	2	Mine tip	Levelled out and changed into a park.	yes	no
25	Halde Frohe Ansicht	Fröndenberg	8	<0,5	Mine tip	Forested, accessible but without any infrastructure.	yes	no
26	Halde Gen. Blumenthal I/II/VI	Recklinghausen	12	10	Mine tip	Greened over, partly accessible with paths.	yes	no
27	Landschaftsbauwerk Gneisenau	Dortmund	20	8	Rubbish dump	Part of a park with a playground.	yes	no
28	Halde Gotthelf	Dortmund	43	6	Mine tip	Greened over and covered with paths.	yes	no
29	Halde Graf Moltke I/II	Gladbeck	21	5	Mine tip	Part of the 'Braucker Alpen'. Greened over and covered with paths.	yes	no
30	Halde Graf Moltke III/IV	Gladbeck	49	20	Mine tip	Part of the 'Braucker Alpen'. Inaccessible - it is a burning spoil tip.	no	inaccessible
31	Grevel Alm	Dortmund	40	37	Rubbish dump	Greened over and covered with paths. Viewing platforms.	yes	no
32	Halde Groppenbruch	Dortmund	17	18	Mine tip	Currently redeveloped, used (illegally) by motocross or quad riders	yes	no
33	Halde Großes Holz	Bergkamen	84	126	Mine tip	Greened over and covered with paths. Panorama point on the trail 'Route Industriekultur' and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
34	Halde Haniel	Bottrop, Oberhausen	128	107	Mine tip	Greened over, with an amphitheatre and art installation and a brightly painted railway on the top and stations of the Cross path. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
35	Halde Hannibal I/II	Bochum	22	5	Mine tip	Greened over and covered with paths.	yes	no
36	Halde Hannover I/II/V	Gelsenkirchen	26	5	Mine tip	Forested, accessible but without any infrastructure.	yes	no
37	Heinrich-Hildebrand-Höhe	Duisburg	35	8	Slag heap	Park with an art installation in the shape of a roller coaster called 'Tiger & Turtle – Magic Mountain'. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
38	Halde Haus Aden 2	Bergkamen	43	25	Mine tip	Mountain biking trail.	yes	no
39	Halde Hibernia-Dreieck	Gelsenkirchen	6,5	23	Mine tip	Arable and grassland, as well as a horse farm.	no	no
40	Hiltroper Höhe	Bochum	?	1,6	Rubbish dump	A landmark with helical ramp to a viewing platform.	yes	no

41	Halde Hoheward	Herten and Recklinghausen	102	175	Mine tip	Greened over and covered with paths. Landscape park with astronomical installations: horizon observatory and sundial. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
42	Halde Hoppenbruch	Herten	69	59	Mine tip	Greened over and covered with paths. Part of a Landscape Park Hoheward with sculptures dedicated to the wind and a wind turbine.	yes	no
43	Halde Humbert	Hamm	37	16	Mine tip	Still growing, inaccessible.	no	inaccessible
44	Halde Hympendahl	Dortmund	?	11	Slag heap	Greened over and covered with paths.	yes	no
45	Halde Ickern	Castrop-Rauxel	?	8,5	Mine tip	Elongated and changed into noise protection with built-in amphitheatre.	yes	no
46	Im Hürfeld	Dorsten	45	90	Mine tip	Still growing. Inaccessible.	no	inaccessible
	Halde Jakob	Dortmund	12	?	Mine tip	Greened over and covered with paths.	yes	no
47	Halde Juno	Witten	?	?	Mine tip	Part of a tourist trail through Mutten Valley.	yes	yes
48	Halde Kissinger Höhe	Hamm	55	45	Mine tip	Hiking area with 17 km of walking trails. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
49	Knappenhalde	Oberhausen	60	?	Mine tip	Greened over and covered with paths. A viewing tower. A part of CentrO Oberhausen. An element of the theme trail: 'Landmarks and Panorama Points' of 'Route Industriekultur'.	yes	no
50	Halde Königsgrube	Herne	5	5	Mine tip	Park with some mine buildingrelics	yes	no
	Halde Lohwiese	Gelsenkirchen	14	?	Mine tip	Park with sport facilities.	yes	no
51	Halde Lothringen I/II	Bochum	16-26	5	Mine tip	Greened over and covered with paths. Landmark built from thick yellow pipes. An element of the theme trail: 'Landmarks and Panorama Points' of 'Route Industriekultur'.	yes	no
52	Halde Massen	Dortmund and Unna	10	?	Mine tip	Small park.	yes	no
53	Halde Maximilian	Hamm	7,5	4	Mine tip	Part of a Maximilian Park.	yes	yes
54	Halde Minister Achenbach I/II	Lünen	38	27	Mine tip	Greened over and covered with paths.	yes	no
55	Halde Minister Achenbach III	Lünen	9	0,5	Mine tip	Greened over and covered with paths.	yes	no
56	Halde Minister Achenbach IV (Halde Tockhausen)	Lünen	36	12	Mine tip	Greened over and covered with paths.	yes	no
57	Möllerhalde	Gladbeck	13	4	Mine tip	Greened over and covered with paths.	yes	no
58	Halde Monopol	Bergkamen	35	10	Mine tip	Completely overgrown, only minor paths for walkers.	yes	no
59	Halde Monopol	Kamen	6	6,5	Mine tip	Part of a Technopark.	yes	no
60	Mottbruchhalde	Gladbeck	88	57	Mine tip	Part of the 'Braucker Alpen'. It is still growing because of material deposited there, so is inaccessible.	no	inaccessible
61	Halde	Neukirchen-	74	90	Mine tip	Recreational area with a steel framed house which is reminiscent of a	yes	no

	Norddeutschland	Vluyn				large greenhouse in the garden. The wind can blow freely through the steel beams and 'whistle'. An element of the theme trail: 'Landmarks and Panorama Points' of 'Route Industriekultur'.		
62	Halde Nordstern	Gelsenkirchen	15	4	Mine tip	Part of the NordsternLandscape Park. A viewing point.	yes	no
63	Halde Oberscholven	Gelsenkirchen	137	60	Mine tip	Greened over and covered with paths. A viewing point, wind park and a big cross – place of devotions in Mai.	yes	no
64	Halde Oestrum	Homberg	14	14	Mine tip	Greened over and covered with paths.	yes	no
65	Halde Orion	Witten	?	?	Mine tip	Part of a tourist trail through Mutten Valley.	yes	yes
66	Halde Pattberg	Moers	64	34	Mine tip	Greened over and covered with paths. A viewing point and a cross at the peak. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
67	Halde Pluto-Thies (Dürerhalde)	Herne	34	2	Mine tip	Greened over and covered with paths. A viewing point.	yes	no
68	Phoenix Ost (Kaiserberg)	Dortmund	?	4,5	Ground landfill	Arose during creation of Phoenix-See, is now a viewing point.	yes	no
69	Halde Pluto-Wilhelm	Herne	39	12,5	Mine tip	Natural protected area, inaccessible.	no	inaccessible
70	Preußenhalde	Lünen	25	?	Mine tip	Greened over and covered with paths.	yes	no
71	Halde Prinz von Preußen	Bochum	?	?	Mine tip	Private propertyof Bochum Environmental Services, inaccessible.	no	inaccessible
72	Halde Prosperstraße (Alpincenterhalde)	Bottrop	60	30	Mine tip	Indoor - ski slope, summer toboggan run, high rope climbing, skydiving facility.	yes	yes
73	Halde Radbod	Bockum	30	25,5	Mine tip	Greened over and covered with paths.	yes	no
74	Halde Recklinghausen II	Recklinghausen	10	5	Mine tip	Training mine.	no	inaccessible
75	Halde Rheinbaben	Gladbeck	21	22	Mine tip	Forested natural protected area, accessible.	yes	no
76	Halde Rheinelbe	Gelsenkirchen	40	19	Mine tip	Greened over and covered with paths. Landmark 'Stairway to heaven'. Panorama point on the trail 'Route Industriekultur' and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
77	Halde Rheinelbe (Nord)	Gelsenkirchen	26	9	Mine tip	Greened over and covered with paths. A sculpture forest.	yes	no
78	Halde Rheinpreußen	Moers	78	52	Mine tip	Landmark - a huge 30 m high red mining lamp. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks and Panorama Points'.	yes	no
79	Halde Robert Müser	Bochum	9	?	Mine tip	Completely overgrown and offers only minor paths for walkers.	yes	no
80	Halde Rockelsberg	Duisburg	38	11	Slag heap	Greened over and covered with paths.	yes	no
81	Halde Roland	Oberhausen	6	?	Mine tip	A park.	yes	no
82	Ruhrgashalde	Gelsenkirchen	6,5	2,5	Mine tip	Part of a landscape park, a viewpoint.	yes	no
83	Halde Rungenberg	Gelsenkirchen	60	56	Mine tip	Landmark – a tip divided into two parts of a pyramid with a headlamp on top of each. Panorama point on the 'Route Industriekultur' trail and an element of the theme trail: 'Landmarks	yes	no

						and Panorama Points’.		
84	Halde Sachsen	Hamm	32	10	Mine tip	Greened over and covered with paths. Landmarks – high cross and wind-gauge. An element of the theme trail: ‘Landmarks and Panorama Points’ of ‘Route Industriekultur’.	yes	no
85	Halde Schallacker	Dortmund	20	5	Slag heap	A part of Phoenix-West revitalized area, local recreational facility.	yes	no
86	Halde Schleswig	Dortmund	48	30	Mine tip, slag heap	Greened over and covered with paths.	yes	no
87	Halde Schöttelheide	Oberhausen	?	60	Mine tip	Is still growing because of material deposited there, so is inaccessible.	no	inaccessible
88	Halde Schurenbach	Essen and Gelsenkirchen	50	50	Mine tip	Greened over with walking paths, mounds and a landmark - a 15m high steel slab. Used by kiteboard riders. Panorama point on the ‘Route Industriekultur’ trail and an element of the theme trail: ‘Landmarks and Panorama Points’.	yes	no
89	Halde Schwerin	Castrop-Rauxel	33	14,5	Mine tip	Greened over and covered with paths. A sundial on the top – landmark. Panorama point on the ‘Route Industriekultur’ trail, a part of the theme trail: ‘Landmarks and Panorama Points’.	yes	no
90	Sundernrücken	Hamm	50	38	Mine tip	Currently redeveloped, inaccessible.	no	inaccessible
91	Halde Unser Fritz I/IV	Gelsenkirchen	10	6	Mine tip	A part of a bicycle ore railway path.	yes	no
92	Halde Vereinigte Hermann	Witten	<5	<0,5	Mine tip	Part of a tourist trail through Muttten Valley.	yes	yes
93	Halde Victoria I/II (West)	Lünen	25	4,5	Mine tip	Greened over and covered with paths.	yes	no
94	Halde Victoria I/II (Ost)	Lünen	31	5,5	Mine tip	Greened over and covered with paths.	yes	no
95	Halde Victoria III/IV	Lünen	24	15	Mine tip	Greened over and covered with paths.	yes	no
96	Halde Voßnacken	Herne	3	?	Mine tip	Natural protected area, inaccessible.	no	inaccessible
97	Halde Welheimer Mark	Bottrop	21	8	Mine tip	A sports field.	yes	no
98	Halde Werne III	Unna	13	?	Mine tip	Greened over and covered with paths.	yes	no
99	Halde Wilhelmine Victoria II/III	Gelsenkirchen	18	4	Mine tip	Housing development.	no	no
100	Halde Zollverein IV/V/XI	Essen	40	35	Mine tip	A training area for dressage horses.	yes	no
101	Halde Zollverein XII	Essen	17	?	Mine tip	Sculpture Forest.	yes	no
102	Halde 7 (Stinneshalde)	Essen	21	9	Mine tip	Part of the ‘Braucker Alpen’, small natural protected area, accessible.	yes	no
103	Halde 19	Gladbeck	28	9,5	Mine tip	Part of the ‘Braucker Alpen’ with landmark pulley from the conveyor tower.	yes	no
104	Halde 22	Gladbeck	39	19	Mine tip	Part of the ‘Braucker Alpen’, a local recreational area with small paths.	yes	no

? - undefined

The vast majority of spoil tips in the Ruhr area are already revitalised. In the process of land reclamation they were greened over and assimilated into the rest of the landscape. Some of the smaller ones are hardly visible among the surrounding forested or overgrown areas. The larger ones stand out in the flat landscape and are used as viewing points and landmarks (Tab. 1).

89 out of 104 of the distinguished spoil tips are accessible to everyone by at least one footpath.

Of the 15 inaccessible spoil tips: 5 are still increasing as dumping places, 2 are currently being redeveloped, 4 are on private property, 2 are within nature protection areas, 1 is a burning tip and another 1 is a training mine. 2 former spoil tips which are accessible but without leisure possibilities have been developed into housing estates. The remaining 87 spoil tips are used for leisure and recreational areas (Tab. 1).



Fig. 3. Paths and viewing platform on the Hoheward tip
(*M. Chmielewska, 2008*)



Fig. 4. Banks around the pond on the Schurenbach tip
(*M. Chmielewska, 2008*)



Fig. 5. The landmark at the top of the Schurenbach tip
(*M. Chmielewska, 2008*)



Fig. 6. Tetraeder on Bottrop
(*M. Chmielewska, 2008*)



Fig. 7. The horizon observatory on the top of Hoheward tip
(*M. Chmielewska, 2008*)



Fig. 8. A mine spoil tip in Nordstern Landscape Park
(*M. Chmielewska, 2006*)

The recreational functions of spoil tips are diverse, but all 87 mentioned above have at least one recreational use - they serve mainly as a place for walks (Fig. 2, 3). In addition, some of them have been changed into recreation parks with an appropriate infrastructure such as banks (Fig. 4) or playgrounds, others are used as sports facilities for skiing, sledding, kite boarding, biking, motocross racing etc. Over a dozen of the tips in the Ruhr area are tourist attractions recommended by the post-industrial heritage tourist trail in the region - "Route der Industriekultur" with great panorama points and/or landmarks (Fig. 1, 5-7). Some form parts of other tourist trails: "History of mining trail" in Bochum and "Early mining trail in Mutten Valley" in Witten. Several mine tips are connected with landscape parks: 3 form a part of the Nordstern Landscape Park (Fig. 8) and another 2 are part of the Landscape Park of Hoheward (Fig. 3, 7), some others are known as the Braucker Alps and are in a hiking area (Tab. 1).

The vast majority of the spoil tips in the Ruhr area are accessible free of charge, even as tourist attractions. Those spoil tips located on the Alpine center halde in Bottrop require an entrance fee, as does the Maximilian Park - the location of Halde Maximilian, and the Mutten Valley which forms part of the GeoPark in the Ruhr area (Tab. 1).

In conclusion, this research has shown that it has been possible to use the majority of the spoil tips in the Ruhr area as leisure facilities after their revitalisation. Because of the direction of the implemented redevelopments and due to their free accessibility they serve a wide range of people - from locals to visitors, from children to senior citizens etc., regardless of their income. As such they mitigate the negative phenomena of socio-economic polarisation and social exclusion in the region.

5. Discussion

It is remarkable that most revitalisation projects implemented in Germany, incorporate the creation of leisure and recreation spaces at least as a sub-goal (cf. PROSSEK ET AL., 2009). This is especially noticeable in the Ruhr area which has experienced over fifty years of restructuring of its industries and the implementation of many diverse revitalisation projects and has developed into a post-modern recreational paradise (REUBER & KRAJEWSKI, 2009).

The Ruhr region is known for numerous major revitalisation projects which have led to the creation of large-scale leisure and entertainment spaces. The best example of these is the "Neue

Mitte" in Oberhausen which has been changed from a former steelworks area into a new city centre with a shopping mall, event halls, museums, sports facilities and amusement centre (CHMIELEWSKA & OTTO, 2013). It is an attractive place for both locals and visitors, but not everybody can afford to visit facilities located there. The same situation applies to other new objects which are appearing in the urban spaces of the region like multiplex cinemas, musical theatres, adventure pools, aqua parks, aquaria, amusement parks, theme parks, zoos, indoor ski slopes, etc.

The entrance fees, irrespective of their economic justification, are a barrier for low-income households to participate in recreational activities and therefore reinforces the polarisation trends in the leisure sector. The prices of new recreational paradises can usually not be financed within tight budgets. For example a day in the Alpine Centre costs over 100 euros for a family with two children and at the Sea Life Centre a family of four will pay 72 euros (excluding the travelling costs). The museum facilities, which account for a significant focus of the industrial revitalisation in the Ruhr, have a different price structure. However, they are significantly cheaper than the post-modern leisure facilities and quite often also offer special rates for recipients of transfer payments. The entrance fee for the mining museum starts at 14 euros for families and the current exhibition in the Gasometer costs 20 euros. The large enclosed parks are significantly cheaper. One example is the Maximilian Park in Hamm, situated on a former colliery site, which has a wide infrastructure especially aimed at children and which has created space for various events. Here the admission is 10 euros for a family per day (OTTO & CHMIELEWSKA, 2014).

Since the mere existence of entrance fees can discourage participation, it is very welcome for the developers of the Ruhr area to implement revitalisation projects which offer recreational opportunities that are not associated with any costs. A good example of a successful combination of an industrial monument and an everyday recreational area is the Landscape Park Duisburg-Nord which provides recreation opportunities for different kinds of people and is accessible to everybody free of charge (OTTO & CHMIELEWSKA, 2012). In a similar way is functioning the Landscape Park Nordstern in Gelsenkirchen in the vicinity of the River Emscher and the Rhine - Herne Channel built in place of a coal mine with attractions like: an open-air amphitheatre on the channel bank, mock mining gallery or climbing garden (CHMIELEWSKA, 2010b).

As shown by the research, the majority of the spoil tips in the Ruhr area are without entrance fees and therefore available to everyone. As green areas, freely accessible parks and other recreational facilities that offer space for diverse sport activities they are important every day recreational urban spaces and as tourist sites they are attractive for visitors as well. Particularly interesting and also available free of charge is the Landscape Park Hoheward on the border of Herten and Recklinghausen which is entirely organized on spoil tips and covers the area of the biggest spoil tip in the region – Hoheward tip and the neighbouring Hoppenbruch tip which offers over 20 km of footpaths and bike paths, several viewing platforms (Fig. 3) and an Astronomical Park on the top (CHMIELEWSKA, 2010a).

Thanks to the diversity of revitalisation projects implemented in the Ruhr area their impact on socio-economic polarisation is quite well balanced. There are of course many facilities available only to wealthy inhabitants which can exacerbate negative phenomena like social exclusion. But there are also many recreation areas, like these located in place of spoil tips, which are accessible for everyone without any social segregation. The importance of these redeveloped spoil tips is that these objects are spread all over the region which means they may serve quite a wide range of people – most of whom are local inhabitants.

6. Conclusions

This paper discussed the issues of the revitalisation of spoil tips and their relation to socio-economic polarisation and social exclusion in the field of municipal recreational facilities using the example of the largest post-industrial region in Europe – the Ruhr area in Germany. A 104 spoil tips of different origin, size and state of preservation were identified within the research area. The directions of revitalisation of each of them were analysed as well as their potential for mitigating negative phenomena associated with socio-economic polarisation within the region such as social exclusion. The research has shown that it is possible to use the majority of the spoil tips in the Ruhr area (87 of them) as leisure facilities as they have been transformed into green areas, parks, playgrounds, locations for sports activities and tourism. Furthermore, they are accessible free of charge (with only a few exceptions) and serve a wide range of people – from locals to visitors, from children to senior citizens etc., regardless of their income. As such

they may mitigate the socio-economic polarisation tendencies within the region contrary to other redevelopment projects implemented there before.

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