

Alina Zajadacz¹

Anna Lubarska²

Creating sensory gardens and paths as outdoor sites for people with visual impairments

1. Introduction

Gardens are a stimulating sensory environment for recreation, education and therapy outdoors (Spring, 2016). These properties are used in a special way in sensory gardens, which, historically, have evolved gradually from the traditional concept of a 'garden for the blind' into sensory landscapes. This evolution has contributed to the creation of outdoor sites promoting social inclusion through universal design, focused on the multi-sensory landscapes. A sensory garden is a self-contained area, which is focused on a variety of sensory experiences (Sensory Trust 2017). Such an area, if designed, maintained and managed well, offers a positive resource that caters for a variety of needs, from education to recreation. With sensory element (hard and soft landscaping, colours, textures) as the key factor in designing these gardens, its role is to encourage the users to touch, smell and actively experience the garden with all their senses (Hussein, Abidin & Omar, 2013). The inspiration for creating sensory gardens was the ideas promoted by Hugo Kükelhaus (1900–84), paying attention to the profound meaning of experience in human perception (Luescher, 2006).

2. Literature review

Every garden is, in a broad sense, a sensory garden, as people perceive it with all their senses. However, visual perception tends to be dominant, focusing all the attention of the viewer and pushing the impressions perceived by other senses to the background. That is

¹ Department of Tourism and Recreation, Faculty of Geographical and Geological Sciences
Adam Mickiewicz University, ul. Bogumiła Krygowskiego 10, 61-680 Poznań (Poland), e-mail: alina@amu.edu.pl

² Department of Tourism and Recreation, Faculty of Geographical and Geological Sciences
Adam Mickiewicz University ul. Bogumiła Krygowskiego 10, 61-680 Poznań (Poland), e-mail:
anna.lubarska@amu.edu.pl

why sensory gardens are designed in such a way that non-visual stimuli are used at a higher intensity, giving blind people the opportunity to spend a pleasant time in the garden, whose visual qualities they cannot appreciate (Pawłowska 2008, Dąbski & Dudkiewicz 2010). Even for sighted sensory gardens' users consider the sensory value to be more important than aesthetic one (Hussein 2009).

Since the beginning of their existence, Polish sensory gardens have been the subject of many studies and research. Over the years, gardens in Owińska, Bucharzewo, Chorzepowo, Bolestraszyce or Zakopane have been described in publications by authors from various research centres in Poland (Dąbski & Dutkiewicz 2010, Trojanowska 2014, Woźnicka et al. 2014, Zajadacz et al. 2015, Szczepańska et al. 2018). Sensory gardens turned out to be such a popular topic that each year several new ones are created and it is difficult to estimate the number of sensory gardens, public and private, as new ones are opened practically every month. There are even more projects drawn up by landscape architects and students.

Designing accessible space is connected with the concept of universal design and design for all. Environments must be designed in such a way so that they can be used by people of all ages and abilities without the need for further adaptation in different circumstances. Independence in using the space is crucial (Connell, Jones et al. 1997; Story, Mueller et al. 1998, Li, Eichhorn et al. 2014).

3. The aims and methods of research

The aim of the study is to present the ways of creating universal gardens and sensory paths as outdoor sites which are also attractive for the visually impaired, in various types of environment in both urban and rural areas, as well as in areas of natural value. The key question is: which features of universal design are of elementary importance from the point of view of the blind and partially sighted (e.g. in terms of spatial orientation, information, sense of security) and should constitute a basis for designing parks and gardens so that they are more accessible to all.

Opinions of blind and visually impaired people are critical in the process of identification of these basic features and facilities. Hence the stages of work included a field inventory of parks and gardens alongside interviews with blind and partially sighted people.

The research was carried out between June and August 2018. The study covered 15 gardens and one sensory path. These objects are located in various regions in Poland, in cities, rural areas and areas of natural value, including national parks (Fig. 1).

Interviews with the blind and partially sighted were conducted in the studied areas in cooperation with the Polish Association of the Blind. 32 interviewees are included. More detailed characteristics of respondents will be presented during the presentation of the survey results. The results of the conducted analyses form the basis for the formulation of recommendations in the field of good practice of universal garden design, which can provide sensory experiences for everyone, including people with a visual impairment.

4. Research results of selected gardens and paths

The discussion of the research results will include the field inventory. During the inventory, the features important from the point of view of the needs of blind and partially sighted people were taken into account. Their selection was based on Szczepańska et al. (2018). The following features were included:

- Elements for easy spatial information,
- Infrastructure for mobility for the blind and partially sighted,
- Techniques for communicating information to the blind and partially sighted in sensory gardens.

This discussion also takes into account the results of interviews conducted with blind and partially sighted people. The questions were based, among others, on a study on the subject of designing environments for blind people by incorporating non-visual perception of space (Wysocki 2010). The following issues were raised:

- The role of the senses in individual perception and spatial orientation,
- The role of the senses in spatial orientation in the garden visited,
- Possibility of moving independently (spatial orientation and safety) in a known environment; in a new, unknown environment; in the visited sensory garden,
- Facilitation of spatial orientation in the visited sensory garden,
- Factors determining the feeling of security in the visited sensory garden,
- Favourite, most interesting places in the visited sensory garden,
- Barriers and restrictions hindering sightseeing, stay in the sensory garden.

4.1. Adaptation of gardens and sensory paths to the needs of blind people

The results of field inventory are included in Tables 1-3. Table 1 shows whether the selected feature is present in the sensory garden in question. The most frequently found features regarding easy orientation were scents (100% of the gardens), clear path layout (81% of the gardens), diversified texture of the path surface (69% of the gardens, see Fig. 2) and advice from other people (63% of the gardens – see also 4.2 - Opinions of the blind and partially sighted about sensory gardens). Some of the places declared that they use a modified programme depending on the level of disability of the visitors and that the staff are able to serve groups and individuals with visual impairments. This does not apply to open parks and gardens; however, some of them have guards or gardeners present most of the time.

Table 2 presents the infrastructure for mobility and amenity for the blind and partially sighted. Most of the places had diversified types of surfaces. More than half had tables. Ramps (50% of the gardens) are also appreciated by the older and less mobile guests of the gardens. Some of the places did not need ramps, as they were mostly flat. However, there were also places which were not fully accessible. Elevated flowerbeds are of key importance, as it is easy to miss a low flowerbed. Gardens were generally well equipped – one out of four had a tactile site plan (Fig. 3).

The conclusions of Table 3 are as follows: some solutions are used in only one or two gardens, but they are worth looking at as an opportunity for further improvements. The most popular were sensory or interactive toys and sensory paths – 3 out of 4 places had them. Braille and Large Print plates were present in 50% of the studied gardens, and tactile graphics or plans in 38%. The details can vary. Fig. 4, 5 and 6 show a way to engage the sense of hearing. Tubular bells, wind bells, different species of plants, different surfaces and water elements such as fountains and streams all stimulate the same senses in different ways. Some gardens decided to use art to make their place more attractive to visitors. The idea to include information plates makes it possible to get information without asking (Fig. 7, 8).

4.2. Opinions of the blind and partially sighted regarding sensory gardens

The group of interviewees consisted of 32 people, of whom 19 were women, 11 were men, and 2 did not specify their gender. The minimum age was nine years old, whereas the oldest person was sixty-eight years old. The average age was 31 years. Regarding education, the largest group (13 people) consisted of those with secondary education, the second largest group had primary education, while six people had graduated from a vocational school and three were university graduates. Some were still students. Nine could not see at all, whereas the rest were visually impaired but had some sight.

While the majority feel entirely or rather independent in their place of residence, the same people feel that in a new environment they need assistance. The sensory gardens, however, are perceived by them as safe areas, where they feel much more independent than in other outdoor spaces. The assistance of other people is still crucial. The vast majority feel insecure in new places and prefer to have assistance. Many of the interviewees mentioned that they prefer to ask somebody for help (garden staff, a guide) than to try and find the way or information themselves. They appreciated being accompanied by trained staff. Regarding garden equipment and toys, the majority of respondents concentrated on other aspects when asked about what is important in a sensory garden; however, when asked what places they liked the most in the sensory garden that they had visited, they recalled many interesting elements, such as outdoor gyms or arbours, special areas for different senses, and playground facilities (Fig. 9).

The interviewees also answered the question of what amenities they would expect in an outdoor space, e.g. a city park. Their answers were assigned to one of the five categories: safety, orientation, information, rest and recreation and miscellaneous. Regarding safety, the interviewees paid attention to paths: even sidewalks, with secure edges, and high kerbstones without any obstacles. They appreciate good lighting, markings and colour contrast, especially in dangerous areas. There were also some answers suggesting that cyclists and skaters should not enter alleys where blind people can walk, and that there should be separate paths. Properly designed paths also help with orientation in the sensory garden. A varied path surface is helpful, as well as tactile plans and enlarged maps. Regarding access to information, aids such as Braille guides (Fig. 10) and Braille plates were mentioned, but also audioguides, plates with added sound, and the ability to touch elements in the garden (plants, sculptures, architecture).

5. Conclusions - recommendations for the design of universal gardens and sensory paths

- (1) Based on the analyses carried out so far, the universality of the recommended principles of designing gardens and sensory paths has been confirmed (Dąbski, Dudkiewicz, 2010, Zajadacz et al., 2015). This mainly concerns the use of natural stimuli of the natural environment, stimulating the senses of hearing, smell and touch. Outdoor sites need to be safe - the path system must be clear and convenient. The paths should also be signposted, giving directions to different parts of the garden, and their surface and width should be varied. All paths must have elevated curbs, which will prevent the visitors from wandering off the path. Road intersections and corners of quarters should be rounded, accentuated by changing the surface. Also, the texture and colour of the walls or fences can be varied in different parts of the garden.
- (2) The composition of the garden should take into account the key places that can be located through sound. For the sense of hearing, the noise of flowing water is particularly attractive. Elements of garden equipment, such as benches and lanterns, should be placed outside the alley and be of colours that contrast with the surroundings.
- (3) The plants present in the garden: fruit trees and shrubs should have large fruits which are easy to find and pick. It is unacceptable to plant thorny, poisonous, coniferous plants with hard needles. Plants are placed on rebates raised 50-90 cm above ground level. They should have strong and diverse scents of flowers or leaves, being grouped so that their fragrances do not mix. The fragrant garden needs protection from the wind, such as a hedge, a wall or a building wall.

Taking into account the functions of parks and gardens, universal principles of their design should refer to:

- (1) Arrangement of different spheres, allowing different senses to be experienced in order to:

- get to know phenomena, objects (e.g. physical, acoustic experiences) and oneself (sensory sensations, e.g. sensory paths, scents),
- rest, by relaxing in a multi-sensory natural environment, and be active (playgrounds, outdoor gyms, etc.),
- entertain oneself and play in an inspiring environment, socialise in the open air, through facilities for all.

(2) Providing basic facilities for the blind and partially sighted in parks and gardens, in terms of:

- spatial orientation,
- safety, elements that can be recognised through non-visual perception,
- information (on elements of the garden, facilities and spatial orientation).

The observed development of sensory gardens (most of the areas presented in the article were created in the last ten years) results from the great interest in this type of outdoor site, which conducive to recreation, education, integration and social inclusion. Gardens and sensory paths, however, should not be 'lonely islands'. Solutions developed in them should 'penetrate' and inspire us to create universal gardens, accessible 'for all'.

Another important aspect of this is taking care of sensory gardens so that their potential is not wasted. The environment of people supporting the accessibility of space must make every effort to ensure that, once created, the gardens can be used for many years and be kept in good condition. Although the number of people directly benefiting from them is small (the number of entirely blind people is not very high), they are not only an educational aid, but also a pleasant area to spend free time, in which all people can meet, regardless of whether or not they have a disability.

6. Bibliography

Luescher, A. (2006). Experience Field for the Development of the Senses: Hugo Kükelhaus' Phenomenology of Consciousness *International Journal of Art & Design Education* 25 (1), 67–73 doi:10.1111/j.1476-8070.2006.00469.

Connell, B. R., Jones, M. [et al.] (1997). The principles of universal design. https://projects.ncsu.edu/ncsu/design/cud/about_ud/udprinciplestext.htm. Access: 10.10.2018.

Dąbski M., Dudkiewicz M. (2010). Przystosowanie ogrodu dla niewidomego użytkownika na przykładzie ogrodów sensorycznych w Bolestraszcach, Bucharzewie i Powsinie. *Teka Kom. Arch. Urb. Stud. Krajobr.* – OL PAN, 2010, 7-17.

Hussein, H. (2009). Sensory garden in special schools: The issues, design and use. *Journal of Design and Built Environment*, 5, 77- 95.

Hussein H., Abidin N.M., Omar Z. (2013), Engaging Research and Practice in Creating for Outdoor Multi-Sensory Environments: Facing future challenges. *Procedia - Social and Behavioral Sciences* (2013) 536 – 546.

Li, G., Eichhorn, V. [et al.], (2014), Economic Impact and Travel Patterns of Accessible Tourism in Europe – Final Report.

Ogród Ceramiki (2015), Pierwszy ceramiczny ogród sensoryczny w Warszawie! <http://ogrodceramiki.blogspot.com/2015/09/pierwszy-ceramiczny-ogrod-sensoryczny-w.html>, access: 13.10.2018

Pawłowska, K., (2008), Ogród sensoryczny. In: *Dźwięk w krajobrazie jako przedmiot badań interdyscyplinarnych*. Ed. Bernat, S. – Lublin: Inst. Nauk o Ziemi UMCS: Prace Komisji Krajobrazu Kulturowego PTG, 143-152.

Sensory Trust, (2017), <https://www.sensorytrust.org.uk/information/factsheets/sensory-garden-1.html>, access: 13.10.2018.

Spring J. A. (2016), Design of evidence-based gardens and garden therapy for neurodisability in Scandinavia: data from 14 sites. *Neurodegenerative Disease Management* Vol. 6, No. 2 Short Communication. Published Online:1 Apr. 2016, <https://doi.org/10.2217/nmt.16.2>

Story, M. F., Mueller, J. L.[et al.], (1998), The Universal Design File: Designing for People of All Ages and Abilities. Revised Edition. – Raleigh: NC State University, The Center for Universal Design.

Szczepańska M., Ogonowska-Chrobowska H., Jakubowski M. (2018), Ogrody i ścieżki zmysłów w procesie rekreacji i edukacji przyrodniczo leśnej osób niewidzących i niedowidzących. Materiały archiwalne Ośrodka Szkolno-Wychowawczego dla Niewidomych w Owińskach.

Trojanowska M. (2014). Sensory gardens inclusively designed for visually impaired users. In: *PhD Interdisciplinary Journal*, 1, 309-317.

Woźnicka M., Janeczko E., Nowacka W.L. (2014), Wykorzystanie roślinności leśnej w edukacji leśnej osób z dysfunkcją narządu wzroku. In: *Studia i Materiały Centrum Edukacji Przyrodniczo-Leśnej*, 16, 1[38], 219-225.

Wysocki M. (2010), Projektowanie otoczenia dla osób niewidomych. Pozawzrokowa percepcja przestrzeni. Wydawnictwo Politechniki Gdańskiej.

Zajadacz A., Kołodziejczyk K., Stasiak A., Śledzińska J., Włodarczyk B., Wysocki M. (2015), Dostępność szlaków turystycznych dla osób niepełnosprawnych [w:] *Szlaki turystyczne od pomysłu do realizacji*, Stasiak A., Śledzińska J., Włodarczyk B., (red.) wyd. PTTK Kraj, Warszawa: 413- 449.



Fig. 1. Location of the fifteen studied sensory gardens and one sensory path



Fig. 2. Diversified surface of the paths (source: authors' own collection).



Fig. 3. A convex plan in sensory garden in Bolestraszyce.



Fig. 4. "The sound path" in Bród Nowy.



Fig. 5. "The garden of sound" in Muszyna sensory garden



Fig. 6. Tubular bells in Poddębice.

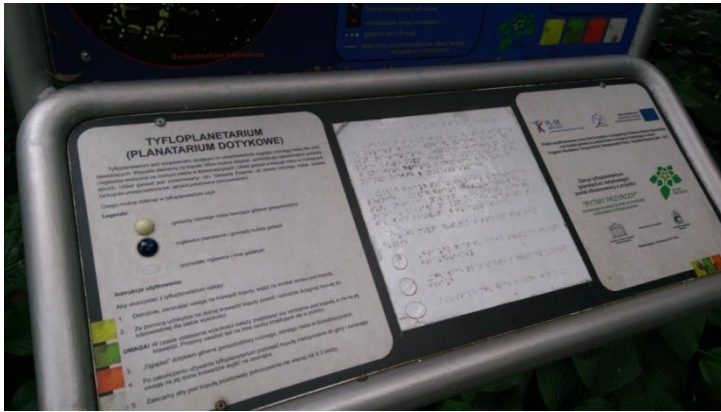


Fig. 7. Printed and convex description of a typhloplanetarium



Fig. 8. Pieces of art with their description in Braille in Bolestraszyce.



Fig. 9. An original project of a educational aid combined with an attractive toy in Owińska. The pipes transmit voice.



Fig. 10. A Braille guide in Bolestraszyce.

TABLES

Tab. 1. Elements in the sensory garden to facilitate spatial orientation

Feature	Sensory gardens and paths																Σ/%
	(a)							(b)								(c)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1a	
1. Clear path layout	x	x	x	x	x	x	x	x	x	(-)	(-)	(-)	x	x	x	x	13/81
2. Convex plans of communication routes	x	(-)	x	x	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	(-)	(-)	4/25
3. Tactile walking surface indicators	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	0/0
4. Diversified surface of path surface	x	x	x	x	(-)	x	(-)	x	(-)	x	x	(-)	x	x	x	(-)	11/69
5. Waypoints described in Braille	x	x	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	(-)	(-)	x	(-)	x	5/31
6. Audible information	x	x	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	3/19
7. Spatial models	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	0/0
8. Scents	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	16/100
9. Applications in mobile devices	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	0/0
10. Advice from others	x	x	x	x	x	x	x	x	(-)	(-)	(-)	x	(-)	(-)	(-)	x	10/63

Garden designation (a) rural areas: 1. Bucharzewo, 2. Owińska, 3. Zawoja, 4. Bolestraszyce, 5. Osmolice, 6. Trzcianki, 7. Bród Nowy; (b) towns and cities: 8. Kraków, 9. Gdańsk, 10. Lublin, 11. Muszyna Ogród Zmysłów, 12. Muszyna Ogród Biblijny, 13. Muszyna Ogród Magiczny, 14. Poddębice, 15. Powsin (Warszawa); (c): sensory path in a village: 1a. Chorzępowo; x – the element is present, (-) – the element is not present. Source: Field inventory results, July-August 2018.

Tab. 2 Infrastructure for the mobility and stay of blind and partially sighted people in selected sensory gardens

Feature	Sensory gardens and paths																Σ/%
	(a)							(b)								(c)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1. Site plan	x	(-)	X	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	(-)	x	(-)	(-)	4/25
2. Tables	x	x	X	x	(-)	x	x	x	(-)	x	(-)	(-)	(-)	(-)	(-)	x	9/56
3. Curbs (as a guideline)	x	x	(-)	x	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	(-)	x	(-)	(-)	5/31
4. Railings	x	x	X	x	(-)	x	(-)	(-)	(-)	(-)	x	(-)	x	(-)	(-)	(-)	7/44
5. Elevated flowerbeds	(-)	x	X	x	(-)	(-)	x	(-)	x	x	x	(-)	(-)	x	(-)	(-)	8/50
6. Ramps	x	x	X	x	(-)	(-)	(-)	(-)	(-)	x	x	(-)	(-)	x	x	(-)	8/50
7. Type of surface (diversified)	x	x	X	x	(-)	x	(-)	(-)	x	x	x	(-)	x	x	x	(-)	11/69

Garden designation (a) rural areas: 1. Bucharzewo, 2. Owińska, 3. Zawoja, 4. Bolestraszyce, 5. Osmolice, 6. Trzcianki, 7. Bród Nowy; (b) towns and cities: 8. Kraków, 9. Gdańsk, 10. Lublin, 11. Muszyna Ogród Zmysłów, 12. Muszyna Ogród Biblijny, 13. Muszyna Ogród Magiczny, 14. Poddębice, 15. Powsin (Warszawa); (c): sensory path in a village: 1a. Chorzępowo; x – the element is present, (-) – the element is not present. Source: Field inventory results, July-August 2018.

Tab. 3. Techniques for providing information to blind and partially sighted people in sensory gardens

Feature	Sensory gardens and paths																Σ/%
	(a)							(b)								(c)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1a	
1. Braille/Large Print plates	x	x	(-)	x	(-)	(-)	(-)	(-)	(-)	x	x	(-)	(-)	x	x	x	8/50
2. Braille/Large Print guide	(-)	(-)	(-)	x	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	1/6
3. Information touch-and-audio boards	x	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	2/13
4. Interactive website/ Voice guide/ Audio description	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	(-)	(-)	(-)	(-)	1/6
5. Tactile graphics/ Tactile plans	x	x	X	(-)	(-)	x	(-)	(-)	(-)	(-)	(-)	(-)	(-)	x	(-)	x	6/38
6. Sensory path/ Interactive toys	x	x	x	x	(-)	x	x	x	x	x	x	(-)	(-)	x	(-)	x	12/75

Garden designation (a) rural areas: 1. Bucharzewo, 2. Owińska, 3. Zawoja, 4. Bolestraszyce, 5. Osmolice, 6. Trzcianki, 7. Bród Nowy; (b) towns and cities: 8. Kraków, 9. Gdańsk, 10. Lublin, 11. Muszyna Ogród Zmysłów, 12. Muszyna Ogród Biblijny, 13. Muszyna Ogród Magiczny, 14. Poddębice, 15. Powsin (Warszawa); (c): sensory path in a village: 1a. Chorzępowo; x – the element is present, (-) – the element is not present. Source: Field inventory results, July-August 2018.