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Original Research Article

HORTICULTURAL THERAPY IN GREENERY DESIGN. EXAMPLE OF THE "ŚWIATŁO" HOSPICE IN TORUŃ

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A b s t r a c t

The aim of the article is to present the method of horticultural therapy (gardening therapy) and its application in designing green areas using the example of the sensory garden at the "Światło" hospice in Toruń. The issue of horticultural therapy and its use in shaping green areas was raised due to the important role of greenery in human life (e.g. they absorb pollutants, produce oxygen, perform an insulating function) and the growing importance of horticultural therapy in the design of usable areas. The final effect of this research process is the design of a sensory garden based on horticultural therapy. The concept uses selected types of greenery which, through their properties, have a positive effect on the well-being and health of patients and, indirectly, the inhabitants of the entire city.

Keywords: horticultural therapy, sensory garden, green areas, city

1. INTRODUCTION

The role of greenery in the modern world is pivotal because, due to its functions, it affects many aspects of human life and constitutes an important component of the spatial structure of cities [14].

Greenery in the city has many important functions, including being a natural barrier against wind, thus reducing its speed. Wind speed is lowered through the appropriate shaping of the insulating green belts which also facilitate the

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ventilation of the city. Greenery, therefore, allows for the levelling of urban heat islands. Trees and shrubs partially absorb or reflect the sun's rays, which lowers the temperature under the trees themselves and, consequently, throughout the city. In addition, plants, through their biological structure, have the natural ability to store water from precipitation. This process is called phytoretention. In addition to the above-mentioned applications of greenery, one can distinguish its impact on noise reduction in the city. This is a common problem in large agglomerations, where green sound-absorbing screens are planted on busy routes or green vertical gardens are constructed [18,29,30,36].

Plants in the city are a protective barrier because they have the ability to retain dust from both transport and industrial plants. In addition, greenery absorbs dangerous compounds from the air, including sulphur oxide, hydrogen sulphide, and carbon dioxide. In the city, in areas with high building density, considerable amounts of harmful substances accumulate. On the other hand, their concentration is lower over existing green areas because the plants filter them out. Moreover, greenery is responsible for the production of oxygen, necessary for proper human functioning [18,29,30,36].

The importance of green areas also concerns their social and educational role, such as facilitating leisure and recreation (e.g. walks in nature, physical activity). Through close contact with greenery, city-dwellers can benefit from the therapeutic advantages of plants, which has a positive effect on physical and mental regeneration. Additionally, botanical or zoological gardens and arboreta constitute didactic elements for the education of children, youth, and adults in urban spaces [18,29,36].

Greenery also plays an important aesthetic role, as it is an element that can be used to emphasise the value of a given place or to hide its unattractiveness, taking advantage of the seasonal variability of plants, and the variety of colours, forms, and textures (of flowers, leaves, fruits). Moreover, greenery can have a productive function, thanks to which raw materials used in various spheres of social and economic life are obtained from plants [5,10,18].

As the above analysis shows, the significance of greenery is vast and diverse from a social, economic, ecological, recreational, and aesthetic point of view. At the present stage of development of civilisation, greenery has become a natural factor mitigating negative effects related to environmental degradation and civilizational progress, and its proper shaping ensures a balance between the urban and environmental spheres [17,26,35].

Cities have dense development, there is often a lack of large open spaces, so in this type of built-up environment, greenery performs important functions eliminating the effects of dynamic urbanisation. In the Nature Conservation Act of 16 April 2004 there appears a definition of green areas which classifies them as arranged areas together with the necessary technical infrastructure and

functionally connected buildings, covered with vegetation, performing public functions. Green areas include, in particular: parks, green squares, promenades, boulevards, botanical, zoological, and historical gardens, gardens for the youth, cemeteries, greenery accompanying roads, town squares, historic fortifications, public buildings, and industrial facilities [10,18]. In addition to the traditional types of urban greenery listed in the Nature Conservation Act, several modern, eco-innovative, 'green' solutions have appeared in urban spaces. These new, green solutions often use elements of horticultural therapy. They comprise, for instance: vertical gardens, roof gardens, pocket parks and parklets.

Vertical gardens are mainly designed on the walls of buildings, often on special constructions, e.g. trellises. Such plants are used in vertical gardens that resist climate and environmental change. They are mostly vines. The most popular species chosen are different types of *Parthenocissus* because they are not susceptible to negative factors from the environment (diseases, drought) and are characterised by low requirements [20] (cf. Fig. 1). Vertical gardens also take a modern form of green walls whose construction and functioning are based on plants that do not require a substratum. They have the ability to develop in soilless conditions or with a minimum supply of soil substrate [34].

Fig. 1. A building at Podmurna Street in Toruń overgrown with a vine as an example of a vertical garden, Source: Katarzyna Ziemkiewicz, 2019

Vertical gardens are a source of many benefits because the greenery covering the wall of the building provides insulation – in winter it protects against the loss of

heat, in summer it protects against excessive sun rays [23]. This type of green solution protects the façade from precipitation so that the wall is not directly exposed to climatic factors. Greenery covering walls can suppress traffic noise and significantly reduces air pollution from, e.g., dust and gases [16,34]. Moreover, in autumn, vertical gardens allow you to see the different coloured leaves which make up a range of intense and contrasting colours to stimulate the visual experience.

Another new trend in greenery design takes the form of roof gardens. Green roofs are defined as a zone which is covered with vegetation and isolated from the building by an engineering structure and soil. Green roofs introduced into the urban tissue increase biodiversity, counteract pollution, improve the image of the city, and increase the stock of green areas. Similarly to vertical gardens, they provide thermal insulation, a barrier against noise, and contribute to the protection of the roof structure [21,31,32]. In addition to the environmental benefits, green roofs also have an impact on society, as they shape visual feelings and provide a modern model of human contact with nature (cf. Fig. 2). Furthermore, near the roof gardens people can listen to the sounds of rustling leaves, plants, grass, birds singing. This type of greenery can encourage the user to calm down and listen to the sounds of nature, even in the city centre.

Fig. 2. Green roof on a fortress at Dąbrowskiego Street in Toruń
Source: Katarzyna Ziemkiewicz, 2019

There are two types of green roofs: intensive and extensive. Intensive roofs are used by residents and can also be open to the public. Shrubs, perennials, and even trees are planted on their surface. Since they contain typical garden plants,

they require care such as fertilisation, watering, and pruning. These roofs also need an appropriate, durable construction [32,37]. Extensive roofs, on the other hand, use small plants with a shallow root system (due to the limited depth of the ground), slight growth (due to the limited bearing capacity of the building), and minimal demand for water and care [38]. Such roofs are most often covered with less demanding plants, such as stonecrop, houseleeks, mosses, or herbs. The construction is simple to create and does not require large financial outlays. Extensive roofs are created primarily to increase the biologically active area, improve the aesthetic aspects of the building, and slow down the outflow of water from precipitation [39]. Roof gardens are an attractive alternative, a substitute for the city in creating new biologically active areas, especially when there is a lack of traditional places for such activities or when they cannot be otherwise developed.

The pocket park is yet another type of urban greenery. The history of pocket parks dates back to the 1970s. They are created in densely built-up areas using different types of containers, pots, trellises, and pergolas, which serve as support for plants growing in a small area of greenery. These small parks play diverse roles, but most importantly they serve to improve interpersonal contacts [33]. The idea of pocket parks is a good solution, especially for small spaces. Such mini-parks are a source of additional biological space which positively influences the shaping of the microclimate and improves the aesthetics of the city [40]. Moreover, it is a good solution to locate plants with therapeutic fragrance properties in pocket parks, especially close to seating places where people are relaxing.

Parklets are created in crowded streets or on pavements, by transforming parking spaces into a pedestrian zone enriched with greenery (cf. Fig. 3). They improve the aesthetic values of the space by supplementing it with vegetation and street furniture [41].

Fig. 3. Parklet in the New Town Square in Toruń
Source: Katarzyna Ziemkiewicz, 2019

Parklets are appearing more and more often in many cities, encouraging passers-by to use the interesting equipment they offer (e.g. seats, tables, umbrellas, or flower pots with flowers, shrubs, and small trees) [1]. Moreover, in parklets, we can cultivate therapeutic fragranced plants (for example herbs) and even trees and shrubs which produce seasonal fruits - for health reasons they should be located away from all sources of pollution.
All the above-described modern forms of urban greenery, i.e. vertical gardens, roof gardens, pocket parks, and parklets, are important elements in the city's structure, as they enlarge biologically active areas and thus bring benefits to society, positively affecting the urban aesthetics, and they even can play a role in horticultural therapy [4].

2. HORTICULTURAL THERAPY

Man needs to function in the proximity of greenery. For this reason, it is important to fit the urban habitat with vegetation which, among other things, has a positive effect on people's mood, healing them by improving their mental and physical condition. That is why one such modern method, called horticultural therapy, is increasingly being used in the design of green areas.
The first mentions of horticultural therapy date back to antiquity. In the new era, the beginnings of horticultural therapy are attributed to England, but it is most

closely associated with the United States and is more popular there because, in the 1970s, the method of horticultural therapy was widely used to treat disorders in American soldiers and war veterans. Horticultural therapy has long been known also in Japan and Korea. In Europe and Poland, this type of therapy is now becoming more and more popular.

2.1. Horticultural therapy – genesis, role, purpose

The term horticultural therapy can be defined as 'treatment by use of a garden', because the term comes from a combination of the words: Latin *hortus* (garden) and Greek *therapeuein* (treatment, care). This type of therapy uses gardens and the plants growing in them as therapeutic tools which are a complementary or alternative form of treatment and rehabilitation [19, 27].

Horticultural therapy has been relatively recently recognised as an official method of aiding treatment. Scientific evidence has confirmed the beneficial effects of plants on human well-being and psychophysical condition. Gardening therapy uses various types of plants that can affect the human senses and stimulate their activity. At the same time, physical work and staying in the garden is a form of rehabilitation for people with extensive diseases, which promotes faster recovery. This method can be divided into passive and active. Passive horticultural therapy is based on sensory sensations, i.e. all the elements that affect the senses of hearing, smell, taste, or sight. It consists of observing and experiencing positive sensations coming from close contact with nature which has a relaxing effect. On the other hand, active horticultural therapy concerns the direct relationship between the patient and nature. It is based on taking care of the plants; planting, watering, etc. Moreover, dried or fresh plants from the garden can be used in creative activities, allowing patients to create interesting compositions and artistic works. In this way, it stimulates the ill to act and improves their physical and mental condition, which constitutes a type of rehabilitation. The consequence of these activities is that patients learn to be responsible for plants and become involved in their duties. Through horticultural therapy, we achieve the improvement of manual skills, contact with other people, and reduction of stress, anxiety, nervousness, increased self-confidence, improved motor fitness as well as opening up to others and new relationships [6,7,12,15,19,22,27].

2.2. Application of horticultural therapy – theoretical and design assumptions

Horticultural therapy can be approached from an amateur and a professional therapeutic perspective. The first is related to the simple enjoyment of spending time around plants. On the other hand, the therapeutic approach is more advanced, since it is linked to the presence of a qualified therapist who, taking

into account the patient's illness, selects the right task to be performed and evaluates the whole process in the final phase (cf. Fig. 4). This technique makes it possible to check whether the therapeutic activity was appropriate and yielded results, or whether something needs to be changed to achieve the intended goal [12,15,42].

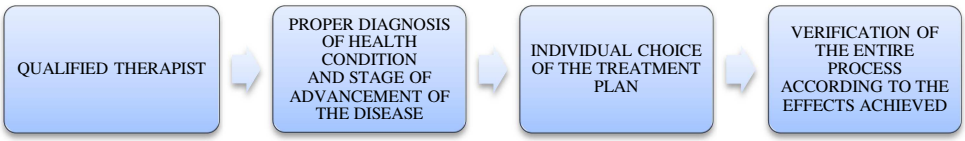

Fig. 4. Key elements for the proper use of horticultural therapy in the treatment process
Source: own study based on 42

It seems that horticultural therapy is a completely new concept and method discovered in the 21st century, but its roots go back to ancient Egypt, as already then doctors suggested that people in need of treatment should stay in close contact with greenery. Over the years, this method has developed significantly and gained popularity and more supporters. In the past, it used to be an optional and rarely employed element of therapy, but today it is an inseparable part of the process of treating people with both mental and physical disabilities. It brings measurable positive effects. Horticultural therapy is a method that has no age limits, which makes it universal. It can be applied in the case of the following disorders:

- mental,
- physical,
- oncological,
- geriatric,
- sensory,
- social,
- related to all kinds of addictions [7,12,24].

All the elements that enrich the patient's space are significant in horticultural therapy. In order to diversify the garden area and make patients interested, it is advisable to introduce paths leading along rows of plants, flower pots, water cascades, or multicoloured flower beds. Horticultural therapy uses different plant species (in terms of colour, texture, smell, etc.), therefore their appropriate design translates into therapeutic properties of the whole process (cf. Table 1). However, it should be born in mind that in the case of severe diseases it is a method for supporting and supplementing traditional treatment [11,13,15,19,24].

Table 1. Advantages and disadvantages of horticultural therapy

ADVANTAGES	DISADVANTAGES
→ for people of all ages, → allows for contact with nature, → improves the quality of life, → stimulates the senses, → affects the patients' readiness to take actions, → affects the physical and mental well-being, → helps establish social ties, → reduces stress, aggression, → improves concentration and motor coordination, → reduces the dosage of drugs, → helps people with physical and mental disabilities, → builds a relationship with nature, → helps recover more quickly, → teaches responsibility and independence.	→ is not widespread enough yet, → requires adequate space, → requires time to achieve the desired effect, → therapy must be carried out by a person with experience and knowledge of the subject, → may be conducted only in adapted spaces, → improperly matched plants and elements of spatial planning may put life and health at risk, → inadequate treatment of the disease may result in a deterioration of health.

Source: own study based on 13,19.

When creating sensory gardens that will play a healing role, it is necessary to consider the selection of appropriate plants. Since they may be looked after by people with reduced mobility, e.g. patients in wheelchairs and people with different disabilities, the right species of trees, shrubs, perennials, and annual plants must be selected. Therefore, only carefully selected plants are used in therapeutic gardens, i.e. ones that:

- do not require too much care, so that the patients are able to take care of them,
- are resistant to all diseases and pests,
- require constant but simple care, so that the patients constantly have work to do,
- can be used in various situations – as a material for artwork, for bouquets, or as an edible product used in the kitchen,
- stimulate all the senses,
- do not pose a health risk to patients [2,6].

Plants used in horticultural therapy to create sensory gardens should also diversify the garden space to arouse interest and attract the attention of all users. For this reason, horticultural therapy uses species that stimulate the senses, i.e. those that are colourful and expressive, have different leaf structures, have an intense smell, and offer taste sensations. In this way, they impact the senses and provide different stimuli. When designing gardens with the use of sensory aspects of horticultural therapy, it is worth remembering to select plants characterised by seasonal variability, so that interesting accents appear in the composition at any time of the year [2,6,8,9].
Creating gardens that will provide space for patients and all users means the proper layout is a key element. Therefore, one must not introduce plants that could be dangerous. Since people with various cases are treated, it is necessary to ensure their comfort in using the garden, therefore, all plants with thorns, spines (which can easily injure), or containing poisonous, allergenic substances (which may pose a health hazard), stinging (a potential threat to the physical condition), abundant in fruit, difficult to nurture or not very resistant to external factors (increasing the risk of diseases and pests) should not be introduced into the flora of therapeutic gardens [2,15]. Regardless of age, sex, or health condition, greenery significantly affects people's mood and mental and physical condition, therefore, its presence in human life is important.

2.3. A sensory garden based on the assumptions of horticultural therapy

The idea of a sensory garden is based on the assumptions of horticultural therapy concerning the stimulation of the senses during contact with plants. This contact triggers receptors which stimulate the entire nervous system. In effect, the entire body is activated through the senses of taste, smell, touch, hearing, and sight, resulting in visible benefits in the rehabilitation process. Sensory gardens designed on the basis of horticultural therapy guidelines usually consist of five zones: taste, smell, touch, hearing, and sight.

2.3.1. Taste zone

Taste is one of the primary human senses. It is important to select the vegetation in this zone so that the trees and shrubs produce tasty and vitamin-rich seasonal fruits. They must also be properly chosen so as not to cause allergies or poisoning among patients. The planted vegetation should guarantee a new taste experience and be located in places that are easily accessible (also for people in wheelchairs). Just as important as the choice of species is the location of the taste zone because, for health reasons, it should be located away from all sources of pollution such as frequently used roads. Plants available in this area are intended to provide patients with a varied taste experience [19,25]. In the taste

zone of the sensory garden, northern highbush blueberries (*Vaccinium corymbosum)*, nasturtiums (*Tropaeolum)*, red currants (*Ribes spicatum Robson*), wild strawberries (*Fragaria vesca*), gooseberries (*Ribes grossularia*), and various varieties of apple trees (*Malus Mill*) can be introduced (cf. Fig. 5 and 6).

Fig. 5. Northern highbush blueberry (*Vaccinium corymbosum*) [43]

Fig. 6. Nasturtium (*Tropaeolum*) [44]

2.3.2. Smell zone

The sense of smell stimulates concentration and, depending on the choice of plants, has a relaxing or stimulating effect. It also has a calming effect, reducing pain, stress, and tension. To experience subtle smells intensely, the smell zone should be placed in a sheltered area. In this way, the wind will not disperse the therapeutic scent, and the floating smell will stay longer in the garden space and thus be better felt. A good solution is to locate plants with therapeutic fragrance properties close to seating places (benches, arbours), i.e. where patients spend a lot of time [19]. In the smell zone of the designed sensory garden, herbs such as peppermint (*Mentha piperita*), basil (*Basilicum*), lavender (*Lavandula*), sage (*Salvia*) as well as lily of the valley (*Convallaria majalis*) or decorative garlic (*Allium*) can be introduced (cf. Fig. 7 and 8).

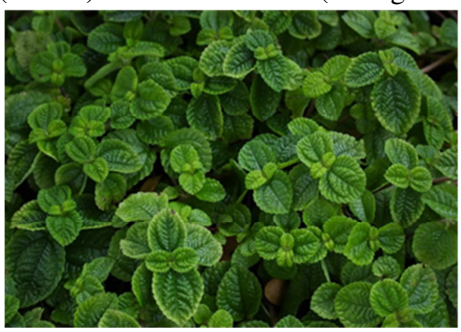

Fig. 7. Mint (*Mentha*) [45]

Fig. 8. Lavender (*Lavandula angustifolia*) [46]

2.3.3. Touch zone

The touch zone lets patients feel the structure of the surface of leaves, tree bark, flower petals, and fruit. These sensations are particularly frequent in all greenery work they perform. Many plants have a diverse structure, so one can easily examine their texture. Some plants have a smooth surface, while others can be rough or hairy (tomentose). In this way, one can experience a number of sensations that stimulate the body and help rehabilitation. This solution works well for people who have suffered from cerebral palsy, sensory disturbances, and traumas and strokes. However, the touch zone is not only related to plants, but also to the experience of walking along paths and garden alleys. Thanks to the surface being made of many different materials, the patient, while moving, can perceive various impressions and stimulate their body [19,25]. The touch zone of a sensory garden can be filled with, e.g., lamb's ears (*Stachys bysantina*), bighead knapweeds (*Centaurea macrocephala*), silver ragworts (*Senecio cineraria*), curry plants (*Helichrysum italicum*), broad-petaled geraniums (*Geranium*), or blazing stars (*Liatris*)(cf. Fig. 9 and 10).

Fig. 9. Lamb's ear (*Stachys byzantina*) [47]

Fig. 10. Bighead knapweed (*Centaurea macrocephala*) [48]

2.3.4. Hearing zone

In the fourth of the analysed zones, patients can listen to the sounds of rustling leaves, plants, water, grass, birds singing. This zone encourages the user to calm down and listen to the sounds of nature. These noises help relax and improve orientation. The hearing zone will benefit from rattles or bells, hanging from an arbour and swaying in the wind. All noises present in this area have a stimulating effect and train nerve receptors [19,25]. The hearing zone of a sensory garden can contain grasses such as silver banner grass (*Miscanthus sacchariflorus)*, pearl millet (*Pennisetum*), pampas grasses (*Cortaderia selloana*), ornamental sedges (*Carex*) but also golden everlastings (*Helichrysum bracteatum*) or field poppies (*Papaver rhoeas*)(cf. Fig. 11 and 12).

Fig. 11. Silver banner grass (*Miscanthus sacchariflorus*) [49]

Fig. 12. Instruments [50]

2.3.5. Sight zone

In sensory gardens, the sight zone allows you to see the different coloured flowers, trees, and shrubs which make up a range of intense and contrasting colours to stimulate the visual experience. The plants to be introduced should have saturated colours to stand out from the environment and arouse interest among patients. This is particularly important for people with poor eyesight so that the receptors in the eye are stimulated more effectively. The sight zone should be distinguished by the seasonal variability of flowers so that the garden will not be monotonous and will produce eye-catching colours in every season [19,25]. Plants that might be introduced to the sight zone include panicled hydrangea (*Hydrangea paniculata)*, true forget-me-not (*Myosotis palustris)*, Mexican marigold (*Tagetes erecta*), sweet William (*Dianthus barbatus*), lungwort (*Pulmonaria officinalis*), or various varieties of dogwood (*Cornus*) (cf. Fig. 13 and 14).

Fig. 13. Panicled hydrangea (*Hydrangea paniculata*) [51]

Fig. 14. True forget-me-not (*Myosotis palustris*) [52]

When designing and establishing sensory gardens, using the knowledge of horticultural therapy, one should also introduce elements of street furniture

(arbours, benches, seats), water elements (ponds, fountains, springs, water troughs), and passageways. These elements should be stylistically coherent, ergonomic, and safe for users.

3. METHODS AND STUDY AREA

The following methods were used in the article:

- desk research (analysis of existing materials and literature as well as cartographic and photographic studies);
- monographic method, i.e. case study, which herein concerns the area at the "Światło" hospice located in Toruń (and related inventory method).

The study area is the area at the "Światło" hospice of ca. 1.2 ha, located in the western part of the city of Toruń, on the Bielany housing estate at 64 Grunwaldzka Street, in the Kujawsko-Pomorskie Voivodeship. The Ludwik Rydygier Voivodeship Hospital and St. Joseph's Church are not far away [53]. The area includes the historic 18th-century White Manor, called "Prezydentówka", together with a park whose area is about 4 ha. This is a protected area entered in the register of monuments. It also houses nature monuments in the form of horse-chestnut (1 tree) and common oak (12 trees) [28]. The buildings located on the premises have a total of 2,150 m² and are connected to utilities. Coniferous and deciduous tree and shrub species occur in the analysed area [54].

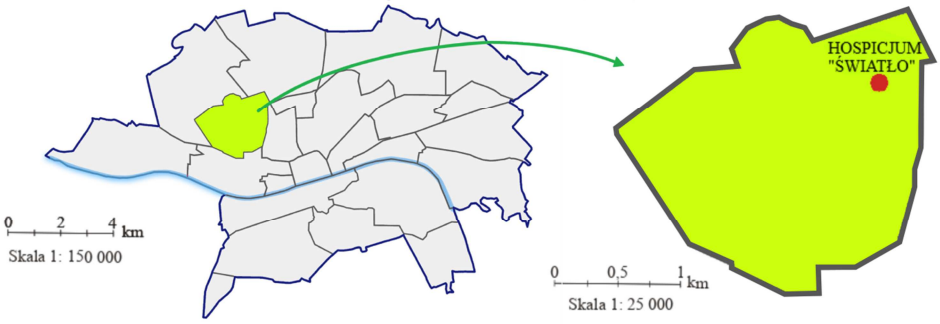

Fig. 15. Location of the "Światło" hospice in Toruń, Source: Katarzyna Ziemkiewicz.

Formally, the "Światło" hospice was established in 1993 on the initiative of the District Chamber of Nurses and Midwives. In 1999, the Holy Father John Paul II was appointed the patron saint of this facility. The idea of the "Światło" hospice is to provide the patients with appropriate living conditions to improve their quality of life, ensure comfort, and provide the necessary medical, nursing, and psychological assistance during their illness [55].

Analysing the vegetation present in the hospice area, one can distinguish a variety of fragments developed with low greenery in the form of lawns, medium-sized greenery in the form of shrubs and hedges, and high greenery represented by various tree species. In the analysed area there are 27 tree species and 13 shrub species. Among the trees and shrubs, the area's original species are the Norway maple, common hornbeam, small-leaved lime, field elm, common oak, and horse-chestnut. In the discussed park site, deciduous species are predominant, while coniferous species are in the minority. In total, the entire stand has 730 trees and shrubs. The area where the sensory garden is to be created, taking into account the guidelines characteristic for the horticultural therapy method, is diversified in terms of light and soil conditions. It does, however, need to be modernised and given a new form [3].

4. RESULTS – DESIGN OF A SENSORY GARDEN AT THE "ŚWIATŁO" HOSPICE IN TORUŃ

On the basis of the materials collected and the field visit carried out, it was concluded that a number of actions should be taken to improve the current state of land use at the "Światło" hospice. This is an area where genuine health functions are located, so it is extremely important for the comfort of patients as well as visitors and users of the area to develop detailed design guidelines to modernise the area. It is important that the changes made will improve the functionality of the area and the comfort of the users. The sensory garden will, therefore, be a place where patients and their visitors will be able to spend free time. In this way, patients will gain direct contact with nature, involving the senses of sight, hearing, smell, taste, and touch, which will improve their mental and physical condition. The following fieldwork should be carried out first:

- pruning of existing vegetation (in particular low and medium-sized greenery),
- additional plantings for the enrichment and refreshment of the area with new vegetation,
- reclamation of green areas damaged by exploitation,
- modernisation of parts of passageways due to damage or unevenness that reduce the aesthetic value and the safety level of their users,
- replacement of the existing, currently unused waterworks with a new one which will increase the attractiveness of the area,
- modernisation of the existing street furniture, which will improve its aesthetic and functional values.

Apart from the above-mentioned fieldwork resulting in the modernisation of the "Światło" hospice area, a sensory garden will be created with appropriately adapted vegetation that will play a stimulating role (see Fig. 16). As a result, five

zones have been designed to make the most of the potential and possibilities of horticultural therapy.

The sight, hearing, and smell zones were placed in the central part of the design. They include street furniture such as a pergola, a fountain, pots (wooden and concrete) and objects for everyday recreation and use such as benches, lamps, and trash cans. There are also footpaths within these zones. The newly-introduced objects will enable users to freely use available space while also serving for contemplation and relaxation. In the eastern and southern sections, the other two zones focusing on taste and touch were planned. They require more space because they bring together species of trees and shrubs that need suitable conditions for natural growth. The sensory zones in the area of the "Światło" hospice have suitable connections between them in the form of convenient paths which guarantee comfort and freedom of use. The passageways to be created in the area will be made of paving stones as well as smaller stones. These materials are easy to lay, maintain, and possibly replace. The pergola, on the other hand, will be made of wooden elements, and its openwork walls, covered with vegetation (e.g. clematis, will constitute an aesthetic composition. In addition, it will create a shady alleyway in the garden space that will encourage people to walk there. The fountain will be made of stone (beige granite) due to it being a very durable material, both in terms of mechanical damage and weather conditions.

The designed sensory garden has zones of various sizes and interesting shapes, located in accessible places. Various plant species are introduced to provide multisensory experiences for the patients. The sight zone will comprise, among others, the Mexican marigold, sweet William, and true forget-me-not. These are flowers of different colours, which will make the garden multi-coloured and help it change throughout the flowering period. The smell zone will include the lily of the valley, decorative garlic, and lavender. These plants will stimulate the body with their scent, inspire the imagination, and increase concentration. Golden everlastings, sedges, and silver banner grass were selected for the hearing zone. They will allow people in this part of the sensory garden to relax and listen to the sounds of nature, while the presence of instruments swaying in the wind and the fountain will further intensify the experience. The touch zone will house silver ragworts, lamb's ears, bighead knapweeds, and shade-tolerant hostas. These plants differ in structure, texture, and colour, so they will constitute a valuable didactic and cognitive space, creating an interesting form that stimulates the senses. The flavour zone will be planted with red currants, northern highbush blueberries, and various types of cherry and apple trees. These plant species stand out in terms of the taste, colour, and shape of their fruit. In addition to their taste, they will be a valuable source of vitamins. Among the elements of street furniture, stylistically coherent wooden benches, trash

cans, and lamps were also designed. The planned design solutions for the "Światło" hospice area take into account the psychomotor capabilities of patients with various disorders and are completely safe.

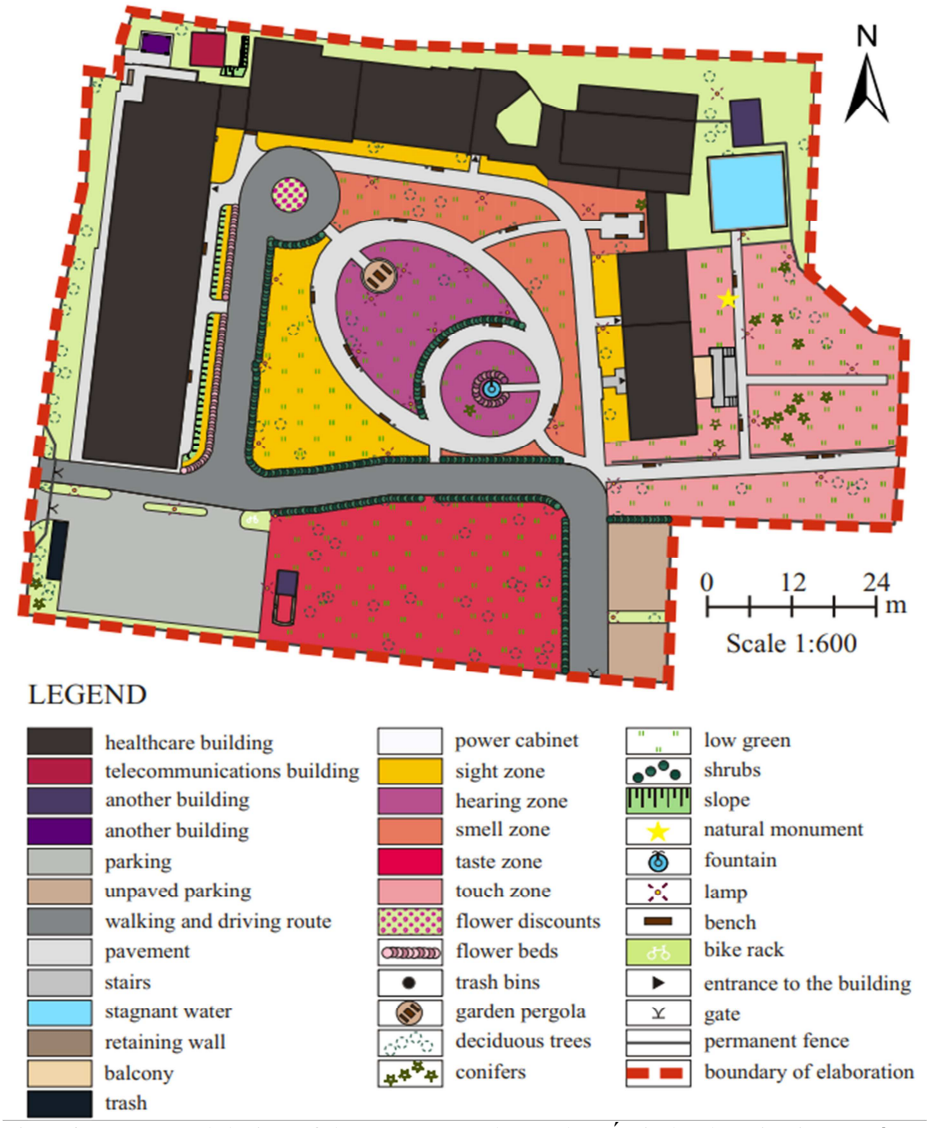

Fig. 16. Conceptual design of the sensory garden at the "Światło" hospice in Toruń
Source: Katarzyna Ziemkiewicz

In the project, the area of the "Światło" hospice was developed to house zones of different nature, but overall, it is a valuable space that stimulates the entire

human organism. Activities related to the creation of the sensory garden also included the creation of a water cascade, a sensory path made of elements with different substrates (sand, wood, stone, gravel), tall vegetation pots (designed for people in wheelchairs), and elements of street furniture in the form of benches, lamps, and pavements.

Thus-shaped, the sensory garden will positively influence patients, encouraging them to stay among the plants. Both passive and active participation of the ill person in all works related to greenery, from observation to care activities, is important. The idea of a sensory garden corresponds well with the area around the "Światło" hospice because it makes it visually attractive and plays a utilitarian role – in short, it helps patients.

5. SUMMARY

Green areas have long accompanied humans, performing a number of important functions and influencing both the physical and mental spheres. Introducing the idea of horticultural therapy into the design of green areas is a modern approach with versatile use, and contact with plants, taking care of them and performing various care tasks, is an important part of the therapeutic process. The universality, versatility, and innovation of this method lie in the fact that it:

- is intended for all people regardless of age,
- allows for intensive contact with nature,
- improves the quality of life and stimulates the senses,
- affects the actions and initiatives taken by patients,
- improves mental and physical well-being and promotes regeneration,
- reduces the dose of painkillers taken and shortens the treatment time,
- helps establish social ties,
- teaches responsibility and self-reliance,
- introduces innovation in the treatment process, while being a non-invasive method.

The use of horticultural therapy to create a sensory garden at the "Światło" hospice will contribute to improving the health of patients who will thus receive a new place for social interaction and relaxation in the open air. More broadly, we should strive to establish new areas of greenery in cities, as well as to nurture existing ones, because greenery has a positive impact on our health, quality of life, and psychophysical condition. In addition, it is important that the horticultural therapy elements should be implemented in various type of greenery in the city, such as vertical gardens, roof gardens, pocket parks, or parklets.

The popularity of horticultural therapy and its dissemination in the planning of green areas in the city depends on the promotion (competitions, meetings,

festivals connected with horticultural therapy) as well as the inclusion of the elements of the horticultural therapy concept in study plans for such fields as landscape architecture or spatial management.

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