Greenery forming of the Boyen Fortress

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Abstract: Greenery forming of the Boyen Fortress. The study presented here deals with issues related to types, forms and functionality of the fortress greenery in the defensive establishments from the turn of the XIX and XX centuries in Poland. It also indicates the significance of the greenery as a strategic military element, which purpose is to mask the real position of the object, hamper the reconnaissance and bewilder the enemy. The main aim of this work is to identify in the Fort Boyen in Giżycko the primary fortress vegetation, and to elaborate general recommendations for the shaping of the structure of historical greenery.

Key words: masking/camouflage, primary fortress vegetation, fortress greenery, military greenery, masking vegetation.

INTRODUCTION

The Boyen Fortress is the example of the best preserved Prussian brick fortress in Europe. At the same time, it is little considered and in a small part discovered place, deserving for wider interest. As well as brick, concrete or stone, greenery is used as a kind of „building material”, applied to special tasks, being meant to create space and to secure it. The simplest and the most perfect curtain is greenery within reach. The greenery was appreciated during the period of escalated military operations on the turn of the XIX and XX century. At that time its masking features, especially bemusing the enemy were spotted. It was not accidental cropping. All, but most of the plantings for sure has its easy to explain application and its matter. The logic of dealing and greenery usage was pretty astonishing.

The aim of this work is to formulate guidance to form fortress greenery of the Boyen Fortress in Giżycko on the basis of the overview of the literature and information analysis about division and function of fortress greenery. Other sources are: nature environment of the area analysis, historical documentation, spatial cartographic conditioning analysis around the fortress in XIX century and recently, fortress plant cover structure analysis, forest stand cataloguing on the basis of earlier collected information, species structure and forest stand age analysis, researches results, and guidance to form fortress greenery of the Boyen Fortress.

MATERIALS AND METHODS

The first stage of this work was a visit to the scene of the Boyen Fortress area in Giżycko and root materials enquiry referring to the object.

It was flashed, in the elaboration, on fortress greenery located directly on the Boyen Fortress area and not coming in
the group of masking plants probably exist and surround defence work.

Grounds men fortification objects of were interviewed, they prepared for Warmia and Mazury Provincial Heritage Conservator „Conservation code for the revalorization of the Boyen Fortress maidan in Giżycko” in November 2001 (Molski et al., 2001).

All available figures coming from Book 3/2003 Feste Boyen of the Boyen Fortress Enthusiast Institution magazine (Białuński, 2003) were accounted for substantial source of knowledge that allowed see the structure of greenery surrounding the Boyen Fortress. The aerial picture made in 2000, coming from Heritage Restoration Chair on the Architecture Faculty Warsaw Polytechnic let us to see about modern structure of greenery surrounding the Boyen Fortress.

One of the most important points referring to the scope of work is forest stand isolated from the whole structure of high greenness cataloguing. Forest stand was made on the basis of the literature overview, interview with mentioned above grounds men, visit to the scene of the Boyen Fortress, verification of the existing stage (exclusion of low greenery groups and young high greenery), and inventarization of the age and species. The main aim was to isolate all the historical specimen greenery age on the basis of the species structure. Collected information allowed to estimate trunk diameter and as a consequence to estimate singular specimen age and classifying in particular age intervals, fortress greenery evolvement role on the turn of XIX and XX century. The forest stand age was defined on the ground of „Tree age table worked up in 1980–1986” by Professor Longin Majdecki.

Carried out analysis, research and photographic documentation isolated fortress greenery structure and allowed preparing guidance in the field of the Boyen Fortress greenery forming.

RESULTS

Object characteristics

The Boyen Fortress is located within the boundaries of Giżycko city, in its south-west part (Fig. 1). The Fortress is located on an artificial island created through canal connection with both neighbouring lakes – Niegoćin Lake on south and Kiszjano Lake on north-west (Krahel, 2005). The Boyen Fortress location was not accidental. Localization on narrow island, counting about 750 meters isthmus, between two important in the whole system lakes: Niegoćin and Kiszjano, had its meaning first of all for strategic point of view. Place chosen for object building was related to existing field conditions connected with natural landscape form.

Confirmation of this supposition is fortress silhouette having form of hexagon deprived of regularity (Fig. 2). Some of the solid sides were shortened and others lengthen – fortress shape was adjusted to the topographic features. Some of the existing embankment fragments were raised and some were levelled what emphatically indicates that fragments of the area on which groundworks were done at the Boyen Fortress had to be too high for the needs of the object. On the basis of the cartographical materials “Giżycko. Old Court and Castle neighbourhood” date on 1843 can be presumed that fields below the Fortress that approach Niegoćin waterside were
FIGURE 1. Localisation of the Boyen Fortification

FIGURE 2. Characterization of ground around the Boyen Fortification in 1871–1893
a part of agricultural land with extensive wetland, while around the Fortress are acclivities, corresponding to embankments surrounding the Fortress central ward area (Białuński, 2003).

The Boyen Fortress spatial structure analysis over a span of 1843–2000

On the basis of the figure coming from Book 3/2003 of the Boyen Fortress Enthusiast Institution magazine Feste Boyen, dated 1843 and picture from 1871–1893 analysis of the spatial conditionings around the Boyen Fortress was accomplished (Białuński, 2003).

The drawing from 1843 (Fig. 3) showing the region before the fortress erection, pointing on the presence of wide forests and smaller forest conglomeration on the Giżycko Island area. That confirms received information that defence work was localized in places naturally generating possibilities for good masking of the object from the enemy. According to Kleczke and Wyszyński (1937) forests naturally masked the position, they significantly impeded observation and enemy fire. Later they also were on additional barrier versus tanks.

The drawing from 1871–1893 (Fig. 2), from the times when the Boyen Fortress was a military object, suggests some tendencies towards reducing forest structure surrounding the object (Białuński,

FIGURE 3. Characterization of grounds around the Boyen Fortyfication in 1843
2003). However, we can also assume that similar to the Fortress area forest stand formation at its east side was suppose to disorient the enemy about the real location of the object. It also shows the system of existing roadside plantings along the roads defined as 1st range roads. After becoming acquainted with fortress greenery subject matter and comparing the models of fortress historical forest stands we can predict that forests surrounding the Fortress were suppose to have masking and confusing function, naturalizing area, and trees along main road had to misinform the enemy (Środulska-Wielgus, 1997, 1999).

Today aerial picture (Fig. 4) lets us to see the growth of forests, forests groups and forests stand area round the fortress and on the Giżycko Island area. Now, from the point of view of military service, probably it has no strategic impor-

FIGURE 4. Characterization of grounds around the Boyen Fortification today
It can be presumed that it is going on because of spontaneous and uncontrolled growth of trees formation. After 100 years since the Boyen Fortress was erected forest system did not change much. However, during the past years, in the times of the object defensive magnificence, changes of the arrangement and size of greenery systems around the fortress had its connection with war strategy and could be seen it, a use of using greenery as supporting masking element.

The Boyen Fortress greenery

On the Boyen Fortress area high and low greenery groups occur, we can isolate historical primary plantings, modern ones and disordered spontaneous growing plants groups. To the most frequently occurring dendrites’ species we can include: linden (*Tilia cordata*), grand ash (*Fraxinus excelsior*), maple tree (*Acer platanoides*), pine tree (*Pinus sylvestris*), white robinia (*Robinia pseudoacacia*), seldom species as great maple (*Acer pseudoplatanus*), horse chestnut (*Aesculus hippocastanum*), black alder (*Alnus glutinosa*), Betula (birch tree) verucossa (*Betula pendula*), hornbeam (*Carpinus betulus*), larch (*Larix sp.*), aspen poplar (*Populus tremula*), poplar (*Populus sp.*), plum tree (*Prunus sp.*), peduncle oak (*Quercus robur*), linden (*Tilia platyphyllos*). Between shrubbery most popular are: grand ash brushwood’s (*Fraxinus*).
Greenery forming of the Boyen Fortress

excelsior) (Fig. 5), maple tree (Acer platanoides) and representatives of hazel (Coryllus avellana), hawthorn (Crataegus monogyna), Euonymus verrucosu, privet (Ligustrum vulgare), late bird cherry (Prunus serotina), blackcurrant (Ribes nigrum), rose (Rosa rugosa), grey willow (Salix cinerea), laurel willow (Salix pentandra), common elder (Sambucus nigra), meadow-sweet Arguta (Spiraea arguta), white snow-berry (Symphoricarpos albus) and thuja (Thuja sp.) (identification based on Seneta and Dolatowski, 2000).

Notably this kind of species composition corresponds to greenery kind selection, which was above all connected with plants function, habitat expectations, and cultivation possibilities. First of all there were used native species, characteristic for the area of the fortress but foreign plants also appeared (Buliński, 1995). Territories outside the fortresses and forts were usually planted with thorny and spiny species – creating natural, hard to go through barriers, and also distinguished by resistance to high temperatures and lack of water (Ceynowa-Giełdon and Nienartowicz, 1995). Some of them were brought to Poland from warm climate areas, where thorny thickets belong to main plants formations, characteristic for dry areas, degraded by human economic activity.

Among species commonly used to fortress planting dominate white robinia (Robinia pseudoacacia) and hawthorn (Crataegus laevigata). Rose (Rosa rugosa) and blackthorn (Prunus spinosa) were often used on the defence line (Poznański, 1995). In XIX century fort systems realities in fort fore field were located in a form reminding ladder, concealing linear hedge inter alia consisting of thorny robinia, blackthorns and hawthorns, sometimes group of cornelian trees (front masks), that not only hid creation expansion from the fore field, but also impeded distance estimation and fire accuracy through covering detonation. Besides the defence line, behind forts, along the roads inside the fortress area and those leading to, species characterized with dense leaves such as maple tree (Acer platanoides), horse chestnut (Aesculus hippocastanum), linden (Tilia cordata), grand ash (Fraxinus excelsior) were used. Introducing coniferous trees was resigned because they would excessively highlight in leafless periods (Poznański, 1995).

The Boyen Fortress permanent greenery height diversification analysis

Aerial Picture from 2000 (Fig. 4) coming from Heritage Restoration Cathedral at the Architecture Faculty of Warsaw Polytechnic shows the Boyen fortress overgrown by existing plants intensity. Distinct contour of forest stand and fragments of area occupied by lower structure greenery can be observed. The picture shows that plants occurring the fortress area are not significantly different from plant groups surrounding defensive work, ipso facto it can be assumed that on the turn of XIX and XX century trees note was to blend the fortress in the surrounding landscape. Probably this task was not fully completed because trees growing tempo was to slow toward military technique progress. The picture allows us to have general spatial orientation, although its low resolution precludes more
Our visit to the fortress allowed to make the analysis of the Boyen fortress permanent greenery height diversity when the high and low plants divisions were taken into consideration. To the low greenery were included areas with low bushes or uncontrolled growings of brushwood’s in the neighbourhood of the trees. High greenery consists of trees and groups of trees. Low greenery forms consist of about 18% of the fortress area and high one over 30%. The rest of the area, exclusive of road and space under buildings, is covered with herbs and grass – where we can find young brushwoods of neighbouring trees.

In course of time historical plantings on the area of the Boyen fortress started to disappear. Usually this was affected by strong expansion of neighbouring plant groups, uncontrolled occurring growth of self-sowing plants, successive falling out of and initial plant material lack of protection of historical work and also misuse of the Boyen fortress area in sixties. After accurate studies of materials from field of fortress greenery, visiting the place, researches, analysis, and interview with groundsmen on the Boyen fortress, we can isolate visible fortress plantings. The fortress plants make very clearly readable lines of trees or its outlines accompanying numerous slipways driving to the maidan area, plinth hedges, hedges on the embankment separating donjon from the rest of fortress area, hedges accompanying roads, and not many but considerable trees examples on maidan.

After recognizing the area and existing greenery structure, and also after acquainting with fortress greenery subject matter, groups of trees were isolated and submitted to define acutely its specimen and age. On the basis of conducted analysis, the structure of historical greenery accomplishing mentioned before functions and accompanying modern plants was prepared. The rest of fortress plant groups on account of its location and potential age points to post-war plantings and uncontrolled greenery, successively occupying extensive fortress territory.

**Dendrochronological analysis the Boyen fortress forest stands**

Taking on account building age, fortress functioning time, and role of fortress greenery development which role was connected with occurring on the turn of XIX and XX century new military technological solutions – therein flying machines development and its common use to reconnaissance purpose. The forest stands age groups were isolated (this results are presented in Tables 1 and 2):

- **Group 1** – 196–152 years old
- **Group 2** – 149–100 years old
- **Group 3** – 99–76 years old
- **Group 4** – 75–41 years old
- **Group 5** – 40–10 years old

The first group consists of the oldest trees which probably were on the researched territory before the fortress was erected. The third group also consists of trees with its fortress greenery function – especially masking functions. The second group contains trees planted at the beginning of the fortress being – during years 1857 till 1907 – in the period when the flying machine was improved (flying machines started to move on by dynamic flight, making possible to unrestricted changes of flight parameters) and pho-
tographic cameras were more often used to military reconnaissance. The last two groups were numbered among modern greenery – although planted in historical plants lines, replacing died away specimens and supplementing diminution in forest stand structure.

Conducted dendrochronological analysis separated particular age groups. Out of 100% of studied forest stand, first group contains 0.8% trees, the second one 20%, the third one 32%, the forth one 45% and the fifth 1.4% specimens. Trees standing for antique matter constitute 52.8% of examined forest stand.

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On the examined territory existence of 331 specimens of historical trees with age between 196–76 years was ascertained. It can be assumed that they constitute the substance of the Boyen fortress greenery that has survived. Among them 131 specimens there are over 100 years old.

Four of five of the oldest fortress trees are located close to two granaries on the maidan area. They belong to Quercus robur species. The fifth tree in the first group Tilia cordata is located on the donjon area in direct neighbourhood of caserns. The trees age let us to think that they were grewed on the fortress area before the fortress was build.

The second group consists of trees between 149–100 years old. It can be said that they are the main – primary – fortress greenery group, which create this fortress greenery from the turn of XIX and XX century.

The third group consists of trees with age between 99–76 years. They are the supplement of greenery classified to the second group and corroborate the tendency of creating the fortress greenery on the fortress area.

After the analysis conducting visibly fortress contour above all pointing on masking trials of slipway and roads on which soldiers were moving and also masking of firing positions throughout placing trees on so called plinths outlines.

TABLE 1. Age group of analysed the Boyen Fortification forest

<table>
<thead>
<tr>
<th>Age group (years old)</th>
<th>Number of objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 196–152</td>
<td>5</td>
</tr>
<tr>
<td>2 149–100</td>
<td>126</td>
</tr>
<tr>
<td>3 99–76</td>
<td>200</td>
</tr>
<tr>
<td>4 75–41</td>
<td>281</td>
</tr>
<tr>
<td>5 40–10</td>
<td>10</td>
</tr>
</tbody>
</table>

TABLE 2. Age structure of historical forest in the Boyen Fortification

<table>
<thead>
<tr>
<th>Age group (in years)</th>
<th>Number of objects</th>
<th>% historical forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 196–152</td>
<td>5</td>
<td>1.5%</td>
</tr>
<tr>
<td>2 149–100</td>
<td>126</td>
<td>38.5%</td>
</tr>
<tr>
<td>3 99–76</td>
<td>200</td>
<td>60.0%</td>
</tr>
</tbody>
</table>

Forest stand species composition the Boyen fortress

The prevailing species occurring in plants hedges is Tilia cordata. It states over 50% of examined forest stand. The second species with numerous appearance is grand ash (Fraxinus excelsior), which states 34% of examined forest stand. Becouse of fast spreading over it is the main component of underwood accompanying to the fortress greenery. Another numerous occurring specie is maple tree (Acer platanoides) being the main complementation of linden or ash hedges. Single specimens of oak (Quercus robur) were localized only on the maidan area. Hornbeam (Carpinus betulus) only once in the examined hedges occurred,
twice occured horse chestnut (*Aesculus hippocastanum*) and fourfold (*Betula verucossa*) birch tree (*Betula pendula*) (Tab. 3).

**TABLE 3. Taxonomic structure of analysed the Boyen Fortyification forest**

<table>
<thead>
<tr>
<th>Latin name</th>
<th>Number of objects</th>
<th>% of analysed forest</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acer platanoides</em></td>
<td>30</td>
<td>4.8%</td>
</tr>
<tr>
<td><em>Aesculus hippocastanum</em></td>
<td>2</td>
<td>0.3%</td>
</tr>
<tr>
<td><em>Betula pendula</em></td>
<td>4</td>
<td>0.6%</td>
</tr>
<tr>
<td><em>Carpinus betulus</em></td>
<td>1</td>
<td>0.2%</td>
</tr>
<tr>
<td><em>Fraxinus excelsior</em></td>
<td>211</td>
<td>34.0%</td>
</tr>
<tr>
<td><em>Quercus robur</em></td>
<td>5</td>
<td>0.8%</td>
</tr>
<tr>
<td><em>Tilia cordata</em></td>
<td>369</td>
<td>59.3%</td>
</tr>
</tbody>
</table>

**Directives and recommendations to creating fortress greenery at the Boyen fortress**

Conducted literature studies on the fortress greenery subject matter and acquaintance with existing elaborations about protection and revaluation of fortress areas, therein for the Boyen fortress territory, let us to draw the directions of fortress areas creation with fortress greenery elements. General rules prepared by post-fortress areas preservation specialists can be related to the Boyen fortress and surrounding territory:

- in accordance with Molski (2001) is stated that „Fortress Complex – The Boyen fortress” should be included with full law security as a Cultural Park on the ground of “Culture Goods Protection Statue” written in 1990. The fortress area and the Giżycko Island area fulfil all of the criteria to be included to such kind of protection;
- post-fortress area greenery together with fore field should be the treated together and only this will allow to valuable creation of park landscape;
- fortress greenery compositions have landscape aesthetic values, ecological values and most of all historic values being the evidence of shaping of old battlefield;
- indubitable difficulty in the protection and shaping of fortress greenery groups is territorial extension and connection with objects scattered throughout the area. It is connected with necessity of taking under the protection roads, trees apparently accidental and visual connections. Substantial is that it should be remembered that with the protection of greenery the structure of historical buildings must be protected and at the same time not to disregard historical greenery and not to treat it as a secondary, not relevant or less relevant element (similar Wielgus, 1999);
- it is necessary to pay attention on effective form of keeping the existing condition and protection of historical substance as a record in city or community land development plan and including the fortress plants in city greenery system. It also emphasise that in community development strategies on which territory historical fortifications are located the conditions being meant to raise attractiveness and originality of defence work through conscious and systems adaptation of fortress greenery areas – often covering several hundred hectares (similar Środulska-Wielgus, 2002) should be taken into consideration.
REFERENCE


Streszczenie: Konserwacja i rewaloryzacja Twierdzy Boyen. Twierdza Boyen jest przykładem najlepiej zachowanej w Europie cegełnej fortyfikacji pruskiej. Jednocześnie jest miejscem mało docenionym, w niewielkim stopniu „odkrytym”, zasługującym na szersze zainteresowanie. Najprostsza, a zarazem najdoskonałą formą prześladowania jest zielony, która znajduje się w zasięgu ręki. Zieleń pozostała także doceniona w okresie nasilających się działań wojennych na przełomie XIX i XX wieku. W tym czasie szczególnie zauważono jej właściwości maskujące, dekorujące przeciwnika. Każde, a nawet większość nasadzeń, miało swoje wytłumaczalne zastosowanie i pełniło określoną funkcję. Logika postępowania i wykorzystywania roślińności była zaskakująca. Celem pracy jest opracowanie wskazań do kształtowania zieleni fortecznej Twierdzy Boyen w Giżycku na podstawie przeglądu literatury i analizy informacji w zakresie podziału oraz funkcji zieleni fortecznej, analizy środowiska przyrodniczego opracowywanego obszaru, dokumentacji historycznej obiektu, analizy kartograficznej uwarunkowań przestrzennych wokół twierdzy w XIX wieku, analizy uwarunkowań przestrzennych w latach współczesnych, analizy struktury szaty roślinnej Twierdzy, inwentaryzacji drzewostanu wyodrębnionego na podstawie zebranych wcześniej informacji, analizy struktury gatunkowej i wieku drzewostanu, wyników przeprowadzonych badań oraz zalecenia do kształtowania zieleni fortecznej Twierdzy Boyen. Przeprowadzona analiza dendrochronologiczna wyodrębniła stan poszczególnych grup wiekowych. Ze 100% badanego drzewostanu grupa pierwsza zawiera 0,8% drzew, grupa druga 20%, grupa trzecia 32%, grupa czwarta 45%, zaś grupa piąta 1,4% egzemplarzy. Drzewa stanowiące zabytkową substancję stanowią 52,8% przebadanego drzewostanu.

Na badanym obszarze stwierdzono obecność 331 egzemplarzy drzew historycznych, których wiek oszacowano w granicach 76–196 lat. Można przypuszczać, że stanowią one trzon przetrwałej zieleni fortecznej Twierdzy Boyen. Z ponad stu-letnim wiekiem zachowało się 131 egzemplarzy. Przeprowadzenie studia literaturowe z dziedziny zieleni fortecznej oraz zaszanowania się z istniejącymi opracowaniami zakresem obejmującymi zasady maskowania terenów pofortecznych, w tym opracowaniami dla obszaru Twierdzy Boyen, pozwalać nakreślić kierunki kształtowania terenów pofortecznych, w których skład wchodzi również elementy zieleni fortecznej. Ogólne zasady sformułowane przez specjalistów zajmujących się konserwacją terenów pofortecznych można odnieść również do przypadku Twierdzy Boyen i otaczających ją obszarów: stwierdza się, że „Zespół forteczny-Twierdza Boyen” powinien zostać objęty, na mocy Ustawy o Ochronie Dobr...
Kultury z 1990 r., pełną ochroną prawną w postaci Parku Kulturowego. Teren twierdzy, a także teren Wyspy Giżyckiej spełniają wszelkie kryteria do objęcia taką formą ochrony; zielenia terenów pofortecznych wraz z przedpolem powinna stanowić całość kompozycyjną i tylko ten warunek pozwoli na wartościowe tworzenie krajobrazu parkowego; kompozycje zieleni twierdz mają obecnie estetyczne wartości krajobrazowe, wartości ekologiczne, a przede wszystkim wartości zabytkowe dokumentujące kształtowanie dawnego pola walki. Zwrócić należy uwagę na skuteczną formę utrzymania stanu istniejącego i ochrony substancji zabytkowej jako zapisów w planie zagospodarowania przestrzennego miasta lub gminy i włączenia zieleni fortecznej w system zieleni miejskiej. Podkreśla również, że w strategiach rozwoju gmin, na których terenie znajdują się zabytkowe fortyfikacje, powinny zostać uwzględnione warunki mające na celu podniesienie atrakcyjności i oryginalności dzieła obronnego poprzez świadomą i systemową adaptację terenów założeń zieleni fortecznej – często obejmujących kilkaset hektarów.

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