

18th International Annual ECLAS Conference

**LANDSCAPE ASSESSMENT -
FROM THEORY TO PRACTICE:
APPLICATIONS IN PLANNING AND DESIGN**

10th - 14th October 2007
Faculty of Forestry, Belgrade, Serbia

18th International Annual ECLAS Conference
LANDSCAPE ASSESSMENT - FROM THEORY
TO PRACTICE: APPLICATIONS IN PLANNING AND DESIGN
University of Belgrade, Faculty of Forestry
Department of Landscape Architecture and Horticulture

Zbornik radova / Proceeding

Izdavač / Publisher:
Univerzitet u Beogradu,
Šumarski fakultet

Za izdavača / For the publisher:
Prof. dr Ratko Kadović

Priprema za štampu / Text capture and processing:
Vladimir Batica
Tijana Dragović

Rešenje korica / Cover page design:
Katarina Čavić

Štampa / Printed by:
Planeta print, Beograd

Tiraž / Circulation:
200

ISBN: 978-86-7299-137-6

18th International Annual ECLAS Conference
LANDSCAPE ASSESSMENT - FROM THEORY TO PRACTICE:
APPLICATIONS IN PLANNING AND DESIGN
University of Belgrade, Faculty of Forestry
Department of Landscape Architecture and Horticulture
10 - 14 October 2007, Belgrade, Serbia

SCIENTIFIC COMMITTEE

Prof. Nilgöl Karadeniz, University of Ankara
Prof. Diedrich Bruns, University of Kassel
Prof. Karsten Jörgensen, Norwegian University of Life Sciences
Prof. Richard Stiles, Vienna University of Technology
Prof. Ivan Marušić, University of Ljubljana
Prof. Jeroen De Vries, University of Van Hall Larenstein WUR
Prof. Ratko Kadović, University of Belgrade
Prof. Jasminka Cvejić, University of Belgrade
Prof. Mihailo Grbić, University of Belgrade

ORGANIZING COMMITTEE

Prof. dr Jasminka Cvejić, University of Belgrade, Faculty of Forestry
Branislav Božović, dipl.ing., Secretary, City of Belgrade,
Secretariat for Environmental Protection
Prof. dr Matilda Đukić, University of Belgrade, Faculty of Forestry
Prof. dr Mihailo Grbić, University of Belgrade, Faculty of Forestry
Mr Nevena Vasiljević, University of Belgrade, Faculty of Forestry
Mr Andreja Tutundžić, University of Belgrade, Faculty of Forestry
Dragović Tijana, dipl.ing., University of Belgrade, Faculty of Forestry
Biljana Glamović, dipl. ing., City of Belgrade,
Secretariat for Environmental Protection
Mr Dragana Skočajić, University of Belgrade, Faculty of Forestry
Mr Ivana Popović, University of Belgrade, Faculty of Forestry
Mr Dragan Vujić, University of Belgrade, Faculty of Forestry
Marija Marković, dipl.ing., University of Belgrade, Faculty of Forestry
Mr Biljana Jović, University of Belgrade, Faculty of Forestry
Boris Radić, University of Belgrade, Faculty of Forestry

KEY NOTE SPEAKER:

Prof. Carl Steinitz, Harvard University Graduate School of Design

CONFERENCE SECRETARY:

Tijana Dragović, University of Belgrade, Faculty of Forestry

THE AREA EVALUATION WITH THE SCOPE OF ABILITIES FOR DESIGNED PLANT SUCCESSION

Rostanski, Krzysztof M.²

Abstract: Plant succession could be an important tool in landscape design, especially in the areas of brownfields, where native, ruderal plants of wide ecological adaptation seem to play a significant role in the biological diversity of the place. An adequate area evaluation should recognise the nature value of the area concerned and its surroundings. Among the most important elements to assess are ground conditions, soil pollution, humidity etc. There arises a question of the usability of the existing soil. Its conditions, if heavily degraded, may affect the stability of new plantations. In the case of covering the ground with new soil, one should assess its negative impact on the existing flora. Another element is the ecological value of the existing plant cover and a possibility of its further adaptation. The question is whether they create a sufficient ground cover, and whether these plants could be used in the future development. Another question refers to the sensibility of the biotope for a designed change and the influence of plants introduced, with their possible expansion. The evaluation should also state which existing elements are aesthetically acceptable according to the designed vision, locality and public demands. Agricultural activities may cause a disaster to the succession already functioning. Thus, a designer is faced with a very important decision - to create a nice plant cover, but quite often impermanent, or to leave the area for a more permanent community, more valuable ecologically, but less picturesque. Sometimes the opposite approach to the total design is very useful. Leaving some parts of the designed area untouched, or with very limited management, can preserve important nature values. This could be achieved by employing Land Art forms. This article shows the applicability of the method described in a few chosen areas located in Upper Silesia, Poland: spoil heap reconstruction in Chelm Sl., brownfield in Zabrze, Swierczewski Park in Zabrze and Tysiaclecia Park in Sosnowiec.

Key words: plant succession, tool, landscape design, area evaluation, abandoned places, brownfields, land Art, biodiversity

INTRODUCTION

Nowadays, with the overwhelming, global pressure of unification, any attempts made to preserve local values are of great importance. Protecting local values is emphasised in the Convention on Biological Diversity and the European Landscape Convention. Both conventions promote activities enhancing differences between the regions according to landscape and natural environment. We can distinguish various laws regulating environmental protection depending on the type of area. On the European level, the most important objects are covered by the Nature 2000 network. On the regional and local levels in Poland, elements of the ecological system are indicated as - biodiversity sources, ecological corridors, wide scale bio-active zones. They affect all levels of spatial plans. Nature elements are protected in the form of areas, habitats, and particular specimens of trees. It should be stressed that not only the most natural and valuable objects should be under protection, but also the value of common green areas as the bio-transfer paths (Miklos, 1995). All kinds of biodiversity protection may

¹ Silesian University of Technology, Faculty of Architecture, Akademicka 7, 44-100 Gliwice, Poland; phone:(+48 32) 237 23 58, fax:(+48 32) 237 13 18 /// krzysztof.rostanski@polsl.pl

take passive or even active forms, like habitat creation (from: Truman I., 2006. Habitat creation, University of Wolverhampton, England, lecture at Silesian University in Katowice, Poland, 05.2006), and other planting activities enriching local biological diversity (Koster,



Figure 1: Ruderal vegetation of exceptional aesthetic value on spoil heap in Chelm Sl.

2001). Places developed in this way, although not of the highest ecological value, have significant potential in the local nature system of urbanised territories. These are especially brownfields, abandoned places and wastelands. Ideas of enriching biodiversity there is gaining still more interest (Vries et al., 2006). Especially brownfields needs special proposals to create there well balanced green cover (Patrzałek,

1997, 2006). Among various methods plant succession is being considered as a good tool in landscape architecture though it may bring some threats (Kuhn, 2006). Mentioned activities represent the landscape ecological approach which views the whole landscape as a complex of many biotic and abiotic factors. They all should be considered in a proper assessment.

ENRICHING LOCAL BIODIVERSITY

It is still necessary to make people aware of the value of local nature. Biodiversity does not mean simple richness of plants and animals of any kind. Expansive, introduced plants may invade territories outside the designed area and sometimes change valuable ecosystems. Thus, the role of introduced plants in green areas should be considered carefully. When choosing plants, accommodation and easiness of further succession should not be the only factors to be taken into account (Potteiger et al., 1998). It is also possible to use domestic plants in green areas, although they are not so beautiful as common ornamental plants. Some problems with production and accessibility of material in nurseries could be overcome by replanting material from the surrounding areas or collecting seeds. However, it may cause problems in implementation, especially if it comes to meeting deadlines. Restoring natural plants in protected areas is quite complicated, and requires doing research and obtaining legal agreement. It is much easier in common places, but appropriate research and area evaluation should be also carried out.

AREA OF RESEARCH

The criteria of area evaluation are the result of research based on the examples of proposals for development of parks in Upper Silesia, Poland. To illustrate the complexity of the problem four examples were chosen. A spoil heap reconstruction in Chelm Sl. gave an opportunity to use domestic plants as basic plant material. The place of about 50 ha was located outside villages, far from any kind of settlement. The area evaluation showed that the spoil rock deposited there created habitat unsuitable for most plants. Only some kind of ruderal plants succeeded in growing there. Near the area of the heap there is a wood, valuable ecologically,

and a pond with natural flora and fauna. For instance, the number of birds found reaches 50 species. The area is inhabited by twelve mammalian species and a large number of other animals. The easiest way of bringing the area into cultivation was to cover it with soil or to fertilise its surface, creating thus grass cover. Fifty hectares of the area concerned made this idea impossible to implement. Planting trees was very limited there, mostly because of the possibility of ignition of the spoil heap. There is a polluted creek and three ponds, two of which with developed succession and one heavily polluted. Because of already developed succession on spoil heap surface and to diminish cost of re-cultivation, it was decided to create patches of fertilised soil sown with seeds of chosen ruderal plants already present in the area. These patches, called "centres of dispersion", were designed in an aesthetic pattern. The idea being implemented there should protect valuable nature elements of the surroundings.

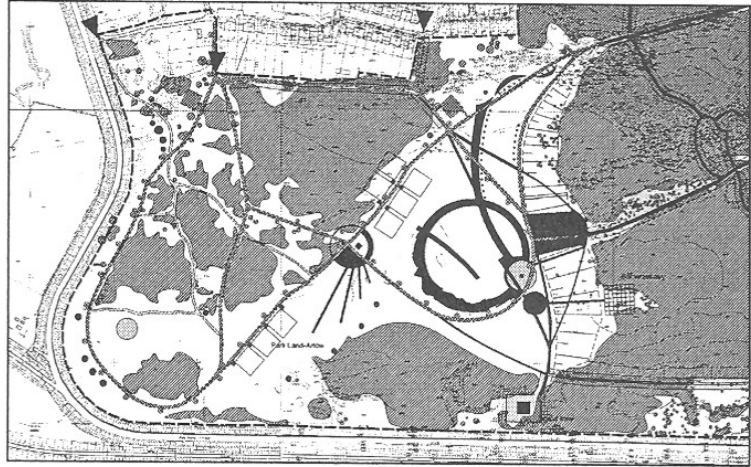


Figure 2: Design of Tysiaclecia Park in Sosnowiec. Spoil heap surface will have pattern of lawn among area naturally succeeded by ruderal plants.

A similar case was the brownfield at Zabrze-Zaborze. That place, of about 14 ha, is designed for sale and waiting for its final developing. The evaluation showed well-developed succession of ruderal plants in most of the area. Some parts were covered in sand, others in coal dust mixed with spoilt rock. They give an interesting impression of bright and dark patches divided by the greenery of plants. The aesthetic appearance and value of the existing

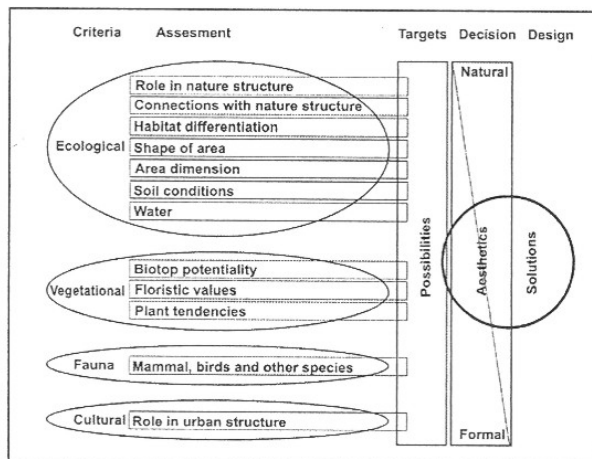


Figure 3: Scheme of design process with the use of plant succession as an implementation tool.

plant cover suggested its possible use in further developing. No valuable nature elements were noticed around. Under such conditions it was decided to design an aesthetic pattern of "centres of dispersion" and a very limited number of trees so as not to cause problems with the subsequent, final developing.

Swierczewski park in Zabrze is a wooded area of 40 hectare, with planted boreal forest trees. The assessment stated a succession of oak-hornbeam flora and no renewal of boreal species, which gives an impression of the real potential flora of the place. The park has lost

its function as a productive forest and has become an urban wood now. The natural value of the area is not very high, but it is growing. There is an interesting pond in the middle of the area, with various animals frequently seen there. Some of them are rare in Poland - for instance kingfisher (Alcedo). At the beginning of the 20th cent. the park belonged to an industrial firm. Some beautiful lanes lined with trees are the remains of the past. In accordance with the area assessment, it

has been decided to leave most area for natural succession or to encourage it there, which will return the potential flora to the area. Some domestic trees, providing food for animals, are designed there as colour dominants, especially in spring or autumn. To make the park safer, fire-roads have been designed and special zones without shrubs along paths, which enables visual penetration. To meet the needs of a city park, a small ornamental garden has been made. The idea of the park tries to protect and support the existing nature and cultural values.

Tysiaclecia park in Sosnowiec covers an area of about 100 ha. Most of it is the remains of a former sand-mine, re-cultivated by planting mainly poplars, birches and locust trees. There are visible old illegal surface excavation of coal - interesting remains of XIX century. The area is divided by unused rail embankments. In the western part is a spoil heap grown partly with advanced ruderal plant succession and partly with pine and birch trees. Artificial wood planted on park area is succeeded by oak-hornbeam and boreal flora, depending on the various soil conditions. Certain protected plants such as *Epipactis helleborine* and *Vinca minor* can be seen there. The park is designed to meet various public needs. The facilities are located in places of a lower ecological value. The wood is to help to rebuild the tree composition into a more domestic one and adequate to the potential flora. The spoil heap will have shaped patterns of lawns among the areas succeeded by ruderal plants.

EVALUATION CRITERIA

For ecological balance on the urban scale, the evaluation criteria should comprise the following elements: environmental - level of emissions, dimension of the degraded area of town, town area dimensions; vegetational - rate of vegetation, level of synantropisation, biodiversity of vegetational formations, area dimensions, ground plan of vegetation, distribution of vegetation within a town area, relation between vegetation and the surrounding landscape, ecological and environmental importance of vegetational formations (Supuka, 1998). When moving from the urban scale to the implementation scale, the above mentioned criteria should be more detailed. Moreover, a development proposal considering the results of such evaluation should take into account not only the existing state but also a time factor. Natural tendencies of plant succession are vital for using as a development tool. Demands of the implementation scale strongly emphasise social and cultural influences on the greenery designed. Accepting such ideas, the most important criteria for area evaluation on the implementation scale are as follows:

1. ECOLOGICAL

ROLE IN NATURE STRUCTURE OF AN URBANISED REGION

- source of biodiversity - high value - limited changes
- element of ecological corridor - medium value - changes dependent on the local conditions, enhancing biodiversity
- additional element - low value - changes dependent on the local conditions

CONNECTIONS WITH NATURE STRUCTURE OF A TOWN

- well connected with other elements - high value, enhancing biodiversity - if needed
- spot like - low value, possible various forms of developing

HABITAT DIFFERENTIATION

- high - high value, enhancing biodiversity - if needed
- low - low value, possible various forms of developing

SHAPE OF AREA

- compact - high value, various forms of developing - if needed
- sprawl like - medium value, enhancing biodiversity - if needed
- segmented - low value, possible enhancing biodiversity, various forms of developing

AREA DIMENSION (SUPUKA, 1998)

- over 2 ha - high importance, enhancing biodiversity
- 0.5 - 2 ha - medium importance, enhancing biodiversity - if needed
- below 0.5 ha - low importance, various forms of developing

SOIL CONDITIONS

- possible adaptation, very limited agricultural activities
- needed partial change - agricultural activities limited to part of the area, or limited fertilising of the whole area.
- needed complete change - exchange of the whole ground surface

WATER

- possible adaptation, depending on the situation limited designed activities, or enhancing ecological value
- needed retention activities
- reducing of retention abilities is out of the question

2. VEGETATIONAL**BIOTOP POTENTIALITY**

- potential flora - high value - protection, enhancing biodiversity - if needed
- potential flora mixed with synanthropic and ornamental plants - medium value - enhancing biodiversity
- synanthropic and ornamental plants - low value - possible enhancing biodiversity, various forms of developing

FLORISTIC VALUES

- presence of protected and rare plants - high value - needed protection
- presence of domestic plants within natural communities - protection and enhancing biodiversity if needed
- presence of synanthropic plants covering degraded ground - possible adaptation depended on proposal idea
- presence of synanthropic or ornamental plants invaded natural communities - need of agricultural activities diminishing their role

TENDENCIES

- increasing role of domestic plants - support the tendency
- increasing role of synanthropic plants - support or diminishing the tendency according to proposal idea
- increasing role of expansive, introduced plants - diminishing the tendency

3. FAUNA

- presence of mammal and other species - limited changes, enhancing biodiversity if possible
- presence of bird species - enhancing biodiversity if needed

4. CULTURAL

ROLE IN URBAN STRUCTURE

- well-ordered element with a high ecological value - protection, very limited changes
- well-ordered element with a high aesthetic value - protection, very limited changes
- element with a considerable nature value, aesthetically acceptable - possible limited changes
- unordered element with a high ecological value - needed changes within aesthetic range and protection of ecological values
- unordered element with a low ecological value - needed changes

CONCLUSION

Following such criteria should be determined by the need or possibility of using domestic plants in a development proposal. This idea can be implemented in two ways: firstly, by protecting and shaping the existing greenery with small architectural elements and a road pattern; secondly, by enhancing nature values with seeding and planting domestic plants and with some agricultural activities. Aesthetics could be naturalistic or formal, but both should accept temporal dimensions of a designed effect. Various kinds of earthwork are possible, but with regard to existing nature values. Some designed changes in ground surface conditions may cause predictable changes in succession.

REFERENCES

- Koster A., 2001. Ecologisch groenbeheer. Schuyt & Co. Haarlem
- Kuhn N., 2006. Intentions for the Unintentional. Spontaneous Vegetation as the basis for Innovative Planting Design in Urban Areas. JoLA Journal of Landscape Architecture, autumn 2006, 46-53
- Miklos L., 1995. The ecological awareness - selected issues. Ekologia (Bratislava) Vol.14, Supplement 1/1995, 191-203.
- Patrzałek A., 1997. Formation of plant communities on coal mining waste tips under influence of seeded variety of grass and agricultural treatments. Ecological Aspects of Breeding Fodder Crops and Amenity Grasses, 147-150.
- Patrzałek A., 2006. Evaluation of the Bio-reclamation Process of the Mining and Metallurgy Dumps. in: Górnictwo i geologia. Zeszyty Politechniki Śląskiej, Vol.3 No.1, Gliwice 2006, 31-47.

Potteiger M., Purinton J., Landscape Narratives: Crossing Realms, Landscape Review 4, No.1, 1998, 16-26.

Supuka J., 1998, Importance of urban vegetation for ecological stability of towns. Ekologia (Bratislava) Vol.17, Supplement 1/1998, 110-117.

Vries de J., Dorp van D., Koster A., 2006. Design for biodiversity in the urban fringe. Cultural Dimensions of Urban Landscape, Bratislava University of Technology, Bratislava 2006