

REZEPTION VON LANDSCHAFTEN *LANDSCAPE PERCEPTION*

WHICH KIND OF NATURE IS LIKED IN URBAN CONTEXT? A CASE STUDY OF SOLARCITY LINZ, AUSTRIA

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Zusammenfassung

Welche Art von Natur wird in Städten geschätzt? Eine Fallstudie der SolarCity Linz, Österreich

Es gibt zahlreiche Belege für die negativen Umweltauswirkungen der städtischen Zersiedelung verglichen mit städtischer Dichte. Anders als in verdichteten Ballungsräumen gibt es in den dünner besiedelten Vorstädten verschiedene Formen des Naturzuganges.

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Dieser bessere Zugang zur Natur stellt schließlich den einzigen positiven Effekt der Suburbanisierung dar und gibt Anlass zur näheren Betrachtung.

In einer Studie wurde der Nutzen dieses positiven Effektes in der SolarCity Linz, einem Außenbezirk der Stadt Linz, Österreich, untersucht. Die SolarCity wurde im Jahr 2005 mit dem Ziel fertiggestellt, Heimat für 3.500 neue Vorstadt-Bewohner zu werden. Nur wenige Gehminuten davon entfernt liegt das Schutzgebiet „Natura 2000 Traun-Donauauen“ mit einem eingebetteten Landschaftspark. In einer Umfrage wurden 153 Anwohner zu Verhalten, Vorlieben und Beziehungen zu verschiedenen Naturtypen befragt. Als Vergleichsgruppe wurden darüber hinaus 91 Besucher des städtischen Schutzgebietes zu den gleichen Aspekten befragt. Unterstützend zur Befragung wurden Bilder eingesetzt, die einen Gradienten zwischen Wildnis und gut gepflegter Freizeitfläche abbilden.

Die Ergebnisse zeigen, dass dem Großteil der Anwohner (75%) und Besucher (66%) der Schutzgebietsstatus der Flächen nicht bewusst ist. Die Wildnis innerhalb der geschützten Flächen wird von der Mehrheit beider Befragungsgruppen geschätzt; genutzt wird diese jedoch nur von einem Drittel der befragten Anwohner. Der neu errichtete Landschaftspark hingegen wird von mehr als zwei Dritteln genutzt. Somit genießt der gepflegte Landschaftspark einen höheren Beliebtheitsgrad als die naturbelassenen Flächen des Natura-2000-Gebietes.

Als bevorzugte Aktivitäten im Naturschutzgebiet sind Spazierengehen (28%), Natur beobachten (24%), Entspannen (18%) und Sport treiben (6%) am häufigsten genannt worden. Bevorzugte Aktivitäten im Landschaftspark oder im Stadtgrünraum sind Spazieren, Entspannen oder Freunde treffen.

Es zeigt sich, dass Natur für 54% der Befragten wichtig ist. Welche Art von Natur dabei bevorzugt wird, ist abhängig von Faktoren wie Akzeptanz, Qualität der Infrastruktur und Zugänglichkeit. Diese Erkenntnisse dienen letztendlich dazu, verschiedene Naturtypen so in das städtische Muster zu integrieren, dass erstens die Bevölkerung zu einem hohen Grad davon profitiert, und dass zweitens die stadtnahe Natur optimal geschützt wird. Obwohl die Studie auf den suburbanen Raum begrenzt ist, lassen sich die genannten Ziele auch in Modelle zur nachhaltigen Stadt integrieren.

Schlagwörter: Städtische Schutzgebiete, Naturtypen, Naturpräferenzen, Umfrage, Landschaftspark, Nutzungsverhalten

Summary

The negative environmental effects of urban sprawl compared to compact cities are well documented. Unlike in many compact cities, nature in suburban areas is accessible in many forms. The use of the only positive effect of suburbanisation – better access to nature – is worth having a closer look at. In a study in the suburban areas of Linz, Austria, this subject matter was investigated. Finished in 2005, the SolarCity Linz was built for 3,500 new suburban residents, and it is located within walking distance to the urban protected area “Natura 2000 Traun-Danube Alluvial Forest”, which features a newly-established landscape park in between. In a survey, 153 inhabitants were questioned on their behaviour, their preferences

and their relations to the different natural surroundings. The same was done in a survey of the visitors of the urban protected area (91 interviews), using pictures illustrating a gradient of nature types between wilderness and well-maintained recreational green.

A large proportion of inhabitants (75%) and visitors of the urban protected area (66%) was not aware of the protection status. The majority in both questionings appreciates the wilderness in the protected area, but only one third of the questioned residents are users of it. The newly-established landscape park has the highest user preference (more than two thirds). A clear majority of questioned residents (73%) prefer to use the well-maintained landscape park over the accessible wilderness of the Natura 2000 area.

Preferred utilisation activities in the protected area are walking (28%), nature observation (24%), relaxing (18%) and sports (6%). The favoured activities relaxation, meeting others and walking are mostly pursued in the landscape park or in urban green.

Nature is important for 54% of all respondents, but the preferred kind of nature depends on acceptance, safe accessibility, and infrastructure quality. These findings can be used to successfully integrate different types of nature into the urban pattern in a way that people better benefit from urban nature and to better protect nature close to urban areas. Since these aims are not limited to suburban areas, they have potential to be realised in sustainable city concepts as well.

Keywords: Urban protected areas, nature types, nature preferences, questioning, landscape park, utilisation behaviour

1 Introduction

Urbanisation is a complex and dynamic process of landscape change, occupying land for urban land use but also incorporating farmland, forests, wetland, riverbanks and streams, and all kinds of nature around cities and towns into an urban pattern (BREUSTE & BREUSTE 2001). This process will continue in terms of an increasing share of population living in urban areas but also in terms of turning rural nature into urban nature (BATTY et al. 2003; EEA 2006). HOBBS & STOOPS (2002) mentioned that more than 60 percent of new housing in the USA between 1990 and 2000 was constructed in the suburbs. In many urban regions, urban elements sprawl far into the countryside and rural elements exist close to or even within the urban fabric (GULINCK & DEWAELEHEYN 2008). A distinct separation between urban and rural land is no longer feasible (HAASE & TÖTZER 2012). The urban sprawl creates a new type of landscape – the suburban landscape – with new mixtures of nature and built-up land (SIEVERTS 2008; SIEVERTS et al. 2005; BREUSTE 2010, 2012). It often refers to the unplanned and unorganised growth of development into the peripheries of urban centres (ENOTES 2016).

A more compact urban pattern to plan, preserve and construct is widely preferred and recommended to plan, preserve and construct (e.g., JENKS 1996). HASSE & TÖTZER (2012) claimed the consequences for both human quality of life and the environment in rural-urban subregions. Cities are seen as not depending on the availability and state of nature of

the surroundings, but this does not take into account the frequently lacking contact with nature in cities (HAASE & NUISSL 2007).

This urban sprawl is mostly seen as being connected with negative environmental influences (JENKS et al. 1996) such as higher energy consumption, more transport and social isolation (ADELMANN 1998; BURCHELL et al. 1998; KAHN 2000; CAMAGNI et al. 2002; MINDALI et al. 2000; HANDY et al. 2005). However, there is little agreement on many aspects of this phenomenon and more analytical case studies are required (JOHNSON 2001).

The positive role of nature in suburban areas is still not fully understood, analysed and evaluated (BREUSTE 2010, 2012). In some planning practices, like in Germany, suburban nature already plays an increasing role and is no longer just regarded as more residual categories of sub-regional planning but instead, has become an important element of urban and regional development (WIEGANDT 2000). German planning practice has assumed suburban nature to have an important complementary and supplementary function for dense city development and for the relationship between settlement areas and open areas. Suburban nature planning is not only to protect the natural prerequisites for life, but also for satisfying the social and cultural requirements of the people (WIEGANDT 2000). The importance of the recreational function of suburban nature areas is recognised, but mostly for urban residents of the core cities (BREUSTE 2010, 2012). In Berlin, regional parks were developed, which not only entail an ecological compensatory function but are also intended to act as a recreational area for the urban residents (WIEGANDT 2000).

Suburban natural areas offer primarily the suburban residents the already widely lost contact with nature and help to initiate a better relationship with nature in general. These can serve not only as recreational places, but also as places for the young generation to learn about nature (BREUSTE 2012). This ‘new nature’ is often very close to new suburban settlements. New nature categories such as forests, wetlands, and near-nature riverbanks are available and rarely found in inner cities. Unlike inner city residents, suburban residents have many more options in closer proximity to use these nature offerings in a wider spectrum of utilisation possibilities, and they are less regulated than in inner city public parks.

Often it is exactly these nature categories that are the targets of nature protection, sometimes with the intention to reduce human impact. Negative effects by human utilisation are often argued (e.g., PAGE 2016) but overestimated and in case studies rarely found (MARGULES & MEYERS 1992).

The conflict between nature protection and human impact has to be managed (BREUSTE 2004). There is argued demand for more forestland for people, for example in the USA (WOODALL & MILES 2008); thus, forestland should be available for urban residents as well as for ecosystem services.

The international nature conservation movement traditionally concentrated on protecting large, remote areas that have relatively intact natural ecosystems, has recently given increased attention to urban places and urban people. The International Union for Conservation of Nature (IUCN) set out to correct this since about the year 2000. An IUCN group decided to focus their attention on urban nature reserves, especially those fitting IUCN’s definition of “protected areas” to change cities and protected areas from an oxymoron to a partnership (MCNEELY 2001a; TRZYNA 2014a). Globally significant biodiversity within

city limits and in suburban areas was recognised (McNEELY 2001b; McNEELY 2001c). The most important product of the efforts in recent years is an IUCN book, “Urban Protected Areas: Profiles and Best Practice Guidelines” by Ted TRZYNA (2014b). It targets best-practice guidelines for urban protected areas. The 30 guidelines include eleven guidelines on urban protected areas and people. Among these are:

- provide access for all; reach out to diverse ethnic groups and the underprivileged;
- help infuse nature into the built environment and break down the cultural barriers between the ‘natural’ and the ‘urban’;
- control encroachment, and
- create and expand urban protected areas (TRZYNA 2014b).

To follow these, more knowledge is necessary about the real utilisation of urban and suburban nature, about opportunities for improvement to better connect people with nature, to avoid encroachments and about general preferences and attitudes of urban and suburban residents under different cultural and natural conditions.

There have been a number of case studies on human use of green spaces in the past decades. Urban residents typically appreciate and actively use urban green spaces. The times of use, frequency and length of stay vary depending on several factors like distance, location, time, type of urban green, utilisation intensity, infrastructure, expected risks, etc. (e.g., JIM & CHEN 2006a, b; JAMES et al. 2009). Some of those factors, which are important for urban residents to use nature are better observed in suburban areas than in inner city areas, e.g., close proximity to homes, high biodiversity, availability of near-nature areas such as forest and wetlands (e.g., BREUSTE 2004, 2012). More case studies are needed to illustrate how these offerings of very different nature is really used, what nature types are preferred, and which ‘people’, which social groups behave in which ways. To know this will be helpful for better planning and decision-making to improve contact with nature, to protect and manage urban nature and, especially, to use the special qualities and potential of suburban nature.

This study focuses on three questions. Firstly, what is the knowledge and perception of protected nature areas very close to a suburban settlement? Secondly, which nature offerings are preferred and how they are used? Thirdly, how do suburban residents use different nature types when they have a choice between ‘wilderness’ in a forest, a landscape park outside of the built-up area and an urban green space, all easily accessible and in close proximity?

2 Material and methods

2.1 Study area

The city of Linz, located on the Danube River [Donau], is the capital of the Austrian federal state Upper Austria [Oberösterreich] and has nearly 200,000 inhabitants. Because

of the enormous demand for housing in Linz during the years 2001 to 2005, twelve housing developers built a new residential estate in a location in the suburban area of Linz. The city owned large, contiguous pieces of real estate in the suburban area about 10 km from the city centre.

The compact ecological settlement SolarCity includes a total of 1,300 dwellings on a 36-hectare site for nearly 3,500 new residents. It is located close to the 664-ha-wide European nature protection area Natura 2000 Traun-Danube Alluvial Forest [Natura-2000-Gebiet Traun-Donau-Auen]. This urban nature protection area is one of the remaining alluvial forests dominated by ash (*Fraxinus ornus*) and grey alder (*Alnus incana*), and habitat to numerous protected, red-listed amphibian, mammal and bird species (Fig. 1).

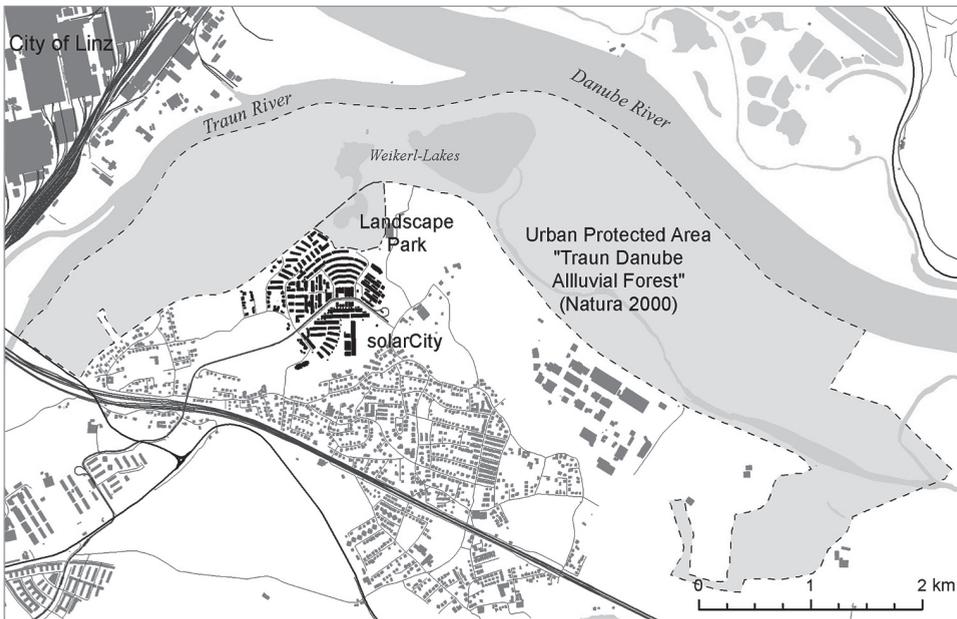


Fig. 1: Location of SolarCity, urban protected area Traun-Danube Alluvial Forest (Natura 2000) and landscape park

SolarCity offers its new inhabitants not only optimal dwelling and living quality, but also a variety of areas for recreation, such as a landscape park with adventure playgrounds, a lake, and sports facilities between the settlement and the nature protection area. SolarCity was planned by the designers as an exemplary model of future-oriented urban development (DOBUSCH 2008; TREBERSPURG & STADT LINZ 2008). Beside all recognised aspects of sustainable urban development, the location of 3,500 new urban dwellers close to a before rarely-visited protected forest was a problem in managing the expected intensive recreational use. The landscape design had to ensure that the nature value of the

protected area, nominated as European Protected Area (Natura 2000) in 1998, would not be diminished by people. Urbanity and nature had been connected in a landscape plan for the built-up area of SolarCity, but this plan lacked the integration into the surrounding landscape of the Traun-Danube Alluvial Forest (LATZ et al. 2008; LAND OBERÖSTERREICH 2011).

With the landscape park between SolarCity and the now ‘urban’ protected area, it was intended that visitors be attracted and use it as a pleasant environment for walks, recreation, biking, and playground for kids. It was also intended to reduce the expected disturbances by a high number of visitors in the urban protected area.

2.2 Survey

The investigation is based on a survey of people living in SolarCity. The survey intends to identify the relation of urban residents to the nature of the urban protected area, and was organised as oral interviews of (a) visitors of the urban protected area and (b) residents of SolarCity as potential visitors. Both groups were established inhabitants of SolarCity eleven years after the end of construction (ASTNER 2015).

The orally interviewed persons were selected randomly (A) within the protected area (visitors, $n = 93$) and (B) in the city centre (residents, $n = 153$) on the market square on weekends and weekdays in 2015. The response rate in the protected area was 95%, in the city centre 56%. The age structure of the inhabitant group reflects about the age structure of the population of SolarCity. Table 1 shows, that among visitors is a slightly larger share of elder people compared to residents.

	Sample A Visitors of the urban protected area (in %) $n = 93$	Sample B Inhabitants of residential estate, residents (in %) $n = 153$
Questioned persons	93	153
Age group 10–14	3	11
Age group 15–29	36	30
Age group 30–59	29	39
Age group 60 and elder	32	20
Females	48	46

Tab. 1: Structure of the questioned samples

The questioning of the visitors of the urban protected area concerned their nature preferences and nature utilisation behaviour. The questionnaire consisted of 16 questions

in five groups: knowledge about the protected area, preferences of nature types, utilisation of the urban protected area, perception of the status of the urban protected area, and reasons motivating or demotivating to use the area. 50% of the visitors live in SolarCity, 31% in the surrounding settlements and 18% elsewhere in the city of Linz, 59% live in apartments.

Habitat code	Habitat name	Area in ha	Share in %
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation	47.35	7.13
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	13.94	2.1
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) semi-xeric grassland	2.13	0.32
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	0.41	0.06
6510	Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)	10.01	1.51
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	271.04	40.82
91F0	Hardwood alluvial forest	9.04	1.36

Tab. 2: Habitat types by the European Council Directive 92/43/EEC of 21 May 1992 in the Natura 2000 Traun-Danube Alluvial Forest (EC 1992; MALETZKY et al. 2013)

The questioning of the residents concerned preferences and nature utilisation behaviour of (a) the protected area, (b) the landscape park, (c) the urban green areas. The questionnaire consisted of 23 questions in five groups: knowledge about the urban protected area, acceptance and utilisation of the nature types, and reasons motivating or demotivating the use of the area.

2.3 Habitat types and nature-type classification

The urban protected area Natura 2000 is divided into seven of the listed habitat types of the European Council Directive 92/43/EEC (EC 1992) (Table 2). The dominant habitat type is alluvial forests (*Alno-Padion*, *Alnion incanae*); followed by natural eutrophic lakes, water courses and a small area of lowland hay meadows.

To find out, which nature types are preferred by visitors of the urban protected area, a number of alluvial forest situations were selected, representing a gradient from mostly untouched, near-nature and dense forest patches (‘wilderness’) to increasingly open and (along the trails) maintained forest types with and without natural disturbances (Nature Types A-D). Additionally, the nature types E (Open Cultural Landscape) and F (Landscape Park) were included as alternative between the protected and the residential area. Together, the six nature types, all easily accessible, safe to use and near the residential areas were offered as alternatives in the questionnaire.

Six nature types were identified (Fig. 2). They belong to two main categories of nature:

- **Urban protected area** (A – E in Fig. 2) – different types of forest (see below),
 - **Landscape park** (F in Fig. 2) – different managed park grassland, managed bush patches, play and sport grounds; and a public free to use open lake shore for bathing and swimming with refreshment facility.
- Additionally, as third group Urban Green Space was used as category in the questioning of the residents.
- **Urban Green Spaces** are small neighbourhood parks, green strips along foot paths and garden green belonging to the houses.

All nature types, including the forests, were accessible to visitors by trails. Each nature type was visualised by photographs showed to the questioned persons to get a response about perception, attractiveness and individual utilisation (Fig. 2). All nature types were reachable from the residential area within 15 minutes walking on good trails, usable in all weather conditions.

Nature types (habitat types)	Photo showed to questioned visitors
Forest Nature Types A-D	
A – Dense alluvial forest with (visual) contact to lakes	

Nature types (habitat types)	Photo showed to questioned visitors
B – Dense alluvial forest with natural disturbances	
C – Young, less dense alluvial forest	
D – Dense alluvial forest in contact with young brush areas with broad open strip along the trail	

Nature types (habitat types)	Photo showed to questioned visitors
<p>E – Mowed grassland between dense alluvial forest patches under electric transmission line right-of-way</p>	
<p>F – Landscape park with maintained grassland, single trees, shrub areas, playgrounds and further recreational equipment</p>	

Fig. 2: Nature types (habitat types) used for questioning of visitors of the Nature 2000 area (photos A. ASTNER)

3 Results

3.1 Perspectives of visitors of the urban protected nature area

3.1.1 Knowledge about the urban protected area

64% are unaware of the protection status of the visited area. Only 10% are aware of the actual status as a European protection area. 42% expect high species diversity. 46% do not see any conflicts with nature protection. Only littering, vandalism and less accept-

ed using activities were mentioned. The rest see different conflicts in different forms of human behaviour. 58% are unaware of any management in the area and see it as a kind of 'wilderness'.

3.1.2 Nature preferences and nature utilisation

Preferences and utilisation of nature types within the protected area (Nature Type A-E and of the connected landscape park (Nature Type F) show different degrees of acceptance and utilization (Table 3).

Nature type	Nature acceptance (in % per category)						Nature visits (in % per category)					
	1 I like it very much 2 I like it 3 I like it somewhat 4 I dislike it somewhat 5 I dislike it 6 I dislike it very much						1 I use it very frequently 2 I use it frequently 3 I use it sometimes 4 I use it rarely 5 I use it very rarely 6 I use it never					
	liked			disliked			used			not used		
	1	2	3	4	5	6	1	2	3	4	5	6
A	33	26	33	2	2	2	6	7	11	15	26	33
B	3	8	17	33	19	18	2	2	7	4	25	58
C	10	33	39	13	3	2	16	30	19	22	7	4
D	13	30	35	13	7	2	17	31	18	21	7	4
E	5	19	44	21	9	2	12	22	19	29	12	4
F	54	37	6	0	0	1	55	25	12	2	4	2

Grey = more than 15%, Black = more than 30%

The general utilisation degrees of the nature types are: A – 2; B – 1; C – 2; D – 2; E – 3; F – 4

1 very low (mostly no people frequently observed in the area)

2 low (only a few people frequently observed in the area),

3 medium (several people frequently observed in the area), and

4 high (many people frequently observed in the area)

Tab. 3: Nature preferences and nature utilisation (n = 93)

The best-accepted nature types are not the most intensively used ones. The visitors of the urban protected area, who like the alluvial forest beside the landscape park much and very much, use especially the most highly accepted, and the 'pristine' Nature Type A mostly very rarely or never. A high acceptance (59%) is the case here along with a low utilisation rate (59%). Also the naturally disturbed alluvial forest is very rarely or never used

(83%), but was also disliked. Highest rates of utilisation have the two nature types of the urban protected area, the alluvial forests with obvious maintenance C (46%) and D (48%). They are frequently and very frequently used. Along with high preference, the landscape park also has the highest attraction to use it (80% frequent and very frequent use) for users of the urban protected area.

41% stay usually 30-60 minutes, 32% 60-90 minutes, 16% more than 90 minutes, the remaining 11% less than 30 minutes. Two thirds of the users come here by foot, 18% by bike. 45% need less than 5 minutes, 32% 5-10 minutes to reach the area. Only 23% need more than 10 minutes.

Top choices of preferred activities are walking (35%), jogging (20%), dog walking (15%); secondary choices are as follows: nature observation (40%) and to enjoy peace and quietness (27%). All other reasons are only of marginal importance.

3.1.3 Perception of the urban protected area

For the majority of users, it is very important (40%) or important (14%) to be in a near-nature area instead of an urban park. For the visitors, it is also very important (37%) or important (29%) to keep the area protected and untouched. The majority is satisfied with the existing nature situation (22% are very satisfied and 39% are satisfied). Regarding increasing utilisation restrictions, 27% would be accepting this, 33% would not like this much and 36% would not like to accept this.

3.2 Perspectives of residents of the urban protected area and other green areas (landscape park and urban green spaces)

3.2.1 Knowledge about the urban protected area

55% of the questioned residents are unaware of the protection status of the area. Only 19% are aware of it. A majority (72%) values the species diversity very much or much. Two thirds (66%) are not aware of any conflicts in the area, and 75% are not aware of any management activities there.

3.2.2 Nature preferences and nature utilisation of visitors of the protected area

The majority of residents either like the protected area (25%) or they like it very much (39%). Only a minority (7%) dislikes it. The residents enjoy nature (22%) and especially wildlife (12%), but 48% of questioned persons cannot specify their likes. Insufficient infrastructure (trail maintenance, benches, trash receptacles, etc.) is the most disliked aspect; however, only 12% give this answer. Similarly, 57% of questioned persons cannot specify their dislikes.

Preferences and utilisation of nature categories in the residential area and its surroundings show different degrees of acceptance and utilisation (Table 4).

Nature categories	Nature acceptance (in % per category)						Nature visits (in % per category)					
	Categories: 1 I like it very much 2 I like it 3 I like it somewhat 4 I dislike it somewhat 5 I dislike it 6 I dislike it very much											
	liked			disliked			used			not used		
	1	2	3	4	5	6	1	2	3	4	5	6
Urban protected area	39	25	25	6	1	1	9	18	32	18	16	7
Landscape park	74	18	7	1	0	0	62	28	8	1	1	0
Urban green spaces	35	39	21	3	1	1	24	28	27	12	5	4

Grey = more than 15%, Black = more than 30%

Tab. 4: Nature preferences and nature utilisation (n = 93)

The most accepted nature types are not the most intensively used ones. The questioned residents who had the choice between only three nature types (urban protected area, landscape park and urban green space) use only the landscape park very frequently (62%). The urban green space is the next most frequently used. The urban protected area of the alluvial forest is at most (32%) only sometimes used.

3.2.3 Utilisation of the nature categories by visitors of the protected area and residents

Table 5 shows the utilisation intensity by duration of visits by residents for the different nature categories, including the visitors of the protected area.

The results show that the questioned visitors for the most part use the urban protected area shorter (73% 30 – 90 minutes) than the questioned residents (43% more than 90 minutes). The majority of the residents use the urban green space for a short stay (48% 15 – 30 minutes). The total utilisation categories for activities in the areas are summarised in Table 6.

Primary reasons given by residents (n = 153) for utilisation are:

Urban protected area: The primary preferred activities are walking (80%), jogging (30%), dog walking (15%); the secondary are walking (40%), enjoying peace and quietness (40%) and observing nature (25%). All other reasons are only of marginal importance.

Nature categories	Visiting time in minutes, share in percent						
	0-5	5-10	10-15	15-30	30-60	60-90	more than 90
Visitors of the urban protected area (n – 93)							
Urban protected area		3		8	41	32	16
Residents (n = 153)							
Urban protected area		3		3	17	27	43
Landscape park		1		11	39	22	27
Urban green spaces		9		48	28	3	8

Grey = more than 15%, Black = more than 30%

Tab. 5: Visiting times of residents for different nature categories

Activities	Urban protected area	Landscape park	Urban green space
Walking	29	26	29
Jogging	11	14	10
Dog walking	4	4	5
Enjoy tranquility	18	11	0
Nature observation	19	6	0
Meeting others	5	15	
Swimming	1	22	1
Reading	0	1	

All relevant categories could be selected following a scale (i) primary, (ii) secondary etc., Grey = more than 15%

Tab. 6: Total utilisation activities of residents (in percent shares) (n – 153)

Landscape park: People prefer the landscape park (primary reasons) for swimming (55%), walking (50%), jogging (20%), and meeting others (13%). 42% do not see any problems or conflicts in the area. The rest list several inconveniences related to different user conflicts. The most liked aspects are the recreation infrastructure (30%), the swim-

ming possibilities (22%) and the proximity to the residential area (6%). 74% like the area very much!

Urban green space: People preferred the urban green spaces (primary choice) because of walking (60%), meeting others (35%), walking the dog (17%), reading (18%), and jogging (13%). 59% are happy with the actual status of the urban green. The only criticisms are about dogs running off-leash (22%). The quietness (15%), playgrounds (14%) and green (11%) as well as its structural diversity (11%) are liked by the residents.

Reasons motivating or demotivating to use the area: 30% of the residents have their own garden near the house, 14% own a dog, 58% live in apartments.

4 Discussion

4.1 Perception and knowledge of the urban protected area by visitors and residents

MCNEELY (2001c) is convinced that a new category of protected areas, “urban protected areas”, are an increasingly important part of national and international protected area programs, and essential for building the necessary consensus for conservation in the 21st century. The Traun-Danube Natura 2000 Alluvial Forest was established as protected area 13 years before the start of construction of the suburban settlement SolarCity. A landscape plan, established 15 years after the declaration of the protection status, could have already included the new status as an urban protected area but mentioned mostly only the risks of encroachment by people rather than the opportunities to now connect people to the new nature (LATZ et al. 2008; MALETZKY et al. 2013).

Local conflicts between nature protection targets and visitors were expected, but without any survey. With becoming an urban protected area, an increase of disturbances by a growing number of visitors was expected in the first management plan seven years after completing the SolarCity (MALETZKY et al. 2013). Further research was only mentioned preserving species biodiversity because of expected conflicts. Beside littering and low forms of irregular usage, no conflicts are recognisable. In addition, more than two thirds of the visitors and nearly in the same amount residents do not recognise any conflicts. No survey related to the utilisation by people was foreseen by the protection management. The change in dynamics focused on the threat to the area posed by the visitors rather than the opportunity to explain nature and nature conservation to people living close by, contrary to other studies and protection guidelines (IUCN WCPA 2016; TRZYNA 2005, 2014b). Some of the guidelines of the IUCN to connect urban protected areas and people have not yet been implemented, such as:

- Guideline 2. Engender a local sense of ownership;
- Guideline 3. Take advantage of volunteers and support groups;
- Guideline 4. Communicate carefully and use a range of communication technologies;
- Guideline 5. Demonstrate, facilitate and promote good environmental behaviour, and

- Guideline 6. Demonstrate, facilitate and promote health as well as the benefits of contact with nature and of good eating habits (TRZYNA 2014a).

The attractive landscape park also served to keep people out of the urban protected area. There is no special information point or visitor centre. It is only possible to clearly identify the protected area by panels on the entrances to the trails. People are not generally ‘invited’ to visit. An ‘urbanisation’ of the nature protection strategy seems to be necessary (BREUSTE 1994).

The suburban settlement SolarCity is actually about ten years old. The first who settled here are mostly still living here because of very low fluctuation based on low rental costs, the highly accepted location, and the green settlement (DOBUSCH 2008). For those interested, it was possible to get information on the surrounding nature. The urban protected area is connected to the new settlement by a distance mostly under one kilometer (see Fig. 1). It is surprising that more than half of the questioned residents and even 65% of the visitors are unaware of the protection status and 75% of the residents about management activities. This shows that despite close proximity, the urban protected area is still delinked from the majority of people, as has already been mentioned in other studies (LOUV 2005; BRÄMER 2010).

It is not the protection status, which is important to the users, but rather the nature as an experiential site. This shows that the urban protected area is still not a site for learning about nature, but a recreational site for enthusiastic visitors. It needs to be improved to fulfil more possible functions for people as has been demanded in other cases (ROBERTS et al. 2005; LE ROUX et al. 2014).

Despite lacking information, a high importance on biodiversity of the urban protected area is expressed by the questioned persons: 42% of the visitors expect high species diversity as do 72% of the residents. This contrast between highly expected actions on biodiversity accompanied by low knowledge is also seen in the Study on the Awareness of Nature 2015 [Naturbewusstseinsstudie 2015] in Germany (BfN 2016). More than half of the German population (58%) does not know what biodiversity is, yet value biodiversity very much (85%) and regard it as important for their quality of life. 88% of questioned persons of this study understand biodiversity as simply species diversity. The societal information level allows people to simply argue that biodiversity is connected with high species diversity without concrete knowledge (BfN 2016). This finding and the real importance of urban biodiversity is also supported by other studies (MCNEELY 2001a; PHILLIPS & GAY 2001; TRZYNA 2005; HONG et al. 2008).

4.2 Which kinds of nature do people like and which do they use?

To establish new natural areas and to protect and maintain nature in and around urban areas, it is necessary to know more about preferences and acceptance of different kinds of nature. The nature gradient from low-maintenance forest (‘wilderness’) to high-maintenance landscape park sites applied in this study can show these preferences very well.

A majority of the residents, nearly two thirds, like the urban protected area. Only 7% dislike it. A majority cannot specify their likes or dislikes in the area. What they expected or found is a lacking level of infrastructure, maybe compared to urban park conditions. The urban protection area cannot fulfil the demands of infrastructure and maintenance urban residents expect. This shows the high level of expectations for open spaces in and around settlements in general.

The questioned residents had the choice to express preferences between the urban protected area (A), the landscape park (B) and the urban green space (C). The results are very clear and show a preference (“very much liked”) of 74% for the landscape park, followed by the urban protected area and the urban green space, both nearly the half of acceptance (see Table 4). All three categories of urban nature are “liked” to varying degrees. All nature categories have an adequate infrastructure, are easily accessible and in close proximity. It can be argued that the preferences for the landscape park have other reasons beside these, which were not asked. It can be expected that these differences are aesthetically based (see LORENZO et al. 2000). Since urban residents usually value nature based on their personal experience and subjective perception, aspects including stress relief, affinity with nature, and a place for children to play are also frequently associated with their perceptions of urban nature (PINCETL & GEARIN 2005).

The utilisation data of the survey (see Table 6) give other arguments. Each of the nature categories has a different profile for utilisation activities. They are used for more than walking and jogging. The urban protected area is clearly preferred to visit to enjoy quietness and for nature observation (see COLES & BUSSEY 2000). These activities occur much less in the other two nature categories. Between the urban protected area and the urban green space, the landscape park has the highest variety of utilisation possibilities. Maybe this is the reason for its high acceptance.

Utilisation options can produce different qualities. This matches very well with comparable findings about quality of space by HERZELE & WIEDEMANN (2003), GRANZIN & WILLIAMS (2012) and QIU & NIELSEN (2015). It contrasts nature-related findings based on cultural preferences of urban forest in northern European cities (e.g., TYRVÄINEN 2001; TYRVÄINEN et al. 2007). Socialisation and leisure can be more prevalent among children and young adults of both genders; women tend to see them as places for children to play (SANESI & CHIARELLO 2006).

It can be expected that those who are visitors of the urban protected area have generally a positive perception of nature. This is clearly visible in the perception of all six nature types (A – F) showed to them in pictures (see Fig. 2). The more ‘pristine’ Nature Type A was among all forest nature types (urban protected area) the most preferred (59% like it much and very much), followed by those (C and D), which show an increasing degree of maintenance and open trails (see Table 3). The natural disturbances in the dense alluvial forest were less positively valued and dominantly disliked. The disturbances were not seen as natural processes but maybe as risks for visitors. The dominant positive acceptance overall is Nature Type F (91% much and very much liked). Even those who have a positive perception of nature, like with Nature Type F, also like the designed, clean, safe, multivariate, usable nature of a landscape park. This is a comparable finding to WILLIAMS & GREEN (2001) who found that accessibility, safety, cleanliness, tidiness and quietness

are valued key qualities of urban nature spaces. Users of urban nature usually prefer peace, quietness and cleanliness (JIM & CHEN 2006b; TYRVÄINEN et al. 2007). BANSE & MATHEY (2013), on the example of an urban derelict property, showed how picture simulations of different vegetation succession levels are accepted. The results show that very dense vegetation lacking many utilisation options and initial sparse vegetation with low aesthetic attractiveness are both regarded as less attractive. The vegetation of the Solar-City landscape park best fits to the most positively valued vegetation structures of BANSE & MATHEY (2013).

There are several studies about nature utilisation in cities, especially in urban parks and gardens (e.g., BALRAM & DRAGICEVIC 2005; SANESI & CHIARELLO 2006; JIM & CHEN 2006a; PRIEGO et al. 2008; PESCHARDT et al. 2012). Most of them are investigations on the example of one nature type like forests, urban parks, allotments, etc. The innovation in this study is the comparison of the utilisation of different urban nature types, all high maintained, with attractive infrastructure, good accessibility, and proximity to people's home in a suburban location. This comparison could show the perceived quality of the nature types, excluding other influencing factors. 'Natural' scenes were widely favoured by citizens over urban environments (FORSYTH 2003).

The findings show that a high degree of acceptance does not necessarily link to a high degree of utilisation. This can be shown on the example of the residents' survey (Table 4) as well as of the visitors' survey (Table 3). The most highly accepted nature type is not the one with the highest utilisation rate but rather the nature type (landscape park F), which is most variable to use, clean, safe, and high maintained. The attraction of the urban green space, which is at a small-scale and has reduced utilisation possibilities and the urban protected area is not high enough to compete with those of the landscape park with its open lawn, sports grounds, playgrounds and artificial lakes for swimming (see also OGUZ 2000; HERZELE & WIEDEMANN 2003).

There is an increasing number of papers on the perception and valuation of urban biodiversity over the past decade (e.g., BOTZAT et al. 2016; MATHEY et al. 2016). There is a need for further research, which vegetation types are preferred by which groups of users (HANNIG 2006). This agrees with the finding of BREUSTE (2004) in his basic study in Halle/Saale (Germany) that while most urban residents use urban open space, they prefer managed parks to 'wildernesses' and even forested areas.

5 Conclusions and recommendations

The example of SolarCity shows that it is possible to practice sustainable urban development even close to protected areas. Beside all the negative effects of suburbanisation on the environment, in general it gives excellent opportunities for new suburban dwellers to develop again a generally lost relationship with nature in daily life. The huge potential of natural sites close to urban settlements offered here is still rarely used. There are several reasons for this: lack of information, the steering of visitors away from the protected area, the attraction of alternative nature like a landscape park, and the pre-ex-

isting preferences of people to specific types of nature, which are more maintained and offer a greater variety of safe utilisation possibilities. In this way, the case study is exemplary because of the spectrum of potential of nature in a suburban surrounding and people's use of selected nature. It shows also the still existing steering of nature conservation management to reduce the utilisation of these areas, even when they are close to urban settlements. Nature protection is as in many cases still not 'urbanized' (BREUSTE 2004).

The lack of knowledge and utilisation by urban residents of urban protected nature close to their homes shows that it is not the actual distance but rather the mental distance to nature that has to be bridged to make people benefit more from all types of nature, especially of near-nature and protected areas.

In this way, the suburban areas are generally areas where people can learn the benefits of diverse nature in its setting even when they are not currently doing so. Outgoing from the findings there are several steps to change the current nature utilisation situation and to make all types of nature valuable for the people in urban and peri-urban areas. The focus of recommendations must be on how to increase the use of the protected area.

A short-term change can be supported by an 'invitation' to use the protected areas. This can be done by a clear information strategy executed with different media (printed, digital and in the landscape), showing the nature potential in descriptions and pictures to the potential users, the residents (change of the knowledge status).

A medium-term change can be expected by a change in nature protection management to better integrate people and connect them to information. The existing trails in the area can be made more attractive and more convenient to use without a reduction of protection. This includes trail surfaces, on-site information (length, duration and attraction of the trails, litter boxes, resting points and other trail equipment).

A long-term strategy could be a change in behaviour of the people to accept different, also less or less-maintained types of nature by education. This can be locally supported cooperating with local schools and other institutions. This must be embedded into a necessary general change of behaviour by different but not primarily local activities.

When city administration, district management, nature protection institutions and agencies cooperate developing such a strategy, positive effects can be expected. The strategy should include a constant monitoring of the status of the set targets and promotion of these activities by public media.

The findings do not support suburbanisation as generally positive for greater contact with nature. They do, however, suggest better integration of nature into urban – preferably compact and green – development, not only by a closer location to people's homes, but rather by better integration of all types of nature into the reality of urban life in cities.

6 References

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