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The Spatial and Aesthetic Dimension of Nature-Based Solutions: Towards a New Typology

Prostorna i estetska dimenzija rješenja temeljenih na prirodi: prema novoj tipologiji

Uvod i teorija
Introduction and Theory

Suvremene arhitektonsko-urbanističke teorije zagovaraju prelazak preko dualizma prirodno vs. antropogeno i usvajanje hibridnih pristupa javnim prostorima, gdje ljudi i neljudski akteri koegzistiraju. Dinamični okoliš postaje prostor eksperimentiranja i stvaranja novih prostorno-društveno-ekoloških odnosa, a hibridnost se očituje integracijom ekoloških, prostornih i mikroklimatskih elemenata te inovativnim pristupima oblikovanju prostora.

Contemporary architectural and urban theories advocate moving beyond the dualism of natural vs. anthropogenic and adopting hybrid approaches to public spaces, where human and non-human actors coexist. The dynamic environment becomes a space for experimentation and the creation of new spatial, social, and ecological relationships, with hybridity manifested through the integration of ecological, spatial, and microclimatic elements, as well as innovative design approaches.

	odnos relationship	uloga role		
	▸ 20.st. 20th c.	▸ hijerarhijski podređen hierarchically subordinate	▸ regulativna; estetska regulatory; aesthetic	
priroda u gradu [1] nature in the city	▸ 21.st. 21st c.	▸ suradnički; integralan collaborative; integral	▸ hibridna [2] hibrid ▸ adaptivna adaptive ▸ transformativna transformative	▸ brisanje granica [3] blurring boundaries ▸ liminalnost liminality ▸ stalna promjenjivost constant change

▸ prirodno - neprirodno
▸ ljudsko - neljudsko
▸ organizam - stroj
natural - artificial
human - non-human
organism - machine


bioswale


wetland


green street

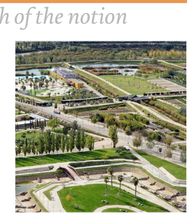

rain garden


urban forest


biodiversity habitat

	obilježja [5] characteristics	istraženo existing research		neistraženo / inovativno non existing research
nature based solutions [4] ▲	▸ akcija/intervencija/rješenje	▸ usluge ekosustava	▸▸▸ monofunkcionalno monofunctional	■ *u potrazi za pojmom* *in search of the notion*
	▸ jasna svrha/uloga	▸ infrastrukturne usluge ecosystem services infrastructural services		
	▸ definiran način djelovanja action/intervention/solution clear purpose and role defined mode of operation			

Pojam (NBS) uveden je 2008., a od 2013. postaje središnji koncept ekoloških i urbanih istraživanja.
The term Nature-Based Solutions (NBS) was introduced in 2008, and since 2013 it has become a central concept in ecological and urban research.


Parque del Aqua [10]


Oyster-tecture [11]


Scalo Farini [12]


Hans Tavsen's Park [13]


Jade Eco Park [14]

Hipoteza
Hypothesis

NBS su do sada uglavnom proučavane kroz prizmu usluga ekosustava i infrastrukturnih učinaka, a većina postojećih definicija tretira ih kao monofunkcionalne.
So far, NBS have been mostly studied through the lens of ecosystem services and infrastructural impacts, and most existing definitions treat them as monofunctional.

Ovaj rad polazi od pretpostavke da prepoznavanje i integralno sagledavanje višestrukih uloga NBS-a omogućuje uspostavljanje novih tipova gradskih javnih prostora.
This paper starts from the assumption that recognizing and integrally observing multiple roles of NBS enables the establishment of new types of urban public spaces.

Metode/1,2
Methods/1,2

1 / Sustavni pregled literature – Wos i Scopus – s ciljem identifikacije teorijskih pristupa u kategorizaciji NBS prema ulozi.
Systematic literature review (Web of Science and Scopus) – aimed at identifying theoretical approaches in categorizing NBS according to their role.

2/ Sustavni pregled primjera, realiziranih i planiranih – pregledom stručne literature – s ciljem identifikacije kategorija koje pregledana literatura nije prepoznala.
Systematic review of realized and planned examples – through professional literature, identifying categories not previously recognized in reviewed works.

Istraživanje/1
Research/1

Prethodna istraživanja o prostornim i oblikovnim ulogama NBS
Previous Studies on Spatial and Formal Roles of NBS

Prostorna i oblikovna obilježja uključuju objektivno i subjektivno sagledavanje koje varira ovisno o struci i mijenja se prema kulturno-povijesnom kontekstu. Prostorna obilježja odnose se na fizičke i perceptivne kvalitete prostora te opisuju kako je prostor organiziran, percipiran i korišten te se daju kvantificirati. Oblikovna obilježja odnose se na senzorne i doživljajne kvalitete prostora, a opisuju se kvantitativno i kvalitativno

Spatial and formal characteristics include both objective and subjective perspectives that vary by discipline and change according to the cultural-historical context. Spatial characteristics refer to the physical and perceptual qualities of space — how space is organized, perceived, and used and can be quantified. Formal characteristics refer to sensory and experiential qualities of space, described both quantitatively and qualitatively.

"nature based solutions" AND "aesthetics"

Pretragom pojmova utvrđen je 41 rad s područja Europe koji se odnosi na urbani kontekst, a koji ove dvije teme istražuje integralno. Pritom se svi radovi odnose na istraživanje tzv. ekološke estetike koja prepoznaje estetske vrijednosti u neuredenom, divljem, promjenjivom – obilježjima koja odražavaju prirodne procese.
41 European studies were found that address the urban context, exploring these two themes integrally. All studies deal with the concept of ecological aesthetics, which recognizes aesthetic value in disorder, wildness, and changeability—features reflecting natural processes.

▸ ekološko oblikovanje (estetika)
ecological design (aesthetics)

"nature based solutions" AND "typology"

Pretragom pojmova utvrđeno je 149 radova koji integralno istražuju kriterije za klasifikaciju/kategorizaciju NBS s ciljem razvrstavanja NBS prema zajedničkim ulogama. Pretragom su utvrđena četiri najzastupljenija pristupa kategorizacije NBS.
149 papers were found that integrally examine the criteria for the classification/categorization of NBS with the aim of grouping NBS according to their common roles. The search identified four most prevalent approaches to NBS categorization.

▸ prostorna uloga
spatial role;

Za potrebe ovog istraživanja relevantna je baza koja se bavi prostornim ulogama te analizira njihove urbanističke aspekte. Arhitektonska prostorna uloga u istraživanjima izostaje.
For this research, the spatial role database is most relevant, as it analyzes urban aspects. Architectural-spatial roles are largely absent in current studies.

▸ tehnička uloga
techical role;

▸ modeli upravljanja
governance models;

▸ teorijski modeli
theoretical model

"nature based solutions" AND "design"

Pretragom pojmova utvrđeno je 50 radova koji integralno istražuju navedene teme i to u kontekstu urbanističkog planiranja (28) i projektiranja (11) te participativnog oblikovanja (11). Uloga oblikovanja u NBS u najvećem broju radova spominje se načelno/općenito, dok se tek u pojedinačnim radovima u vezu dovodi sa specifičnim pristupom oblikovanju prostora.
50 papers were found addressing the topic integrally within the contexts of: Urban planning (28); Design (11); Participatory design (11) The role of design in NBS is generally mentioned in broad, conceptual terms, while only a few studies connect it to specific spatial design approaches.

▸ "placemaking design"

Odgovara lokalnom kontekstu, obogaćuje kulturno značenje i potiče stvaranje urbanog identiteta [6].
Responds to the local context, enrich cultural meaning, and encourage the creation of urban identity [6].

▸ "transformative design"

Transformativna uloga za izgrađeni okoliš kod integracije u arhitektonsko-urbanistički kontekst [7].
Has a transformative role for the built environment when integrated into architectural-urban contexts [7].

▸ "more-than-human design"

Aktivira potencijal ljudskih i neljudskih aktera u procesu oblikovanja prostora te kroz rekonceptualizaciju sukreativne umjetnosti [8].
Activates the potential of human and non-human actors in space-making through co-creative artistic processes [8].

▸ "experimental design"

Oblikovanje, sukreacija i prototipiranje NBS-a uz vođenje načelima transdisciplinarnosti [9].
Involves co-design and prototyping of NBS guided by transdisciplinary principles [9].

Istraživanje/2
Research/2

Usporedba odabranih primjera – fokus na prostornim i oblikovnim ulogama
Comparative Analysis of Selected Examples Focusing on Spatial and Formal Roles

Ovo istraživanje usmjereno je na prostorne (urbanističke) i formalne (oblikovne) karakteristike NBS-a, s posebnim naglaskom na načine na koje se voda, tlo i vegetacija - i materijalno i nematerijalno - modificiraju i integriraju u urbani okoliš.
This part of the research focuses on spatial (urban) and formal (design) characteristics of NBS, emphasizing how water, soil, and vegetation — both materially and immaterially — are modified and integrated into the urban environment.

modificirana priroda ▸
modified nature

hibridni javni prostor ▸
hybrid public space

Hibridni fenomen u kojem prirodni (voda, tlo, vegetacija) i tehnološki elementi djeluju u sinergiji te stvaraju produktivni okoliš sposoban za tehničke, ekološke, oblikovne i prostorne učinke.
A hybrid phenomenon in which natural elements (water, soil, vegetation) and technological components act in synergy, creating a productive environment capable of technical, ecological, formal, and spatial effects.


Parco della Vincenza;
Vincenza, Italija; 2016.; Studio LAND

Projekt oblikuje blagu topografiju koja usmjerava oborinske vode, koristi autohtone biljne zajednice za filtraciju i stvaranje mikroklime te kombinira ekološke tehnologije infiltracije s održavanjem prirodnog ciklusa tla.
The project shapes a gentle topography that directs rainwater, uses native plant communities for filtration and microclimate formation, and combines ecological infiltration technologies with the preservation of the soil's natural cycle.


Jade Eco Park;
Taichung, Tajvan; 2018.; Mosbach Paysagistes + Philippe Rahm architects

Park spaja geomorfologiju tla, vodene tokove i biljni pokrov s atmosferskim procesima (vlaga, toplina, zagađenje) te koristi pametne senzore i klimatske algoritme za aktivno upravljanje mikroklimom.
The park integrates the geomorphology of the soil, water flows, and vegetation cover with atmospheric processes (humidity, heat, pollution) and employs smart sensors and climatic algorithms for active microclimate management.


Buitenschot Park;
Haarlemmermeer, Nizozemska; 2013.; H+N+L Landscape Architects

Reljefne formacije od zemlje i trave djeluju kao prirodne akustične barijere protiv buke zrakoplova, dok vegetacija stabilizira tlo i poboljšava mikroklimu uz minimalnu upotrebu tehnologije.
The undulating formations of earth and grass act as natural acoustic barriers against aircraft noise, while the vegetation stabilizes the soil and enhances the microclimate with minimal use of technology.


Renaturation of the River Aire;
Geneva, Švicarska; 2015.; Atelier Descombes Rampini

Projekt vraća rijeku Aire u prirodni meandrirajući tok koristeći šljunkovita i aluvijalna tla, autohtonu vegetaciju za filtraciju i erozijsku stabilnost te senzorske sustave za praćenje protoka i kvalitete vode.
The project restores the River Aire to its natural meandering course, using gravel and alluvial soils, native vegetation for filtration and erosion control, and sensor systems to monitor water flow and quality.

Zaključak

Dosadašnja istraživanja pokazala su kako se NBS u gradu većinski promatra kroz ekološku i tehničku (inženjersku) perspektivu, kao alati za regulaciju okolišnih procesa ili upravljanje vodama. Takvo tumačenje ograničava mogućnost sagledavanja NBS-a kao tipa javnog prostora.
Previous research has shown that urban NBS are mostly viewed through ecological and technical (engineering) perspectives — as tools for regulating environmental processes or managing water systems. Such interpretation limits understanding NBS as types of public space.

Takvi prostori imaju potencijal istovremeno djelovati kao ekosustav, infrastruktura i arhitektonsko - urbanistički prostor. U njima prirodni procesi (voda, vegetacija, tlo, mikroklima) postaju oblikovni materijal.
Such spaces can simultaneously function as ecosystem, infrastructure, and architectural-urban spaces. In them, natural processes (water, vegetation, soil, microclimate) become design materials.

Promatranjem NBS-a kroz arhitektonsko-urbanističku perspektivu fokus se premješta s kvantitativnih pokazatelja (kapacitet, otpornost) prema prostornim i oblikovnim te se otvara prostor za prepoznavanje novih morfoloških tipova javnih prostora.
Viewing NBS through an architectural-urban lens shifts focus from quantitative indicators (capacity, resilience) toward spatial and formal aspects, opening possibilities for recognizing new morphological types of public spaces.

Ovo istraživanje potvrdilo je da NBS nisu samo tehnički sustavi koji uvode prirodu u grad, već prostorni hibridi u kojima se ekološki i tehnički procesi očituju u novim formalnim konfiguracijama.
This study assumes that NBS are not merely technical systems introducing nature into cities, but spatial hybrids in which ecological and technical processes manifest in new formal configurations.

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13. Hans Tavsen's Park - Copenhagen, Denmark - SLA Architects - 2016.
14. Jade Eco Park - Taichung, Tajvan - Mosbach Paysagistes + Philippe Rahm architects - 2018.