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Report on governance, institutional and economic frameworks of UFBS in China and Europe

Authors : Mrs. Clive DAVIES (EFI), ROITSCH D. (EFI), KONCZAL A.(EFI), JIN J. (CAF-RIF), WANG C. (CAF-RIF), BASNOU C. (CREAF), KRONENBERG J. (ULodzki), KRAJTER OSTOIC S. (CFRI), HAASE D. (HUB), LAFORTEZZA R. (UNIBA), DA SCHIO N.(VUB), SCHANTE J. (LGI), DEBELLIS Y. (UNIBA), DE VREESE R. (EFI), ZIVOJINOVIC I. (BOKU), SIMKIN J. (LUKE), TYRVAINEN L. (LUKE), WOLFF M. (HUB), SCHEUER S. (HUB), FRANSEN K. (VUB), BIERNACKA M. (ULodzki), BERGIER T. (TSF), PINO J. (CREAF), FU W. (FAFU)

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Author(s)	Mrs. Clive DAVIES, ROITSCH D. (EFI), KONCZAL A.(EFI), JIN J. (CAF-RIF), WANG C. (CAF-RIF), BASNOU C. (CREAF), KRONENBERG J. (ULodzki), KRAJTER OSTOIC S. (CFRI), HAASE D. (HUB), LAFORTEZZA R. (UNIBA), DA SCHIO N.(VUB), SCHANTE J. (LGI), DEBELLIS Y. (UNIBA), DE VREESE R. (EFI), ZIVOJINOVIC I. (BOKU), SIMKIN J. (LUKE), TYRVAINEN L. (LUKE), WOLFF M. (HUB), SCHEUER S. (HUB), FRANSEN K. (VUB), BIERNACKA M. (ULodzki), BERGIER T. (TSF), PINO J. (CREAF), FU W. (FAFU)
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Summary

Governance, institutional and economic frameworks in China and Europe are considered to be decisive for the design, implementation and impacts of urban forests as nature-based solutions (UF-NBS). Several lines of inquiry were established to focus the analysis; these were developed in a co-design process with project partners. To provide an evidence base for the analysis, case histories of 22 existing projects were collected: 16 in Europe and 6 in China. The selection of case histories and countries was motivated by the ambition of covering different bio-geographical regions and planning families based on the modified ESPON approach used in the GREEN SURGE FP7 project. We found that governance, institutional and economic frameworks for UF-NBS are still under development. Support was found from the findings of Xie & Bulkeley (2020) who reported that whilst local planning processes are assumed to be the instigator of urban (NBS), for European cities project-based actions are presently preeminent. We concluded that for this to move up the agenda to city strategic development plans, which are generally guided from the national, regional, and city level, there is a case for an EU-NBS strategy (including UF-NBS) to influence national thinking. In China, city masterplans set out the high-level policy of the city and all other local plans are subordinate to it. Unlike for its immediate predecessor, the absence of urban forestry from the Chinese 14th five-year plan is offset by the robust structure of the China National Forest City Development Plan (2018 - 2025). We found that the design, implementation and management of UF-NBS depend on the social, cultural and economic context, but that there is added value in the promotion of good practices and successful stories, as well as innovation. Key informants in the case histories were interested to learn from elsewhere. The case histories are being uploaded to the NetworkNature/OPPLA platform and shared via networks, notably the European Forum on Urban Forestry (EFUF) and the International Forest City conference. The engagement of civil society (i.e., social groups, citizens) in UF-NBS is still relatively low. This links to the top-down approach described in the majority of the case histories, with the leading role embedded within municipalities. We have identified a need for widening the scope of the co-design processes involving local residents and citizen groups. The engagement of the private sector also seems to ...

Approval

Date	By
2021-04-30 08:46:31	Dr. Rik DE VREESE (EFI)
2021-04-30 08:58:38	Dr. Rik DE VREESE (EFI)

CLEARINGHOUSE
中欧城市森林应对方案

D1.4: Governance, institutional and economic frameworks for Urban Forests as Nature-Based Solutions (UF-NBS)

Cover picture: Landscape Park Duisburg-Nord, Germany (Photograph by Luisa Berry)

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EXECUTIVE SUMMARY

Governance, institutional and economic frameworks in China and Europe are considered to be decisive for the design, implementation and impacts of urban forests as nature-based solutions (UF-NBS). Several lines of inquiry were established to focus the analysis; these were developed in a co-design process with project partners. To provide an evidence base for the analysis, case histories of 22 existing projects were collected: 16 in Europe and 6 in China. The selection of case histories and countries was motivated by the ambition of covering different bio-geographical regions and planning families based on the modified ESPON approach used in the GREEN SURGE FP7 project.

We found that governance, institutional and economic frameworks for UF-NBS are still under development. Support was found from the findings of Xie & Bulkeley (2020) who reported that whilst local planning processes are assumed to be the instigator of urban (NBS), for European cities project-based actions are presently preeminent. We concluded that for this to move up the agenda to city strategic development plans, which are generally guided from the national, regional, and city level, there is a case for an EU-NBS strategy (including UF-NBS) to influence national thinking. In China, city masterplans set out the high-level policy of the city and all other local plans are subordinate to it. Unlike for its immediate predecessor, the absence of urban forestry from the Chinese 14th five-year plan is offset by the robust structure of the China National Forest City Development Plan (2018 - 2025).

We found that the design, implementation and management of UF-NBS depend on the social, cultural and economic context, but that there is added value in the promotion of good practices and successful stories, as well as innovation. Key informants in the case histories were interested to learn from elsewhere. The case histories are being uploaded to the NetworkNature/OPPLA platform and shared via networks, notably the European Forum on Urban Forestry (EFUF) and the International Forest City conference.

The engagement of civil society (i.e., social groups, citizens) in UF-NBS is still relatively low. This links to the top-down approach described in the majority of the case histories, with the leading role embedded within municipalities. We have identified a need for widening the scope of the co-design processes involving local residents and citizen groups. The engagement of the private sector also seems to be falling short of expectations. Indeed, the funding of UF-NBS relies to a high degree on municipal funds. This has multiple consequences in respect of governance arrangements where citizens are recipients, not co-owners and co-makers of proposed solutions, and may also reduce the scope of economic innovations. We have also identified that long-term planning should always be considered in the case of UF-NBS, since funds can be restricted to the duration of project inception leading to a loss of NBS functionality if UF-NBS management declines.

KEY WORDS

Nature-based solutions; Urban forestry; Governance, Institutional and Economic frameworks; CLEARING HOUSE; Green infrastructure; China and Europe comparison

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ABBREVIATIONS

CLEARING HOUSE (Project acronym):	Collaborative Learning in Research, Information-sharing and Governance on How Urban tree-based solutions support Sino-European urban futures
EC:	European Commission
EU:	European Union
NBS:	Nature-based solution(s)
NFGA:	National Forest and Grassland Administration
UF-NBS:	Urban forests as nature-based solution(s)

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AUTHORS

Lead authors: Dennis Roitsch, Clive Davies, Agata Konczal (EFI); Jiali Jin, Wang Chen (CAF-RIF).

Other contributing partners: Dagmar Haase (HUB); Raffaele Lafortezza (UNIBA); Nicola da Schio (VUB); Joanne Schante (LGI); Yole DeBellis (UNIBA); Rik de Vreese (EFI); Corina Basnou (CREAF); Ivana Živojinović (BOKU); Jakub Kronenberg (UniLodzki); Silvija Krajter Ostoić (CFRI); Jenny Simkin (LUKE); Liisa Tyrväinen (LUKE); Manuel Wolff (HUB); Sebastian Scheuer (HUB); Koos Fransen (VUB); Magdalena Biernacka (UniLodzki); Tomasz Bergier (TSF); Joan Pino (CREAF); Weicong Fu (FAFU).

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Box 1: DEFINITION OF TERMS

Nature-based solutions (NBS): Nature-based solutions (NBS) are defined as solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions." (European Commission, 2021b; Faivre et al., 2017)

Urban forestry: the integrated and multidisciplinary approach to planning and managing all forest and tree resources – ranging from street trees to peri-urban woodlands – in an near urban areas. (Konijnendijk et al., 2005)

Urban forests: tree-based urban ecosystems that address societal challenges, simultaneously providing ecosystem services for human well-being and biodiversity benefits. Urban forests include peri-urban and urban forests, forested parks, small woods in urban areas, and trees in public and private spaces. (Escobedo et al., 2011; FAO, 2017)

Urban tree(s): usually long-living woody organism(s) including woody shrubs, frequently single stemmed, with the potential to grow at a site in an urban or peri-urban area. Examples include roadside trees, trees in square or in parking areas, in parks and private gardens. Urban trees appear as individual or as groups of trees.

Urban forests as nature-based solutions (UF-NBS): a subset of nature-based solutions, that build on tree-based urban ecosystems to address societal challenges, simultaneously providing ecosystem services for human well-being and biodiversity benefits. UF-NBS include peri-urban and urban forests, forested parks, small woods in urban areas, and trees in public and private spaces. UF-NBS comprise every measure a city can take to address urban development challenges by deploying tree-based ecosystems. (European Forest Institute, 2018)

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1. INTRODUCTION

1.1 CLEARING HOUSE project

"Collaborative Learning in Research, Information-sharing and Governance on How Urban tree-based solutions support Sino-European urban futures" (CLEARING HOUSE), funded through the European Union's Horizon 2020 research and innovation programme, is a four-year research project (2019-2023) designed to address global challenges such as climate change, human well-being, and the deterioration of ecosystem services. These challenges have arisen from the cumulative impact of rapid urban growth, economic development and unsustainable consumption and are amplified in urban areas through notable socio-economic and demographic challenges, such as ageing populations, migration flows, and social and economic segregation (O'Brien et al., 2017; see also Sustainable Development Goal (SDG) 11).

The CLEARING HOUSE project unites European and Chinese cities and researchers in adopting a co-design approach in their quest to develop more resilient and liveable cities. To do this, CLEARING HOUSE is exploring urban forests as nature-based solutions (UF-NBS) pathways for the cost-effective restoration of degraded urban and peri-urban environments and the enhancement of ecological connectivity. The aim is to improve human well-being and social inclusion and create better conditions for biodiversity and the delivery of ecosystem services such as clean air, microclimates and aesthetics.

1.2 Work Package 1

Work Package 1 is one of six work packages in the CLEARING HOUSE project. The main purpose of Work Package 1 is to review knowledge and develop analytical concepts. It does this by identifying existing UF-NBS, developing a novel UF-NBS typology, and by reviewing available knowledge and data related to the design, implementation, and impact of UF-NBS. This has been conducted through surveys of societal perceptions, an analysis of the governance, institutional and economic frameworks shaping and impacting UF-NBS, and the development of an interdisciplinary analytical framework for CLEARING HOUSE Work Package 2. The latter is the conduct of a comparative case study analysis between cities in Europe and China.

1.3 Purpose of this deliverable

This report, referred to as Deliverable 1.4 (D1.4), is a summary of key findings, an overview of, and a comparative perspective on, relevant governance, institutional and economic frameworks in China and Europe for UF-NBS. It also feeds into a Sino-European co-design event. In the context of UF-NBS and the CLEARING HOUSE project, governance, institutional and economic frameworks are interlocking at various spatial levels.

1.4 Objective of CLEARING HOUSE task 1.4

Governance, institutional and economic frameworks are considered to be decisive for the design, implementation and impacts of UF-NBS. D1.4 has reviewed existing frameworks in China and Europe by studying these at various levels, including the European (e.g., guidance on NBS and on green

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infrastructure), national (e.g., the Forest City Construction Action in China), regional, city and project delivery level.

The following research questions underpin the investigation. In relation to governance, institutional and economic frameworks:

1. Which actors, resources, rules of the game and discourses are involved in UF-NBS, how are they characterised and how are these institutions inter-related, if at all?
2. What positive and negative economic effects do institutions determine as arising from the delivery of UF-NBS?
3. In respect of governance, analysis and economic, what elements of UF-NBS can be considered as novel or innovative?
4. What governance arrangements are in place that impact on the potential or actual delivery of UF-NBS at the project level and multi-tiered levels above the project?

1.5 Analytical framework

An analytical framework was developed for task 1.4 (Milestone 1.6, month 6) based on (i) a series of web meetings based and drawing on findings from the GREEN SURGE FP7 project (Buijs et al., 2016; Buizer et al., 2015; Davies et al., 2015) which analysed urban green space governance and planning in Europe and (ii) a reading of project outcomes from other NBS projects (including Nature4Cities, Urban GreenUP and Naturvation) that could be relevant to the task. Particular attention was paid to multi-level and networked governance dynamics, in relation to urban development, and contextual differences concerning UF-NBS governance and implementation between countries/regions in Europe and China. A key focus for this task is at the project level. The project level varies in geographical extent but is generally within a given municipality or between municipalities. This was selected for two principal reasons. Firstly, there would be expert key informants in post who would be able to provide insights into UF-NBS, and by the positions they hold would also be connected to other hierarchies at the local, regional, and national level. Secondly, an initial scoping by CLEARING HOUSE researchers in February 2020, held at The University of Bari Aldo Moro (UNIBA), Italy, showed that most activities in relation to UF-NBS were happening at the project level and that for this reason a deeper understanding and knowledge base could be garnered at this scale.

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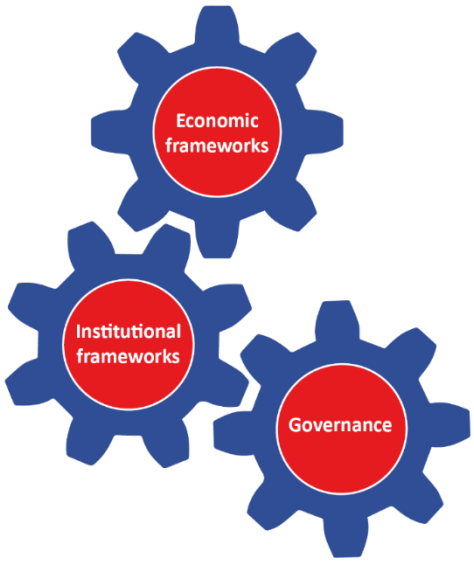

Figure 1: The three frameworks are the focus of investigation in task 1.4. Analysis is focused on their role in the design, implementation and impacts of UF-NBS.

2. SETTING THE SCENE

2.1 Urban forests as nature-based solutions (UF-NBS)

Tree-based green infrastructure, including peri-urban and urban forests, forested parks, and trees in public and private spaces, is the key focus for CLEARING HOUSE and the typologies associated with these are the basis for "*urban forests as nature-based solutions*" (C. Davies et al., 2017; Scheuer et al., 2021). UF-NBS are defined as a subset of nature-based solutions, one that builds on tree-based urban ecosystems with the aim to address societal challenges whilst simultaneously providing ecosystem services for human well-being and biodiversity benefits (European Forest Institute, 2018). UF-NBS have been posited as an effective response strategy to mitigate the negative impacts of climate change and urban growth on human well-being (Baró et al., 2014; Elmqvist et al., 2016; Ferrini et al., 2017). It does this by providing a rich set of critical ecosystem services such as enhancing biodiversity and providing green space for recreation (Baró et al., 2014; Elmqvist et al., 2016; Ferrini et al., 2017) to regulating services (e.g., improving air quality, water regulation, moderating the urban heat island effect).

Since the launch of the Horizon 2020 work programme, progress has been made in terms of recognising the role tree-related green infrastructure plays as an NBS; the CLEARING HOUSE project is an example of this. It needs to be stated that the role of trees in enhancing ecosystem services has been recognised for longer than the current discourse on NBS and that examples of urban forests acting as NBS can be found across the globe. However, a clear opportunity exists to bring UF-NBS into the mainstream discourse on NBS and emphasise the role trees can and do perform in terms of planning and implementing NBS in a wide variety of settings.

Whilst trees are a proven NBS, their potential for delivering ecosystem services, enhancing biodiversity and contributing to the resilience of cities, including both the urban ecosystem and society, is frequently underestimated. This may lead to decisions in urban planning that miss opportunities to exploit synergies between ecosystem regeneration and sustainable urban development. In addition,

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there is a need to systematically review, connect and expand the existing fragmented knowledge and experience on the potential utilisation of UF-NBS. This need is at the heart of the CLEARING HOUSE project: bringing together two major arenas of urban development, Europe and China, to improve the progress of what is collectively termed the "urban forest" at a larger scale. The implications of this raise important questions with regards to governance and institutional frameworks and whether these are robust enough to reflect the value of existing ecosystem services that trees are supplying, let alone an expansion of UF-NBS to meet new challenges.

2.2 Analysing governance, institutional and economic frameworks

The main aim of this chapter is to offer a better understanding and description of the state and interplay of governance, institutional and economic frameworks. Based on Liefferink (2006) and the policy arrangement approach by Arts et al. (2006), we draw on a policy arrangement with four different dimensions: actors, resources/power, rules of the game and discourses. As these dimensions are closely intertwined, a change in one of the dimensions will automatically lead to changes in the other dimensions. This can be visualised by the tetrahedron in figure 2, which can be considered only temporarily stable in terms of its content and organisation (Arts et al., 2006).

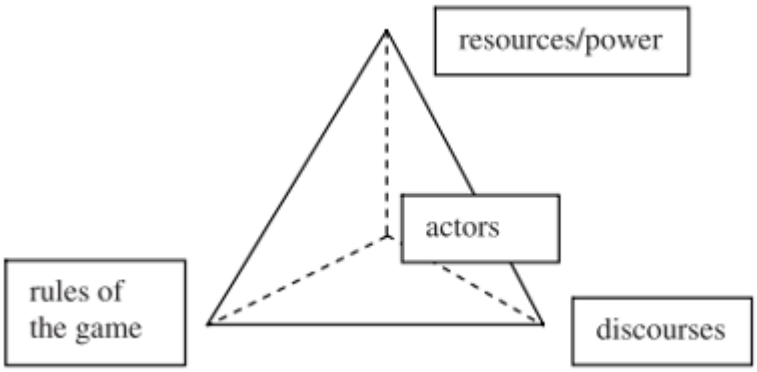

Figure 2: The interconnectedness of actors, rules of the game and resources/power and discourses (Liefferink, 2006).

The following is a list of concepts defined specifically for their use in respect of UF-NBS. They are not intended as a full discussion on each individual terminology.

2.2.1 Governance

Governance can be broadly defined as "any effort to coordinate human action towards goals" (Rayner et al., 2010). Oftentimes, governance is defined based on the role of the state in the governance arrangement. In that sense governance is a continuum from 'governance by government' (also known as old or hierarchical governance), to 'governance with government' (co-governance, network governance) to 'governance without government' (self-governance) (Kleinschmit et al., 2009; Kooiman, 2003). With their multiple benefits, urban forests contribute to meeting multiple policy goals (climate change mitigation and adaptation, ecosystem restoration, biodiversity protection, etc.). Urban forest governance is multi-actor, multi-sector and multi-level in respect of governance (Lawrence et al., 2013) and may involve both governmental and non-governmental actors. In the context of NBS, governance is not limited to how 'humans are governed' but considers how 'nature is

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governed', either through natural biotic processes or abiotic human designed and operated systems. With regards to UF-NBS and the Sino-European comparison, task 1.4 is also interested in innovative forms of governance such as 'mosaic governance'. Mosaic governance aims for a context-sensitive way of urban green infrastructure planning, enhancing relationships between the diversity of landscapes and communities across cities (Buijs et al., 2019).

2.2.2 Institutional frameworks

Institutional frameworks are the formal and informal rules of a governance system that shape human choices, behaviours, and interactions (Biernacka & Kronenberg, 2018). They specifically involve organisations (governance actors), laws, regulations, and social norms. Hence, the institutional frameworks for urban forests describe the governance actors (e.g., local authorities, national and regional agencies, special purpose organisations, etc.), laws and regulations (e.g., tree preservation orders and tree felling licences) and social norms (i.e., the unwritten rules that govern how we behave towards the urban forest, such as respect for new tree planting and volunteering to be active in tree care in the local neighbourhood, etc).

2.2.3 Economic frameworks

Economic frameworks refer to the different economic aspects related to the functioning of UF-NBS. These primarily concern funding mechanisms and sources, economic benefits and costs including broad economic issues, such as local branding and related business opportunities and economic models. Among other things we wish to investigate how UF-NBS have been integrated into real economies (adapted from GREEN SURGE D4.1; Andersson et al., 2015).

2.2.4 Actors

Actors are a key part of the policy arrangement and can be affected by decisions and have the means and power to influence decisions (Reed et al., 2009).

2.2.5 Rules of the game

Rules of the game are the formal and informal procedures that guide decision-making and all political and other forms of interaction (Arts et al., 2006)

2.2.6 Resources

Resources are considered to be money, knowledge, land, status and skills. In D1.4 the main focus is on resources in terms of money.

2.2.7 Discourse

Discourse is defined as "*A specific ensemble of ideas, concepts, and categorisations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities*" (Hajer, 1997).

2.3 Planning families

European planning families were previously used in the European Union GREEN SURGE FP7 project (C. Davies et al., 2015) to define institutional and governance differences in relation to urban green infrastructure and to create appropriate typologies. In the GREEN SURGE project researchers identified

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the work of Newman & Thornley (1996) and went on to identify models which were summarised on the basis of the European Spatial Planning Observatory Network (ESPON) (2007).

In the period since 2007, there have been significant changes to European planning systems driven by emerging agendas ranging from improvements in integration, the rapid development of the information society, the growth of sustainability and of resilience concepts in the planning discourse. Consequently, the overlap between planning families is increasing, and this is most noticeably so in ambitious core cities. This can be illustrated in Spain, which would hitherto be classified as part of the urbanism tradition. However, a core city such as Barcelona and its metropolitan region is an example of where sustainability and resilience are now key policy agendas (Barcelona City Council, 2013).

Researchers in the GREEN SURGE project determined their typology of planning families based on a territorial government system as found in the European Union FP6 PLUREL2 report (Tosics et al., 2013, p. 380). This is based on a combination of hard and soft structures, whereby legal and administrative systems are described as 'hard' and cultural described as 'soft'. Since researchers in the GREEN SURGE project had established the use of planning families, it is beneficial to continue this categorisation in the CLEARING HOUSE project because urban forestry is very closely associated with urban green infrastructure typologies, the key focus of GREEN SURGE. An investigation by Chinese partners failed to determine any noticeable regional or cultural differences in planning approaches across that country.

Table 1: Planning families used by CLEARING HOUSE D1.4 amended from the European Union GREEN SURGE FP7 project (C. Davies et al., 2015).

Planning family	Key word description	Countries included in D1.4	No. of case histories
British	Land use planning	United Kingdom	1
Central	Regional economic planning	Austria, Germany, France, Belgium	7
New Member States	Post-socialist	Poland, Slovenia, Croatia	3
Mediterranean	Urbanist and rigid	Italy, Spain	3
Nordic	Comprehensive and integrated	Denmark, Finland	2
Chinese	Centrally derived	China	6

2.4 Sino-European comparability

Whenever possible in the CLEARING HOUSE project, the comparative situation between China and Europe is considered. The significance of this task should not be underestimated as awareness of NBS, including UF-NBS, between the two continental situations is limited. Language barriers and a lack of historic Sino-European collaboration on research and innovation on NBS are factors here. In respect of UF-NBS, the CLEARING HOUSE project has a role to overcome this. The challenge and opportunity can be illustrated by the following examples: in Europe it is generally not known that urban forest establishment is one of the goals in China's 13th five-year plan (2016 – 2020) and that the Chinese government aims to plant more than 60,000 hectares of new trees in urban areas by 2025. Conversely, in China it is generally not known that in Europe maintaining and enhancing green infrastructure and

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green urban ecosystems (of which UF-NBS is a key element) is part of the EU Biodiversity Strategy 2030 (European Commission, 2020) and EU Climate Adaptation Strategy (European Commission, 2021a).

To overcome limitations and allow for the potential of comparison, a methodology that could work in both Europe and China was devised whilst retaining the flexibility to address 'cultural' and 'information availability' differences. It was determined that the framework should, as a priority, first meet the demands of the CLEARING HOUSE project as too much attention to cultural and information availability differences could hamper evaluation of the performance of UF-NBS. It was concluded that it may be necessary in some instances to accept that an evaluation is not possible given lack of data. This debate helped to clarify a conceptional point which is that the CLEARING HOUSE project can undertake analysis on two spatial transects; firstly within Europe and China and secondly between Europe and China. Hence, if cultural data sets prove too restricting for an analysis between Europe and China, then analysis within Europe and China should still be achievable with the resources available.

The act of collaboration between Chinese and European actors in the CLEARING HOUSE project and other projects is addressing this knowledge divide through co-learning, and future projects will benefit from this.

3. METHODOLOGY FOR ANALYSING GOVERNANCE, INSTITUTIONAL AND ECONOMIC FRAMEWORKS

3.1 Research-based investigation

A number of lines of inquiry were established to focus the analysis of governance, institutional and economic frameworks in respect of UF-NBS. The first line of inquiry was to determine which actors, resources and 'rules of the game' are currently involved in UF-NBS, how they are characterised and how involved institutions are inter-related, if at all. The second line of inquiry was to ascertain which governance arrangements are in place and to determine the impact on the potential or actual delivery of UF-NBS at the project level and multi-tiered levels above the project. The third line of inquiry was to identify positive and negative economic effects that institutions determine as arising from the delivery of UF-NBS. The fourth and final line of inquiry was to determine which aspects of governance, analysis and economics of UF-NBS could be considered as novel or innovative. To meet the fourth line of inquiry, it was necessary to determine what would be considered as novel or innovative. For the purposes of the study, advanced or original approaches were identified as those that were atypical and notably different from the norm. The methodology for the study is set out in diagrammatic form in figure 3.

3.2 Integrated methodology devised through co-design

The methodology of this report is an integral part of the CLEARING HOUSE project methodological framework. Crucial from the perspective of task 1.4 is the strong link to the activities on UF-NBS typology (Task 1.1.), knowledge review (Task 1.2.) and with social survey (Task 1.3). All these tasks, in turn, feed the activities on developing the interdisciplinary analytical framework for UF-NBS (Task 1.5).

The methodology for this report was developed in a co-design process with project partners. A series of online workshops were held to set the broad approach for this report, followed by contributions from individual authors and dialogues between European and Chinese project partners. During this

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stage, the collaboration and exchange with project partners leading task 1.2. supported the next step – the design of the "case history template" (M1.6).

It must be noted that the completed templates are referred to as 'case histories' and explicitly include path dependencies. The choice of terminology was made to distinguish between these and the case studies (Task 2.1) and because they are historical and/or current examples.

In a first step, the 'case history template' was designed in a series of meetings. It was developed to meet the characteristic of both European and Chinese circumstances. The template includes detailed descriptions of the project conducted in the urban settings and focused on the use of trees/and forests as NBS. The template consists of 12 thematic boxes and a box for references (Appendix B). The most extensive part of the template collects information on governance, institutional and economic frameworks. The boxes contain the key information needed to understand how, when, and why UF-NBS were being used in a given project and provide a level playing field for more detailed investigation. The sections were drawn from the CLEARING HOUSE design of action (European Forest Institute, 2018), CLEARING HOUSE Milestone 1.1 [typology as amended], and the GREEN SURGE FP7 Project (Pauleit et al., 2019).

In a second step, the template was tested on two case histories – Parco Nord Milano in Europe and Beijing Plain Area Afforestation Programme in China. To support the process of preparing the template, a glossary of terms was also created (Appendix C).

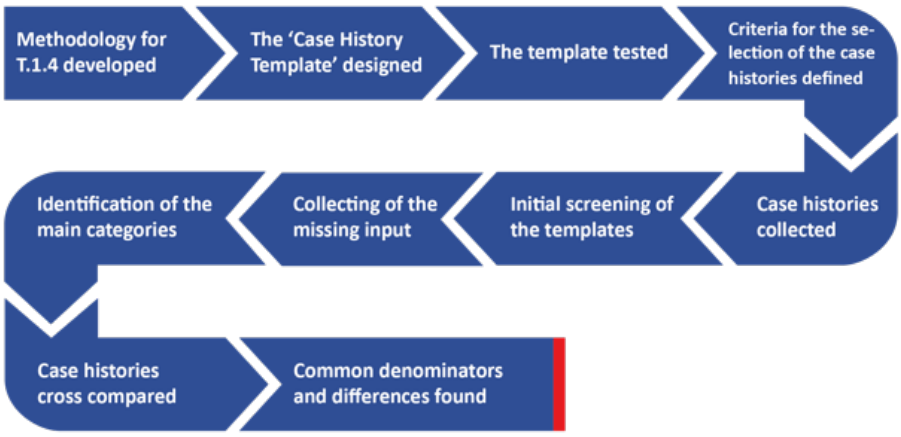

Figure 3: Methodology of the study for D1.4.

In the third step, the criteria for the selection of the case histories were defined by the core group of task leaders. In this report, the case histories are understood as: (1) urban forestry projects or (2) projects where evidence of an UF-NBS approach has been used in part or in whole. Criteria for selecting the case histories are the following:

- The case needed to have trees on-site

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- The case needed to be at least partly within the boundaries of an urban area
- The researchers needed to be able to establish a local contact
- For European cases, the case study needed to be within a planning family, as described by (Hansen et al., 2014)

In the fourth step, 22 case histories were collected. All templates were collected by researchers of the CLEARING HOUSE project team in collaboration with local partners. The selection of case histories and countries was motivated by the ambition of covering different bio-geographical regions and planning families. The authors used their professional networks for identifying the case histories to fill the European and Chinese planning families matrix (see Table 1). The matrix was critically discussed within the core group multiple times between June and November 2020. This consultation aimed to ensure the comprehensive selection of case histories. The templates were filled for 12 European countries (16 case histories) and China (6 case histories).

The fifth step encompassed an initial analysis and screening of the templates. Information gaps in regard to the governance, institutional and economic frameworks were identified, and the responsible authors were contacted to provide the missing input. Later, all data was organised in spreadsheets in thematic groups. This step gave the first idea of the significance of the collected data and main themes. Initial analysis, together with the research questions, allowed to identify the main categories (e.g. actors, local community engagement, city scale and region-wide engagement, national and international actor engagement, rules of the game, resources, innovation and novel elements, positive and negative economic effects) which were then applied to each case history. The aim of this step was to glean an overview of the situation and characteristic in each case and in each planning family.

In the last step, the situation in the case histories was cross compared in a search for common denominators and differences. The outcome of this step is enclosed in the synthesis chapter and discussed as findings of this D1.4 report. To enrich the overview, additional perspectives on the characteristic of the selected (under-represented) planning families were collected within the core group of authors.

4. FINDINGS

Here we present our findings that were compiled from 22 case histories, both in Europe and China.

4.1 Case histories in Europe

In Europe, it was possible to collect 16 case histories (see figure 4) covering several biogeographic regions and all five European planning families, spanning from Northern Europe (e.g. Helsinki and Aarhus) to Southern Europe (e.g. Barcelona), as well as from Western Europe (e.g. Leeds) to Eastern Europe (e.g. Łódź).

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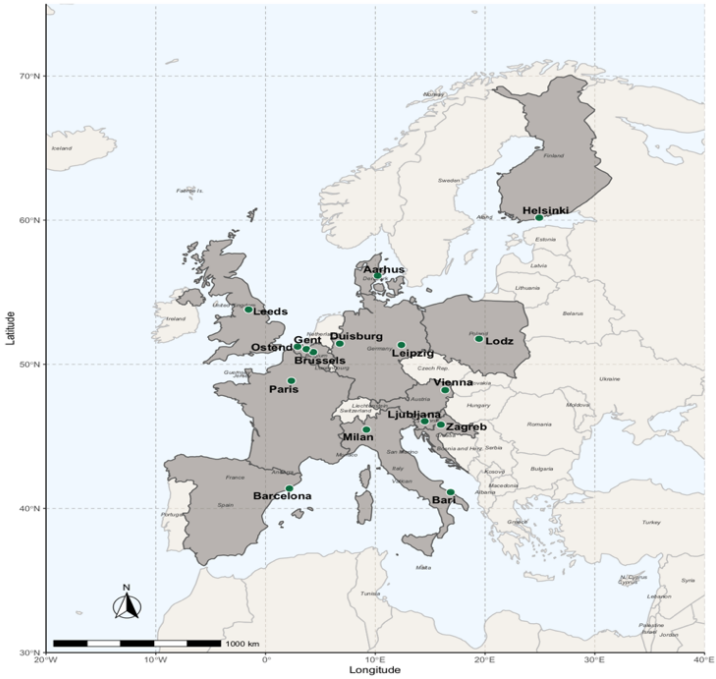

Figure 4: Map of case histories in Europe (Bivand et al., 2020; Pebesma, 2018; R Core Team, 2018; South, 2017; Wickham, 2016).

The case histories not only stretch across all European planning families and across several bio-geographic regions but are diverse in terms of urban forest typology and, consequently, the ecosystem services they provide, covering forests in urban and peri-urban areas, parks, and case histories focussing on urban trees. In the following sections, an introduction to the case histories in Europe is given showcasing their individual characteristics.

4.1.1 British planning family

Within the sphere of the British planning family is Water Haigh Woodland Park (figure 5), which is the outcome of a large-scale landscape restoration process east of Leeds that began in the mid-1970´s. Water Haigh Woodland Park comprises over 30 ha of peri-urban woodland and is one of three UF-NBS-orientated parks that straddle the River Aire as part of Naturalised Flood Management. Although many organisations have been involved in restoring this area, it is now owned and managed by Leeds City Council.

Figure 5: Educational board at Water Haigh Woodland Park.

4.1.2 Central planning family

The Central planning family is the planning family with the highest number of case histories. It contains seven case histories: Donau-Auen National Park (AT), Bois de Vincennes (FR), Stadsrandbos Oostende (BE), Parkbos Gent (BE), Réseau Écologique Bruxellois (BE) and Landschaftspark Duisburg-Nord (DE).

Donau-Auen National Park (AT) is one of the largest remaining floodplains of the Danube in Central Europe. The floodplain can be separated into two sub-areas (Upper and Lower Lobau) that differ

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considerably in their ecological characteristics. Donau-Auen National Park stretches from Vienna to the border of Austria near neighbouring Bratislava.

The Bois de Vincennes ("Vincennes forest"), located in the east of Paris (FR), is an urban park where a mix of landscapes as well as several leisure, athletic and cultural facilities can be found. The park's history is tied to the Vincennes Castle (located in the north of the park), which previously belonged to the ancient forest belt that surrounded the Gallo-Roman city of Lutecia (now Paris). The Bois de Vincennes was successively the property of the Church, of the Kings of France, and of the French State until the 19th century when the State donated the area to the City of Paris on the condition that the city maintained it and made it available to the public.

Stadsrandbos Oostende (BE) is a new afforestation in the coastal and harbour city of Oostende. Planting started in 1996, and the aim is to develop 120 ha of multifunctional forest. The forest is a buffer zone between the residential area, the industrial zoning, and the creek area which is of historical and ecological importance. The peri-urban forest is part of a Green Ribbon network (Groen Lint) that surrounds the city core.

Renforcement du Réseau Écologique Bruxellois (Enhancing Brussels Ecological Network-REB) is a city-wide programme aiming to reconnect green spaces and develop biodiversity, nature and the quality of life in the city of Brussels (Belgium). In selected neighbourhoods, a diagnostic study will be carried out in consultation with local stakeholders to define objectives, projects and carry out innovative developments with an ecological vocation. The local strategies will lead to the development of concrete projects and will offer lessons and inspiration to neighbourhoods with similar characteristics.

The case history Landscape Park Duisburg-Nord (DE) is part of the larger Emscher Landscape Park (472 km²) that was started during the International Building Exhibition Emscher Park (IBA) between 1989 and 1999. The iconic iron works buildings have been maintained and repurposed for sports, cultural events, for their historical significance, and tourism (with 700,000 people visiting each year). Today, the Landscape Park is part of a permanent regional park system in the centre of the Ruhr metropolitan area, together with seven regional green corridors (A-G/ North-South bound) and the New Emschertal (East-West green corridor).

In 1996, Leipzig (DE) launched the fundraising campaign "Baumstarke Stadt" as a political instrument. The project has two goals: to use the money for planting new trees, and to establish a long-term engagement of citizens with city greenery. Those who take on a sponsorship can choose a sponsored tree among some specified locations and young trees that have already been planted.

4.1.3 New Member States planning family

The case history of the International Horticultural Exhibition 2024 in Łódź (PL) will cover two parks (3rd May Park – historic park and Baden Powell Park) and the neighbouring green square in the city centre. Currently, these parks and the green square are separate green spaces, but in 2024 exhibitions and floral constructions will cover these three green spaces and will form one coherent exhibition site. As a result of the Expo, the character of these green spaces may change significantly, and they may lose some of their previous functions delivered to city residents.

Landscape park Tivoli, Rožnik and Šiška hill is located in the city centre of Ljubljana (SI) and has a rich history of being a "volkspark", public urban park open for the health and well-being of citizens and visitors. The area was first protected in 1984, when the then local authorities designated the area a

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Natural Site of Special Interest to conserve numerous natural values and landscape diversity in the heart of an urban area. In 2015, the Municipality of Ljubljana drafted a new ordinance to conserve numerous natural values, extraordinary biodiversity, and landscape diversity of the area.

Park forest Grmoščica in Zagreb (HR) has been neglected in terms of not responding to the needs of the local community for recreation but today, it is mainly used by the locals for recreational purposes as well as for practicing extreme sports such as downhill mountain biking. Grmoščica is also a project area of Interreg Danube's project URBforDAN (Management and Utilization of Urban Forests as Natural Heritage in Danube Cities) (6/2018-4/2021). Within the URBforDAN project several workshops with stakeholders and an onsite survey with visitors were conducted to support participatory planning and management.

4.1.4 Mediterranean planning family

The case history of Serra de Collserola Natural Park (CNP) is located in the north-western part of Barcelona (ES), and as a Natura 2000 site it forms part of a complex network of protected green areas in the region. It is one of the hotspots of biodiversity in a highly urbanised landscape, with an important ecosystem services demand. Several types of blue and green infrastructure can be found in the park. They range from forests, scrubland, grassland and croplands to aquatic environments. CNP has an important cultural heritage (old churches serve as meeting points for various pilgrimages). It is reference for education and outdoor learning activities (Can Coll Environmental Education Centre) and shelters a research station (Can Balasc).

Parco Nord Milano (PNM) is located on the North-Eastern outskirts of Milan in the Lombardy region (IT). In 1975, PNM was officially recognised as a regional park. Today, it consists of urban blue-green infrastructure such as woodlands, urban forest plantations (101 ha), species-rich grasslands (2.10 ha), wetlands (35 ha), river corridor (4 km), allotment gardens (350), agricultural fields (120 ha) and other natural elements that were once industrial, agricultural or uncultivated lands. PNM is a Regional Public Law Entity and is part of the Protected Areas System of Lombardy.

L. Braille Public Garden in Bari (IT) was an illegal parking lot and now features 104 planted trees (including one almond tree and five olive trees already present) and over 1,600 shrubs and plants served by a remote-control irrigation system. Other amenities are an internal foot-/cyclepath, benches, game tables in reconstructed stone, waste bins, dry stone walls, a children's play area, LED lighting system, several parking spaces, dog-walking areas, and facilities accessible also to the disabled.

4.1.5 Nordic planning family

Old Town Bay (OTB) is located in the middle of Helsinki (FI) with good public transport access. The diversity of its flora and fauna makes it unique among urban nature destinations. Its history stretches back to the 19th century and it is Helsinki's largest nature reserve, designated 1959, covering an area of 338 hectares of which 316 ha belong to the Natura 2000 network. Recent changes like the cross-border project "NATTOURS - Sustainable urban nature routes using digital IT-solutions" helped to expand the area and to increase visitor numbers.

The municipality of Aarhus (DK) has the objective to increase the ratio of green area per inhabitant through green-blue infrastructure planning in spite of densification. The city representatives decided to double the total nature area in the municipality by 2030 and increase the area with forested land

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by 60% by 2030 to ensure drinking water provision and improve recreation, biodiversity, social habitation, and health by focusing on improving accessibility to green areas to all citizens.

Table 2 gives an overview of all case histories within their respective planning families. The uneven distribution of case histories in each planning family is a result of the geographical distribution of researchers and access to local contacts in D1.4. For the British planning family, one case history was selected whereas for the Central planning family seven are described.

Table 2: Overview of European planning families and case histories.

Planning family	Case history	City	Province	Country	Area size (ha)
British	Water Haigh Woodland Park	Leeds	Yorkshire	UK	97
Central	Donau-Auen National Park	Vienna	Lower Austria	Austria	9,300
	Bois de Vincennes	Paris	Île-de-France	France	995
	Stadsrandbos Oostende	Oostende	West Flanders	Belgium	120
	Parkbos Gent	Gent	East Flanders	Belgium	1,200
	Réseau Écologique Bruxellois	Brussels	Brussels Capital Region	Belgium	500
	Landschaftspark Duisburg-Nord	Duisburg	North-Rhine Westphalia	Germany	180
	“Baumstarke Stadt” Leipzig	Leipzig	Saxony	Germany	29,700
New Member States	Three parks for the International Horticultural Exhibition 2024	Łódź	Łódź Voivodeship	Poland	77.3
	Landscape park Tivoli, Rožnik and Šiška hill	Ljubljana		Slovenia	459
	Park forest Grmoščica	Zagreb		Croatia	53.3
Mediterranean	Serra de Collserola Natural Park	Barcelona	Catalonia	Spain	8,120
	Parco Nord Milano	Milan	Lombardy	Italy	790
	L. Braille Public Garden	Bari	Puglia	Italy	0.95
Nordic	Vanhankaupunginlahti - Old Town Bay	Helsinki	Greater Helsinki	Finland	338
	Aarhus City	Aarhus	Jutland	Denmark	790

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4.2 Summary of key findings in Europe

4.2.1 Discourses

The analysis in D1.4 focussed on the basic ideas and objectives that support each case history. It was possible to detect various motivations for the implementation of each of these case histories, starting with social functions (local recreation), as in the case of park forest Grmoščica in Zagreb. Also, Aarhus City and "Baumstarke Stadt" Leipzig centre around the positive social effects (social cohesion) that they hope to achieve by implementing NBS. Furthermore, Water Haigh Woodland Park, Aarhus City and Donau-Auen National Park follow the idea of nature conservation and the protection of environmental functions (water quality, climate). Other aspects are the preservation of the historical character of the sites as in Bois de Vincennes, Parkbos Gent and Landschaftspark Duisburg-Nord. None of the case histories follows traditional forestry purposes such as wood production.

Table 3: Discourses, ideas and objectives in the case histories in Europe.

PLANNING FAMILY & Case history	Discourses
BRITISH Water Haigh Woodland Park	Transformation of previously mined industrial land into a mosaic of new woodlands, with extensively restored wetland habitats
CENTRAL Donau-Auen National Park	The protection and renaturation of wetlands along a stretch of 38 kilometres along the Danube river.
CENTRAL Bois de Vincennes	Primarily to protect this urban forest for recreation, leisure and aesthetic purposes. Further, the preservation and attempt to foster biodiversity by creating the conditions for the development of certain species. This is done by mitigating the presence of man in some reserve areas, and by implementing circular principles in management practices all along the way.
CENTRAL Stadsrandbos Oostende	An afforestation project of previous agricultural land. Main aim is to buffer the newly developed industrial zone from residential areas, and to expand recreation opportunities for residents and tourists.
CENTRAL Parkbos Gent	Providing new forests as a recreational asset to city dwellers. Following resistance from farmers, safeguarding agriculture by setting aside dedicated areas for agriculture for local farmers was also an important aspect. Also, historical elements in the landscape are protected and the area provides opportunities for recreation and play.
CENTRAL Réseau Écologique Bruxellois	To establish ecological connectivity in the city by reconnecting green spaces and develop biodiversity, nature and the quality of life in the city.
CENTRAL Landschaftspark Duisburg-Nord	To transform and renature a highly industrial landscape. The area was redeveloped while keeping as much of the existing structures as possible. This makes it a nicer place to live and boosts the economy after the fall of the industry, for example, by encouraging tourism. Besides many socio-cultural economic benefits, water protection and ecological preservation also play a dominant role.
CENTRAL "Baumstarke Stadt" Leipzig	Fundraising and sponsorships for urban tree planting which aims at enhancing the identification of citizens with the city's greenery in the long-term.
NEW MEMBER STATES Three parks for the International Horticultural Exhibition 2024	To use nature for the development of the city and to improve the quality of residents' life. As part of the exhibition, the quantity and quality of green spaces in the city should be improved.

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NEW MEMBER STATES **Landscape Park Tivoli**	Protected since 1984 and as the green lung of Ljubljana protecting wildlife and a spot for recreation.
NEW MEMBER STATES **Park forest Grmoščica**	The project aims to further build recreational and educational value in a participatory process by improving the local infrastructure.
MEDITERRANEAN **Serra de Collserola Natural Park**	A forest restoration project that ensures the connectivity of built-up urban and peri-urban areas.
MEDITERRANEAN **Parco Nord Milano**	The transformation of abandoned land into biodiverse green space which aims to foster social cohesion and protect biodiversity.
MEDITERRANEAN **L. Braille Public Garden**	The objective is to transform a former parking lot into an urban garden/urban green space thereby rejuvenating the area.
NORDIC **Vanhankaupunginlahti - Old Town Bay**	The goal is to maintain green areas for recreational use in such ways that they are pleasant and safe as well as retain their landscape and natural values. The main goal of a nature conservation area in the city is to maintain biodiversity.
NORDIC **Aarhus City**	The project aims to increase the green area per inhabitant – doubling the total nature area in the municipality by 2030. This will improve recreation, biodiversity, social cohesion and public health.

4.2.2 Actors

When it comes to actors involved in the case histories in Europe, in total, we identified 329 actors. On one hand, these can be individual citizens that had a strong impact in the design or management of the case history, like in Landschaftspark Duisburg-Nord where artist Jonathan Park created a permanent light exhibition in 1996 and has since done other light shows in the park that give it a unique characteristic. On the other hand, actors are also governing authorities like the City of Paris that is the sole owner of the vast majority of the Bois de Vincennes facilities (sports club buildings, restaurants, etc.) and the sole funder. Among all case histories, the one with the highest number of actors is Serra de Collserola Natural Park (n=53), and the one with the lowest number of actors is Réseau Écologique Bruxellois (n=7).

In total, the 16 case histories in Europe are managed by 30 lead organisations (figure 6). Most of the case histories (n=11) are managed by more than one lead organisation. The Donau-Auen National Park, Renforcement du Réseau Écologique, Helsinki and Leipzig are managed by one single authority. The same applies to Collserola Park, although the lead organisation Consorci del Parc Natural de Collserola is a public consortium of local character, and of associative and institutional nature. It consists of three institutions and comprises nine municipalities.

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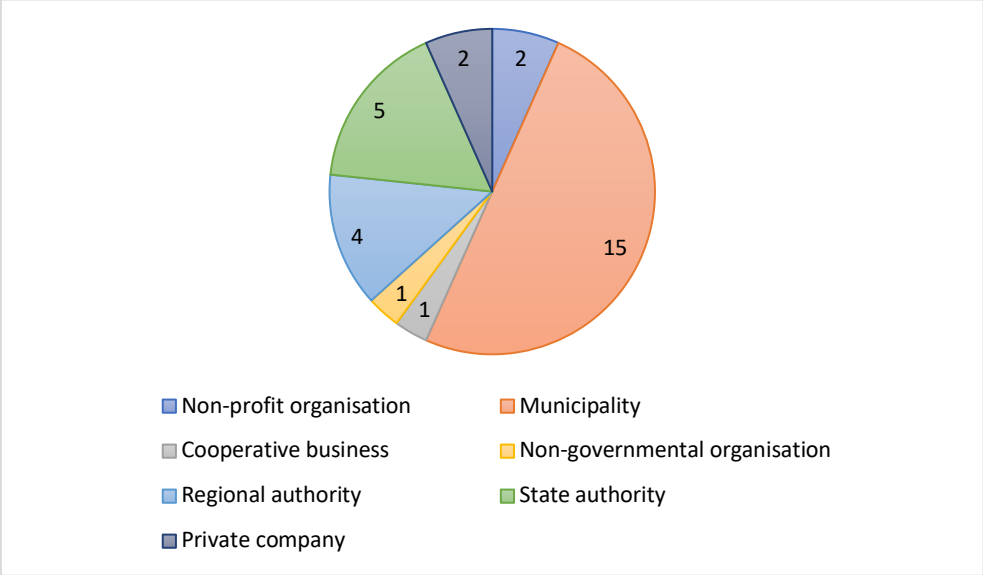

Figure 6: Lead organisations in Europe.

The projects examined are often complex, and stretch across legal and spatial boundaries with many different interests and actors involved. For these reasons, an established project management committee, where actors meet regularly, can increase the long-term success of projects. Our study showed that half of the case histories (n=8) examined presently have a project management committee (see figure 7).

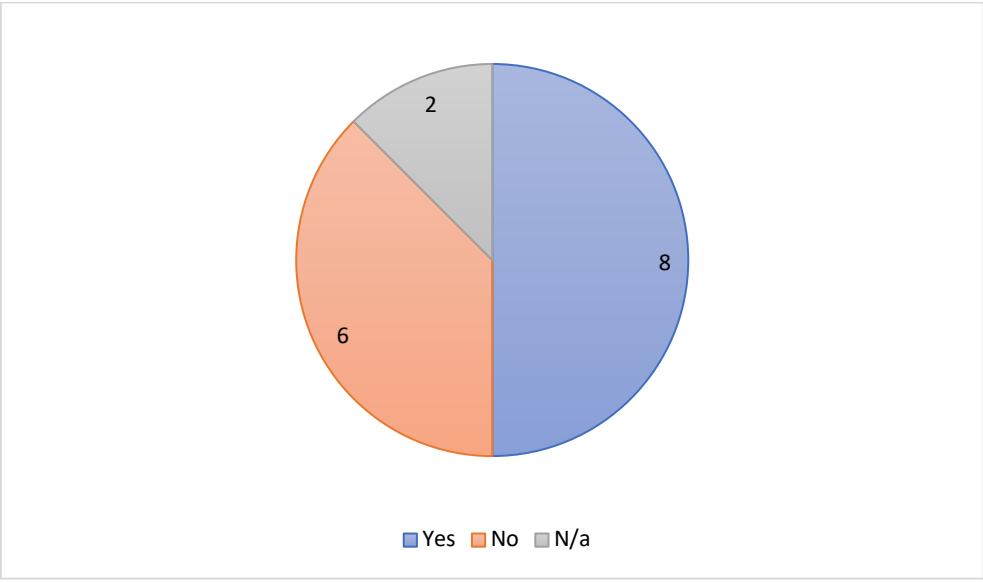

Figure 7: Case histories with a project management committee.

4.2.3 Resources

Across all 16 case histories in Europe, we identified several resources that are provided at different levels, ranging from international funding bodies, national, regional, municipal to the local level of community fundraising. Other funding mechanisms are provided by the private sector and special funds (see figure 8).

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The dominant source of funding, either through financial, land or knowledge, is by municipalities (n=15). This is followed by international (n=11), mostly funding by the European Union in 10 cases, private sector (n=8), community fundraising (n=7), regional and national (both n=5) and special funds (n=2).

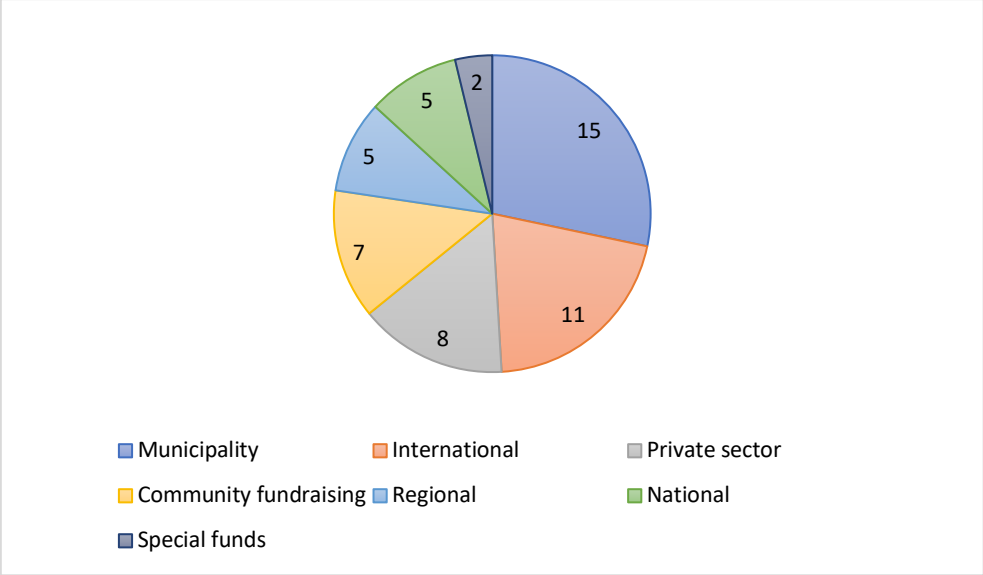

Figure 8: Overview of resources in Europe.

It was not possible to establish concrete financial funding figures in all European case histories.

The majority of international funding sources is provided by the European Union (n=10). Only in the Landscape Park Tivoli international funding was provided by the non-governmental organisation WWF. More concrete figures could be acquired in the following case histories:

- Stadsrandbos Oostende: The international funding came from the EU´s European Territorial Cooperation programme Interreg IVA 2 Seas, "21st Century Parks" and Interreg IVA 2 Seas "Urban Habitats". The "21st Century Parks" project received a total project budget of 1,799,042 EUR and the "Urban Habitats" a total funding of 4,778,115 EUR.
- Parkbos Gent: The project, from 1 October 1999 to 1 October 2002, had a budget of 904,439.53 EUR and was co-funded with 442,896.88 EUR by the EU through the LIFE programme no. LIFE99 ENV/B/000650. This excluded funding for acquiring land to be forested.
- Réseau Écologique Bruxellois: From regional funds, there were 165.000 EUR available for the prospecting, communication and project designing. Further regional and communal funds (amount to be defined) for the landscaping works.
- Landschaftspark Duisburg-Nord: The financial contribution for the maintenance of the park is provided by several sources. The state of North Rhine-Westphalia provides 30%, the Regionalverband Ruhr 18%, the City of Duisburg 11% and the operations of Landschaftspark 41%. The average cost of maintenance per year is 6 million EUR which means that the park can raise 2,460,000 million EUR for the maintenance from their own income. These earnings come from different sources like permanent rental and leasing, temporary rental for events, services

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during events, running of own venues and events, film and photography, and selling of merchandising. The main expenses are repair, services, caring, construction measures and qualifications (about 65%), staff (about 18%), and others (Operation, insurance, marketing, 17%).

- In Park forest Grmoščica in Zagreb, the European Union's Interreg Danube transnational programme secured 85% of the project budget and 15% is co-funded by project partners, of which the city of Zagreb is one.
- Vanhankaupunginlahti - Old Town Bay: This case history received international funding via the cross-border project "NATTOURS - Sustainable urban nature routes using new IT-solutions" (2016-2018) which enabled to expand the nature reserve of the forest of Pornaistenniemi and the forests of Möylä. Pornaistenniemi and the construction of Old Town Bay were funded by the Central Baltic 2014-2020 Programme, of which the budget for Finland was 667.325 EUR.
- Aarhus City: Here the municipality, at recent budget negotiations, allocated around 26,9 million EUR for a 10-year period to e.g.: promote a greener city with more blue (=water), increase biodiversity in rural and urban areas, and create a climate resilient city with NBS. Funds for NBS relating to hydro-meteorological risks on public land are administered and implemented by Aarhus Vand (the water utility company).

4.2.4 Rules of the game

In terms of organisation of the projects and activities related to UF-NBS, the municipalities are leading organisations, also for management and implementation. The projects were implemented by different bodies and units, but the majority were linked to or directly under the authority of municipalities. The municipal units include e.g.: Green Spaces Unit, Environmental Unit, Planning Unit. The cooperation between units was also recorded. Another arrangement which could be found in the case histories was the cooperation between municipality and other institutions. For example in Belgium, where the emphasis was given to afforestation, the Nature and Forest Agency was an important partner of both projects. Less common was a cooperation with or between municipalities (e.g. Aarhus, Parkbos Ghent), with research units (e.g. Duisburg) or with educational and tourism organisation (e.g. Milan). Local community groups were rarely reported as the official implementers or executers of the projects' activities.

In case of the formal and informal rules of governance systems that shape the case histories, to specify outcomes and interactions with other elements of the governance system, two levels were considered: 1. Frameworks above the project and, 2. Framework that the project operates within. Frameworks above the project refer to overarching rules and elements of the governance system that shape the wider governance, institutional and economic context, but do not impact the project in a direct way. Frameworks that the project operates within have a direct impact on the project, its design, implementation and/or outcomes. The authors of the report are aware that the division between 1. and 2. is not strict and depends on the local governance context of the country or even a city.

According to the information provided by the research partners, the municipal laws are the most important frameworks above the project, impacting their implementation and management. In 9 European projects the municipal laws were indicated as important frameworks above a project (see Fig. 9). They include: Urban Development Plan, Forestry Plan, Afforestation Plan, Green Area

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Regulation. Also, regional laws and national/federal laws were listed as significant frameworks impacting management and implementation. In case of the national law (n=5), Nature Protection Law and Forestry Plans were listed among others. The regional regulations (n=6) refer to, e.g., Spatial Plan and Afforestation Plans. For the Duisburg case history, the Landscape Park was listed as well as Association Agreement. The Association Agreement was listed also in the case of Milan.

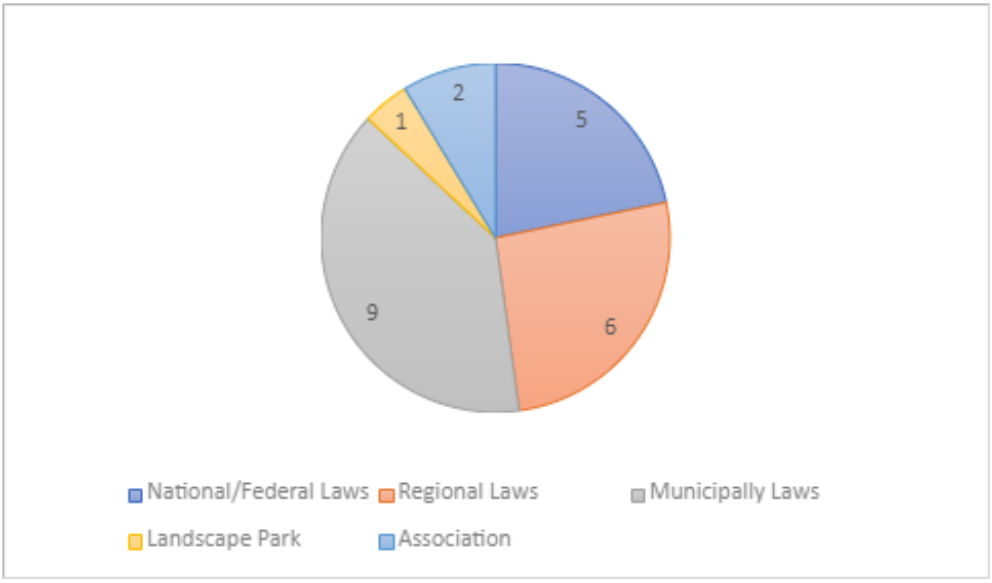

Figure 9: Frameworks above the project that exert influence on the project and/or UF-NBS for European case histories (multiple indications were possible).

In the case of the regulatory framework that the project operates within, the significant role of municipal laws was even more dominant. In 12 case histories, the municipal laws were indicated as crucial for the project (see Fig. 10). Here the range of the laws was bigger, and the municipally laws included, e.g., Forest Management Plan, City Green and Blue Infrastructure Regulations, Development Plan, Traffic Regulations, and Management Plan. Contrary to the frameworks above the project, in the case of the regulatory framework that the project operates within, the national and federal laws were listed more often than the regional laws. In 8 case histories, national laws were listed and included: Forest Act, Nature Conservation Act, and Planning Act. Regional laws were mentioned 4 times. Association, Network, International Laws and Cooperation Agreement – each was mentioned once.

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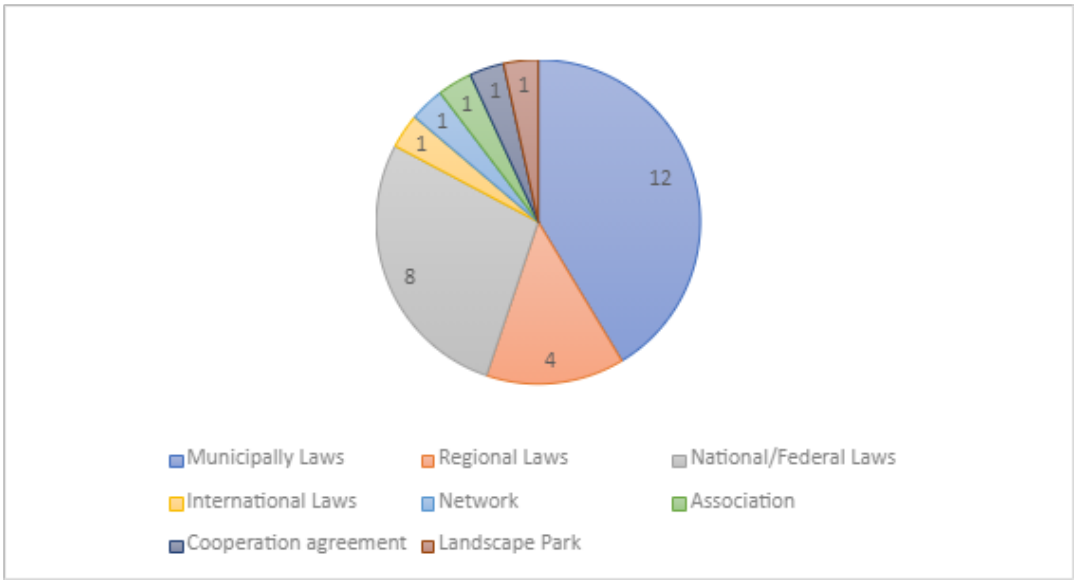

Figure 10: Regulatory frameworks that the project operates within for European case histories (multiple indications were possible).

4.3 Case histories in China

Six project-based case histories located in different parts of China were collected. These are located in coastal cities such as Fuzhou, the capital region around Beijing and in the south-western City of Meishan located in the Sichuan province. The distribution of the cities is shown in figure 11.

Figure 11: Map of case histories in China (Bivand et al., 2020; Pebesma, 2018; R Core Team, 2018; South, 2017; Wickham, 2016).

Table 4 gives a detailed overview of Chinese case histories.

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Table 4: Overview of Chinese planning families and case histories.

Planning family	Case history	City	Province	Country	Area size (ha)
China	Hilly Area	Fuzhou	Fujian Province	China	1,196,800
	Meishan Dongpo Urban Wetland Park	Meishan	Sichuan Province	China	6,948
	"Green Wedges" Jiaxing	Jiaxing	Zhejiang Province	China	427,500
	Green Lungs of the City Project	Yiwu	Zhejiang Province	China	840
	Beijing Plain Area Afforestation Programme	Beijing	National capital region	China	633,800
	Fushan Ecological Park	Qingdao	Shandong Province	China	4.30

4.3.1 Fu Forest Trail – Fuzhou

The *Hilly Area* or *Fu Forest Trail* ("Fudao" in Chinese) in Fuzhou within the Fuijan province is an urban mountainside forest trail built by the Fuzhou prefecture (see figure 12). Work on the trail started in 2016 and it was opened to the public in August 2018. It is not a traditional ground-based mountain trail, but an elevated walkway including significant areas at the canopy level (Hughes, 2002; Lowman et al., 2006; Schwarzer, 2010). The trail is over 8 km long and features strong design elements (fencing and elevated walkway) and commanding views to the city from viewing platforms. The walkway goes through a mature wooded area and follows a zig-zag track to allow for easy gradients for walkers. The context is important as the process of urbanisation in Fuzhou has enveloped many of the previously green hills in the city (Wang, 2017; Yang et al., 2008) and added pressure on the remaining forest in the city. The Fu Forest Trail project is considered locally as a way to manage the conflict between high-intensity construction, the conservation of the urban landscape and green open space protection combined with a visitor attraction.

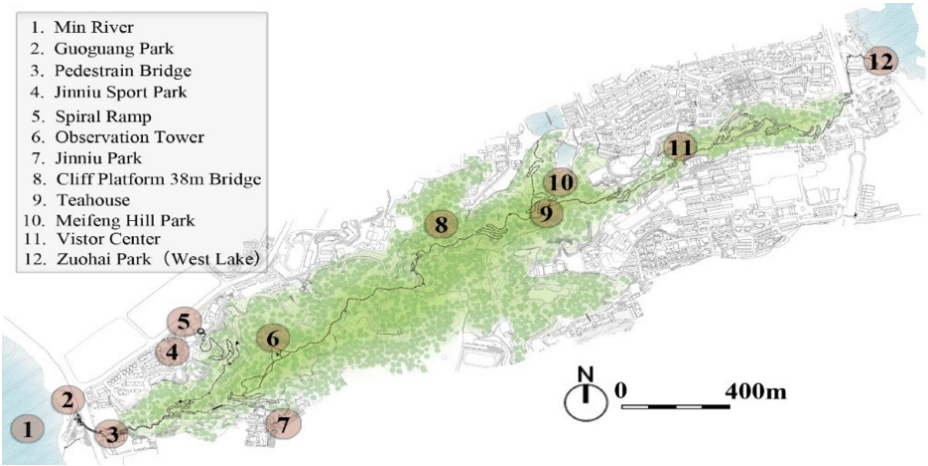

Figure 12: The Fu Forest Trail in the Hilly Area in Fuzhou (Lin et al., 2020).

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4.3.2 Meishan Dongpo Urban Wetland Park

Located on the east side of the City of Meishan there is a new nature-based urban development called the Dongpo Urban Wetland Park. Work on its creation officially started in 2014 and it was opened to the public on 31st of December 2014. Dongpo Island is important to the cultural context of the old city and this, in turn, drives the cultural development and overall development of the adjacent new urban district. The urban wetland park is sub-divided into a central cultural axis, two belts (a walking zone along the lake and a water science and culture ecological belt). There are five management zones (i) a wetland resting zone, (ii) wetland science and culture zone, (ii) recreational activities zone, (iv) ceremonial activity zone and (v) cultural activity zone. Whilst the primary focus is on urban wetland there is extensive tree planting and tree cover across the site. The juxtaposition between the wetland areas and tree areas are important for the ecological management of the site as well as crowd management and the creation of settings for recreational and cultural infrastructure.

4.3.3 Jiaxing green wedges

Jiaxing is a city in eastern China within the province of Zhejiang whose geography is greatly influenced by its river courses. The city's urban planning is an example of green wedge urbanism which has been a feature of municipal planning since 2006. The municipality has planned three green wedges around the city based on existing ecological resources. These green wedges are important components of the city's urban green space system, and a key aim of this is to regulate the urban climate and provide more recreation space. These three green wedges are mainly constituted of wetland and forests and have a tight connection with the inner city through the river network.

4.3.4 Yiwu green lungs

The City of Yiwu in eastern China in central Zhejiang Province has become well known as the railway station and departure point for long distance international container transport linking China with Europe. Its urban growth has been exorbitant and by 2019 its urbanisation rate had reached 77.6%. In the built-up area, the share of green space is 23.34% and the area of urban parks per capita is only 7.82 m^2. As a consequence, the current urban green space in the built-up area has constantly failed to meet the demands of residents. To create more green space for residents in Yiwu, as well as to mitigate the pressure on the environment and improve the city's resilience, the municipal government in Yiwu launched the Green Lungs of the City Project in 2006. This is now part of the City's master plan, and the accompanying project aims to build a forest-wetland ecological park, agricultural park and a botanical garden in the centre of the city.

4.3.5 Beijing Plain Area Afforestation Programme

The plain area is the most developed and most densely populated area in the city of Beijing. With an area of 6,338 km^2, the forest coverage in the plain area was at 14.85% in 2011, which is far lower than the average of 37% in the adjacent more mountainous areas. Nominally the citizens of Bejing have to drive 40–50 km if they want to visit a forest. Beijing faces air pollution, the urban heat island and other environmental issues. To mitigate these issues the municipal government in Beijing has launched the largest afforestation programme in its history called the Beijing Plain Area Afforestation Programme (BPAP). The BPAP is based on 66,674 ha of new green areas to be achieved by converting vacant spots, croplands, sand excavation pits and wasteland into forests, parks and wetlands. By the end of 2015, BPAP had increased the forest coverage from 14.8% (2011) to 25% (2015) in the plain area. More than

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70,000 hectares of forest (more than 54 million trees) have been planted, and the survival rate exceeds 95% (FAO, 2018). BPAP is considered as the most ambitious nature-based project for a high-density urbanised area in China.

4.3.6 Fushan Ecological Park

The Fushan Ecological Park in Qingdao i(see figure 13) is a nature-based response to urbanisation and tourism in the City's hilly Laoshan District. These factors are considered to have a negative impact on the City´s environment and human settlements. Quarrying and illegal buildings in the area of the Laoshan mountains have had a notable negative impact. In 2016, in an attempt to restore Fushan's mountain environment, the local government of Laoshan district launched the project. The goals of this project are to restore the wooded Fushan mountain, to improve landscape connectivity and to meet the recreational needs of citizens.

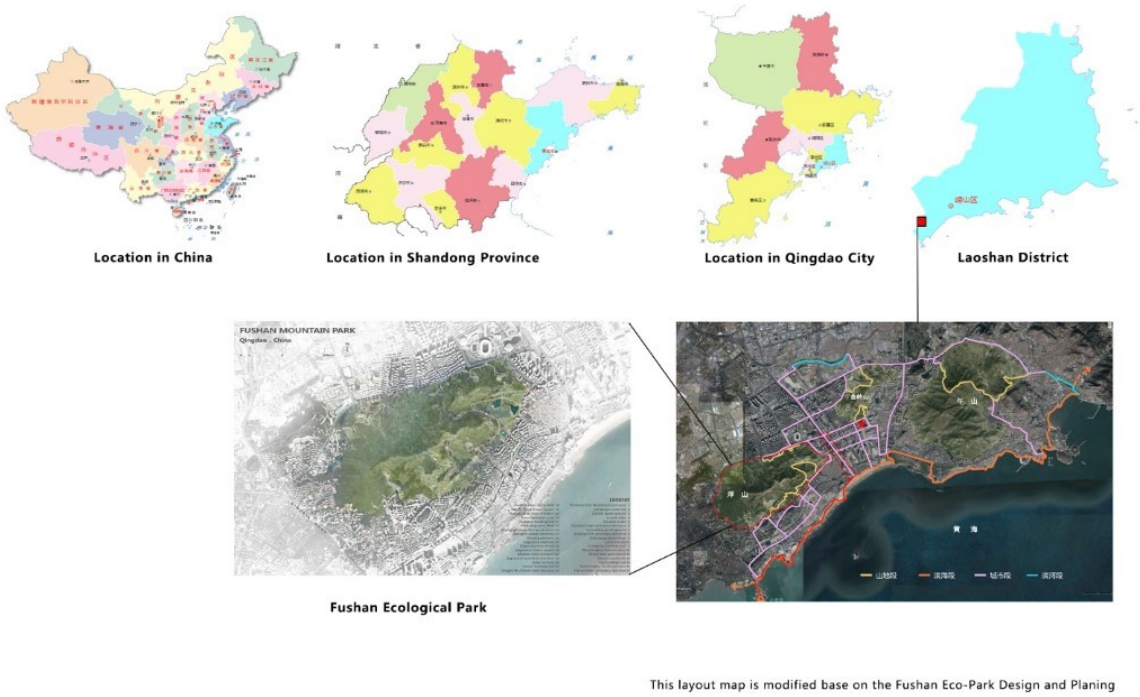

Figure 13: Location of Fushan Ecological Park in Qingdao, Shandong Province, China (modified by Jin, 2020).

4.4 Summary of key findings in China

4.4.1 Discourses

The Chinese case histories are often a response to rapid urbanisation and the environmental problems that are associated with this trend, like the urban heat island effect, loss of green space and air pollution.

Table 5: Summary of discourses in case histories in China.

PLANNING FAMILY & Case history	Discourse

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CHINESE Fuzhou Hills	The objective was to create forest plantation as part of a mountain trail project that provides a variety of recreational spaces for the public and improves urban forest and landscape connectivity. Furthermore, the construction of Fu Forest Trail is to promote policies related to urban mountain protection and urban green restoration.
CHINESE Meishan Dongpo Urban Wetland Park	This inner-city project aims at wetland conservation to enhance human well-being, provide science and cultural education, to increase biodiversity and to improve water quality.
CHINESE Green Wedges of Jiaxing	The main purpose of the three green areas surrounding the city is to regulate urban climate and to provide more recreational space.
CHINESE Green Lungs of the City Project	The vision is to use urban forests and a wetland as NBS to create more green space for residents, mitigate the pressure on the environment and improve the city´s resilience.
CHINESE Beijing Plain Area Afforestation Programme	Mainly an afforestation project that aims to create a more livable urban environment by dealing with air pollution and urban heat island effects.
CHINESE Fushan Ecological Park	The restoration of coastal mountains and therefore landscape connectivity between these mountains and the urban area, hence providing more recreation space for citizens.

4.4.2 Actors

In total there are seven lead organisations that influence and guide the development of the projects in the Chinese case histories. There are five Chinese case histories in which a single lead organisation is responsible for the development of the projects in their community. The only case history where two lead organisations enact their influence is Fushan Ecological Park in Qingdao, where the Metropolitan City of Qingdao and the Zhonghan sub-district office in Laoshan District share the responsibility.

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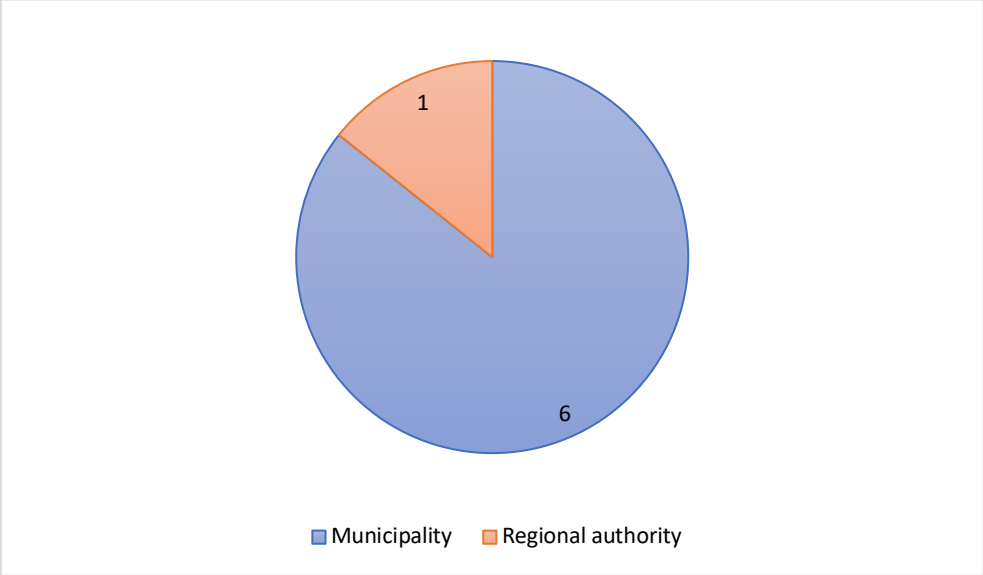

Figure 14: Lead organisations in China.

In total, there are approximately 80 actors that are directly involved in the six case histories in China. In all cases, multiple actors with different responsibilities interact to establish the projects. For example, in Dongpo Urban Wetland Park in Meishan City project management is structured to include a project coordinator (Bureau of Natural Resources), a project planner (The University of Tongji), and responsible for project implementation the state-owned Meishan Development Holding Co. Ltd. (contractors).

In most cases (n=5) the actors, either governing authorities, associations, public or private institutions, park planners and technicians appear to be local Chinese actors. Only in Fuzhou are the Fu Forest Trail planners a company from outside of China; these being Look Architects from Singapore.

In four case histories, the projects are accompanied by one or two universities. In the Hilly Area it is the Fuzhou Forestry University, Research Institute of Forestry - Chinese Academy of Forestry, in Meishan Dongpo Urban Wetland Park the University of Tongji, in Green Lungs of the City Project in Yiwu and in Beijing Plain Area Afforestation Programme it is the Beijing Forestry University and the Research Institute of Forestry - Chinese Academy of Forestry, respectively.

4.4.3 Resources

The resources in the Chinese case histories are mostly provided from public sources of the Chinese state (n=9). That is mostly by municipalities (n=4), regional funders (n=4) and in the case of the “Green Wedges” in Jiaxing the national government (n=1).

State-owned companies (n=4) are also providing resources in the form of funding and skill, particularly during the planning and construction process. There is the example of Dongpo Urban Wetland Park which was funded by the state-owned company Meishan Development Holding Co., Ltd. with a total investment of about 800 million RMB (100 million EUR). In comparison, the entire new green space investment plan by the Meishan Government is 34.5354-49.8022 million RMB. In Yiwu’s Green Lung of the City Project, the local government provided very limited funding to launch the project; e.g. they commissioned the Beijing Beilin Landscape Architecture Institute Co. Ltd. to develop the design and

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planning. Then the state-owned company, Yiwu City Investment and Construction Group Co., Ltd. was responsible for implementing the whole project during the operational period. Also, in the Beijing Plain Area Afforestation Programme and Fushan Ecological Park in Qingdao, the planning of the project was carried out by state-owned companies, the Beijing Beilin Landscape Architecture institute Co. Ltd. and China Construction Engineering Design Group Co., Ltd.

The largest investment in a single project is the total expense of approximately $5.0 billion USD from 2012 to 2015 in the Beijing Plain Area Afforestation Programme.

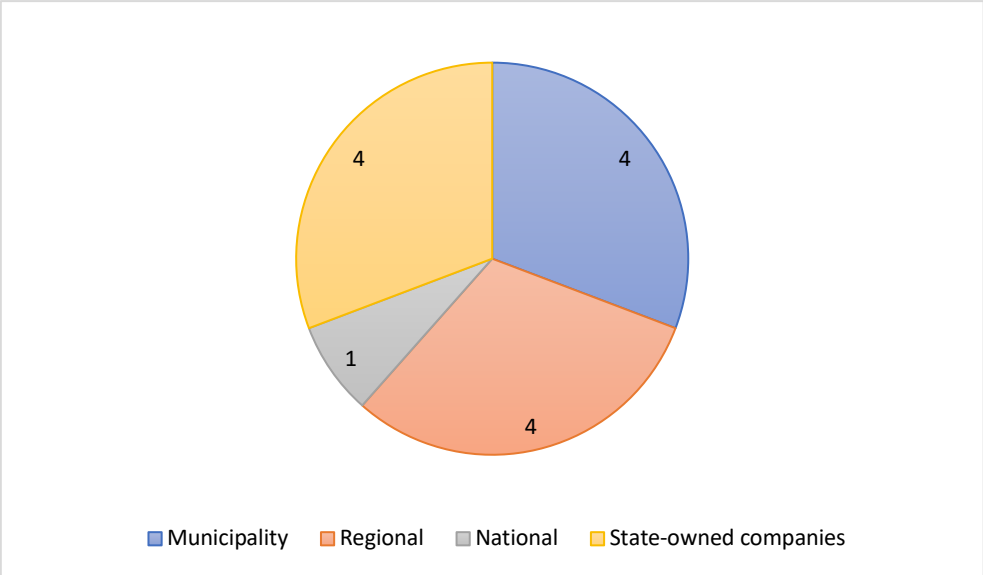

Figure 15: Overview of resources in China.

The case histories of “Green Wedges” in Jiaxing City, Green Lungs of the City Project in Yiwu, Beijing Plain Area Afforestation Programme and Fushan Ecological Park in Qingdao benefitted from very limited non-governmental investment that contributed mainly for various economical purposes such as tourism.

4.4.4 Rules of the game

In the case of frameworks above the ‘project level’ for the management and implementation of the project, municipal laws were crucial (see Fig. 16). They were recorded five times, while the national laws were recorded once, and regional laws were not listed.

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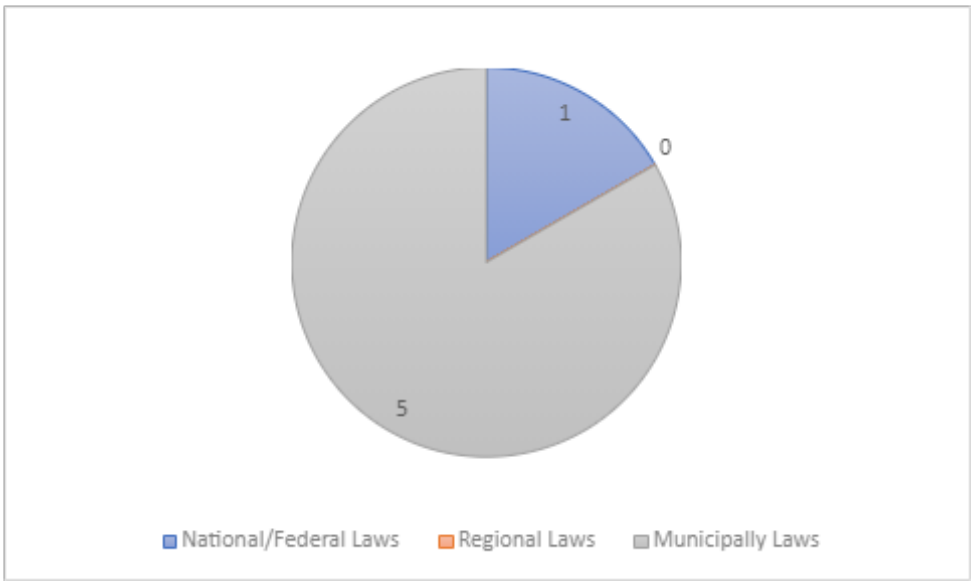

Figure 16: Frameworks above the project that exert influence on the project and/or UF-NBS for Chinese case histories.

Municipalities are leading the implementation and management of the case histories in China. In all the examined case histories they were in charge of organising and leading the design process. Cooperation with regional authorities and sub-municipal public sector bodies was indicated.

As for the regulatory framework that the projects operate within, an equal role was given to municipal and national law (n=4; see Fig. 17). National laws include the Forest Act and Planning Act, while municipal laws include the Management Plan, City Green and Blue Infrastructure Regulations, and Local Plan (Planning Framework). Regional laws were mentioned once.

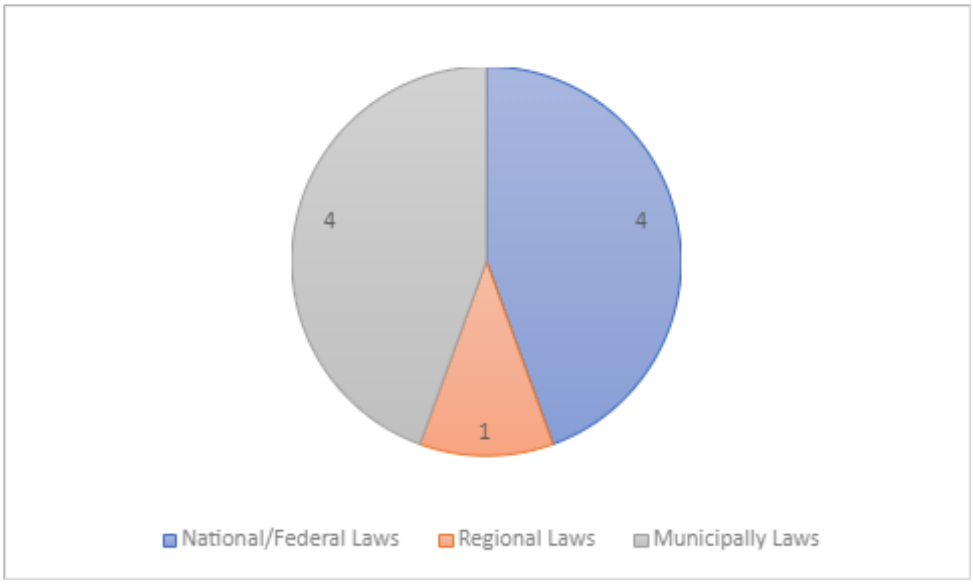

Figure 17: Regulatory frameworks that the project operates within for Chinese case histories.

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4.5 Comparative perspective of relevant frameworks

The third and fourth set of analyses examined the case histories according to their novel and innovative elements, their impacts on UF-NBS, and lastly on their positive and negative economic effects. As novel and innovative we understand governance elements that are striking in conception or style, elements that create something new and are not formerly known or used ('Novel', n.d.). Table 6 shows an overview of the main results. These novel and innovative elements are context specific.

Table 6: Elements of the case histories that are considered novel, impactful or economically positive/negative*.

*(Key to planning families: BRI (British and Irish), CEN (Central), NMS (New Member States), MED (Mediterranean), NOR (Nordic), CN (Chinese).

PLANNING FAMILY	CASE HISTORY	CITY	GOVERNANCE LEAD - *WHERE A PARTNERSHIP ALL INSTITUTIONS SHOWN*	NOVEL/INNOVATIVE ELEMENTS	IMPACTS ON UF-NBS DELIVERY	POSITIVE/NEGATIVE ECONOMIC EFFECTS
BRI	Water Haigh Woodland Park	Leeds	Leeds City Council. Yorkshire Wildlife Trust. White Rose Community Forest.	Local communities have been 'engaged' throughout the Strategic Planning Process of this area. What they had to say has also been addressed both politically and from the design point of view.	The project provides connected multi-functional green space that maximises ecosystem services for the sites and local communities. It is one of several in White Rose project and White Rose Forest is part of an England-wide community	Local schools also use the facilities of the park on a regular basis, thus improving the quality of their educational experience. The value of the UF-NBS work has also been acknowledged as having contributed to the Leeds City Region targets on reducing air pollution and preparations for climate change.

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					forest programme.	There is the risk of 'gentrification' of the community. This has not happened, however, as the park was not 'imposed' on the communities from on high, but was planned, designed and implemented with the local communities very much involved.
CEN	Donau-Auen National Park	Vienna	Nationalpark Donau-Auen GmbH	None	The Donau-Auen National Park preserves the last remaining major wetlands in Central Europe. Here, the Danube is still free-flowing and is the lifeline of the National Park. It creates a habitat for numerous animals and plants, some of which are rare species.	The project has partners from the business world who have helped support the work of the National Park for years. Some provide financial support, others participate in joint projects, while yet others even send their employees on work assignments in the great outdoors. All of these efforts are invaluable and essential to the

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						National Park, which is financed solely through public means.
	Bois de Vincennes	Paris	City of Paris	The City of Paris has the ISO 14001 certification which establishes criteria for the proper management of environmental responsibilities.	It encourages the engagement of citizens with local green spaces and green initiatives through educational programs and shared gardens.	Private entities finance the park's management only indirectly.
	Stadsrandbos Oostende	Oostende	City of Oostende; Cooperative Business Buitengoed; Natuurpunt (nature conservancy NGO)	This case is particularly interesting as the main actor, the Cooperative Buitengoed, is strongly citizen-supported. It is a joint undertaking by the municipality, an insurance company, a trade union, and a nature conservancy NGO.	The project contributes to health and well-being since citizens are engaged through their work at the cooperative.	The peri-urban forest is creating value, because it facilitates a green image to the city, and additional recreational opportunities in the city. The project illustrates how a tourist city can expand its touristic offer with new urban green space.
	Parkbos Gent	Gent	Flemish Agency for Nature and Forest; Province East-Flanders; City of Ghent; Flemish Land Agency; Municipality of Sint-	Starting as a forestry project (with a single focus on increasing the forest area for recreational use), it	Although the project claims to be participatory from the initiation phase, it was	The area has seen a large increase in visitors (walking, cycling, horse riding) which has inevitably

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			Martens-Latem; Municipality of De Pinte	turned into an integrated landscape restructuring project that integrates forest, agriculture, recreation and landscape heritage with other challenges in the area.	more consultation than participation, and specific groups felt to be left out of the participation process (resulting in conflicts with local authorities and farmers). Twenty years later, most actors are happy with the result and see the advantages of the project.	lead to an increase in spending in, e.g., riding schools. The Parkbos has also been a marketing tool for real estate (both selling existing residences and developing new estates). Some small initiatives have been set up, such as a temporary natural campground, but the financial impact of this is limited.
	Réseau Écologique Bruxellois	Brussels	Bruxelles Environnement; Leefmilieu Brussel	It is a show case project for participatory collaboration, as in each of the neighbourhoods a process of consultation will be carried out with local actors (associations, citizens and users) to realise a participatory diagnostic study and to	The goal is to use the nature and biodiversity topic to create local cohesion. A first cohesion is created by the project process itself but the final output (biodiversity enhancement) will also reinforce	So far only the public stakeholders (municipalities) are involved in the local projects. Private sector investment will depend on the local projects and the interest of local stakeholders to join in.

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				define objectives, projects, and eventually carry out innovative developments with an ecological vocation.	the public space quality and the social life thereafter. In low-density districts, the space available also gives the possibility of real biodiversity development.	
	Landschaftspark Duisburg-Nord	Duisburg	NRW.URBAN GmbH & Co. KG; Duisburg Kontor Hallenmanagement GmbH	Unique and award-winning in design and for recreation, the Landschaftspark can be seen as a successful example of structural change, from heavy industry to a large open green space. It still requires public funding, but income is created from private partners and fundraising from the Biologische Station.	Maintaining urban forests in combination with the historic elements of the location (riverbanks, trainline, blast furnaces, "bunkers") is a way of keeping the sense of place and at the same time as contributing to the preservation of flora and fauna, providing space for recreation and	Financially this was a huge effort by all the actors involved, especially the Federal state of Nord Rhein Westfalen, the City of Duisburg, the Ruhr Region and the effects of European funding. Today, income is generated from private partners and fundraising from the Biologische Station. However, the maintenance of the park is not self-sufficient and still

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					events, and offering sports and leisure opportunities.	requires public funding.
	"Baumstarke Stadt" Leipzig	Leipzig	City of Leipzig	Initiated by the city and dependent on citizens actively contributing to this fundraising campaign to increase tree cover in their own city.	The fundraising campaign "Baumstarke Stadt" in the city of Leipzig can be seen as a well-established and successful strategy to increase the tree infrastructure of the city while establishing a long-term engagement of citizens with this type of greenery.	There are no direct economic effects, yet indirectly because trees as NBS are promoted for co-development and co-design to alleviate problems of heat, air pollution and noise in the city in a participatory way.
NMS	Three parks for the International Horticultural Exhibition 2024	Łódź	City Office of Łódź (Department of Ecology and Climate, Environmental Management unit)	A project of high relevance for the international outreach of the city but it failed to ensure public support with local residents so far. The national government is	It is likely that with the Expo the parks will cease to perform their current functions – with new paved paths and exhibition buildings, part of	Expo 2024 will raise funds through entry fees, yet it is also organized in a designated place and as a result a certain group of residents will lose access to these green spaces – due to

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				yet to pledge its support.	trees will be cut down, parks will lose their wildness and unique character, and also biodiversity (while biodiversity should be a cornerstone of NBS). Some residents oppose the organization of Expo 2024 in the three parks surrounding the housing estate – Radiostacja.	fees, fences, noise and crowds.
	Landscape Park Tivoli	Ljubljana	The City of Ljubljana. JP VOKASNAGA	The project is managed by a company set up and wholly owned by the City municipality. The intention is to introduce competitiveness into municipal management.	Landscape Park Tivoli includes recreational areas attractive to residents and visitors. Access is good from the City Centre and by public transport. The park is a major	Ljubljana is a tourist city, and the Landscape Park is an important visitor resource. The park contributes to the city's economy by attracting tourism. The woodland areas are managed for timber as well as biodiversity;

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					recreational attraction. The formal part of the Park merges into urban woodlands and these connect directly into areas outside of the city. The woodland areas have high biodiversity values and provide ecosystem services to the city as a whole. The woodland area is also used as a living laboratory for the nearby Slovenian Forest Research Institute.	the timber generates funds which contribute to the management of the park. There are no known negative economic impacts.
	Park forest Grmoščica	Zagreb	City of Zagreb; Croatian Forests Ltd.	Within the URBforDAN project several workshops with stakeholders and onsite survey with visitors were	This project is a good example of inter-city collaboration of relatively small European	Only indirectly because the project planners gained insights into visitors' needs and their support for

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				conducted to support participatory planning and management, the practice that can be considered as innovative in the local and Croatian context.	countries who work together to enhance UF planning and management practice (addressing recreational, educational and tourist services, implementation of participatory approaches).	implementation of agreed activities. It is a good and transferable example of how to use local and transnational knowledge to improve UF management and planning.
MED	Serra de Collserola Natural Park	Barcelona	Consortium of the Serra de Collserola Natural Park	The process that the private company "Arran de Terra" leads is a participatory process to define a "Collserola Agricultural Contract" as a tool to pay for ecosystem services provided by agricultural activities in the park.	The strategies of the New Urban Master Plan and the Decision Support System that will be implemented and applied to various metropolitan parks in the Metropolitan Area of Barcelona are good examples of transferability for protected green	The involvement of the private company "Arran de Terra" that helps to develop a tool to pay for ecosystem services.

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					areas from other regions.	
	Parco Nord Milano	Milan	Metropolitan City of Milan; The Lombardy Region - Directorate General for Landscape, Urban Planning, and Soil Conservation	There is a strong element of participatory approach in terms of promotion and planning. Successful management is led by the park authorities, associations, and bank institution, as they are the main actors enabling the strategic approach (including raising citizen awareness).	The park's implementation strategy has been characterised by a strong participatory approach in terms of promotion and planning. Park authorities, associations, and bank institution are the main actors enabling the strategic approach (including raising citizen awareness).	A network of institutions, NGOs and initiatives providing constant funding is warranted.
	L. Braille Public Garden	Bari	Municipality of Bari (Parks and Gardens Division)	There are a number of novel ingredients making Bari a successful UF-NBS project. Especially the collaboration among different sectors of expertise, exchanges	L. Braille public garden had and continues to have a strong impact on local citizens, fostering social cohesion and	The design, construction and maintenance of the garden were assigned to a private landscape company – 'Colucci Garden Srl'.

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				with public authorities, respecting roles and citizens' needs, citizen awareness and involvement, continuous funding, a minimum regulatory framework.	biocultural diversity.	
NOR	Vanhankaupunginlahti - Old Town Bay	Helsinki	City of Helsinki	The area is a great example of creating value from knowledge by making knowledge suitable and/or available for societal use and translating that knowledge into competitive products, services, processes.	Citizen participation in UF-NBS increased because of their involvement in the process of planning routes to make the area accessible for all citizens. That planning process took the connectivity of green areas into account.	No information
	Aarhus City	Aarhus	Aarhus Municipality	The fundraising by the Growing Trees Network which together with canal DR held a national fundraiser at prime	People in Aarhus are starting to adopt a green, public space in the city, where they increase	Urban developers are now investing in green (NBS) to get a green profile and managed rainwater.

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				time on television – the first collection of that type in the world.	biodiversity in the city and contribute to management of the area in using their own spare time.	
CN	Fu Forest Trail	Fuzhou	Metropolitan City of Fuzhou (Fuzhou Gardening and Greening Bureau)	The design of Fu Forest Trail adopts many new concepts that are different from the traditional urban forest trails, such as creating a precedent for the rigid frame suspended plank road in China.	Public use of the landscape will contribute to public health and wellbeing. Furthermore, it highlights the value of urban mountains, promotes the importance and protection of urban mountain areas by society as a whole, and further guides and controls the coordinated development of surrounding urban areas.	Fu Forest Trail can contribute to provide more job opportunities for the local population (e.g. need more workers or staff to manage the new afforestation sites, develop eco-tourism).

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	Meishan Dongpo Urban Wetland Park	Meishan	City of Meishan	Dongpo Island is another good case where public authorities ensure that the cultural context of the old city is passed on, drives cultural development and the overall development of the new district.	The original wetland has been preserved maintaining the regional biodiversity. The wetland effectively improved water quality in the area. It ensures ecological security of Dongpo Island, connects the new city with the old, using ecological space, and ensures the sustainable development of the city to the East.	It is free to the public, so no income from entry fees will be generated. The park provides a nice green space for the neighbourhood increasing the price of homes to a certain degree.
	"Green Wedges" Jiaxing	Jiaxing	Jiaxing Municipal People's Government	The project attempts to involve citizens to contribute to the construction of green wedges in different ways using voluntary tree planting.	In the future, the green wedges will be extended as part of urban development and expansion in Jiaxing.	Potential job creation for local people.

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	Green Lungs of the City Project	Yiwu	Metropolitan City of Yiwu	The Public-Private-Participation in the project has improved the efficiency and effectiveness of the project in the urbanised area.	The project improves landscape connectivity between blue and green infrastructure, which is good for biodiversity conservation and water purification. Health and wellbeing benefits are gained through the use of recreational facilities and the provision of educational facilities for local residents and visitors.	The project can provide more green job opportunities for local people (e.g. need more workers or staff to manage the new afforestation sites, develop eco-tourism).
	Beijing Plain Area Afforestation Programme (BPAP)	Beijing	Capital Greening Office (Beijing Gardening and Greening Bureau)	The largest afforestation program in the history of Beijing which gained high levels of satisfaction and support from the local community.	An increased forest coverage and urban green space connectivity in an urbanised area by a forest plantation of	The reforestation and environmental redevelopment of this areas overcame challenges related to those areas that were once low-industrial

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					more than 54 million trees, which is beneficial for biodiversity. There was a strong government intervention in terms of planning and implementation, but insufficient citizen participation during the planning and implementation of this project.	areas, uncultivated lands, waste sand pits and vacant lots.
	Fushan Ecological Park	Qingdao	Laoshan District	Qingdao is a major nodal city of the One Belt, One Road initiative. This project is a good example of how to implement renature/NBS in a coastal urbanised area.	The implementation of NBS or renaturing in a coastal urbanised area helped to enhance the city's resilience and provide more ES for citizens or tourists.	The project can provide more green job opportunities for local people (e.g. need more workers or staff to manage the new afforestation sites, develop eco-tourism).

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5. OVERVIEW OF EUROPEAN AND CHINA GOVERNANCE OF UF-NBS

5.1 Governance of UF-NBS in Europe and China

Nature-based solutions have been described as a "relatively 'young' concept, still in the process of being framed" (Cohen-Shacham et al., 2016). As such, the governance frameworks for NBS are still under development. Based on the research in CLEARING HOUSE WP1.4, there is little to suggest that the governance of UF-NBS is any different to the governance of other forms of NBS. Indeed, support can be found from the findings of Xie and Bulkeley (2020) who reported that whilst local planning processes are assumed to be the instigator of urban (NBS), for European cities project-based actions are presently preeminent. This in turn supports the choice of methodology developed in CLEARING HOUSE M1.6 and used in D1.4 which was to focus on 22 new project-based UF-NBS case histories as the evidence base. Based on an analysis of these, there is support for the findings of Xie and Bulkeley (2020) that at present UF-NBS governance in European cities is presently skewed more towards 'project governance' than 'city governance'.

In Europe embedding UF-NBS in 'city governance' requires an evolution of current urban planning processes to enable the widespread adoption of NBS co-creation in high-level strategic city plans. This is a topic being investigated by the European Commission through its NBS Task Force 6. There is encouragement that elevation of UF-NBS into strategic-level city plans is feasible by drawing a parallel with the widespread preparation of green infrastructure plans as exemplified in the UK. This was driven to a large extent by the decision of the UK Government to include it in the National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2019).

The European Commission is playing a key role in advancing NBS both in terms of its own policy agenda and through the support given from the Horizon 2020 research and innovation agenda. Davies et al. (2021) have identified at least five areas where NBS is directly or implied in EU policy: the EU biodiversity strategy, the EU green infrastructure strategy, the roadmap to a resource-efficient Europe, the European strategy on adaptation to climate change and the EU Green Public Procurement policy. While the European Union can strongly influence research and innovation, it should be noted that for the most part strategic city planning is guided from the national level and then at the regional/city level. Given the dependence of NBS projects on EU funding, this might inadvertently lead to NBS governance remaining at the project level rather than migrating to the strategic city level, unless it becomes a requirement for national governments to follow an EU policy lead. This raises the question of whether in addition to NBS inclusion in other policy areas, such as those identified by Davies et al. (2021), there is a case for an EU NBS strategy to influence national thinking. It should be noted that no differentiation is being made here between NBS and UF-NBS, since it is anticipated that UF-NBS are most likely to be a part of a wider NBS strategic city planning agenda rather than a separate theme, despite urban forests being amongst the most important aspects of urban landscapes in Europe.

Nesshöver et al. (2017) argue that NBS "must be developed by including the experience of all relevant stakeholders such that 'solutions' contribute to achieving all dimensions of sustainability". This argument makes a link to the concept of ecosystem services as proposed in the Millennium Ecosystem Assessment (MEA, 2005), which sets out a variety of governance methods including, amongst others, laws, regulations, partnerships and collaboration. In respect of the evidence base collected in the 22

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'project-based' case histories, all of these governance methods have been found. Furthermore, as pointed out by Kremer et al. (2016) integration of an urban ecosystem framework into urban policy and planning has the potential to translate complex terms to make them more understandable for city actors. UF-NBS is clearly a complex terminology requiring translation for urban professionals, city planners, policy makers and perhaps, most of all, community/citizen interests. A further governance level to be considered is national and international partnerships where urban forestry is the main (or part) focus. Most notable is the European Forum on Urban Forestry (EFUF), which has been a meeting place of researchers, professionals and policy makers since 1998 and has a substantial following across the continent and internationally. There are also a range of organisations undertaking urban forestry research, advocacy and projects at the European level (e.g. European Forest Institute) and at the national level (e.g., the Woodland Trust in the United Kingdom). In addition, science-practice partnerships among universities, research institutes and municipalities provide a further platform for action research, the creation of pilot studies and living laboratories.

In summary at the individual city level in Europe, governance of UF-NBS exhibits the following: (i) a strong focus on the 'project level' where the well-established narrative of ecosystem services provides (and is being used) as a bridge between science and practice and, (ii) a variety of governance methods in UF-NBS projects that resonate with the methods proposed in the MEA and include laws, regulations, partnerships and collaboration.

In China the policy planning field is led from the national 14th five-year plan (2020-2025). This is cascaded throughout the government structures of China including the Province (responsible for regional development), the City (the City Masterplan) and relevant agencies such as the State Forestry and Grassland Administration (NFGA). Beijing, Shanghai, Tianjin and Chongqing have modified arrangements. Each of these has its only five-year plan in a close relationship with the national five-year plan. At the national level the Government wants to see an increase in national forest coverage from 23.2% (2020) to 24.1% (2025). The 14th five-year plan also seeks to implement large-scale projects for ecosystem protection and restoration, especially in the Qinghai-Tibet Plateau region, Yellow River region, Yangtze River, northeast forest belt, the north sand control belt, the south hilly mountain belt, and the coastal line. However, unlike the previous 13th five-plan, the current plan does not point out the 'urban forest'.

Chinese city masterplans set out the high-level policy of the city and all other local plans are subordinate to it; as such they are not that dissimilar to those in Europe although more centrally guided. Of importance is to also recognise that masterplans come with regulations. Government at all levels wants to see more community feedback on local administration and planning although the uptake of this can be low suggesting possible reluctance to engage and/or the need for training on how best to engage.

Despite the absence of urban forestry from the 14th five-year plan, China arguably has a more robust structure for urban forestry and UF-NBS through its National Forest City Development Plan (2018-2025) (see figure 18). The aim of this is to promote the construction of 200 National Forest Cities, six national forest city agglomerations, 500 forest towns and 2,000 forest villages. By 2025, the forest city construction system will be basically established. The trees in forest cities can provide good ecosystem services and the quality of human life will be significantly improved. The detailed planning and management includes expanding the green space, optimising ecological networks, improving forest

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quality, disseminating ecological culture, enhancing ecosystem services and protecting the security of natural resources and each of these has specific quantification indices.

Figure 18: The 194 National Forest Cities in China in 2019 (provided by CAF-RIF, 2021).

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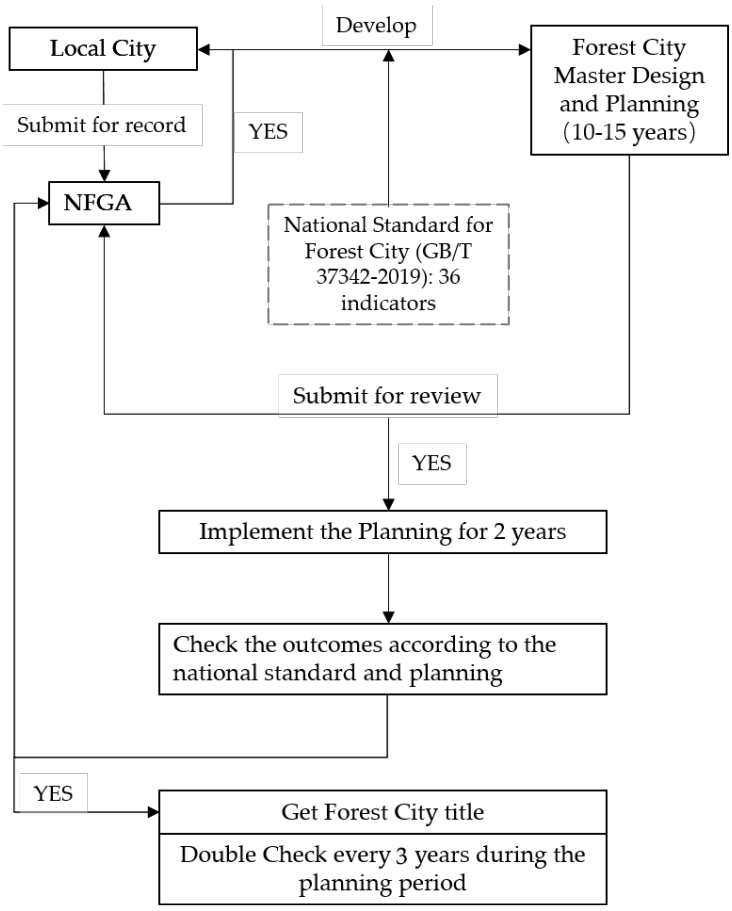

Figure 19: The National Forest City programme has clear structure, key performance indicators and periodic reviews (provided by CAF-RIF, 2021).

In China there is networking activity in respect of urban forestry which includes an Asia Pacific Urban Forestry Meeting led by FAO, China Urban Forestry Forum and a Forest City Forum of China which is a high-level platform involving mayors and coordinated through the NFGA.

5.2 Perspective contributions of governance, institutional and economic frameworks for UF-NBS

To enhance the reportage on governance, institutional and economic frameworks for UF-NBS, the researchers agreed that securing further inputs above and beyond the case histories from regions where frameworks were experiencing acute changes would help to 'ground truth' the conclusions. This requirement was most apparent in Eastern Europe and the Balkans and to a lesser extent in relation to the UK and Ireland albeit for locally defined reasons and regional characteristics. In Eastern Europe and the Balkans, concerns had been raised by the key informants involved in completing the templates that there was a general weakness in respect of governance, institutional and economic frameworks notably but not exclusively outside of major cities (i.e., middle ranking and smaller urban areas). Conversely, it was argued that in the UK and Ireland community engagement in governance is strong and it was felt that the reporting on this should be subject to further expert opinion. To address these,

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contributions were sought from key informants who had worked on the case histories in these regions to add a comparative perspective of relevant frameworks.

5.2.1 Romania

Romania has a long tradition in the forestry domain being one of the richest European countries in forest resources. These forests can have a public or private ownership status and are all managed under the Forestry Code Law (modified in 2020). Areas of primary forests, of high conservation value, still exist in the Romanian Carpathians and are part of Natura 2000, but some are being lost at an alarming pace (Sabatini et al., 2018). In general, poor management practices, often triggered by socioeconomic and institutional change are the main causes of forests loss (Knorn et al., 2013).

A challenging planning issue in Romania is related to peri-urban forests, which are experiencing dynamic and intense landscape changes, causing biodiversity and ecosystem services loss. Many peri-urban areas in Romania include important natural habitats (i.e., meadows, grasslands, forests), with a large potential for NBS, but lack a clear legislation, spatial planning or conservation strategy (Badiu et al., 2019; Gradinaru et al., 2017). At the national level, the Urban and Land planning Law no. 350/2001 (Law on Territorial Planning and Urbanism, 2001), and the Urban Green Spaces Law no. 24/2007 (Law on Regulations and Management of Green Urban Spaces, 2007) are the main regulatory documents influencing the planning of urban forests. A review of existing Romanian planning documents showed that there are no regulations that take into account the specific site conditions in the management of urban forests (Gavrilidis et al., 2020). There are differences in how urban forests are defined at a city level. One can find different types of land use classification such as recreational forests (Bucharest, Brasov, Lasi), forests for sanitary purposes (Sibiu), protected areas (Brasov) or simply just forests. In contrast to other urban green areas (parks, public gardens, and water protection corridors), the city masterplan does not impose thresholds such as a percentage of occupancy by buildings or a coefficient for land cover, which are common planning indicators, nor do they specify a clear range of activities allowed in these areas or the ecosystem services provided for these areas. Planning documents regarding urban or peri-urban forest management, as part of the urban landscape, are equally ambiguous (Niță et al., 2018). Concepts of “green belt”, “connecting green” or “green infrastructure” are non-existent in regulatory documents, which reflects a less developed landscape vision and ambiguous strategies for sustainable development and urban green planning.

Urban strategies have begun to mention the concept of urban green (Niță et al., 2018), but they are rarely based on indicators, targets, expert knowledge or include transversal co-design approaches. A recent study showed that the green infrastructure concept is considered nothing more than a modern reinterpretation of green spaces, and the development of such urban features is considered an unnecessary expenditure for local budgets (Gavrilidis et al., 2020). A recent study on environmental justice in post-socialist countries, including Romania (Kronenberg et al., 2020), found that this issue is still an emerging topic in relation to urban green space provision. That study also confirms the lack of solidarity in society, disregard for social interests and settings that favour business models related to use and management of green spaces rather than the environmental justice discourse.

At the urban scale, green areas are managed by City Councils or Local Environmental Agencies. In the main centres of learning such as Cluj-Napoca, Lasi and Bucharest, universities are also involved in botanical gardens management. The Botanical Garden “Alexandru Borza” of Cluj-Napoca covers an important area in the city centre, being one of the green lungs of the city and a reservoir of biodiversity

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and ecosystem services. Botanical gardens in Romania also cover important functions for outdoor learning. Other outstanding examples of urban green areas in Romania are centenary parks (such as the Central Park in Cluj-Napoca, "Sub Arini" Park in Sibiu, Copou Park in Lasi or Cismigiu Park in Bucharest) and arboreta. Some parks and arboreta are related to former therapeutic gardens or forests, i.e., related to thermal spa's such as Buzias or Borsec or psychiatric hospitals such as Arboretum Simeria. Other valuable green areas are represented by small urban gardens or edible gardens with fruit trees in the front of apartment blocks, created and managed by neighbours. These are seriously threatened by abandonment, lack of institutional interest and land-cover change.

The potential of UF-NBS in Romania is huge, but for the moment no conservation or urban planning documents integrate or recognise them. Assessing, mapping and monitoring urban areas and their ecosystem services would be a good starting point for motivating and engaging citizens. Citizens, scientists, planners and local authorities all have a key role in understanding, valuing and managing the urban and peri-urban forests in Romania, but it is yet to be activated. Green infrastructure needs to be recognised as more than just another term for conventional urban green space, and within that wider domain urban forests must be enhanced and managed to support sustainable development, resilience and biodiversity within Romania's urban areas.

5.2.2 Poland

Poland has experienced a dramatic shift from one socioeconomic system to another – from socialism to market capitalism. The change was abrupt and involved not only institutional changes but important social changes with regards to preferences, values and behaviours. These changes have been manifested by the broad embrace of a neoliberal agenda which sees the market as a solution to socioeconomic problems. This is evident in planning and societal approaches to urban green spaces (Kronenberg et al., 2020). The Nature Conservation Act in 2017 provides a particularly acute illustration of problems generated by this shift. The liberalisation of this act allowed trees to be cut down on private property without an obligation to report the tree removal to relevant authorities. The only exceptions were business operations and nature monuments which retained formal consent approval from authorities; this resulted in an unexpected massive removal of trees. The subsequent public debate suggests that the government had not properly assessed the potential outcomes of this decision and was forced to restore some of the previous restrictions regarding cutting down trees. The effects were very severe. A recent assessment of tree canopy loss over the decade 2010–2019 shows that about 40% of canopy loss took place during this period (Kronenberg et al., 2021). Furthermore, about 80% of the loss was recorded in private land implying that property owners took advantage and removed trees 'just in case' the regulations change again. The largest share of trees removed (approximately 40%) was lost from unclassified and unmanaged greenery, i.e., informal green spaces which – although they were not formally managed – would have provided a large share of UF-NBS.

Whilst the liberalisation of the Nature Conservation Act in 2017 was exceptional in terms of its consequences, there are innumerable other examples where private interests have been given priority over public benefits. Indeed, the loss of urban green and blue spaces in post-socialist cities has been called construction terrorism. This descriptor describes an aggressive development of land, based on poor legal protection and the abuse of numerous legal loopholes. This is not unique to Poland and has been observed in many post-socialist countries. Since the shift from socialism to market capitalism began, many more trees have been removed than planted in Polish cities and this can be attributed to

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a number of social and institutional failures (Bożętka, 2010; Kronenberg, 2015). These included insufficient funding, regulations downplaying the significance of urban greenery, abuses by property owners and managers as well as by the contractors responsible for green space maintenance. Furthermore, society perceives other issues as more important than urban green spaces (including competing land uses) (Kronenberg, 2015).

Governance and institutional problems with urban green space management are part and parcel of broader problems in spatial planning. A study which investigated the evolution of spatial planning in Poland since the 1920s highlighted the dominant policy paradigms and internal and external determinants leading to the reform in the early 1990s. *"The new institutional framework that emerged from the reform failed to introduce alternative and effective forms of local spatial planning. Once options for planning were reduced, it became difficult to revive them. The case of Poland shows that a revision of long-term planning institutions might have unexpected outcomes and that it might be difficult to restore particular instruments and planning approaches once they have been removed from the toolbox of the planning system."* (Niedziałkowski & Beunen, 2019).

In Poland there are also problems with collaboration of different stakeholders and public participation in general (Kronenberg et al., 2016; Mabelis & Maksymiuk, 2009), which favours the interests of the more prominent stakeholders and relying on various local governments – these business coalitions often interpret the needs of society through their own perception of their needs and values (Kronenberg et al., 2020). Poor collaboration and lack of consideration of inhabitants' needs and preferences result in new forms of exclusion from the benefits of urban green spaces, partly related to ongoing and aggravating social segregation. So far, socioeconomic segregation in Polish cities has occurred in microscale only and is primarily related to the evolution of housing stock (Łaszkiewicz et al., 2021), but the current setting is likely to favour further segregation, partly related to (eco)gentrification.

While formal green spaces account for about 10–20% of the area of Polish cities, when all areas covered by vegetation are included this share increases to about 60–70% (Feltynowski et al., 2018; Sikorska et al., 2020). These data are based on 18 regional capitals, i.e., the most important cities, but the same problems occur in smaller towns (Feltynowski & Kronenberg, 2020). Clearly, the potential of green infrastructure is still underappreciated and the informal green spaces which are not formally protected (not formalised) are subject to intense development pressure. If the most important pieces of informal green spaces are not formalised and formally protected, there is a risk that the potential green infrastructure will be deprived of some key nodes and components.

5.2.3 Croatia

Spatial planning is organised as a multilevel system that includes state, regional (county) and local level. The state (ministry responsible for spatial planning) provides a framework for spatial planning. The current Strategy of Spatial Development of the Republic of Croatia (OG 106/2017) (Ministry of Construction and Physical Planning Institute for Spatial Development, 2017) covers the period until 2030. Public green space planning other than forests is a responsibility of city or municipal urban planning departments. A sociological study on urban transformation of the city of Zagreb in the transition and post-transition periods shows that the most powerful actors are economic (developers) and political actors (the mayor), while professionals and civil society are those with almost no power

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(Zlatar, 2013). Political actors favour developers and the result is generally not in the interest of the public. The result is so-called 'spotty urbanism', in comparison to previous urban planning as a long-term, systematic and interdisciplinary process.

The state-owned company Croatian Forests Ltd. manages all state forests and develops general forest management plans for a 10-year period, based on annual forest management plans. Management of public forests in urban areas is also the responsibility of Croatian Forests Ltd. In the City of Zagreb (which also has a status of county) park forest management planning is partly done in collaboration with the city of Zagreb administration that co-funds adaptive management of Zagreb park forests mainly for recreational and amenity services. Private forests in urban areas are the responsibility of their owners who may or may not be engaged in active forest management. The management of public urban green spaces other than forests is the responsibility of local governments. Larger cities have city-owned companies responsible for public green space while smaller urban areas do not have such companies. The problem in smaller urban areas is also a lack of green space professionals.

Special public institutions are responsible for protected areas established at different levels (state, regional, local). For instance, in the city of Zagreb, there is public institution Maksimir that was at first responsible only for park Maksimir as a monument of park architecture (one of the levels of nature protection) and cultural heritage area; later its jurisdiction was enlarged on all green spaces protected at the city level. Public green space management is almost exclusively publicly funded. The exception are activities funded by EU projects. It is not possible to calculate how much money exactly goes for green space management (green space budget is included in the overall public space management/maintenance budget). Recently, there have been some examples of participatory budgeting in some cities in Croatia (e.g. Pula, Mali Lošinj, Karlovac, Dubrovnik, Rijeka, Trogir, Pazin, Opatija, Lepoglava, Pleternica, Pregrada) usually stimulated by different projects. This can be considered as a governance innovation in the context of governance in Croatia even though this has been present in Zagreb for some time.

There are also other green spaces that are not managed by local government-owned green space management companies, such as the greenery of educational institutions (schools, kindergartens) and of sports and recreation fields, which is a responsibility of these organisations. Greenery along water courses (streams, rivers) is the responsibility of the state-owned water management company Croatian Waters, the greenery around residential buildings is the responsibility of all co-owners of the building, and lastly private gardens are the responsibility of their owners. All public green space is accessible for recreational purposes. Urban botanical gardens are fenced and may have limitations in terms of working hours. Parks and other green spaces are not fenced and can be visited at any time of the day. All people have the right of public access to forests regardless of ownership and time of day. Forest foraging (e.g., mushrooms, chestnuts) is also allowed for personal consumption. Municipal regulations prescribe rules that should protect public green space from destruction and negative user behaviour (e.g., Decision on Municipal Order of the City of Zagreb, OG of the City of Zagreb 14/2019; Amended in 22/2020, 2020). In practice, monitoring of municipal regulations is a task of the municipal "police". They can report and charge negative behaviour of users (e.g., parking on green space, dog owners for not cleaning green space after their dogs). The main issue with the monitoring of enforcement of municipal regulations is the small number of people who work as municipal police. A survey with Zagreb residents shows they support the idea that the number of people who work as municipal police should be increased in order to better protect public green space (Krajter Ostoić et al., 2017).

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Governance research with regard to urban forests and green space in Croatia is very scarce. Governance of public forests and green space in Zagreb, but also in other cities and municipalities, is characterised as governance by government. The public can participate mostly by giving comments on spatial (urban) planning documents or forest management plans at the end of the planning process. There are public hearings and exhibitions of urban and forest management plans. The public can also file complaints or any other comments to city administration, companies providing green space or forest management services or any other institution with regard to urban forest and green space planning and management at any time and is entitled to receive formal response. Non-governmental actors are mostly disappointed with public participation processes, since it is not participatory planning where actors are involved from the beginning but are involved at the end of the process merely to legitimise those plans.

Conflicts over urban forest and green space management often happen in urban areas, especially larger cities where every action by green space and forest management companies is under public scrutiny. The public do not trust forestry and green space professionals and especially the city administration. Residents of the city of Zagreb are on average less satisfied with forest management than green space management in the city (Krajter Ostoić et al., 2017). Communication between professionals and city administration and the public is insufficient to non-existent and, so far, little has been done to prevent those conflicts. Some of the problems reported in a recent study with Zagreb residents is the perception that green space is decreasing, that removed trees are not replaced, that the obligation to replace removed trees as prescribed by a municipal order does not correspond to the needs of the local population, that some green spaces are not properly maintained, and that behaviour of other users (usually dog owners) is a problem.

5.2.4 United Kingdom and Ireland

Whilst the planning systems in the United Kingdom and the Republic of Ireland are entirely separate, they have shared historic roots. Furthermore, the planning system within the United Kingdom is devolved to national administrations in Scotland, Wales and Northern Ireland. In many respects they are similar although in Scotland, which has its own legal institutions, there are more notable differences. The United Kingdom has long embraced a market economy which has become increasingly neoliberal since the 1980s. In England there is an emphasis on the private sector as a vehicle to deliver public services and where this is not possible, use is made of non-governmental charities and voluntary organisations although this is less so in other parts of the UK. Both these sectors are considered to play a more significant role in the United Kingdom than in other European countries. Nevertheless, central government and local government are still the major provider of resources for urban green space management.

There is a rich history of urban tree management in the United Kingdom and Ireland which dates back in most instances to the 19th century. This was a period of rapid urban growth based around industrialisation. During this period, cities benefitted from philanthropy which led to the creation of public parks as well as the planting of street trees. Throughout the 20th century urban tree management varied enormously not only between cities but also between successive eras of economic growth and decline. The period of austerity following the 2010 general election saw a major decline in resources for all types of green space management, and although the economic climate has improved it will be many years before it returns to pre-2010 levels. The UK and Ireland have one of the lowest

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levels of forest cover in Europe and for the most part urban fringe areas are principally agricultural interspersed with footprint urban developments. Few urban centres have large woodlands on their periphery although at least one programme, community forests in England, is trying to address this issue. The Forestry Commission, originally a Great British-wide government department, is now essentially devolved to the national administrations. Historically its roots lie in rural land use, but it has become increasingly urban focused and is frequently a partner in local initiatives.

The role of trees in terms of ecosystem services is increasingly understood and the concept of green infrastructure is embedded within the planning system. Whilst both of these concepts are well understood within local municipalities and government, financial and human resources are modest in comparison with other areas of public investment. Many local authorities now have green infrastructure strategies and these generally include reference to the ecosystem services that trees provide. Some local authorities also have tree strategies although these tend to focus on arboricultural issues rather than look at the tree canopy holistically; however, this may be changing with the arrival of planning tools such as iTree. Trees are also under significant pressure in respect of development and the management of street scene infrastructure such as cabling and utility ducting. One of the benefits of urban tree cover is the protection of soils, but this is generally overlooked in the planning system and many trees suffer from premature death or are vulnerable to pests and diseases.

There are a myriad of initiatives to improve the situation with regard to urban and peri-urban forestry in the UK and Ireland. For example, in England there are new initiatives surrounding community forests and interregional initiatives frequently involving non-governmental organisations such as the Woodland Trust. There is no evidence to suggest that this trend will change. NBS are discussed at a policy level, but for the most part their use in infrastructure remains to be exploited. One area that the UK and Ireland excel in is community engagement in green space management. Voluntarism is a well-established part of the culture of society, and membership of nature conservation organisations such as the National Trust and RSPB is very large. Volunteers are involved in the management of local green spaces in most cities usually under the title ‘friends of' groups, or through organised activities by local branches of national/regional charities such as the Trust for Conservation Volunteers (TCV) or County Wildlife Trusts. Consultation is also taken seriously by service providers and in the development of local plans. Hence, in relation to NBS such as education and participation the UK and Ireland are already well positioned. However, NBS as a terminology is generally not used in public discussion and for the most part the predominant professional narrative remains around ‘green infrastructure’.

6. DISCUSSION

6.1 European context

After the data analysis, it has become apparent that the ‘govern by the government’ (Kleinschmit et al., 2009; Kooiman, 2003) approach is a dominant one in all studied planning families across Europe. In most of the collected case histories (n=19) the local authorities initiated a project or UF-NBS-related actions. Mostly cities and municipalities (n=15), less commonly the regional authorities (n=4), acted as the main force behind the initiatives. The cooperation between municipalities was registered (e.g., in Paris or Aarhus), but it was not a dominant governance arrangement. This can be explained by the locations and sizes of the studied case histories, whose scope did not extend beyond one municipality or city (for interesting exceptions see Milano and Vienna). The case of the city of Oostende (Belgium),

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where the forest and afforested land are owned by the city but managed by a cooperative business "Buitengoed", provides an alternative governance framework for the management of UF-NBS. In Oostende citizens can support the establishment and management of the peri-urban forest through several actions (by becoming member-shareholders or annual members of the Buitengoed cooperative or by acting as volunteers). The search for the working and tested alternatives of governance frameworks is of special importance if the problem of the poor collaboration between stakeholders and a lack of consideration of inhabitants' needs and preferences is to be resolved (see a discussion on the involvement of citizens and different groups of stakeholders below).

The discussed issue of the dominance of 'governing by government' is in line with research findings discussed by authors of this report (see section 'Perspective contributions of governance, institutional and economic frameworks for UF-NBS'). Krajter Ostoić (Section 5.2.3 – Croatia) and Kronenberg (Section 5.2.2 – Poland) point out that in the case of the post-socialistic countries this relates to the strong position of local municipalities and limited public participation. If the second appears, it has most commonly a form of public hearings or providing comments on blueprints prepared by local authorities. Kronenberg et al. (2020) state that in the Polish case, the dominance of various local government–business coalitions results in new forms of exclusion of citizens from the benefits of urban green spaces (Łaszkiewicz et al., 2021). Krajter Ostoić et al. (2017), in turn, highlight the conflicts between the public on one side and city administration and management companies on the other, which can be a result of a lack of well-designed participation processes in regard to the design and maintenance of urban green spaces. This is due to lack of trust in authorities in charge of the management of green spaces (as forestry in regard to urban forests). An erosion of public trust in the performance of the public authorities managing green spaces brings a risk of slowing down the process of the shift in governance arrangements (e.g., from the 'govern by the government' to 'govern with the government') and not using the full capacity of UF-NBS.

Similarly, the economic frameworks are strongly linked with the local authorities. Funding for the analysed case histories has been provided mostly by local sources. The most sufficed financial support to the project has been provided by the municipalities (n=15). In some of the examined case histories (Belgian cases, Milan, Vienna, Helsinki), an attempt was registered to widen a source of funds (in total n=5). and to engage with higher level administration Also, some trends towards European funding and international collaboration can be recognised (e.g., in the case histories for Vienna and Helsinki). International, trans-boundary projects profiting from EU funding (like those provided for the Natura 2000 network areas) can be seen as a way to go beyond city-based funding and strike governmental funding (n=11). This kind of projects (see Vienna and Helsinki as examples) provides a holistic approach to UF-NBS and creates a space for cooperation within wider networks of cities, municipalities and regions.

However, even if projects using international funding provide an alternative for the dominant form of governance and economic frameworks, they still do not resolve the challenge of the 'duration-of-the-project-funding'. In most of the case histories, funding was secured only for the duration of the project/initiative. Post-project funding was an open question. If projects do not succeed in developing a wider ownership of their outcomes in (local) society, there is a risk that the benefits obtained from UF-NBS will not be permanent or long-term. Again, the case of the city of Oostende (Belgium) could be seen as a suggestion of an alternative perspective. Long-term economic thinking was embedded in the economic arrangement for the project while targeting a wide and multi-aspectual involvement of

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citizens. The City of Oostende bought the land and is currently lending it to the cooperative "Buitengoed". The Flemish Region co-funded the land acquisition, tree planting, and nature management interventions. The public company (managing the industrial zone) contributed to the starting capital for the cooperative. Citizens support the management of the cooperative through their membership. The income is generated from meat selling (produced by cattle grazing in the project area) and through food production by the urban collective vegetable garden. As this example illustrates, even though the initial funding was provided it was designed to target a long-term solution for the use of UF-NBS, where public funding will no longer be necessary for the continuation of the action.

This leads to the next issue – the involvement of the private sector. As the analysis showed, there is not much of private sector and private funds involved in the development and management of UF-NBS in the presented case histories. However, some innovations are recorded, especially among Nordic cases (e.g., Aarhus – the involvement of a private water company; Helsinki – the prisoners engaged in the project) where there is still a need for innovation. As successful cases of involvement of the private sector illustrate, a way forward may consider a more holistic approach to cities and NBS and not a narrow focus on one NBS. As the Aarhus case showed, linking afforestation and tree planting activities with those focusing on ensuring drinking water provision and improving recreation, biodiversity, social habitation and the health of citizens can be an answer to many, wider and interlinked city challenges like environmental pressures (sea level rise, high groundwater levels), pressures from intensive land use, population growth, increased demand for recreational green space.

As already pointed above, public engagement can be described as quite formalised, with a still substantial deficit of the bottom-up initiatives. Public involvement in decision making, public control and public initiatives are not very visible. This is an important outcome of the analysis as the lack of public engagement can potentially be related to future acceptance of projects and their outcomes in society. Projects like Renforcement du Réseau Écologique in Brussels (Belgium) highlighted a reverse approach, where mapping of relevant stakeholders and involving them take place before the actual action. This project is led by the regional agency for the environment but focusses on the close collaboration with public actors, associations and citizens in neighbourhoods to develop local-based strategies aimed at enhancing regional ecological connectivity.

In many of the studied cases the educational and recreational aspects were dominant. They connect to citizens' health and improving their accessibility to green areas. The role of afforestation is strong in some regions (Bari, Leipzig, Aarhus, Milan, Ostend, Ghent), while in others effort is concentrated on the maintenance and enhancement of existing infrastructure (Paris, Helsinki, Zagreb).

6.2 Chinese context

The Chinese case histories reveal the strong role that local government plays in developing and delivering nature-based projects in China. Indeed, in respect of the institutional framework for UF-NBS the evidence collected suggests that without government engagement, especially at the city level, there is no real mechanism available to plan or deliver NBS. The municipalities are using their own planning powers (e.g., masterplans, city structure plans) and financial and human resources to progress projects at the local level. In respect of planning UF-NBS, the local government has the benefit

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of, but also directivity from, national policy such as the Forest Law as well as guidance from the State Forestry and Grassland Administration and at a macro-level the China five-year plan.

In terms of policy issues and drivers for change several urban planning issues are revealed by the case histories. Improving the recreational infrastructure is notable and this reflects the pressure of rapid urbanisation. There is limited access to local green space for many local residents, and recreational opportunities can be far away. As can be seen from the case histories, these are often beyond reasonable reach by the most sustainable means (walking or cycling) and require long journeys by car or public transport. However, there is evidence that policy maker's awareness about public health and well-being and the socio-environmental impact of dense urbanisation has grown since the millennium. The context is that most urban centres in China provide residential accommodation in tower blocks and internal residential space (i.e. apartment size in sqm) is generally very limited. Even allowing for cultural norms, this does put pressure on families, especially those that are intergenerational and have younger children. Clearly public policy makers are aware of this difficulty and policy and implementation, as evidenced by the case histories, are attempting to tackle this problem.

There is also evidence of ecosystem thinking in the case histories, which indicates an awareness of the need to make development more sustainable and to address issues of resilience. Examples include the management of water and air quality and tackling the urban heat island. Fushan Ecological Park is interesting in this regard, as efforts are being made to prevent the further ingress of urban development and to rebuild the ecosystem services provided by a hilly area which has been in ecological decline for some time.

The scale and financial ambition of the case histories are large. Even allowing for self-selection bias the scale and ambition of NBS projects are noteworthy. This is most notable in the Beijing Plain Area Afforestation Programme, which as reported earlier by the end of 2015 had increased forest coverage from 14.8% (2011) to 25% (2015) with more than 70,000 hectares of new forest (more than 54 million trees) planted and a survival rate in excess of 95%. Even though the Beijing example is the largest of all the case histories, each has a high degree of ambition. The 'Fu Forest Trail' ('Fudao' in Chinese) in Fuzhou is of global quality and an international signature for the city. This does however raise an interesting perspective with regards to governance, which is that ambition is largely top-down in policymaking and does not necessarily reflect the needs or wishes of local communities.

In respect of economic framework most, if not all, funds can be regarded as public sector. Furthermore, in terms of implementation it is clear that public funds are also being used to implement projects via state-owned companies. A single case of a private enterprise was identified and, in this case (the Fu Forest Trail), the rationale appears to have been to bring in experience which was available on an international basis. There is evidence of strong supervision via the municipality too. Hence, the local authority plays a pivotal role in the whole lifecycle of a project from the development of a policy idea, its inclusion in strategic plans, securing funding, deploying that funding, monitoring implementation and then maintaining the asset delivered.

Project development can be regarded essentially as top-down with limited citizen engagement in the policy and planning phase, and only later do citizens get directly involved either as end-users or possibly as volunteers. In terms of governance the overarching theme is one of governance by government either centrally directed in terms of macro-policy and the state five-year plan or notably

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at the local level through the governance provided by the local municipality. Thus, public engagement appears highly structured, and no evidence was found of bottom-up initiatives in the case histories.

6.3 Cross-comparison of the European and Chinese contexts

6.3.1 Homogeneity

Researchers found similarities and differences when comparing the Chinese and European case histories. These in part reflect that urban Europe is less homogeneous than the populous parts of urban China. For instance, in Europe the 'urban' and 'green' planning approaches, unequal distribution of resources and the nebulous nature of project creation and delivery are notably different compared to China. This reflects the fact that Europe is a continent of different countries and that law-making and urban land-use policy making are substantially delegated beneath the EU level.

6.3.2 The role of local government in UF-NBS

At a superficial level, there is a similarity that UF-NBS projects rely upon or are instigated by local government. In both Europe and China, local authorities play the dominant role. However, beneath this the respective roles of local government show different approaches. One of these is in respect of local 'community' engagement. Community engagement and 'bottom-up' governance in UF-NBS projects are more noticeable in Europe than in China. The voice of stakeholders and local communities is normally considered to be a strength of UF-NBS projects in Europe. Indeed, it is normally acceptable in policy terms within Europe to refer to the process of developing a project as one of its benefits to the extent that community engagement in project planning as well as delivery are normally regarded as 'NBS' to address issues such as social exclusion.

6.3.3 Public sector funding

In Europe assembling a budget for a major project is a significant and often time-consuming aspect of project development. This can involve drawn out and uncertain fundraising activities at a regional, national and European funding level. This introduces a project management risk that sufficient funding will not be found and also leads to a long lead time between conceptualising a project and delivering it on the ground. In contrast, in China the process from planning, securing resources to delivery is much shorter. It seems inconceivable that a project such as the Beijing Plain Area Afforestation Programme could happen in Europe within such a short period of time, if at all. Hence, in terms of local government achievements the delivery of 'physical infrastructure' NBS projects on the ground in China has notable benefits.

6.3.4 Managing the outcomes

In China funding appears to be normally ring fenced for the duration of a project's implementation. This can also be the case in Europe, where despite more diversity to funding streams it is generally not so clear cut. However, there are concerns in both China and Europe that funding does not sufficiently address the long-term 'management phase' after a project has been implemented. There are some potential differences driven by culture and governmental structures. Citizens in Europe appear to be more engaged in consultative activities than those in China. This is not because of structural resistance by Chinese local authorities, who are generally eager for citizen feedback, but more likely due to a lack of tradition and the need for confidence building and upskilling about how best to feedback to

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institutions. Indeed, in both Europe and China there is some way to go in terms of developing co-governance and co-design and, for the most part, examples of good practice are down to the effort of local project managers or their staff. The example of the Community Forest programme in the UK is illustrative in this regard of which the Water Haigh Woodland Park in Leeds, is one example. This programme places community engagement as a central tenet of their work. However, in terms of long-term management of UF-NBS (post-implementation) the resources that citizen action represents in terms of certain management tasks and stewardship responsibilities should not be underestimated. The diversity of funding streams in Europe may also lead to the involvement of more stakeholders, and whilst this can complicate decision making it can equally lead to a wider and larger range of involved actors and greater diversity of participation. This in turn increases the possibility for developing social/citizen 'ownership' of a project and its outcome. It also brings greater possibilities for innovative/alternative funding schemes, even after municipality funding has ended. Learning points from this are that the mapping of stakeholders prior to project implementation and involvement of a bigger variety of stakeholders may lead to longer-lasting effects and outcomes. However, this also suggests that capacity building may be needed if the range of stakeholders is limited and that UF-NBS managers should also consider the upskilling of local communities as a means of engagement. This applies equally to China and Europe, although for cultural reasons the approach may be different.

6.3.5 Governance

For historical and cultural reasons, the governance situation in China is predominately top-down starting with the China five-year plan, through national institutions before arriving at a regional and local government level. Bottom-up community participation, which is relatively familiar especially in western Europe, is largely absent in China. However, there are noticeable differences within Europe, and these do correlate with the modified planning families originally chosen for the GREEN SURGE project and used again in CLEARING HOUSE and based on ESPON.

6.4 Links to other WPs and deliverables in the CLEARING HOUSE project

CLEARING HOUSE is a three-tier project. Deliverables in Work Package 1 and task 2.1 represent a review of knowledge and the development of an analytical concept. Task 2.2 and Work Package 3 involve a more in-depth analysis and a collaborative learning process, respectively. The main objectives of Work Package 4 are to take the knowledge, research and learning acquired in Work Package 1, Work Package 2 and Work Package 3 and turn them into a set of functional tools for key end uses. Hence, deliverable 1.4 is an input to later in-depth analysis and collaborative learning and, through a further process of synthesis, into a set of functional tools for key end users.

6.5 Linkage with deliverable 1.2 and deliverable 2.1

There is a close relationship between D1.4 and task 1.2 (D1.2), since the case history templates used as a data source for this deliverable are common to both tasks. Hence, the two deliverables should be considered as complementary and read in tandem. Whilst duplication of results has been avoided as far as possible, researchers are aware that some of the findings from the local 'key informants' who prepared the case histories on UF-NBS mean that where there is overlapping content. To resolve this, the two teams worked together to interpret outputs within the grey literature review in task 1.2 as well as the analysis in deliverable 1.4 and avoid contradictory assessments. Task 1.2 and task 1.4 are

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both concerned with the UF-NBS 'project level' and use this level to investigate higher levels of planning and policy.

In contrast, task 2.1 has undertaken an exploratory analysis of case studies at the 'city/regional scale', although representation of projects is a necessary aspect of this. In summary all three deliverables (1.2, 1.4 and 2.1), read in combination, provide inputs to the collaborative learning process on UF-NBS in Work Package 3.

7. CONCLUSIONS

While the design, implementation and management of UF-NBS depend on the social, cultural and economic contexts, as well as the political framework characteristic for a country, there is a possibility for cross-comparing and mutual learning when analysing case histories among different European countries, as well as between Europe and China.

The added value of cross-comparing is connected to the promotion of the good practices and successful stories, as well as innovation when applied to UF-NBS. Since NBS, and especially UF-NBS, are relatively new concepts, the way they are mainstreamed should be carefully monitored and supported by the knowledge and capacity building among engaged stakeholders. The exchange of practices and discussion on lessons learnt can support this transition. The case histories have shown that ecosystem thinking in both Europe and China is already established, and whilst UF-NBS are not always recognised by name they are already evident in practice.

The engagement of civil society (social groups, citizens) is still relatively low. This links to the top-down approach described in the majority of the case histories, with the leading role of municipalities. We see a need for widening the scope of the co-design processes involving local residents and various citizen groups. It can be argued that the long-term solutions targeting multiple aspects of the urban fabric depend on social acceptance. The same relates to the success of these solutions, if meant in meeting the needs of urban residents.

The engagement of the private sector still seems to be falling short of expectations. There is a need to identify and promote good practices, engagement and cooperation of the private sector in UF-NBS. Indeed, the funding of UF-NBS relies to a high degree on municipal funds. This has multiple consequences for UF-NBS. Firstly, it may strengthen particular governance arrangements, where decisions are taken top-down and public participation to consultations is limited, as well as co-design. Secondly, it may impose institutional arrangements where citizens are recipients, not co-owners and co-makers of proposed solutions. Thirdly, it may reduce the scope of innovations for economic frameworks by consolidating the established funding arrangements and possibly limit the involvement of the private sector.

Long-term planning should always be considered in case of UF-NBS, also in case of funding. Municipal funds can be restricted to the duration of a project. There is a need to explore alternative economic arrangements, which can also be a starting point for new governmental and institutional arrangements.

The scale of ambition and the ability to access capital funding appear to be less problematic in China than in Europe, although some of the same problems are evident in both including the high value of land and general land availability. Funding in Europe generally comes from a number of different

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sources, usually as previously stated with the municipality in the lead. However, EU funding is also very important. Project managers are often engaged in fundraising and grant assembly, too. Assembling the funds to start a project in Europe is slow in comparison with China, which means that the lead time from conceiving a project to starting its implementation can take a long time. Neither does Europe have an equivalent of the Chinese Forest Cities programme and this is considered a limitation.

Table 7: Questions for future research on UF-NBS based on the findings of investigation of governance, institutional and economic frameworks for UF-NBS.

(1)	**What strategies can be developed to build the 'capacity of' and 'diversity of' stakeholders to contribute to the enhancement of UF-NBS?** • contributors to UF-NBS can be highly diverse and beyond those that might be expected to contribute (e.g. nature organisations) should there be a 'long list' of potential contributors developed to guide UF-NBS planners • processes of (co)design, planning, applications and outcomes of UF-NBS projects can enable involvement of a wide range of stakeholders in support of wider green governance (and to make them active and engaged beyond the scope of the project) • local authorities currently dominate the planning and implementation of UF-NBS (albeit not always by name) – are there mechanisms and approaches focusing on the leading role of the citizens in planning and implementation and can these be strengthened • to what extent is capacity building a valued outcome of UF-NBS beyond the delivery of physical biophysical improvements
(2)	**How can the engagement of the private sector be enhanced in the planning and delivery of UF-NBS?** • public–private partnerships in the payment for UF-NBS implementation and management especially in regard to urban ecosystem restoration could be beneficial – are there case studies of good practice that could be shared via NetworkNature • mobilising development consents to raise finance for UF-NBS investment and long-term management has potential but also constraints are guidelines needed • using local bylaws and legal instruments to ensure that trees on private ground are co-managed for UF-NBS and not tree safety alone – are there examples of good practice that could be shared via NetworkNature • awards and other forms of official recognition are useful to the private sector in the self-marketing to employees, investors and customers, can examples from other sectors be adapted for UF-NBS • corporate social responsibility programmes including the adoption of local trees and woodlands extending to workplace volunteering could enhance management of the urban forest, is a toolkit needed
(3)	**How can co-design of UF-NBS be enhanced?** • toolkits and guidelines could help local authorities to seek community engagement and empower co-governance of planning processes for NBS • to what extent engaging professional enablers and facilitators to work with local communities to upskill and enhance their participation (paid for by the local municipality) is beneficial for co-design • is moving up the ladder of community participation from consultation to partnership and possibly co-governance realistic and beneficial to the ecosystem benefits of implemented physical NBS • is the creation of new project organisations (such as Community Forest projects in the UK) with significant local participation important for the delivery of UF-NBS, reducing dependence on the local municipality but not to the extent of abandonment • can change management in institutions lead to enhance multi-level and networked governance dynamics for NBS

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(4) What innovations in the long-term planning and funding of UF-NBS can be foreseen and how can these be achieved?

- how can the inclusion of UF-NBS (and other NBS policies) in city/urban/regional master plans be an addition too, rather than replacement for existing policies on green infrastructure and ecosystem networks
- the need for clearly identified long-term revenue-driven funding is proven but how can the constraint of short termism be overcome
- valuation and modelling of UF-NBS via whole life costing should include valuation of non-market benefits, raising well-being and sustainability/resilience in economic planning, breaking path dependence which currently favours grey infrastructure, what other valuation factors should be added
- target-driven tree planting is an inadequate measure of success as this takes no account of initial loss, planned management or longevity of trees, how can this be attitude be overcome at the highest level of government
- what is the process by which the upscaling UF-NBS from the 'project level' to 'city level' can take place (note that some projects are larger than cities and include multiregional stakeholders)
- low representation of the economic macro-category in the case histories shows the need for further work on the sustainability of UF-NBS solutions in the future based on financial/economic modelling, which in turn is relevant to the previous point about up scaling from project level to city level

(5) How can the time taken from project visioning to commencement be reduced?

- can access to public funding for UF-NBS be enhanced and how
- public funding can be used to 'kick start' a project and ensure that projects have time to build their fundraising capacity but how to withdraw without jeopardising the projects sustainability
- sharing experience among cities and projects from those who are active and successful (e.g. twinning, leader/follower, urban forest learning laboratories) could lead to sharing benefits
- how to better use existing networks (such as the European Forum on Urban Forestry [EFUF]) to communicate methods of success

(6) What additional measures could build up the success of UF-NBS?

- investigate whether the China Forest City concept (see figure 19) could be developed and rolled out in Europe
- could the China Forest City key performance indicators (KPIs) be adapted as a benchmarking tool in Europe
- socio-political framing of UF-NBS could include aspects of environmental justice, environmental racism, urban political ecology, stewardship of trees and woodlands and equal access as areas for further social science research

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APPENDICES

APPENDIX A: OVERVIEW OF ACTORS, RULES OF THE GAME, RESOURCES AND DISCOURSES INVOLVED IN UF-NBS.

PLANNING FAMILY & Case history	Actors	Rules of the game	Resources
BRITISH **Water Haigh Woodland Park**	***Lead organisation:*** *Leeds City Council; Yorkshire Wildlife Trust; White Rose Community Forest* ***Involved actors:*** • *Governing authorities: 3* • *Associations: 4* • *Citizens: 2* • *Municipalities: 4* • *Public/private institutions: 7* • *Park planner and authorities: 1* • *Technicians for park maintenance/monitoring and to educate and support citizens: 1* ***Total number of actors: 22***	**Management (who is responsible/in charge of)** Municipal Units: Green Spaces Unit, Planning Unit. **Frameworks above the project** National/Federal Law: Planning Policy Framework **Regulatory framework that the project operates within** Municipal laws: Local Plan (Planning Framework), City Green and Blue Infrastructure Regulations, Regional agreements concerning Water, Regional agreements concerning NBS.	*Community fundraising* *Municipality Special funds* *International (European Union)*
CENTRAL **Donau-Auen National Park**	***Lead organisations:*** *Nationalpark Donau-Auen GmbH* ***Involved actors:*** • *Governing authorities: 1* • *Associations: 1* • *Citizens: 3* • *Municipalities: 2* • *Public/private institutions: 3* • *Park planner and authorities: 1* • *Technicians for park maintenance/monitoring and to educate and support citizens: 4* ***Total number of actors: 15***	**Management (who is responsible/in charge of)** Public utility company **Frameworks above the project** 1. National/Federal Law: Nature Protection Law, Ministry of Science and Transportation Regulations 2. Regional Law: Biodiversity and nature management law 3. Municipal laws: Nature Maintenance Regulations **Regulatory framework that the project operates within** 1. National Park 2. Municipal laws: Hunting and Fishing Management Plan	*National government* *Private sector* *International (European Union)*
CENTRAL **Bois de Vincennes**	***Lead organisation:*** *City of Paris*	**Management (who is responsible/in charge of)**	*Municipality*

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	Involved actors: • *Governing authorities: 1* • *Associations: 3* • *Citizens: 3* • *Municipalities: 8* • *Park planner and authorities: 7* • *Technicians for park maintenance/monitoring and to educate and support citizens: 1* ***Total number of actors: 23***	Municipality Unit: Green Spaces Unit **Frameworks above the project** National/Federal Law **Regulatory framework that the project operates within** 1. National/Federal Law: Nature Conservation Act, Planning Act 2. Regional Law: Biodiversity Law 3. Municipal laws: Forest Management Plan, City Nature Plan	
CENTRAL **Stadsrandbos Oostende**	***Lead organisation:*** *City of Oostende; Cooperative Business Buitengoed; Natuurpunt (nature conservancy NGO)* ***Involved actors:*** • *Associations: 3* • *Citizens: 2* • *Municipalities: 3* • *Public/private: institutions: 3* • *Park planner and authorities: 2* • *Technicians for park maintenance/monitoring and to educate and support citizens: 2* ***Total number of actors:*** *15*	**Management (who is responsible/in charge of)** Cooperative, Nature Protection Agency **Frameworks above the project** Regional Law: Spatial Plan, Afforestation Plan, Biodiversity and nature management law **Regulatory framework that the project operates within** Municipal laws	*Community fundraising* *Municipality* *Regional* *Private sector* *International (European Union)*
CENTRAL **Parkbos Gent**	***Lead organisation:*** *Flemish Agency for Nature and Forest (Agentschap voor Natuur en Bos); Province East-Flanders (Provincie Oost-Vlaanderen); City of Ghent; Flemish Land Agency (Vlaamse Landmaatschappij); Municipality of Sint-Martens-Latem; Municipality of De Pinte* ***Involved actors:*** • *Governing authorities: 1* • *Associations: 5* • *Citizens: 1*	**Management (who is responsible/in charge of)** Committee/Management Board, Nature Protection Agency, Cooperation among municipalities/regions, Municipality Unit: 'Green Spaces Unit' of Municipally **Frameworks above the project** Regional Law: Spatial Plan, Afforestation Plan, Biodiversity and nature management law	*Community fundraising* *Municipality* *Regional* *Private sector* *International (European Union)*

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	• *Municipalities: 3* • *Public/private institutions: 4* • *Park planner and authorities: 1* • *Technicians for park maintenance/monitoring and to educate and support citizens: 1* ***Total number of actors: 16***	**Regulatory framework that the project operates within** Cooperation agreement	
CENTRAL **Réseau Écologique Bruxellois**	***Lead organisation:*** *Bruxelles Environnement/Leefmilieu Brussel* ***Involved actors:*** • *Governing authorities: 1* • *Associations: Many* • *Municipalities: 6* ***Total number of actors: > 7***	**Management (who is responsible/in charge of)** Nature Protection Agency, Municipality Unit: Environmental Unit **Frameworks above the project** 1. Regional laws: Development Plan 2. Municipal laws: Nature Maintenance Regulations **Regulatory framework that the project operates within** N/A	*Municipality* *Regional*
CENTRAL **Landschaftspark Duisburg-Nord**	***Lead organisation:*** *NRW.URBAN GmbH & Co. KG; Duisburg Kontor Hallenmanagement GmbH* ***Involved actors:*** • *Governing authorities: 3* • *Associations: 4* • *Citizens: 2* • *Municipalities: 1* • *Public/private institutions: 21* • *Park planner and authorities: 5* • *Technicians for park maintenance/monitoring and to educate and support citizens: 4* ***Total number of actors: 40***	**Management (who is responsible/in charge of)** Public utility company, Research Unit **Frameworks above the project** 1. Regional laws 2. Municipal laws 3. Landscape Park 4. Regional Association **Regulatory framework that the project operates within** 1. National/Federal Law: Historic monuments regulation, Nature Conservation Act 2. Association	*Community fundraising* *Municipality* *Regional* *Private sector* *International (European Union)*
CENTRAL **“Baumstarke Stadt” Leipzig**	***Lead organisation:*** *City of Leipzig* ***Involved actors:*** • *Governing authorities: 1* • *Associations: 5*	**Management (who is responsible/in charge of)** Municipality Unit: Green Spaces Unit, Planning Unit, Environmental Unit	*Community fundraising* *Municipality*

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	• *Citizens: Several* • *Municipalities: 1* • *Public/private institutions: >5* • *Park planner and authorities: 2* • *Technicians for park maintenance/monitoring and to educate and support citizens: 4* ***Total number of actors: >18***	**Frameworks above the project** Municipal laws: Green Areas Regulations, Plan for Climate Adaptation, Urban Development Plan, Clean Air Plan **Regulatory framework that the project operates within** Municipal laws: Traffic Regulations	*National government* *Private sector*
NEW MEMBER STATES **Three parks for the International Horticultural Exhibition 2024**	***Lead organisation:*** *City Office of Łódź (Department of Ecology and Climate, Environmental Management unit).* ***Involved actors:*** • *Governing authorities: 2* • *Associations: 1* • *Citizens: Several* • *Municipalities: 2* • *Public/private institution: 3* • *Park planner and authorities: 3* ***Total number of actors:*** *> 11*	**Management (who is responsible/in charge of)** Municipality Unit: Environmental Unit, Trade Unit **Frameworks above the project** 1. Municipal laws 2. International Association **Regulatory framework that the project operates within** Municipal Law	*Municipality* *National government (decision pending)* *Private sector* *International (European Union)*
NEW MEMBER STATES **Landscape Park Tivoli**	***Lead organisation:*** *The City of Ljubljana; JP VOKA SNAGA d.o.o. – the park manager* ***Involved actors:*** • *Governing authorities: 2* • *Associations: 10* • *Citizens: 3* • *Municipalities: 1* • *Public/private institutions: 6* • *Park planner and authorities: 4* • *Technicians for park maintenance/monitoring and to educate and support citizens: 3* ***Total number of actors: 29***	**Management (who is responsible/in charge of)** Public utility company **Frameworks above the project** 1. National/Federal Law: Nature Protection Law, Forestry Plan 2. Regional Law: Spatial law **Regulatory framework that the project operates within** 1. National/Federal Law: Nature Protection Law, Forestry Plan 2. Municipal Law 3. Landscape Park	*Municipality* *International (WWF)*
NEW MEMBER STATES **Park forest Grmoščica**	***Lead organisation:*** *City of Zagreb; Croatian Forests Ltd.* ***Involved actors:***	**Management (who is responsible/in charge of)** Municipality Unit, Forestry Organisation	*Municipality*

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	• *Governing authorities: 2* • *Associations: 2* • *Citizens: >3* • *Municipalities: 2* • *Public/private institutions: 4* • *Park planner and authorities: 4* • *Technicians for park maintenance/monitoring and to educate and support citizens: 2* ***Total number of actors: >19***	**Frameworks above the project** National/Federal Law: Nature Protection Law, Forestry Plan **Regulatory framework that the project operates within** 1. National Law: Forestry Act/Plan 2. Municipal Law: Forest Management Plan, Safety requirements for recreational equipment, Rules for construction of facilities	*International (European Union)*
MEDITERRANEAN Serra de Collserola Natural Park	***Lead organisation:*** *Consortium of the Serra de Collserola Natural Park* ***Involved actors:*** • *Governing authorities: 3* • *Associations: >31* • *Citizens: Several* • *Municipalities: 9* • *Public/private institutions: 3* • *Park planner and authorities: 3* • *Technicians for park maintenance/monitoring and to educate and support citizens: 4* ***Total number of actors: >53***	**Management (who is responsible/in charge of)** Cooperation among municipalities/regions **Frameworks above the project** Municipal Laws **Regulatory framework that the project operates within** N/A	*Municipality* *National*
MEDITERRANEAN Parco Nord Milano	***Lead organisation:*** *Metropolitan City of Milan; The Lombardy Region - Directorate General for Landscape, Urban Planning, and Soil Conservation* ***Involved actors:*** • *Governing authorities: 3* • *Associations: Several* • *Citizens: Several* • *Municipalities: 6* • *Public/private institutions: 6* • *Park planner and authorities: >9* • *Technicians for park maintenance/monitoring*	**Management (who is responsible/in charge of)** Cooperation among municipalities/regions, Committee/Management Board Municipality Unit Environmental Education Centre/Unit **Frameworks above the project** N/A **Regulatory framework that the project operates within** 1. National/Federal Laws: Nature Conservation Act	*Community fundraising* *Municipality* *Regional* *Private sector*

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	and to educate and support citizens: 2 ***Total number of actors: >26***	2. Regional Laws: Biodiversity Law, Spatial Plan 3. Municipal Law: Forest Management Plan, City Green and Blue Infrastructure Regulations, Management Plan 4. Networks	
MEDITERRANEAN **L. Braille Public Garden**	***Lead organisation:*** *Municipality of Bari (Parks and Gardens Division)* ***Involved actors:*** • *Governing authorities: 2* • *Associations: 1* • *Citizens: 0* • *Municipalities: 0* • *Public/private institutions: 0* • *Park planner and authorities: 4* • *Technicians for park maintenance/monitoring and to educate and support citizens: 1* ***Total number of actors: >8***	**Management (who is responsible/in charge of)** Municipality Unit: Green Spaces Unit **Frameworks above the project** Municipal Laws **Regulatory framework that the project operates within** 1. National/Federal Laws: Nature Conservation Act 2. Regional Laws: Spatial Plan 3. Municipal Laws: City Green and Blue Infrastructure Regulations, Rules for construction of facilities	*Municipality*
NORDIC **Vanhankaupunginlahti - Old Town Bay**	***Lead organisation:*** *City of Helsinki* ***Involved actors:*** • *Governing authorities: 2* • *Associations: Several* • *Citizens: Several* • *Municipalities: 1* • *Public/private institutions: 7* • *Park planner and authorities: >6* • *Technicians for park maintenance/monitoring and to educate and support citizens: 3* ***Total number of actors: >19***	**Management (who is responsible/in charge of)** Municipality Unit: Environmental Unit, Planning Unit, Local Community Groups, Research Unit **Frameworks above the project** Municipal Laws: Green Area Regulations, Nature Maintenance Regulations, Urban Development Plan **Regulatory framework that the project operates within** 1. International Laws: NATURA 2000 National/Federal Laws: Nature Conservation Act 2. Municipal Laws	*Municipality* *National* *International funds (Central Baltic Programme)*
NORDIC **Aarhus City**	***Lead organisation:*** *Aarhus Municipality*	**Management (who is responsible/in charge of)**	*Community funding*

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	Involved actors: • *Governing authorities: 1* • *Associations: 0* • *Citizens: 0* • *Municipalities: 5* • *Public/private institutions: 1* • *Park planner and authorities: 0* • *Technicians for park maintenance/monitoring and to educate and support citizens: 1* ***Total number of actors: 8***	Municipality Unit: Environmental Unit, Public utility company, Cooperation among municipalities/regions **Frameworks above the project** Municipal Laws: Plan for Climate Adaptation, Policy for Active Citizenship, Water Strategy, Forestry Plan, Nature Maintenance Regulations **Regulatory framework that the project operates within** 1. National/Federal Laws: Forest Act, Nature Conservation Act, Planning Act 2. Municipal Laws: Local Plan (Planning Framework), City Green and Blue Infrastructure Regulations, Forest Management Plan	*Municipality* *Special funds* *National* *Private Sector Investment* *International (European Union)*
CHINESE **Fuzhou Hills**	***Lead organisation:*** *Metropolitan City of Fuzhou (Fuzhou Gardening and Greening Bureau)* ***Involved actors:*** • *Governing authorities: 3* • *Associations: Several* • *Citizens: Several* • *Municipalities: 1* • *Public/private institutions: 5* • *Park planner and authorities: 2* • *Technicians for park maintenance/monitoring and to educate and support citizens: 2* ***Total number of actors: > 13***	**Management (who is responsible/in charge of)** Municipality Unit **Frameworks above the project** National/Federal Laws **Regulatory framework that the project operates within** Regional Laws: Afforestation Plan	*Municipality*
CHINESE **Meishan Dongpo Urban Wetland Park**	***Lead organisation:*** *City of Meishan* ***Involved actors:*** • *Governing authorities: 1*	**Management (who is responsible/in charge of)** 1. Municipality Unit: Environmental Unit 2. Contractors	*Municipality*

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	• *Associations: Several* • *Citizens: Several* • *Municipalities: 1* • *Public/private institutions: 0* • *Park planner and authorities: 1* • *Technicians for park maintenance/monitoring and to educate and support citizens: 1* ***Total number of actors: >4***	**Frameworks above the project** Municipal Laws **Regulatory framework that the project operates within** Municipal Laws: Management Plan, City Green and Blue Infrastructure Regulations, Local Plan (Planning Framework)	
CHINESE **Green Wedges of Jiaxing**	***Lead organisation:*** *Jiaxing Municipal People's Government* ***Involved actors:*** • *Governing authorities: 1* • *Associations: 4* • *Citizens: Several* • *Municipalities: 1* • *Public/private institutions: 3* • *Park planner and authorities: 1* • *Technicians for park maintenance/monitoring and to educate and support citizens: 4* ***Total number of actors: >14***	**Management (who is responsible/in charge of)** Municipality Unit **Frameworks above the project** Municipal Laws **Regulatory framework that the project operates within** National/Federal Laws: Planning Act	*Municipality* *Private sector*
CHINESE **Green Lungs of the City Project**	***Lead organisation:*** *Metropolitan City of Yiwu* ***Involved actors:*** • *Governing authorities: 2* • *Associations: 5* • *Citizens: Several* • *Municipalities: 2* • *Public/private institutions: 5* • *Park planner and authorities: 2* • *Technicians for park maintenance/monitoring and to educate and support citizens: 2* ***Total number of actors: >18***	**Management (who is responsible/in charge of)** 1. Municipality Unit: Environmental Unit 2. Contractors **Frameworks above the project** Municipal Laws **Regulatory framework that the project operates within** 1. National/Federal Laws: Forest Act, Planning Act 2. Municipal Laws: Traffic Regulations, Management Plan	*National* *Municipality* *Private sector*

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CHINESE **Beijing Plain Area Afforestation Programme**	***Lead organisation:*** *Capital Greening Office (Beijing Gardening and Greening Bureau)* ***Involved actors:*** • *Governing authorities: 2* • *Associations: Several* • *Citizens: Several* • *Municipalities: 12* • *Public/private institutions: Several* • *Park planner and authorities: 2* • *Technicians for park maintenance/monitoring and to educate and support citizens: 2* ***Total number of actors: >18***	**Management (who is responsible/in charge of)** 1. Municipality Unit: Green Spaces Unit 2. Forestry Organisation 3. Contractors **Frameworks above the project** Municipal Laws: Afforestation Plan **Regulatory framework that the project operates within** 1. National/Federal Laws: Forest Act, Planning Act 2. Municipal Laws: Management Plan, City Green and Blue Infrastructure Regulations, Afforestation Plan	*Municipality*
CHINESE **Fushan Ecological Park**	***Lead organisation:*** *Metropolitan City of Qingdao, Zhonghan Sub-district Office in Laoshan district* ***Involved actors:*** • *Governing authorities: 3* • *Associations: Several* • *Citizens: Several* • *Municipalities: 2* • *Public/private institutions: 4* • *Park planner and authorities: 2* • *Technicians for park maintenance/monitoring and to educate and support citizens: 2* ***Total number of actors: >13***	**Management (who is responsible/in charge of)** 1. Municipality Unit: Environmental Unit 2. Contractors **Frameworks above the project** Municipal Laws **Regulatory framework that the project operates within** 1. National/Federal Laws: Forest Act, Planning Act 2. Municipal Laws: Management Plan, City Green and Blue Infrastructure Regulations, Local Plan (Planning Framework)	*Municipality* *Regional*

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APPENDIX B: CASE HISTORY TEMPLATE EXAMPLE – LANDSCHAFTSPARK DUISBURG-NORD, GERMANY

CASE HISTORY NAME: Landschaftspark Duisburg-Nord, Germany

Section	
	This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821241
1	**TITLE OF CASE HISTORY AREA:** Landschaftspark Duisburg-Nord, Germany
2	**INTRODUCTION (max. 150 words)** The Landscape Park Duisburg-North is part of the larger Emscher Landscape Park (472 km²) - that was started during the International Building Exhibition Emscher Park (IBA) between 1989 – 1999 - which links the urban landscape and several parks through green corridors, cycle paths and the Emscher river. Today, the Landscape Park is part of a permanent regional park system in the centre of the Ruhr metropolitan area with 7 regional green corridors (A-G/ North-South bound) and the New Emschertal (East-West green corridor) (*See Figure 1 in 4a Location Maps*). The Landscape Park Duisburg-North is located in the formerly very industrial Ruhr region of Germany, and is centred around an old iron works. The Iron works buildings have been maintained and repurposed for sports, cultural events, historical significance, and tourism (with 700 000 people visiting a year). Some of the material bunkers have been cultivated and planted with various plants, others have been left wild and have grown over. Surrounding the central built up area are large fields, forests, swamp and farms, which have been largely left to nature.
3	**KEY FACTS AND FIGURES OF THE CASE HISTORY AREA** **Biogeographic region**[1]**:** Atlantic **Surface area:** 180 ha **Country:** Germany **Region/Province:** Ruhr Area/ North Rhine-Westphalia (NRW)
4a	**LOCATION MAP(S)**

[1] https://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-3

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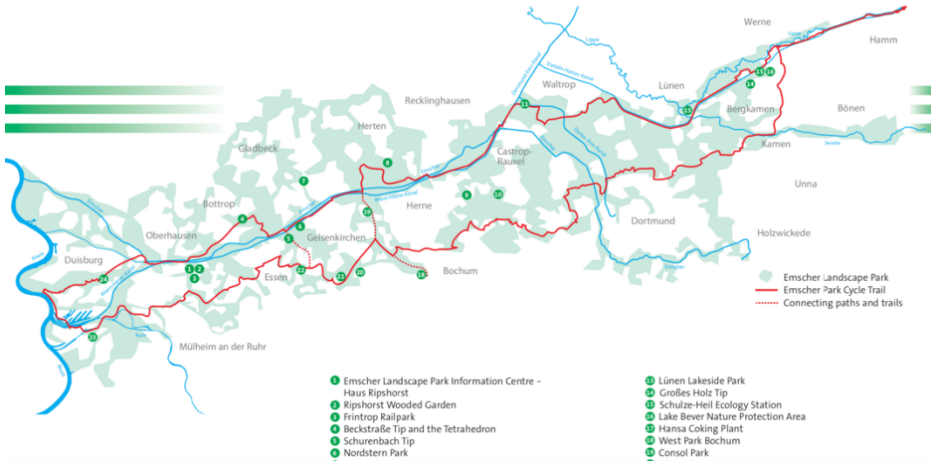

Fig. 1: Map of Emscher Landscape Park

Fig. 2: Map of Landscape Park Duisburg-North

4b	**GIS** Please supply GIS shape files (.shp) for the project area (boundary) and any internal structures that exhibit UF-NBS characteristics e.g. areas of tree planting, path networks, car parking spaces, bicycle hire etc). *Please send this information directly to raffaele.lafortezza@uniba.it* *Please also copy GIS information to clive.davies@efi.int for record keeping purposes only.*
5	**NAME OF MUNICIPALITY AND WEBSITE ADDRESS** City of Duisburg: https://www.duisburg.de/ Landschaftspark Duisburg-Nord: https://landschaftspark.de/

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6	**LEAD ORGANISATIONS** NRW.URBAN GmbH & Co. KG (Owner of property) Treuhandverwaltung Revierstr. 3 44379 Dortmund Duisburg Kontor Hallenmanagement GmbH (The private land is managed by this company, staff: 22 people) Parkleitung im Landschaftspark Duisburg-Nord Emscherstraße 71 47137 Duisburg • Organisation of Duisburg Kontor Hallenmanagement GmbH 1. Public Relations Office (Öffentlichkeitsarbeit) 2. Event Management (Veranstaltungsmangament) 3. Flächen und Gebäudemanagement (Bauhütte), e.g. technical maintenance like lights 4. Parkleitung im Landschaftspark Duisburg-Nord
7	**LOCAL CONTACT(S)** Lena Sieler Public Relations Office **Address:** Duisburg Kontor Hallenmanagement GmbH Parkleitung im Landschaftspark Duisburg-Nord, Emscherstraße 71, 47137 Duisburg Tel: +49-203-712 808 03 E-Mail: lena.sieler@landschaftspark.de
8	**PRINCIPLE UF-NBS ACTION(S)** • Western Ruhr Region Biological Station (for the "Industrial nature") ○ Covers all of the Western Ruhr Area and has several bases throughout the Ruhr region, including one in the Landschaftspark ○ The station develops concepts for the preservation and development of the park, and other inner-city green spaces, focusing on research and conservation. ○ Looking after conservation areas ○ Nature conservation, practical measures to protect species and habitat ○ Land reclamation ○ Technical advice ○ Plan future interventions with the park authorities ○ Data collection (record plant and animal species) ○ Scientific research ○ Providing information and education on environment and nature conservation to public ○ Industrial nature (on former steel and mining industrial land) is a key focus • Two separate farms: Ingenhammshof (farm) & Emstermannshof (more like a green area for walking) ○ Farm school from the workers organisation (AWO), teaching people, especially youth and school courses, from cities the principals of farming and animals

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	○ Animals (horses, donkey, chicken, goat) ○ Orchard, vegetables, herbs, flowers • Enclosed "Bunker" Gardens ○ The bunkers are areas surrounded by high concrete walls, where the materials (e.g. coal, iron ore) were stored and remain left over ○ Different materials left in the bunkers were left to experiments with different soil types in different sections (e.g. Fine soil, or large chunks of concrete from buildings). This develops individual microclimates ○ Some planted, some naturally/wild seeded local plants ○ Some non-native – that come from the steel workers gardens, or were transported with the iron works raw materials • Forested areas/plantations • Densely vegetated areas ○ Nature left to itself ○ Visitors not allowed to enter these areas, to avoid disturbing the environment, and some parts can be dangerous • Swamp areas • Water works part of the new Emscher valley project ○ River divided into 5 parts ○ Filled solely from rainwater – collected from all flat areas (e.g. Building roofs, terraced areas) ○ Some water carried along raised pipes (powered by old wind turbine); this water used to water plants in enclosed gardens, and to a water storage basin. Falls from height back into main canal, this oxygenates the water ○ The canal is now clean enough and there are several fish
9	**OTHER PRINCIPLE NBS ACTION(S) – non-UF** • Culture ○ Festivals & concerts ○ Lights (evenings) • Leisure ○ Climbing walls and high ropes among old buildings ○ Indoor diving tank – filled from canal, in the gasometer ○ Bike rental; cycle path – extended connects surroundings encourage cycling ○ Footpaths ○ Skate and BMX park ○ Playgrounds ○ Pet corner ○ Playgrounds ○ Geocaching ○ Viewing platform • History ○ Tours through iron works (different target groups; themed topics e.g. steel furnaces (Hüttenführungen), Torch Tours (Fackelführung) ○ Viewing platform at top of old blast furnace buildings (Hochhofen 5, only one that can be accessed) • Hospitality ○ Food and restaurants • Youth hostel
10	**LOCAL STAKEHOLDERS LIST ONLY** *(include detail in section 11 sub sections i, j, k.)*

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In total, there are 26 local institutions that provide jobs for about 420 people.

1. **Governing authorities**:

- Federal state of North Rhine-Westphalia (Involving several state departments as Urbanism, Housing, Economy, Traffic, Environment and Culture and the State Development Agency (LEG) / NRW Urban (Owner of the property)
- Duisburg City Council (operation and administration: 100% subsidiary)
- International Building Exhibition Emscher Park GmbH (IBA / 1989 – 1999). The IBA was a special development program of the state government of North Rhine-Westphalia for the northern part (= Emscherzone) of the Ruhr area, it was never itself a formal project sponsor and has supported more than 100 individual projects. The Duisburg-Nord landscape park was one of these 100 projects.

2. **Associations:**

- Regionalverband Ruhr (Ruhr Regional Association, or RVR) (Regional association of the 53 Ruhr towns and 4 districts)
- Metropole Ruhr Tourismus (Regional association for tourism)
- Emschergenossenschaft (EG) und Lippeverband (LV) (water companies) (Together: EGLV.de)
- RAG AG – RAG Stiftung & ThyssenKrupp Steel (Own the blast furnaces) (Steel and mining companies)

3. **Citizens/actors:**

- Latz + Partner, Latz-Riehl, G. Lipkowsky (Landscape architects, came up with original plan of park)
- Jonathan Park – aritist who created the permanent light exhibition in 1996, and since done other light shows in the park.

4. **Municipalities**:

- Duisburg City Council

5. **Public/private institutions**:

- ThyssenKrupp Steel (operate and maintain railway)
- Restaurierungsatelier "Die Schmiede" GmbH (independent company, for restoration; also operates in other locations)

Sport:

- Deutscher Alpenverein Sektion Duisburg e. V. (sport, climbing)
- Taucher im Nordpark Duisburg e. V. (sport, diving)
- TauchRevierGasometer GmbH (sport, diving)
- Revierrad: PIA-Stadtdienste gGmbH (sport, bike hire, diving
- Hundesportverein (sport, Dogs)
- tri:ceps. GmbH (sport)
- power-ruhrgebiet GmbH (Hochseilparcour); Climbing

Culture & history (tourism)

- Filmothek der Jugend NRW e. V. (culture, films)
- Kinematik im Ruhrgebiet (culture, films)

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	• Interessengemeinschaft Nordpark Duisburg e. V. • RBG protection GmbH • Tour de Ruhr GmbH (Guide, information and tours); Marketing of the steel furnaces (Hochofen 5) **Hospitality** • Gourmet Team Catering & Event GmbH (hospitality, food) • Jugendherberge Duisburg-Meiderich für Industriekultur (hospitality, youth hostel) • Restaurant Hauptschalthaus GmbH (hospitality, food) **Conservation & societal** • AWO-Integrations GmbH Duisburg (workers welfare association) - ingenhamshof • GfB Gesellschaft für Beschäftigungsförderung mbH • Landesarbeitsgemeinschaft Lokale Medienarbeit NRW e. V. (• planwerk+ (Data management) 6. **Park planner and authorities**: • Flächen und Gebäude-Management – Bauhütte im Landschaftspark (technical aspects, lights, restoration and construction) • Stadt Duisburg - Amt für Bodendenkmalpflege (history, protection of historical monuments) • NRW.Urban GmbH & Co.KG • Latz + Partner, Latz-Riehl, G. Lipkowsky (architects) – located in Kranzberg near Munich • Regionalverband Ruhr – Moderation and co-financing of the park maintenance 7. **Technicians for park maintenance/monitoring and to educate and support citizens:** • Western Ruhr Region Biological Station (range of urban biotopes) (Biologische Station). Responsible for a complex urban biotopes (e.g. industrial and commercial wastelands). In the station, concepts for the preservation and development of inner-city open spaces are developed and implemented. Protected area management, renaturation measures, contractual nature conservation, scientific research, data collection, scientific advice, species protection and the provision of information are also part of the tasks of the Biological Station Westliches Ruhrgebiet e.V. • Bauhütte: management and maintenance of buildings and surrounding areas, including Electricity for the lighte exhibition • Netzwerk Weg & Raum (path building) • Wirtschaftsbetriebe Duisburg (management and maintenance of green areas and paths.) (Challenges for maintenance)
11	**UF-NBS FRAMEWORK** ➢ **Please leave blank if the principle does not apply to the case study** ➢ **Refer to separate document for definitions/glossary of terms**

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	a.	**UF-NBS typology** *Please refer to task 1.1 typology when completing this section*		Between the buildings and roads in the park: • Forested areas • Brown fields • Informal green spaces, street verge • Extensive green roof, hedge, urban trees In surrounding park area: • Small farms, orchard, • Wooded railway banks • Canal, wooded riverbank • Urban grassland • Green playground • Wetland, water retention basin
	b.	**Integration**		• Riverbank with tree: Water system – part of IBA to change wastewater canal into only rain, spring and purified wastewater. Underground canal to draw off wastewater. • Trees integrated in the local infrastructure and next to local facilities. Local community and sports clubs use facilities – climbing walls, diving tank, paths, playgrounds, educational farm • Transport infrastructure with street trees – large car parks, large cycle path leads through the Landschaftspark and connects IBA. It is mainly used by commuters and visitors. Several other foot and cycle paths exist.
	c.	**Network/connectivity**		The Landschaftspark is part of the much larger regional Emscher Landschaftspark (ELP) , which connects over 120 individual projects in the Ruhrgebiet. The ELP is connected through green corridors, wild green areas, rivers (Emscher and its tributaries). A 230 km circular cycle path and 400km paths and trails (industrial nature trail) goes through the ELP and connects it to Rhine area projects. It is part of the European route of industrial heritage.
	d.	**Multifunctionality**		The Landschaftspark fulfills a variety of green space functions. Functions: • Water protection (freshwater storage and management and park distribution)

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				• Ecological preservation (over 700 different species of plant, 45 species of birds, 100 species bettles recorded), • Socio-cultural economic benefits (education, culture, sports, history).
	e.	**Multi-scale**		The Landscape Park Duisburg North is part of the Emscher Landscape Park (ELP), which is planned, maintained, and largely financed at different levels through Duisburg city, the other involved 19 cities in the Ruhr Region, the NRW state and the Regionalverband Ruhr and is funded by the European Union. The Landscape Park Duisburg North is home to 26 local institutions.
	f.	**Strategic planning processes**		Aim to renature the industrial landscape. To redevelop the area while keeping as much of the existing structure as possible, to make it a nicer place to live, and boost the economy after the fall of the industry for example by encouraging tourism. The planning and making of the park was done by landscape architect Peter Latz. He was the winner of an international competition for landscape architects in 1991, and thus commissioned.
	g.	**Inter- and transdisciplinary**		The Landschaftspark interlink several disciplines, through its several stakeholders. Conservationists, water management, policy makers, architects, and community who use the facilities.
	h.	**Social cohesion and biocultural diversity**		The Landschaftspark is free to enter and open at all times, meaning it is accessible to anyone at any time. The Landschaftspark works closely with AWO (worker welfare community) especially on the farm Ingenhammshof. Aims to help the (esp. young) people to learn about the environment and farms Biocultural diversity: Different areas of the park have different types of plants and environments-forested, farm etc. Variety in the planted plants, and naturally seeded ones. Some naturally seeded plants are local some will have come in the raw material for the iron production, and some from the workers gardens
	i.	**Governance arrangements**	I. Project management structure	Landscape Park Duisburg Nord GmbH, is owned by Duisburg city and is responsible for the park. It is managed by Duisburg Kontor Hallenmanagement GmbH, an operating company. North Rhine-Westphalia state and

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				the Ruhr Regional Association also have an impact on the management. Originally it was run by State Development Company North Rhine-Westphalia (LEG) on behalf of the city of Duisburg.
			II. Local community engagement and the nature of their engagement.	Primarily through the Biological station and sports clubs.
			III. City-scale and/or region-wide governance for the project and/or UF-NBS (city and regional stakeholders and character of their engagement)	• The blast furnaces belong to ThyssenKrupp Steel (Steel and mining company) • Planungsgesellschaft IBA Emscher Park GmbH Emscher park, NRW • RAG AG & RAG Stiftung • Other companies that use the site, for example event holders (named above) • Ruhr Regional Association (RVR)
			IV. National and international governance context (national and international stakeholders and character of their engagement)	The Landschaftspark is part of the European route of industrial heritage that connects former industrial sites, mainly in Europe but also covering sites in Central Asia.
			V. Other (specify)	
	j.	**Institutional frameworks**	I. Project staff responsibilities.	Duisburg Kontor Hallenmanagement GmbH is responsible for the entire park and maintenance, including restoring and maintaining the iron works. Biologische station– responsible for nature conservation and research (see section 8)
			II. Project Management Committee (Y/N) if Y.	Yes, through a working group meeting. For the development (including financial and political coordination/aspects) of the park it brings together 6-7 people from: • Duisburg Kontor GmbH (For the city of Duisburg; e.g. responsible for week markets in city; Head: Uwe Kluge)

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				• Kontor Hallenmangement Gmbh (responsible for indoor areas, parks (CityPalais, **Landschaftspark**) • Parkleitung und Eventmanagement
			1 Frameworks <u>above the project</u> that exert influence on the project and/or UF-NBS e.g. Municipality, National Forestry Department.	• The Landschaftspark is part of the regional Emscher Landscape Park. • Duisburg city owns the project, part of the Ruhr district • The regional government is in Düsseldorf, NRW state (Landesentwicklungsgesellschaft, now NRW urban Gmbh) – which • Regionalverband Ruhr (Ruhr Regional Association, or RVR) – which
			2 Private companies that work on behalf of/or are embedded within the project.	• Regionalverband Ruhr (Ruhr Regional Association, or RVR) • EGLV - Emschergenossenschaft and the Lippeverband (water companies) • Deutsche bahn (railway) • Latz + Partner • RAG AG & RAG Stiftung & ThyssenKrupp Steel (the blast furnaces belong to) (Steel and mining companies)
			I. Trade representative organisations that are involved in the project	• Tour de Ruhr GmbH (Visitor Center, provides tours around park (including, cycle tours, nature tours, children's tours and tours to blast furnace) • Hospitality (Restaurants)
			II. Regulatory frameworks that the project operates within (i.e. bylaws, municipal laws, national laws, licences and leases, partnership agreements etc)	• Nature protection Acts (Naturschutzrecht) • Historic monuments regulation (Denkmalschutz) • Infection Protection Act (Infektionsschutzgesetz) • Guidelines on the granting of benefits in contractual nature conservation (framework guidelines for contractual nature conservation) (German: Vertragsnaturschutz) • Law on the Ruhr Regional Association (RVR): The Emscher Landscape Park and its infrastructure (cycle path system / visitor centers / landmarks /

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				heaps) are moderated, financed and operated by the Regionalverband Ruhr. The local ELP projects are supported by the 20 municipalities involved. The Duisburg-Nord landscape park is one of these local projects.
			III. Other (specify)	
	k.	**Economic frameworks**	I. Community fundraising	The biological station is partly funded through donations.
			II. Project delivered services and monies raised by project	About 41 percent of the maintenance of the park comes from the park's own income. Earnings (No specific numbers could be obtained): • Permanent rental and leasing • Temporary rental (events) • Services (events) • Own venues and events • Film and photography, merchandising Average cost of maintenance per year: 6 million EUR. Expenses: • Repair, services, caring, construction measures and qualifications (about 65 percent) • Staff (about 18 percent) • Others (Operation, insurance, marketing) (17 percent)
			III. City, regional general funds	The construction of the Landscape Park Duisburg North was financed as part of the regional Emscher Landscape Park since the early 1990s and was supported by the International Building Exhibition Emscher Park (IBA). It was financed by Duisburg city, Federal state of North Rhine-Westphalia (NRW), Landesentwicklungsgesellschaft NRW GmbH (NRW-Urban) and the European Union. The financial participation for **maintenance** of the park comes from: • NRW state (30 percent) • Regionalverband Ruhr (18 percent) • City of Duisburg (11 percent)

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				• Operation of Landschaftspark (41 percent)
			IV. Special funds e.g. National Lottery, Challenge funds	
			V. National government funds	There was no investment funding from the federal government.
			VI. Private sector investment	König Baldiun Stiftung
			VII. International funds e.g. European Union structural funds, LIFE + etc.	Many projects in the Emscher Landscape Park were funded with the help of the "Ecology Program-Emscher-Lippe" (ÖPEL) by the state government of North Rhine-Westphalia, which in turn used EU funding for this (Objective 2 program / ERDF / ESF). The Duisburg-Nord landscape park was also funded with ÖPEL funds. • International Funds: European Regional Development Fund (ERDF), also via Ruhr Tourismus Gmbh
			VIII. Other (specify)	Sponsoring for a specific purpose e.g. events (Schauinslandreisen, König Pilsener, Sinalco)
	l.	**Sino/European comparative relevance**		Relevance to other industrial, steel or mining regions in Europe and China, including sites still operating in Duisburg, near the Landschaftspark. No other comparative relevance known.
	m.	**UF-NBS valorisation**		The value of this park comes mainly from the unusual transformation and design of the urban and industrial landscape (Industrie-Natur und Industrie-Kultur) – including the former industrial buildings and infrastructures – to prevent and integrate the industrial and natural heritage of the place, which is the unique basis today for tourism and cultural undertakings. Through the hospitality, cultural, historical and sports use. And from the biodiversity found there. The Landschaftspark has won several awards, including Green Good Design Award (2009), EDRA places Award (2005), Play & leisure Award (2004), the Guardian selected Landschaftspark as top 10 parks globally). These contribute to public awareness and potentially higher visitor numbers.

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	n.	**Procurement of UF-NBS**		Most of the UFNBS strategies are implemented by the biological station, or through the park authority
	p.	**Ecosystem services (list the three most important services being provided in no more than 50 words)**		1) Physical/Experiential use of the landscape: The provision of recreation and educational facilities for local residents and visitors, and the encouragement of tourism to the area 2) Surface water for non-drinking purposes: Water system clean up, Emscher river from sewage canal to fresh water system. 3) Micro and regional climate regulation, especially as part of the Emscher Landscape Park.
	q.	**Renaturing**		Covers the entire park: Industrial steel works, waste pits, gasometers, and rail tracks. All repurposed in the park – buildings to collect water, and as sports and cultural areas, pits left to grow wild, rail to cycle paths

12 **LESSONS AND TRANSFERABILITY (max. 100 words)**

The Landschaftspark received international recognition and was the lighthouse project of the IBA Emscher Park between 1990 to 1999 and the regional Emscher Landscape Park. The Landschaftspark can be seen as a successful example of structural change, from heavy industry to a large open space for the population which improves quality of life in the city in the long-term. Different elements of urban forests as nature-based solutions in combination with the historic elements of the location (riverbanks, trainline, blast furnaces, "bunkers") are a way of keeping the sense of place and at the same time as contributing to the preservation of flora and fauna, providing space for recreation and events, and offers sports and leisure opportunities. Financially this was a huge effort by all the actors involved, especially the Federal state of NRW, the City of Duisburg, the Ruhr Region and the effects of European funding.

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Clearing house typology document draft

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APPENDIX C: CASE HISTORY GLOSSARY OF TERMS

Economic framework	Economic frameworks refer to the different economic aspects related to the functioning of UF-NBS, primarily as funding mechanisms and sources, economic benefits and costs including broad economic issues such as local branding and related business opportunities and economic models. Among other things we wish to investigate how UF-NBS has been integrated into real economies (adapted from GREEN SURGE D4.1; Andersson et al., 2015).
Ecosystem services:	The benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling. (Millennium Ecosystem Assessment, 2005).
Financing of UF-NBS:	The provision of funding for UF-NBS using different mechanisms and financial instruments, e.g., public sector grant, private sector capital investment, use of trust funds held by charity (also see Procurement of UF-NBS).
Governance arrangement:	The process by which plans are implemented is linked to governance, since plan implementation involves many actors across all sectors including for example, NGOs, community groups and many departments of municipalities.
Institutional framework:	The formal and informal rules of a governance system that shape human choices, behaviours and interactions (source: Biernacka & Kronenberg, 2018). Specifically, it involves organisations (governance actors), laws and regulations. Governance actors extend beyond the public sector and include companies (businesses large and small), charities and NGOs.
Integration:	The practice of urban forestry is the planning and management of all the trees in and near urban areas; individually, in groups or in recognisable woodlands and forests. Trees in any of these settings do not exist in isolation from adjacent land uses and other infrastructures. The integration of trees with other land uses and infrastructures is key to the successful delivery of the ecosystem services they can provide. Hence, with regards to UF-NBS, integration should involve UF-NBS typologies along with others that are non-UF-NBS such as built-up structures (through sustainable urban designs), transport

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	infrastructure, and water management system amongst others
Inter, cross and transdisciplinary:	An inter-disciplinary approach in UF-NBS integrates knowledge and demands from different disciplines, such as landscape ecology, urban and regional planning and landscape architecture. The cross-dictionary approach in UF-NBS means that individual researchers in urban forestry should view the needs of other discipline in their research. For example, a researcher looking at the contribution of urban trees air quality should also be considering how their work addresses the needs of public health scientists, who are considering the impact of urban air quality on, for example, on clusters of diseases in neighbourhoods. A transdisciplinary approach in UF-NBS means that different research disciplines should collaborate, normally in advance, to agree shared frameworks, methodologies and research questions on the principle that each researcher contributes equally to the research being undertaken. A key benefit of this approach is to widen the opportunities for peer-review publishing and wider dissemination. All of these approaches share an aim to interlink disciplines, between science, policy and practice. In CLEARING HOUSE we anticipate this being developed in partnerships between the research community with different local authorities and other stakeholders in the private and third sectors.
Multi-scale:	Urban forestry planning should be considered at different spatial levels ranging from city-regions to local projects.
Multifunctionality:	Urban forests provide several ecological, socio-cultural, and economic benefits concurrently. Urban forestry planning aims at intertwining or combining different functions to enhance the capacity of urban green space to deliver valuable goods and services.
Network/Connectivity:	An aim for urban forestry is to seek added values derived from interlinking green spaces with urban forests in a functional and physical way.
Procurement of UF-NBS:	The means by which Urban Forest goods or services are purchased or secured.
Renaturing:	Creation of new natural spaces such as green roofs, areas, or habitats; transformation of grey infrastructures into green spaces (M. Davies et al., 2018; European Commission, 2015).

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Sino/European comparative relevance:	Specifically UF-NBS which show notable similarities or differences between the two continental situations, e.g. a similarity would be the management of trees in an urban park and a difference would be the scale of projects which are often much larger in China.
Social cohesion and biocultural diversity:	The capacity of a society to ensure the welfare of all its members, minimising disparities and avoiding polarisation. People from different backgrounds have an equal chance to participate in decision-making, have similar life opportunities and equal access to services, including, access to urban forests. Biocultural diversity consists of biological diversity at all its levels, from genes to populations to species to ecosystems and cultural diversity in all its manifestations (including linguistic diversity), ranging from individual ideas to entire cultures and the interactions among all of these. (Source: Loh & Harmon, 2005)
Strategic planning processes:	Planning processes based on long-term spatial visions supplemented by actions and means for implementation but that remain flexible over time. The strategic planning processes are usually led by the public sector, but that does not mean that non-state actors are excluded.
UF-NBS typology:	Allied to all NBS, UF-NBS are actions involving trees, woodland and associated green infrastructure which are inspired by, supported by or copied from nature, and simultaneously provide environmental, social and economic benefits. • Forested areas, remnant forests, forested nature reserves, riparian forests; • Forest plantations; • Community parks, green urban areas, pocket parks, historical gardens or country parks with trees; i.e., large urban public park, amenity green spaces, LAPs (local areas for play), LEAPs (locally equipped areas for play) and NEAPs (neighbourhood equipped areas for play); • Woodland play area; • Tree rows, e.g., promenades or boulevards, street trees, street greenbelts or green verges with trees; • Hedgerows, including hedgerows with standard trees; • Wooded railway banks; • Woodland glade or species-rich meadow influenced by adjacent trees; • Wooded or shrubby foraging area for wild berries, fruits and fungi;

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	• Wooded riverbank green and wooded banks of ponds and lakes; • Ornamental trees; • Survivor trees; • Veteran trees; • Rain gardens with trees; • Allotments, house gardens, courtyards, or urban gardens with trees; • Botanical gardens; • Arboretum; • Feng shui garden; • Wooded cemeteries and churchyards; • Fruit orchards; • Bioswales with trees, tree trenches; • Wooded greenways and trails.
UF-NBS valorisation:	Valorisation is the process of creating value from knowledge by making knowledge suitable and/or available for economic and/or societal use and translating that knowledge into competitive products, services, processes and entrepreneurial activity. Hence, UF-NBS valorisation can be considered as the process of creating value from urban forest interventions.

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