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Final report to the EC

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Summary

This report provides a comprehensive overview of the CLEARING HOUSE report, presenting the different steps undertaken to deliver the project and its objectives, along the workpackage and task structure. The second part of the report focusses on the impact of CLEARING HOUSE, which has been a very successful project, with most aims and targets been overachieved. Throughout the project, we have reached around 18 800 researchers, 3 475 members of civil society organisations, 2 500 policy makers and 5 000 participants from the industry (including natural resources managers), through presentations, webinars and conferences. Over 3 000 people participated in a webinar organised or co-organised by CLEARING HOUSE. About 80% of the participants to our activities indicated that they gained more knowledge through CLEARING HOUSE. Our education package ?City of Trees? has been downloaded by over 100 schools. Through articles in newspapers, interactions with about 100 media staff, and a news item in prime time at the GuangZhou TV news, we estimated that we reached over 800 000 members of the general public. We conclude the report by a critical review on international collaboration in research and knowledge transfer on urban forests as nature-based solutions. The collaboration between Chinese and European partners has been challenging, definitely as the project duration covered the COVID-19 pandemic. CLEARING HOUSE showed how the concept of urban forestry has different origins, concepts and traditions in the two continents, but the project contributed to a larger common understanding of the concept ?urban forests as nature-based solutions?. A lesson learnt regarding dissemination is that researchers should be aware of the risk of being ?lost in translation?, not only in technical language, but also in taking the different political and cultural backgrounds in consideration. The legacy of CLEARING HOUSE will be curated in the work of several initiatives nudged by CLEARING HOUSE work: the European Forum on Urban Forestry (registered as a legal international not-for-profit under auspices of CLEARING HOUSE collaborators), the Sino-European Initiative on R&I on Urban Forests as Nature-based Solutions in the Greater Bay Area (China), the Community of Practice on Nature-based Solutions by Metropolis, and the Horizon Europe Urban Nature Plans plus project.

Approval

Date	By
2024-09-04 13:31:46	Dr. Rik DE VREESE (EFI)
2024-09-04 13:35:20	Dr. Rik DE VREESE (EFI)

Final Project Report (Deliverable 6.5)

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2.1	04/09/2024	Rik De Vreese	EFI	Reworked version of the 3rd project review report (Part B. Technical part) for public distribution

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EXECUTIVE SUMMARY

This report provides a comprehensive overview of the CLEARING HOUSE report, presenting the different steps undertaken to deliver the project and its objectives, along the workpackage and task structure.

The second part of the report focusses on the impact of CLEARING HOUSE, which has been a very successful project, with most aims and targets been overachieved. Throughout the project, we have reached around 18 800 researchers, 3 475 members of civil society organisations, 2 500 policy makers and 5 000 participants from the industry (including natural resources managers), through presentations, webinars and conferences. Over 3 000 people participated in a webinar organised or co-organised by CLEARING HOUSE. About 80% of the participants to our activities indicated that they gained more knowledge through CLEARING HOUSE. Our education package "City of Trees" has been downloaded by over 100 schools. Through articles in newspapers, interactions with about 100 media staff, and a news item in prime time at the GuangZhou TV news, we estimated that we reached over 800 000 members of the general public.

We conclude the report by a critical review on international collaboration in research and knowledge transfer on urban forests as nature-based solutions. The collaboration between Chinese and European partners has been challenging, definitely as the project duration covered the COVID-19 pandemic. CLEARING HOUSE showed how the concept of urban forestry has different origins, concepts and traditions in the two continents, but the project contributed to a larger common understanding of the concept "urban forests as nature-based solutions". A lesson learnt regarding dissemination is that researchers should be aware of the risk of being "lost in translation", not only in technical language, but also in taking the different political and cultural backgrounds in consideration.

The legacy of CLEARING HOUSE will be curated in the work of several initiatives nudged by CLEARING HOUSE work: the European Forum on Urban Forestry (registered as a legal international not-for-profit under auspices of CLEARING HOUSE collaborators), the Sino-European Initiative on R&I on Urban Forests as Nature-based Solutions in the Greater Bay Area (China), the Community of Practice on Nature-based Solutions by Metropolis, and the Horizon Europe Urban Nature Plans plus project.

This report is a revised version of the 3rd periodic report to the European Commission; elements related to finances, costs and individual institutions have been omitted.

KEYWORDS

Sustainable urban development, urban trees, urban forests, urban regeneration, green infrastructure, knowledge exchange, biodiversity, green infrastructures, Sino-European collaboration

ABBREVIATIONS

NBS: Nature-based solutions
UF-NBS: Urban forests as nature-based solutions
SIAC: Spatial Impact Assessment and Classification
SIK-Hub: Spatial Information and Knowledge Hub

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KEY DEFINITIONS

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.

Urban forestry: the practice of planning and management of urban forests to ensure their health, longevity and ability to provide ecosystem services now and in the future.

Nature-based Solutions (NBS): Nature-based Solutions (NBS) are defined as *"actions to protect, sustainably manage, and restore natural or modified ecosystems, which address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits"*. (IUCN, 2018)

Urban forests as nature-based solutions: UF-NBS are a subset of nature-based solutions, which 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)

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

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1 Explanation of the work carried out by the beneficiaries and Overview of the progress

1.1 Objectives

CLEARING HOUSE addresses a global challenge that unites European and Chinese cities in their quest to develop more resilient cities and liveable societies: finding pathways for **the (cost-)effective restoration of degraded (peri-)urban environments, and the enhancement of ecological connectivity, in order to improve human wellbeing, also referring to public health and social inclusion.** CLEARING HOUSE focusses on tree-based green infrastructure, including (peri-)urban forests and forested parks, and trees in public and private spaces. Tree-based green infrastructure is the basis for **"urban forests as nature-based solutions"** (similar Davies et al. 2017), henceforth referred to as **UF-NBS**.

Urban Forests as nature-based solutions (UF-NBS) are a subset of nature-based solutions that build on tree-based urban ecosystems to address societal challenges, simultaneously providing ecosystem services (ES) 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 have globally advanced on the political agenda. As a subset of nature-based solutions (NBS), they are considered **critically important to facilitate sustainable urban development**. In China, urban forest establishment is one of the goals in the country's 13th Five-Year Plan (2016 – 2020). The Chinese government will plant more than 60,000 hectares of new trees in urban areas by 2025. The European Green Deal sees a role for the multiple benefits provided by forests, including through afforestation and the restoration of degraded forests. Planting trees and deploying green infrastructure (of which UF-NBS are a crucial element) are mentioned in the EU Biodiversity Strategy for 2030 as actions to cool urban areas and mitigate the impact of natural disasters. A new European Urban Greening Platform is programmed under the "Green City Accord", to facilitate urban greening plans by European cities. The 2030 Biodiversity Strategy explicitly refers to urban tree planting, urban forests, tree-lined streets, parks and urban hedges as being included in the urban greening plans and the EU Nature Restoration Plan. The Biodiversity Strategy also calls for systematically integrating green infrastructure and NBS into urban planning. Whilst trees are a proven nature-based solution, 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.

At the same time, there is an urgent need to systematically review, connect and expand the existing fragmented knowledge and experience on the potential of UF-NBS. This need is the starting point for CLEARING HOUSE: bringing together two major arenas of urban development, Europe and China, the motivation is to learn across local experiences and to improve the development of what is collectively termed the "urban forest" at a larger scale.

The **main objective** of CLEARING HOUSE is to **analyse and develop – across China and Europe – the potential of NBS in general, and UF-NBS in particular, for enhancing the resilience of cities facing major ecological, socio-economic, and human wellbeing challenges**. Specifically, CLEARING HOUSE:

- compiles, reviews and connects the existing **knowledge on developing, managing and monitoring NBS and UF-NBS**, and specifically analyses **governance, institutional and economic frameworks,** as well as **public perceptions and demands,** towards UF-NBS in China and Europe (WP1);

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- analyses **case studies** of UF-NBS in China and Europe in view of their impacts on urban societies (including aspects of socio-environmental justice and gender), their cost-effectiveness and their replicability in diverse contexts (WP2);

- facilitates **a collaborative learning process** on UF-NBS connecting practitioners, businesses, policymakers and scientists from China and Europe to generate and apply new knowledge on UF-NBS as a subset of NBS, and their implementation, including co-design of research questions (WP3);

- develops – in a transdisciplinary way – **decision support tools and guidelines** for cost-effectively developing, governing and managing NBS in general and UF-NBS in particular for enhancing urban resilience and human wellbeing, and derives UF-NBS-related **business and investment cases** (WP4);

- increases **awareness** on the benefits of NBS in general, and UF-NBS in particular, and **disseminates** the developed decision support tools, guidelines and business and investment cases within governments, businesses, civil society and academia (WP5).

1.2 Explanation of the work carried out per work package

The work in CLEARING HOUSE has been impacted by the restrictions imposed to limit the spread of the COVID-19 virus, either by the authorities, either by the project partner's institutions. This was mainly the case in the first and second reporting period, but as a result, planning and organising workshops with stakeholders and researchers, or organising project meetings with consortium partners has been delayed and has led to an additional workload in the 3rd reporting period. The CLEARING HOUSE project partners have been on a journey to bring meetings online, but particularly for some stakeholder meetings it proved difficult to include everyone when meetings are organised online.

The works has also been impacted by the lack of research funding for the Chinese partners. They have only been funded from January 2022 on (until December 2024), with a much smaller contribution then applied for initially Second open call on knowledge exchange mechanism activities.

The descriptions below are provided per reporting period. The project included 3 reporting periods:

- Reporting Period 1: 1 September 2019 to 28 February 2021
- Reporting Period 2: 1 March 2021 to 31 August 2022
- Reporting Period 3: 1 September 2022 to 29 February 2024 (and including additional unfunded work until the report submission beginning of May 2024)

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1.2.1 Work Package 1. Reviewing knowledge and developing the analytical concept

- **Task 1.1. Identifying and mapping UF-NBS and developing a typology**

Reporting Period 1

An innovative UF-NBS typology has been developed under the leadership of HUB and HKU. The typology is described in **D1.1**. The typology describes UF-NBS based on their form (morphology), physical properties, functional properties, and institutional characteristics. The development of the typology has been outlined in **M1.1**. Various existing typologies were screened (including the ThinkNature typology), and relevant aspects for re-use in the proposed UF-NBS typology were identified. The UF-NBS typology is following semantic principles, i.e., knowledge on UF-NBS is expressed in a formal, machine-interpretable way in form of a web ontology language (OWL) ontology. This semantic approach has been chosen, on the one hand, to facilitate re-use of the typology for developing the decision support tool proposed by CLEARING HOUSE (WP4). On the other hand, semantics enable using the UF-NBS typology for interactive browsing and querying of knowledge, and for providing means of building UF-NBS inventories. Moreover, in this way, the UF-NBS ontology provides necessary (technical and conceptual) anchor points for a further integration of databases and models (model coupling). The UF-NBS typology, and the approach chosen for its implementation, has been discussed in an online workshop/webinar (**M1.2**), held on October 28, 2020. A scientific publication introducing the UF-NBS typology is currently being prepared, and further presentations to the NBS task forces is planned.

Partners actively involved: HUB, HKU, EFI, CAF-RIF, CREAF
Partners contributing: BOKU, CFRI, ULodz, UNIBA

Feedback from reviewers (RP1)

A shortcoming of the report is that, as a joint European Chinese project, it uses only European cases studies and there are no Chinese cases citied. This is important since inclusion of Chinese UF-NBS case studies would reveal a different temperament in the classification of UF-NBS systems. Notably emphasis towards monocultures, importance of economic value of UF-NBS in determining typology and erosion of UF-NBS as a result of other (economic) considerations.

Reporting Period 2

A webinar has been organised on 7 October 2021 to present the typology, and to collect comments and recommendations for improvement. Based on these comments, a paper on the typology has been published in *Urban Forestry & Urban Greening*. The Chinese partners have recently submitted input on the typology, this input will be processed in a revised version of the typology that will be integrated in the tool in development in Task 4.2.

Partners actively involved: HUB, HKU, EFI, CAF-RIF, CREAF
Partners contributing: BOKU, CFRI, ULodz, UNIBA

Feedback from reviewers (RP2)

No feedback from reviewers on T1.1.

Reporting Period 3

No further work done on the typology during the reporting period.

- **Task 1.2. Reviewing the knowledge on the importance of UF-NBS for resilient cities**

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Reporting Period 1

Task 1.2 combines a review of the academic literature review on UF-NBS in English, with a review of grey literature and 22 case histories. The **review of the English-language body of academic literature on UF-NBS** was led by HUB, incorporating feedback from the project consortium and with a particular contribution of HKU for the literature in Mandarin and Cantonese. HUB conducted the literature search and the subsequent screening of results for availability and eligibility, leading to a selection of 422 records (cf. **M1.3**) for further analysis through a rapid review process. A description of the review process with a comparative summary of findings focusing on Europe and China is provided as part of **D1.2**. For the presentation of findings, HUB developed an interactive dashboard implemented as a Shiny app using the R statistical language (http://review.clearinghouseproject.eu, **M1.3**). This dashboard is an open source portal of academic literature on UF-NBS, including links to the original article (open access or closed access). Further work to include non-English publications from China is ongoing, and an academic paper on the review is in preparation.

The **analysis of the grey literature** (based on 22 case histories) was led by UNIBA and has built on the contributions from most project partners. The analysis was focused on collating evidence – and identifying research gaps – related to intended and unintended outcomes of UF-NBS implementation for (peri-)urban regeneration and human wellbeing. The body of case histories includes 16 case histories from Europe, and 6 from China, following a template (common with T1.4) that contributing partners used to describe the case histories. A Sino-European analysis, in the form of a modelling exercise of the selected case histories, was conducted to explore shared themes, such as connectivity, multifunctionality and social cohesion, and macro-categories (i.e., ecological, engineering, social and economic) for urban regeneration and renaturing.

The **review of the case histories** illustrates a common shared approach for UF-NBS implementations between Europe and China. The case histories support the idea of adopting UF-NBS to support ecological functions and ecosystem services. The wider scale of implementation for UF-NBS in China however requires a more structured approach which is depicted by the engineering/technological dimension of the projects. An interesting finding is that in both European and Chinese UF-NBS case histories the social component (expressed by key words such as *citizens*, *place*, *education*, *recreation*, *wellbeing*) is also well established and represents one of the targets of new plans and projects for urban regeneration and renaturing. The typologies in the case histories mainly concern afforestation, green urban areas and (historical) gardens, and riparian wetlands.

The **academic literature review** illustrates a different role and particular importance of UF-NBS in Europe and in Eastern Asia. The fields of ***human public mental and physical health*** as well as ***quality of life*** are of great importance in both world regions. Both challenges seem to be key in terms of development goals (in line with SDG11). Ranking the most frequently used/applied green space types and UF-NBS reveals similarities between Europe and China: ***trees*** and ***forest-type landscapes within and around cities*** are studied most in both regions. In both regions, ***forest and/or tree monitoring*** are well established nature-based actions and interventions, but monitoring is not yet used a lot to inform ecosystem management, greening, or assessing stewardship strategies. Also the outcomes of the academic literature – both in Europe and China – is ***rarely differentiating for the genus or species*** that are present in the NBS. Also the ***impact of public perceptions and expectations*** regarding the look of urban green spaces towards on tree and forest management and ES delivery is largely missing in both regions (an aspect that is the object of T1.3).

In terms of ***desired impacts*** the research on multifunctionality can be strenghtened in both regions. While in Europe there is an established debate on the linkages between urban forests and human

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health benefits such as *noise attenuation* and/or the potential for the *provisioning of food*, in Eastern Asia positive and negative synergies delivered by UF-NBS are strongly related to *soil degradation*. One aspect which is most critical in Europe are *(management) costs* which is calling for a stronger policy support in order to minimise and safe costs e.g. for planting strategies. In addition, and in order to mitigate ***undesired impacts*** - esp. in terms of *biodiversity and habitat loss* in Eastern Asia and *damages to built-up elements and infrastructures* in Europe – requires stronger links to other disciplines for future research initiatives such as linking urban forests to social and economic research.

However, there are also obvious ***differences*** that have been identified between Europe and China (East Asia) using the academic review: actions such as ***stewardship; management; social interventions***, or multi-dimensions and inclusive concepts such as ***multi-functionality*** being relevant for Europe are not among the actions having a particular importance for Eastern Asia (this is diverging from the results based on the case histories). Understanding these divergences will be part of the second phase of CLEARING HOUSE.

The work in T1.2 has led to the following outcomes:

- a reference-recorded knowledge repository for the academic literature regarding UF-NBS (**M1.3**): available at http://review.clearinghouseproject.eu;
- integration of the 22 case histories into the new NetworkNature Case Study catalogue (**M1.3**) (uploading ongoing – planned to be finalised by the end of May 2021);
- a deliverable (**D1.2**) reviewing the academic literature and the 22 case histories.

Partners actively involved: UNIBA (task lead), HUB (lead academic review), HKU, EFI, CAF-RIF, CREAF, BOKU, CFRI
Partners contributing: VUB, LUKE, UMKrakowa
External partners: NetworkNature (hosting the repository of cases)

Feedback from reviewers (RP1)

The reviewers suggested that some further discussion and analysis of some results from D1.2 would be done:

- to cross-analyse the two tables that contain the questions emerging from the grey literature analysis and case histories (Table 4, first part) and from the scientific literature analysis (Table, 2, second part);
- to discuss the similarities and differences between the results of the comparative analysis conducted in the first part, and those presented in Section 3 of the second part.

Reporting Period 2

During this reporting period, the 22 case studies have been uploaded to NetworkNature (https://networknature.eu/clearing-house).

A further update of the dashboard has been planned during the last reporting period within the project.

The output from D1.2 has been informing the analytical framework developed within T1.5 (see D1.6) and will guide the analysis in T2.2.

The suggestions from the reviewers to do some cross-analysing of the mentioned tables in D1.2 will be developed into an academic article.

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Partners actively involved: UNIBA (task lead), HUB (lead academic review), HKU, EFI, CAF-RIF, CREAF, BOKU, CFRI
Partners contributing: VUB, LUKE, UMKrakowa

Feedback from reviewers (RP2)

Suggestions from previous RP have been addressed and further analysis based on the outcomes of D1.2 is being undertaken.

Reporting Period 3

No further work done on the typology during the reporting period.

- **Task 1.3. Surveying societal perceptions and demands towards UF-NBS**

Reporting Period 1

This survey looks into public habits and preferences regarding urban forests and trees, the perceptions regarding urban forests and the services they provide, societal acceptance and barriers for implementing UF-NBS, and the impact of forest structure and aesthetics on urban forest use. Based on the results of the survey, European-wide maps for demands and supply of ecosystem services by urban forests and urban trees will be developed. The survey is also looking into the impact of COVID-19 on the use of urban forests, and the role these have as service providers in pandemic times.

This task is heavily delayed due to the underestimated complexity of the work (33 countries, 29 languages), delayed feedback from China due to COVID-19, and especially a delay in the tender procedure (two subsequent tendering procedures needed due to no proposals having been submitted in the first opening of the tender in August 2020, second tender awarded end of December 2020). First runs with test panels have been finalised by the end of March 2021 (**M1.4**). The data collection will be finalised in the first half of May 2021. The number of European respondents will be around 13.200 (n=400 per country), instead of the planned 20.000 in the proposal. The lower number of respondents was necessary for budgetary reasons, and a more detailed calculation of the sample requirements has shown that the representativeness of the results is still guaranteed with this smaller sample. In China, the survey will be run by a polling agency in 18 provinces, with 390 Chinese respondents per province.

The survey questionnaire has been designed in a collaborative approach with partners within and outside CLEARING HOUSE, and between Europe and China. The survey entails also a compatible element to a survey conducted with European forest owners and managers in the SINCERE H2020 project on supply of forest ecosystem services, enabling an European-wide mapping of demand (CLEARING HOUSE) and supply (SINCERE) of ecosystem services provided by (urban) forests. This very novel collaborative approach will possibly result in a high impact publication on forest ecosystem services demand and supply.

Partners actively involved: EFI, CAF-RIF, BOKU, ULodzki, CREAF, VUB, LUKE
Partners contributing: Croatian Forest Research Institute, LGI, UNIBA
External partners: SINCERE project, BILENDI (polling agency), translators: University of Sarajevo, University of Freiburg, Czech University of Life Sciences Prague, University of East Anglia (UEA), Bartin University, Ukrainian National Forestry University

Feedback from reviewers (RP1)

No specific comments

Reporting Period 2

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After testing in Mar - May 2021 (**M1.4**), the data collection has been finalised end of June 2021 (**M1.5**) with 13,319 responses collected in Europe (33 countries), and 7 379 responses collected in China (18 provinces). After data cleaning (finalised June 2022), 10 391 responses (Europe) and 7 232 responses (China) were included in the data analysis. The data were analysed using descriptive statistics and non-parametric statistical tests. The results are presented in a report (**D1.3**) and have been presented at several conferences (including Urban Forest Urbanism, June 2022 and ESP Europe Conference, October 2022).

The survey results show certain similarities and differences between China and Europe. It was common in both contexts that the public viewed regulating and cultural ecosystem services as very important, whereas provisioning ecosystem services are considered moderately important. The most important ecosystem services were air quality, habitat and aesthetics in Europe, while it was air quality, human health, and aesthetics in China. The preferred image of a woodland in terms of landscape aesthetics in the city is closer to a forest than it is to a park in Europe. In contrast, in China, the preferred image of a woodland was reminiscent of a park rather than a forest. The Chinese and European respondents perceived that a park-like woodland would provide most natural benefits to society. We also demonstrate how public perceptions correspond with variables such as country, age, gender, and education. As climate change intensifies and the world becomes more urbanized, the need for trees, parks, and forests to provide a range of ecosystem services in accordance with public demands is very important. Our data improves the knowledge of public perceptions and demands towards ecosystem services, contributing to policy design inclusive of attitudes and preferences of the public.

Partners actively involved: EFI, CAF-RIF, BOKU, ULodzki, CREAF, VUB, LUKE
Partners contributing: Croatian Forest Research Institute, LGI, UNIBA
External partners: SINCERE project, BILENDI (polling agency), translators: University of Sarajevo, University of Freiburg, Czech University of Life Sciences Prague, University of East Anglia (UEA), Bartin University, Ukrainian National Forestry University

Feedback from reviewers (RP2)

The project reviewers have provided a long list of detailed comments, with a request to revise and resubmit the deliverable D1.3 which is reporting on this task.

Reporting Period 3

Work on the results from the survey has been continued during this reporting period. Following the request for revision by the project reviewers during the 2nd project review, the deliverable (**D1.3**) presenting the results has been revised following the data cleaning and has been submitted in April 2023 (delay granted in Grant Amendment 2). Article journals have been prepared and submitted, others are still in preparation and will be submitted later in 2024 (see list under "outputs" below).

Partners actively involved: EFI, CAF-RIF, BOKU, ULodzki, CREAF, VUB, LUKE
Partners contributing: Croatian Forest Research Institute, LGI, UNIBA

- **Task 1.4. Analysing governance, institutional and economic frameworks for UF-NBS**

Reporting Period 1

Based on 22 (6 in China, 16 in Europe) case histories on urban forestry-related projects, programmes and initiatives, the teams led by EFI and CAF-RIF have analysed governance, institutional and economic frameworks that impact the delivery of nature-based solutions by urban forests. The work was initiated through a series of virtual workshops (**M1.6**) that defined the workplan and the case history template. Existing frameworks in China and Europe at various levels have been reviewed, including the European

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(e.g., guidance on NBS, and on green infrastructure), national (e.g., the Forest City Construction Action in China), regional, city and project delivery level. The analysis of the case histories in Europe has been implementing the concept of planning families (as developed by the GREENSURGE project). Based on advice from CLEARING HOUSE researchers in Central and Eastern Europe additional perspective articles were added to the scope of the research to address the realities of governance systems still in transition. The review – as published in **D1.4** – learned that the engagement of the civil society (social groups, citizens) is still relatively low, ergo a top-down approach is dominant, with the leading role of municipalities. We see a need for widening the scope of the co-design processes involving residents and various citizens groups. The engagement of the private sector seems to be still falling short of expectations. The funding of UF-NBS relies to a high degree on municipal funds. This may strengthen top-down governance arrangements with public participations limited to consultation. 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 and possibly limit the involvement of private sector. There is a need to explore alternative economic arrangements, which can be also a starting point for new governmental and institutional arrangements. The results of this analysis have been presented during several conferences (Third International Forest Policy Meeting, Urban Forestry Days Conference and the 2nd China International Forest-City's Conference). An academic publication on the outcomes of this task is in preparation.

Partners actively involved: EFI (task lead), CAF-RIF (co-lead), BOKU, ULodzki, CFRI
Partners contributing: VUB, UNIBA, HUB, LGI, CREAF, LUKE, TSF, FAFU

Feedback from reviewers (RP1)

No specific comments

Reporting Period 2

The outcomes resulting from T1.4 have been guiding the analytical framework developed within T1.5 (see **D1.6**) and will be used to guide the analysis in T2.2.

Partners actively involved: EFI (task lead), CAF-RIF (co-lead), BOKU, ULodzki, CFRI
Partners contributing: VUB, UNIBA, HUB, LGI, CREAF, LUKE, TSF, FAFU

Feedback from reviewers (RP2)

None.

Reporting Period 3

No specific further work has been done on this task in reporting period 3.

- **Task 1.5. Developing an interdisciplinary analytical framework for UF-NBS**

Reporting Period 1

HUB developed jointly with VUB a screening tool (**D1.5**) for supporting the exploratory case study analysis, discussed during an online workshop with the CLEARING HOUSE partners. The screening tool was used in T2.1 for the identification of knowledge gaps, and thus help setting the focus, for the further comparative work of CLEARING HOUSE in T2.2.

The workshop on the draft analytical framework (**M1.7**) and the final version of the analytical framework (**D1.6**) have been delayed until June 2021 due to the delayed work on T1.2 and T1.4 and the delayed Sino-European co-design workshop (T3.1).

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Partners actively involved: HUB (task lead), VUB (co-lead WP2), EFI
Partners contributing: CFRI, BOKU, ULodzki, CFRI, CREAF

Feedback from reviewers (RP1)

No specific comments

Reporting Period 2

An online workshop during the Sino-European co-design workshop on 14 June 2021 reviewed the outcomes of Task 1.2, Task 1.4, Task 2.1 and the local co-design workshops in China and Europe (T3.1), bundled in a draft analytical framework (**M1.7**). Members of the User Advisory Group and the Stakeholder Mirror Group participated in this event.

These discussions, and a follow-up discussion during the Steering Committee on the 14th of July 2021, lead to an analytical framework for the work in Task 2.2. This framework is organised along 4 research streams (further detailed in **D1.6)**:

- Governance Analysis: UF-NBS and transdisciplinarity, building on Workshops and key informant interviews
- Cultural ecosystem services and citizen appreciation of UF-NBS, building on the survey and participatory mapping tool (T3.3)
- Sustainable funding mechanisms on UF-NBS: Business models, cost evaluation, economic side of UF-NBS (links with T4.1)
- Geography of UF-NBS and multifunctionalities: research questions that have to do with UF-NBS and mobility, ecological connectivity, biodiversity, blue and green nexus

For every research stream, the analytical framework defines

- the broad research objective
- the nature of the task, including the aimed outcomes
- the coordinator of the task
- prospective research questions to be discussed by this stream

Partners actively involved: HUB (task lead), VUB (co-lead WP2), EFI
Partners contributing: CFRI, BOKU, ULodzki, CFRI, CREAF

Feedback from reviewers (RP2)

Minor revisions to D1.6 have been requested. Further, the reviewers asked “In the future updates of D1.6 (which is intended to be a living document), particular attention should be paid to describing how the proposed framework will “give guidance for analyzing existing planning instruments and monitoring schemes” (as stated in the DoA), considering that this aspect is currently covered only in a limited way.”

Reporting Period 3

No specific further work has been done on this task in reporting period 3, apart from resubmitting **D1.6** after revision. The comment on D1.6 has been integrated in the deliverables reporting on the tools (WP4), that have been implementing D1.6.

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1.2.2 Work package 2. Conducting the comparative case study analysis

The main objective of WP2 is to analyse and compare the implementation of UF-NBS in selected cities and city regions in view of their impacts on urban ecosystems and societies, their cost effectiveness, and their replicability in distinct contents.

- **Task 2.1. Exploratory analysis of the CLEARING HOUSE case studies**

Reporting Period 1

Task 2.1 undertook an exploratory analysis of the 10 CLEARING HOUSE case cities and case city regions. The research questions resulting from this exploratory analysis will feed into the co-design process (T3.1) and will provide a necessary background for a more in-depth and targeted comparative analysis of UF-NBS-related challenges and research questions in the second phase of CLEARING HOUSE (more particularly T2.2).

A workplan for the exploratory analysis (**M2.1**) was agreed among partners in the course of the first months of the project and submitted in March 2020. The screening tool defined in T1.5 was aimed to collect information from the 10 CLEARING HOUSE cases for the exploratory analysis. The result of the analysis was compiled in **D2.1** and includes chapters based on GIS and quantitative analysis of urban areas in Europe, as well as qualitative profiles for the 5 case study cities in Europe. At the moment of submitting the report, the five case study descriptions from China are still missing despite regular meetings and reminders. A workshop to discuss findings from exploratory analysis (**M2.3**) was conducted online in the context of the project general assembly in March 2021. It included a presentation of the D2.1 report to all partners, to share the lessons learned and to receive comments, suggestions and feedbacks. It also included a reflection on the process (i.e. how was the collaborative research experienced by all partners).

A final step in this task is to include the information from the screening tool in the repository developed by T1.2 (**M2.2**) in the NetworkNature case study descriptions. This work – based on the executive summaries of the report's chapters (i.e. continental mapping of UF and city profiles) – will be finalised in June 2021.

Partners actively involved: VUB (task lead), CAF-RIF (co-lead), EFI, UNIBA, HUB
Partners contributing: TSF, LGI, LUKE, UMKrakowa, AMB, CREAF, Gelsenkirchen, CFRI, Vlaams-Brabant, IBGE

Feedback from reviewers (RP1)

It is recommended that, since it was not possible to carry out the necessary case studies in China as indicated in D2.1, that a second report be produced D 2.1A, focusing on the Chinese case studies, and hopefully to be carried out during 2021.

Reporting Period 2

A Workshop to discuss findings from exploratory analysis (M2.3) was conducted online in March 2021. The minutes were submitted to the whole consortium.

Contribution of Chinese partners to Task 2.1 was submitted in September 2022 and integrated in the Deliverable **D2.1**, that has been re-uploaded to the EC portal.

Partners actively involved: VUB (task lead), CAF-RIF (co-lead), EFI, UNIBA, HUB
Partners contributing: TSF, LGI, LUKE, UMKrakowa, AMB, CREAF, Gelsenkirchen, CFRI, Vlaams-Brabant, IBGE

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Feedback from reviewers (RP2)

Revisions to D2.1 have been requested. Further, the reviewers asked “A more detailed comparison of Chinese and European case studies: Similarities and differences and what can be learned from this”

Reporting Period 3

No specific further work has been done on this task in reporting period 3, apart from resubmitting D2.1 after revision, addressing most of the comments by the reviewers. As indicated in our observation letter on the comments by the reviewers, we have been missing the necessary resources regarding the requested further analysis for a more detailed comparison in D2.1 in the project review report on RP2.

Partners actively involved: VUB (task lead), CAF-RIF (co-lead), EFI, UNIBA, HUB
Partners contributing: TSF, LGI, LUKE, UMKrakowa, AMB, CREAF, CFRI

- **Task 2.2. Exploratory analysis of the CLEARING HOUSE case studies**

Reporting Period 2

Building on the lessons learned from the "Exploratory analysis of the CLEARING HOUSE case studies" (WP2, Task 2.1), task partners decided to structure the D2.2 as an “articles-based report”, that is: compilation of a number of items such as scientific articles, concept papers, blogposts, reports, independent from one another. All of them would be organised in four sections, reflecting the four themes (i.e. "Research Streams"), as defined in Task 1.5 (and D1.6). This approach was considered to be more effective and more efficient: it would be in line with the dominant form of scientific knowledge production today (i.e. relatively brief articles on specific questions), it would benefit from the diversity of the consortium without being threatened by it, and would be more resilient to the long-term planning-related problems arisen following the COVID19 disruption.

Subsequently, a survey was circulated all across the consortium to call for contributions in one or more research streams, and a detailed plan was developed and submitted in April 2022 (**M2.4** Detailed plan for the comparative analysis of the case studies developed). Afterward the modus operandi was such that every research stream had a leader who would manage the team autonomously. Every month all research stream leads (plus observers from the steering committee and other tasks, as needed) meet and exchange.

Different activities have been carried out since beginning of 2022, and are planned to be finalised in the June 2023.

By the end of November all partners will submit to the Task coordinator (VUB) all inputs related to the individual research streams. The research coordinator will bring them together and compose an "editorial" piece: the objective of this editorial is to tie together all research, illustrate their synergy and complementarities, and take the reader through the whole landscape of research and narrative that was developed to shed light on various aspects of UF-NBS. By the end of December a draft report (all inputs and editorial) will be shared with the whole consortium for review and comments, and at a later stage to the steering committee for approval. A final revised report will be submitted by the end of February 2024.

Partners leading research streams VUB, EFI, LUKE, LGI, HUB
Other partners involved: University of Bari Aldo Moro, University of Lodz, CREAF, CFRI, Croatian Forest Research Institute, ZZM-UM KRAKOWA, TSF

Feedback from reviewers (RP2)

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The reviewers commented on the proposed structure for D.2.2. The proposal is probably very efficient from a dissemination perspective. However, there is a risk that the different streams will (also) incorporate outputs that are only loosely related to the case studies. This is suggested from the draft list of outputs included in the periodic report. A final "editorial" might not be sufficient to consistently and comprehensively report results and insights emerging from the comparative and in depth analysis of the case studies, which was the original purpose of Task 2.2. One possibility could be to produce another short document - in parallel to this compilation of outputs that shed light on various aspects of UF-NBS – more directly focused on the comparison and lessons learned from the activities in the case studies. Another element to pay attention to is the fact that the number of contributions expected under the different themes varies largely, and some topics seem under-represented. Particularly, the topic of NBS cost-effectiveness (a key element of CLEARING HOUSE specific objective no.2) receives very limited attention, and this might jeopardize the possibility of fully achieving the objective.

Reporting Period 3

Following the plan for the comparative analysis of the case studies (**M2.4**), the research streams developed their part of the task during 2023. Every month the research stream leads (plus observers from the steering committee and other tasks) met and exchanged. The timeline of this task included:

- A workshop was organised during the project meeting in Krakow (May 2023) to present the report to the whole consortium, and discuss its findings and implications for city-level governance of UF-NBS
- Preparation of draft articles and submission to task lead (VUB) by October 2023
- Compilation of the report by the VUB researchers, tying together the research, illustrating their synergy and complementarities, and taking the reader through the whole landscape of research and narrative that was developed to shed light on various aspects of UF-NBS.
- A draft report was shared with the whole consortium for review and comments, and at a later stage to the steering committee for approval (**M2.5**, November 2023).
- The final revised report has been submitted at the end of February 2024 (**D2.2**).

Deliverable **D2.2** is an articles-based report, that builds on the involvement of multiple disciplines, with inputs both from academics and practitioners. This "articles-based report" is a compilation of a scientific articles, concept papers, and reports, independent from one another. This approach allows to produce at the same time wide-ranging texts addressing the multiple dimensions of an issue, as well as sharp and in-depth building blocks focused on specific research questions and methods. This tactic is effective to deliver both synthesis and in-depth results. This document brings together all the findings and formulates lessons learnt from a Sino-European perspective, within a coherent and comprehensive picture. It summarises the articles focusing on the elements that are critical to realise the comparative in-depth analysis and illustrates the thread that connects all of them.

The report is structured along three thematic chapters or "research streams": governance and management, geography of UF-NBS – connectivity and accessibility, and the city and trees. Each thematic chapter includes four to five articles, which are introduced and summarised along the most interesting aspects for the exploratory analysis in this task. In a last chapter, conclusions are presented, and key recommendations are defined.

This methodological choice was based on the work conducted in Year 1 and Year 2 of CLEARING HOUSE, notably the standardised Sino-European UF-NBS typology (D1.1), the reference-recorded repository of policy-based and scientific knowledge of UF-NBS and their impacts (D1.2 and D1.4), the Sino-European co-design events (D3.1), the exploratory analysis of all case study cities (D2.1), and the Analytical Framework for case study research (D1.6). If the research streams were initially four, once the research

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was conducted, we opted to reduce this number to three to increase internal consistency and the flow of the text. This was realised by integrating the research stream on cost-effectiveness with the research stream on governance and management. The latter decision has also been taken as a mitigation measure to be taken due to unavailability of staff at the lead-partner for Stream 4 on cost-effectiveness (LGI) due to private reasons. However, to cover the cost-effectiveness aspect in CLEARING HOUSE, a very comprehensive report has been provided for Task 4.1 (D4.1, business models and investment cases), which also includes comparative aspects on the business models for urban forests in most European CLEARING HOUSE case study cities. Unfortunately it was too late in the process to incorporate this into D2.2.

One of the limits of the approach we followed is that the comparative angle is probably underdeveloped vis-à-vis the ambitions of the project proposal and of the plans developed in the early stages of the CLEARING HOUSE project. The initial idea was to conduct a comparative analysis of 10 paired cities and city region in Europe and China, that is an EU city with certain characteristics with a similar city in China, and this repeated for five pairs. Such an analysis was not possible: the Chinese partners only received their funding very late, and their activities were limited -inter alia- by the sanitary situation (COVID-19) and the consequent frequent lockdowns, limitations to travel and reduced staff capacity. In addition, we experienced limited consistency in the data collected from the core European and Chinese case study cities due to various factors, including issues related to data sharing. At the same time, believing in the importance of a comparative approach to shed light on UF-NBS governance and geography, and to compensate for the missing EU-China comparison, we took a comparative angle in numerous of the articles included in this deliverable, as well as in the conclusion.

Partners leading research streams VUB, EFI, LUKE, LGI, HUB
Other partners involved: University of Bari Aldo Moro, University of Lodz, CREAF, CFRI, Croatian Forest Research Institute, ZZM-UM KRAKOWA, TSF

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1.2.3 Work package 3. Establishing the collaborative learning process

- **Task 3.1. Implementing the CLEARING HOUSE co-design and co-learning process**

Reporting Period 1

This task started with LGI, FAFU and EFI compiling a guidance document (**D3.1**) for the co-design and co-learning events. This guide supports local partners in organising local co-design and co-learning workshops. Due to the pandemic, it was not possible to test the guidance document before being rolled out to the 10 case cities in CLEARING HOUSE. The meeting restrictions also resulted in the need to revise the guidance document with additional information to organise the local co-design workshops in an online setting.

A series of local co-design workshops have been organised in Europe (**M3.1**, Gelsenkirchen 10 September 2020 – physical meeting, Brussels 1 October 2020 – physical meeting, Krakow 13 October 2020 – hybrid meeting, Halle-Leipzig 12 November 2020 – on-line meeting, Barcelona 27 November and 15 December 2020 – hybrid meetings). Due to the COVID-19, only one co-design workshop could be organised in China – during the 2nd International Forest-City Conference on the 6th of April 2021, where scientists and decision-makers involved in urban forestry-related research and practice defined the most relevant research questions for the Chinese part in the CLEARING HOUSE project.

For every local workshop, a report was produced exploring the states of the art on UF-NBS in the city, challenges related to implementation and management of UF-NBS and UF-NBS governance. The reports also stated a number of research questions that the stakeholders involved in the local co-design workshop suggest as further research questions in the second phase of the project. The reports have been compiled in an overall synthesis report (**D3.2**; however the report for the Chinse co-design event on 6 April is still missing). The hybrid setting of some of the workshops make it available to include more people than allowed for physical meetings under the COVID-19 regulations. Although participants were indicating that the social aspect of the meetings, including the social and mutual learning, was negatively impacted by the hybrid setting. Workshop organisers also experienced that it was more difficult to engage the online participants in the discussions (see also the M6.5 document).

The Sino-European co-design workshop (**M3.2**, foreseen originally February 2021) has been postponed to the half June 2021. This postponement makes it possible to include all the outcomes of the first phase (governance analysis, academic literature review, case histories, exploratory analysis of the case studies) in the meeting discussions, and to define the project-wide research questions for the second phase of the project.

Partners actively involved: LGI, FAFU, EFI
Partners contributing: VUB, BOS+, Vlaams-Brabant, IBGE, AMB, CREAF, Gelsenkirchen, ULodzki, TSF, UMKrakowa

Feedback from reviewers (RP1)

As for other deliverables, we recommend future work to include also process-related results, by describing and discussing the level of interactions among participants and the effectiveness of different engagement methods (e.g. problems associated with lack of engagement, power issues among participants, dominance of some stakeholders, etc). Another important element that is described only generally in the Deliverable is the level of participation of different stakeholder groups. There is a general reference to the groups of stakeholders invited to the different workshops, but it would be useful to have a detailed break-down by participants' affiliation/sector of activity.

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The process-oriented analysis and the composition of the participants during the workshops, as requested by the reviewers, is part of the Deliverable **D3.7** (in T3.4). Due to the delay in the workshops, D3.7 has been delayed until October 2023. We started the requested analysis, and the draft will be shared with the reviewers mid-November.

Two online sessions have been organised to form the Sino-European co-design workshop, on the 14th of June and on the 25th of June. On 14 June 2021, the results from T1.1, T1.2, T1.4, T1.5 and T2.1 were presented, followed by 3 breakout groups to give input on the analytical framework for T2.2 (finalised as D1.6).

On 25 June, 6 brainstorming sessions were organised, collecting needs and ideas for the future work in WP4 and WP5:

- sustainable business models and investment cases for UF-NBS (to kick off the work on T4.1)
- the work in T4.2 on developing a decision support tool
- the guidelines to be developed in T4.3.
- the work in T4.4 on piloting UF-NBS in field laboratories
- the CLEARING HOUSE webinars (T5.3)
- Innovation and Exploitation plan (T5.5)

This was followed by presentations on good examples in China: the Forest City Programme, the Beijing Plain Afforestation Plan, the Green Lungs of the City project, the Meishan Dongpo Urban Wetland Park, a research project on Wind Resistance of Urban Trees in Shenzen, and an overview of investments in urban trees in Guangzhou.

The outcomes of the Sino-European co-design event have been described in **D3.3.**

A final part of this task T3.1 are the local co-learning workshops, organised in two rounds: a first round is introducing and discussing the research done (workshops organised by end of 2022), and a second round is closing down the collaborative work in the case studies.

The table below gives an overview of the workshops taken place in the first round of the co-learning workshops.

Case study	Date	Topic	Target group
Barcelona	24/03/22 (AM)	Llobregat values: strengths and opportunities	Local associations
	24/03/22 (PM)	Environment and mental and physical health	Research institutions
	27/10/22	Ecosystem services in the Vall Baixa del Llobregat	Local and regional administrations
Brussels	12/10/21 & 13/12/21	Developing an action plan for "street parks" in Woluwe Saint-Pierre	Local and regional administrations, civic organisations
Gelsen-kirchen	09/09/21	Two themes: - Protect urban forests and green infrastructure sustainably! - Ecosystem services of urban forests and (street) trees	Local and regional administrations, civic organisations
Krakow	13/10/21	Field trip to the Drwinka River Park	Local and regional administrations, civic organisations, business, academia and education

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	14/10/21	Defining actions, activities and means for Drwinka River Park	Local and regional administrations, civic organisations, business, academia and education
Leipzig	11/11/21	Benefits and trade-offs of methods for green space assessments in Leipzig	Local and regional administrations
	17/01/22	Screening the requirements for accessing a perception study in the city of Leipzig	Local and regional administrations

Some further meetings for this first round are planned in Barcelona (mid-November 2022) and Brussels (date to be set). A reflection on the process is ongoing, and will be part of **D3.7** (evaluation of the learning process, due October 2023).

Partners actively involved: LGI, FAFU, EFI
Partners contributing: VUB, BOS+, Vlaams-Brabant, IBGE, AMB, CREAF, Gelsenkirchen, ULodzki, TSF, UMKrakowa

Feedback from reviewers (RP2)

The reviewers provided some detailed feedback on the submitted D3.3. This feedback did not result in a request for resubmission. The feedback by the reviewers has been taken into account during the work in RP3.

Reporting Period 3

During reporting period 3, the local case study coordinating partners organised two further series of local co-learning stakeholder workshops to introduce the research work on UF-NBS and fit it to their specific local context (**M3.3**, completed in February 2023 – Vlaams-Brabant and some Chinese case studies were late), and to report and discuss findings from the analysis of the UF-NBS (**M3.4**, completed by 20 October 2023) with local stakeholders and citizens. The discussions were summarized through workshop minutes and were shared with the consortium.

Two city sharing sessions were organized and facilitated by LGI, one during the 4th Consortium Meeting in Krakow in May 2023, and the second one in January 2024 before the closing of the project, in order to leverage the knowledge sharing and learnings between city partners and increase the level of impact of the activities developed by the cities.

The table below details the workshops held by the cities for the 2 last rounds of codesign workshops.

Case study	Date	Topic	Target group
Barcelona	05/11/22	Final public event: guided tour to the metropolitan section of the Llobregat river, with Joan Pino, CREAF	Open to all participants: Local associations, research institutions, Local and regional administrations
	Online (mail)	Cartography of ecosystem services in the Llobregat	Regional administrations
	Online (mail)	Evaluation of results. Identification of spaces of opportunity	AMB+CREAF
Brussels	03/02/22	3rd codesign workshop Brussels	Local and regional administrations, civic organisations
	15/02/23	Workshop on Greening Initiatives in the Vlaams-Brabant case area (Leuven)	

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	18/09/23	Co-design workshop Tervuren	Local and regional administrations, civic organisations, interested citizens
	04/10/23	Co-design workshop Hoeilaart	
	20/02/24	Training session on urban forestry solutions	Local and regional administrations, civic organisations
Gelsen-kirchen	15/09/23	Rheinelbeforest (Gelsenkirchen Ueckendorf) - Street tree improvement and street tree scenarios (marteloscopes), citizen participation projects	For experts – city administration, scientists, colleagues, biologists, politicians
	16/09/23	Greenlab HUGO (Gelsenkirchen Buer) - Citizen participation projects, Smart City model project with citizen participation, Future workshops	For the public – citizens, NGOs, politicians, neighbors, kids…
Krakow	13/10/22	Codesign workshop in Kraków River Parks	Local and regional administrations, civic organisations, business, academia and education
	14/09/23	Geosurvey on the perception of river parks, case study of Drwinka River Park	
	13-14/10/23	Codesign workshop in Drwinka River Park	
Leipzig	27/10/23	Co-design workshop on "Strengthening local actors in dealing with the consequences of climate change for urban trees"	13 participants from administration, academia, and civil society

Partners actively involved: LGI, FAFU, EFI
Partners contributing: VUB, BOS+, Vlaams-Brabant, IBGE, AMB, CREAF, Gelsenkirchen, ULodzki, TSF, UMKrakowa

- **Task 3.2. Setting up and running the CLEARING HOUSE learning architecture**

Reporting Period 1

The Learning Mechanisms include (1) two international thematic workshops, (2) two learning city tandems, and (3) two task forces providing scientific support to cities on implementing UF-NBS. We had planned one workshop, one city tandem and one task force visit during this reporting period, but following the travel restrictions, only the international thematic workshop took place (Urban Forestry Days, 23-24 March 2021). The planned 1st call for candidate cities (**M3.5**) and 1st round of learning mechanism implementation (**M3.6**) was postponed and is suggested to be merged with the second call (**M3.7**, suggested postponed call launch September 2022). As we still foresee to run two learning city tandems, and two task forces – as planned – there is no negative consequence of this postponement. We even expect that the merged activities will be more effective, with a reduced time needed for travel and with less emissions linked to travels.

The Urban Forestry Days were a collaboration between EFI, EFUF (European Forum on Urban Forestry), CLEARING HOUSE, Metropolis, IUCN, the German Federal Ministry of Food and Agriculture (BMEL) and the Ministry of Environment, Agriculture, Nature and Consumer Protection of North Rhine-Westfalia. Over two days, 750 participants from over 60 countries attended the event. Particularly important for CLEARING HOUSE was the panel discussion with representatives of Barcelona, Guangzhou, Joensuu, Milan, and Sao Paolo (chaired by our partner Metropolis) and the 2nd day focussing on Urban Forests

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as Health Infrastructures. CLEARING HOUSE partners gave five presentations. Furthermore, other European NBS projects contributed, through presentations by NetworkNature (H2020), NATURVATION (H2020), GoGreenRoutes (H2020), ENABLE (BiodivERsA), Dr. Forest (BiodivERsA) and Green for Care (ERASMUS+). The Urban Forestry Days had a relevant impact in social media (including 8 blogposts on the CLEARING HOUSE blog, the Resilience Blog (by EFI), the blog of the European Forum on Urban Forestry. A report on the thematic international workshop (**D3.4**) was delivered at the end of April.

Partners actively involved: Metropolis (task lead), CAF-RIF (co-lead), EFI, IUCN, AMB, IBGE
Partners contributing: HUB, VUB, HKU, LUKE
External partners: EFUF (European Forum on Urban Forestry), the German Federal Ministry of Food and Agriculture (BMEL), Ministry of Environment, Agriculture, Nature and Consumer Protection of North Rhine-Westfalia

Feedback from reviewers (RP1)

No specific comments

Reporting Period 2

Given the uncertainties related to traveling to China, it was decided to focus the Knowledge Exchange Mechanism on the exchanges beyond China-Europe collaboration (which was initially the second round of the call). The call was launched in March 2022 (**M3.7)** with deadline on 11 April 22 (was extended to 11 May). Seven cities showed interest (4 from Latin-America, 2 from Europe, 1 from Asia). The applications where reviewed by Metropolis, IUCN and EFI along pre-agreed criteria:

- Level of political commitment to UF-NBS
- UF-NBS policies implemented by the local authority
- Experience with UF-NBS projects (past, present or future)
- Involvement of the local authority in another H2020/EU project tackling UF-NBS or other nature-based solutions
- Strength of compliance of the UF-NBS to the Global Standard for NBS
- Topic submitted matches to the one of a potential city partner
- Contribution of submitted UF-NBS project/s to the accomplishment of goals established by the global agendas

Bogota has been selected for the Task Force, and Belo Horizonte and Mexico City have been selected for the city tandem. The knowledge exchanges are currently being prepared, and will be leading to site visits in Spring 2023.

The other call – which was originally focussed on Europe-China Exchange – will be launched beginning of 2023, with a general focus on Europe-Asia Exchange, as the restrictions to enter China are still strict. Given these delays, the deliverables and milestones associated with this task have been postponed with a grant amendment (**D3.5, M3.5, M3.6, M3.8**).

Partners actively involved: Metropolis (task lead), EFI, IUCN
Partners contributing: LGI

Feedback from reviewers (RP2)

No specific feedback

Reporting Period 3

Impacted by the COVID-19 pandemic restrictions, this activity has been mostly implemented during reporting period 3. In 2023, the two learning city tandems, and two task forces were implemented, as well as one international thematic workshop.

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The **first learning city tandem** (March 2023, **M3.8**) involved the cities of Belo Horizonte (Brazil) and Mexico City (Mexico) on projects concerned with inner-city afforestation and green infrastructures, specifically on the management of continuously extending parks and green areas across the whole territory and the mechanism they used to foster the interconnections between all the green areas. The exchange visit has been organised in March 2023, also including the AMBarcelona in Mexico-City (with external funding provided through the "Metropolis Green Infrastructure" project, coordinated by Metropolis).

Following the launch of the second call for potential candidates for the knowledge exchange mechanism (**M3.5**, January 2023), the **second learning city tandem** involved the cities of Haikou (China) and Istanbul (Turkey), in which exchanges mainly evolved around methods of increasing public awareness of green infrastructure projects' benefits. These exchange visits took place in December 2023 (reaching **M3.6**).

The two task forces were implemented in Bogotá (Colombia, March 2023, **M3.8**) and Braga (Portugal, June 2023). The **task force in Bogotá** (Storymap) focused on the Bogotá Urban Forest Decree, a significant step in integrating urban forestry into city legislation, providing a platform for coordinated action among local institutions and the community, and to which CLEARING HOUSE experts were asked to provide feedback to an example of similar policies. The **task force in Braga** (Storymap) examined the maintenance and governance aspects of urban trees, integrating exchanges on comprehensive strategies that encompass forest management, responsible practices, and engaging with forest owners.

The activities and outcome of the city tandems and the task force visits have been documented in **D3.5** (submitted April 2024).

The second international thematic workshop has been organised as part of the **Brussels Urban Summit** (organised by Eurocities, Metropolis and OECD in Brussels). On 13 June, about 85 representatives from cities around the world, local administrations, and consultants participated in the CLEARING HOUSE-hosted session with as title "Sustaining Cities, Naturally – Urban Ecosystem Restoration through Nature-based Solutions". Following an introduction on Nature-Based Solutions by IUCN's Susanna Gionfra, CLEARING HOUSE was introduced by Rik De Vreese. This was followed by interesting presentations highlighting cases from Brussels, GuangZhou and Belo Horizonte.

In addition to the aforementioned activities performed during 2023, and as part of the knowledge exchange mechanisms activities (WP3), Metropolis provided support to EFI in its participation in the **2nd World Forum on Urban Forests**: Greener, healthier, and happier cities for all, which was held from 16-20 October 2023 in Washington D.C, especially with the logistics for the session "Collaborative Learning on Urban Forests as NBS in China and Europe", carried out on 16 October 2023 from 1:30 pm to 3:00 pm. This event has introduced the outcomes of the CLEARING HOUSE project to an audience of around 20 participants from around the globe.

Partners actively involved: Metropolis (task lead), EFI, IUCN
Partners contributing: LGI

- **Task 3.3. Developing and implementing a citizen science monitoring of UF-NBS impact**

Reporting Period 1

Given the delay in previous tasks, we postponed the start of this task to April 2021 (instead of November 2020). As a result, **M3.9** on the CLEARING HOUSE citizen science monitoring methodology has also been postponed (until June 2021). HUB and CFRI have been preparing a preliminary version of a PPGIS platform for participatory mapping of cultural ecosystem services and disservices of urban

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green space in Zagreb, Croatia. This will serve as a pilot for the CLEARING HOUSE citizen science approach. CFRI's share in this project is funded by Croatian national funding, HUB has used CLEARING HOUSE person months to support this pilot.

Partners actively involved: HKU (task lead), HUB (co-lead), LUKE, CFRI
Partners contributing: none so far

Feedback from reviewers (RP1)

No specific feedback

Reporting Period 2

Based on the experiences made in the (unplanned) pilot conducted for Zagreb ("MyDynamicCity" tool), and further on the basis of analyzed core themes of case study cities (cf. D2.1, D3.2), a citizen-science (CS)/PPGIS framework has been elaborated for the CLEARING HOUSE project (**M3.9**). The framework considers very brief, location-specific, focused, and predominantly trait-based surveys for the elicitation of citizen perceptions, and for the personal evaluation of perceived traits. In contrast to the Zagreb pilot, and thus compared to more traditional PPGIS activities or surveys that ask respondents once, an approach is suggested that seeks to engage citizens repeatedly, i.e., to respond to surveys multiple times, and at different locations. Simultaneously, a software tool ("LOUPE") for conducting the CS/PPGIS within CLEARING HOUSE has been deployed at HUB under the URL https://www.mydynamicforest.de/app . The tool was chosen in favor of the "MyDynamicCity" tool applied in the Zagreb pilot as it is location-aware, and as it allows for a better repeated engagement of citizens due to this location awareness. In a meeting on June 02, 2022, status quo and ideas for tool development and CS implementation were exchanged between European and Chinese project partners.

The proposed framework and tool were tested by HUB, and subsequently, a process has been established to put CS/PPGIS successively into operation with interested case study cities. This process stipulates how surveys are tailored to each case, and outlines setting the thematic scope of CS/PPGIS in each case, the initial survey design, and testing to prepare the actual CS campaign in each case study city. The process was introduced to the European case study cities in a virtual meeting on June 21, 2022.

In regard to the case study cities, CS/PPGIS is in different stages of this process, as follows: (i) For the city of Leipzig, a survey on (drought-affected) tree health has been conceptualized, with a test campaign having been completed end of September 2022. Therefore, pending minor revisions, the survey will be made available to the public starting in quarter 4/2022; (ii) For the Area Metropolitana de Barcelona (AMB), a survey on air pollution and UF-NBS impacts related to air pollution has been conceptualized in August 2022, and tested during September 2022. (iii) For the city of Gelsenkirchen, the process has been started in September 2022, with the thematic scope currently being under finalization (October 2022); and (iv) regarding further cases, including Krakow, the process will be started in quarter 4/2022. Therefore, regarding the kick-off of citizen science campaign in the case study cities (**M3.10**), the process for establishing CS/PPGIS campaigns has been started (quarter 3/2022). The public kick-off of CS/PPGIS is expected in the quarter 4/2022 in the first cases.

Partners actively involved: HUB (lead), LUKE, CREAF, AMB, Gelsenkirchen, UMKrakowa
Partners contributing: CFRI

Feedback from reviewers (RP2)

No specific feedback

Reporting Period 3

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The piloting of CS in the city of Zagreb revealed that a local, case-wise technical deployment of CS requires considerable effort, i.e., IT-related capacities (e.g., regarding application hosting, database administration), or capacities for ensuring GDPR compliance. It had thus been concluded that a case-by-case deployment of CS may not be preferable. Therefore, from a technical perspective, the proposed PPGIS-based CS approach has been put into operation as a centrally coordinated CLEARING HOUSE CS platform called "MyDynamicForest" (MDF), deployed at HUB, that is used across cases linked to T4.4. This platform platform is accessible under its URL https://www.mydynamicforest.de/app. MDF is a web-based, responsive (i.e., supporting both desktop and mobile devices), location-aware (i.e., relying on browsers' geolocation API) application. It allows participating in PPGIS surveys/activities based on a user's location through geofencing. Therefore, case-specific surveys are made available based on spatially delineated areas of interest. Conversely, a user's location also allows spatializing responses for subsequent analysis. The data protection officer of HUB was informed and consulted to ensure GDPR compliance of the MDF implementation and data collection.

In collaboration with the case study cities and T4.4, PPGIS activities/surveys were co-created in an iterative process, under consideration of the research interests of case study partners and considering potentially relevant local knowledge (e.g., findings from surveys previously conducted). Co-created surveys were implemented in selected languages (i.e., typically, the local language as well as English), tested by local partners, revised as needed, and with data collection subsequently been kicked-off. In so-doing, a rolling implementation of citizen science (CS) has been conducted in CLEARING HOUSE, therefore, **M3.10** (Citizen science campaign in the case studies kicked off) has been achieved at a case-by-case basis (Barcelona: 04/2023; Leipzig: 09/2022, with further revisions in 09/2023; Gelsenkirchen: 04/2023, with further revisions in 08/2023; Krakow: 10/2023). Given staff change and delayed local processes, the implementation of the CLEARING HOUSE CS in Brussels has not been possible. Following achieving M3.10 at case level, i.e., with collection of data kicked off locally per case, data collection was monitored, and collected data repeatedly read-out and processed for a tentative analysis. This data processing included normalization of data for analysis, a summarization of core items, charting of categorical response variables, and a mapping of responses. The so-prepared CS data were subsequently shared with the corresponding CLEARING HOUSE partners in the form of (Excel) spreadsheets and short reports. Moreover, as previously indicated, based on this tentative analyses, selected surveys were also revised further as needed, e.g., by adapting geofences, improving localization (e.g., changes to wordings) including revising of pre-defined answering options, or adding additional items to the survey.

From a content perspective, key themes for CS to support UF-NBS governance include the understanding of cultural ecosystem service values of different types of UF-NBS (pilot application in Zagreb), the perception of environmental qualities and effects on health and well-being (Barcelona), the perception of city tree health as important determinant for the delivery of biophysical functioning (Leipzig), and understanding baseline UF-NBS conditions in terms of citizen awareness, appreciation, and perception (Gelsenkirchen, Krakow).

Overall, the application of the methodological framework for conducting citizen science in CLEARING HOUSE proved feasible, and the use of MDF as location-based, cross-case application serving multiple use cases, as expressed through the varying, case-specific thematic scopes, proved workable. However, potential privacy concerns may need to be addressed. E.g., it has been found that apparently, users were not consenting to share their location, thus rendering the use of MDF ineffective. It also needs to be noted that for recruitment of respondents, local engagement activities

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proved to be crucial. The MDF platform remains available at HUB, and data collection for the cases is, in principal, ongoing.

Partners actively involved: HUB (lead), LUKE, CREAF, AMB, Gelsenkirchen, UMKrakowa, TSF
Partners contributing: CFRI

- **Task 3.4. Evaluating the CLEARING HOUSE collaborative learning process**

Reporting Period 1

This task tracks the impact and quality of the events organised by CLEARING HOUSE. A multilingual online evaluation survey has been compiled (M3.11, see https://ec.europa.eu/eusurvey/runner/Co-DesignWS4CH) and is sent to attendees of all relevant events and workshops organised by CLEARING HOUSE. Based on this survey, a report on attendee satisfaction and the impact of the events has been compiled (see milestone M6.5 document). Overall, the assessment of the Co-Design Workshops showed that the events were received very positively. Out of 104 participants in total, we received 61 responses, a response rate of 59%. The majority of questions asked for a rating of 1 (lowest) and 5 (highest) and most received an overall score of 4 or higher, with only 3 questions scoring 3.9. As such, we can say that the webinars and events were a great success, yet in some areas there's still room for improvement.

Partners actively involved: EFI (task lead)
Partners contributing: event organisers that send out the survey

Feedback from reviewers (RP1)

As for other deliverables, we recommend future work to include also process-related results, by describing and discussing the level of interactions among participants and the effectiveness of different engagement methods (e.g. problems associated with lack of engagement, power issues among participants, dominance of some stakeholders, etc). Another important element that is described only generally in the Deliverable is the level of participation of different stakeholder groups. There is a general reference to the groups of stakeholders invited to the different workshops, but it would be useful to have a detailed break-down by participants' affiliation/sector of activity.

Reporting Period 2

Given the delays in organising the workshops (T3.1) and the knowledge exchange mechanism (T3.2), the evaluation in **D3.7** has been postponed with the second grant amendment until October 2023 (was due August 2022).

The process-oriented analysis and the composition of the participants during the workshops, as requested by the reviewers, will be part of **D3.7**. We started the requested analysis, and the draft will be shared with the reviewers mid-November.

Feedback from reviewers (RP2)

No specific feedback

Reporting Period 3

The co-design and co-learning workshops in Europe have been evaluated, using the evaluation survey developed at the start of the project. 65 respondents have replied to the survey. The overall evaluation was good to very good, with the respondents evaluating the workshops as relevant, interesting and well-organised. Respondents indicated having learned a lot, but they were missing more concrete examples and tools, that can be used in their daily work. We also evaluated the knowledge exchange mechanism activities (T3.2, task forces, city tandems and international thematic workshops). Finally,

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suggestions for a durable institutionalisation have been developed and discussed during the final project consortium meeting in Brussels (30/11/2023, **M3.12**). All this has been reported in **D3.7** (February 2024).

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1.2.4 Work package 4. Synthesising, developing tools and piloting solutions

The main goal of WP4 is to synthesise the findings of the research, knowledge exchange and learning work in CLEARING HOUSE (conducted in WP1, WP2 and WP3) into a set of functional tools for key end-users in Europe, China and worldwide. The work in WP4 was initially planned to start in February 2021, but due to the delay in the other work packages, the WP4 actually started later. WP4 Kick-off Workshop held 30 April 2022 should be considered as the actual WP4 start, during which the framework of further work on all four WP4 tasks were discussed, refined and planned.

- **Task 4.1. Deriving business models and investment cases**

Reporting Period 2

The main goal of T4.1 is to develop and test (in T4.4) novel business models and investment cases. The first stage of T4.1 (ongoing) is an analysis of the state of the art, thus literature review of European projects and other sources, including analysing NBS and UF-NBS business models and investment cases. The kick-off workshop **M4.1** took place during the Sino-European co-design workshop on 25 June 2021. During May 2022 – September 2022, we held interviews with external stakeholders (representatives of financial institutions, insurance companies, project developers, water infrastructure companies, municipalities).

- The first stage of T4.1 realization is an analysis of the state of the art, thus a) a literature review, b) interviews with external stakeholders, and c) inputs collection from WP2 T2.2 workstream 3. The kick-off workshop **M4.1** took place during the Sino-European co-design workshop on 25 June 2021. The literature review (from European projects and other sources) was conducted and completed (since September 2021 to May 2022). In the same period, the interviews with external stakeholders were also realized (until September 2022), with representatives of financial institutions, insurance companies, project developers, water infrastructure companies, and municipalities were interviewed. Inputs from WP2 were also included in the analysis. Additional interviews might be organised between November 2022 and April 2023.
- The second stage of T4.1, which has been also already started, is tailoring and testing the novel Business Models (BMs) and Investment Cases (ICs), within this task – several ICs and potential BMs have been identified and pre-analysed, based on the analysis of the state of art. More cases and models will be collected (between December 2022 and March 2023), and further analysed. During a workshop, sustainable business models for three cases will be developed, in a co-design approach with stakeholders. Potential business cases include funding trees through water managing companies, or funding urban forests through carbon funding.
- The third and major stage of T4.1 will be to prepare and conduct a deployment analysis, including the developed BMs and ICs (scheduled to complete until September 2023). Collaboration with the ERASMUS+ project Uforest (http://www.uforest.eu) will be sought to analyse the fundraising campaign by 4 cities in this project (Brasov in Romania, Barcelona, Dublin, Milano). Given the state of the project, it will not be possible to have a real test of business models and investment cases, but these will be tested through roleplaying and reviews by prospective users.

Given the overall delay of the project, the mid-term review workshop for this task (M4.2) and the final report on business models and investment cases in UF-NBS (D4.1) have been delayed with the second grant amendment: M4.2 until February 2023 instead of August 2022; D4.1 until October 2023 instead of April 2023.

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Partners actively involved: LGI (task lead)
Partners contributing: EFI, ULodzki, CAF-RIF, TSF, IUCN

Feedback from reviewers (RP2)

The project reviewers requested a revision of the Periodic Report, to include more details on project activities and outcomes that are not included in the deliverables due in the second reporting period. The project partners have provided additional comments (these are included above, in the section on RP2).

Reporting Period 3

Due to the COVID-related delays in the project, the focus of T4.1 shifted from building and testing specific business models to analysing and showcasing a large variety of business models and investments cases, in order to address the wide range of contexts, types and constraints of urban forests.

A detailed semi-directive interview methodology was applied (during reporting period 2) to gather in-depth insights from field experts and stakeholders. The methodology was structured around several key steps, including participant selection, interview guide development, pre-interview communications, and the conduct of interviews with a semi-structured approach. During reporting period 3, inputs from the CLEARING HOUSE results and case studies were analysed from a business model perspective. The state of the art literature review on external UF-NBS (business model) publications and real-life UF-NBS examples was further deepened during the last months of the project in order to capture the most recent and relevant developments that would be useful for sustainable business model innovation. The combined sources helped develop a deep understanding of UF-NBS business models and make tangible recommendations directly tailored to UF-NBS project holders and urban forest developers, as a practical guide on how to fund their urban forest projects. The outcomes of this work have been shared with the Uforest ERASMUS+ project and the SME Etifor (Uforest co-coordinator), leading to a session in April 2024 during the “The Nature of Cities” festival.

The resulting report (**D4.1**) was finalized by the end of the project (February 2024), in order to integrate final results of the project.

Milestone **M4.2** on the “Mid-term review of implementation of business models & investment cases conducted” was validated at the end of the project (Feb 2024) through an online questionnaire sent to all project interviewees, city case study representatives and the User Advisory Board members in order to test the relevance of the business models and recommendations designed.

Partners actively involved: LGI (task lead)
Partners contributing: EFI, ULodzki, TSF, IUCN, AMB, IBGE, AMB, CREAF, Gelsenkirchen, UMKrakowa, HUB

- **Task 4.2. Developing decision support for UF-NBS implementation**

Reporting Period 2

In accordance with the grant agreement, Task 4.2 is concerned with development of decision support tools for facilitating UF-NBS implementation under consideration of knowledge created by the CLEARING HOUSE project. The grant agreement foresaw the development of a set of such tools: First, an online scenario tool, aiming at assessing of UF-NBS solutions at diverging scales and iterative timesteps, e.g., rule-based changes to land-use, forest stands, and tree density. Second, a global benchmarking tool has been proposed, i.e., a benchmark assessment of UF-NBS structure, design, and

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their environmental, economic, and social impacts in different locations, linked to the IUCN Global Standard for Nature-Based Solutions.

However, in light of the pandemic emergency and the resulting delays in the project, but particularly due to a lack of funding of Chinese partners affecting tool conceptualization likely to cause further delays, HUB conducted a scoping of stakeholder demands (MS27-M4.3: "Workshop synthesising users' demands for application and benchmarking tool conducted") as interim task lead. However, a situation emerged that clarification or re-assignment of responsibilities was needed. Simultaneously, it has been deemed desirable to better integrate the decision support tools with other outputs generated by CLEARING HOUSE, in particular, the trait-based UF-NBS typology developed in WP1, the PPGIS/citizen science toll developed in WP3, and the exploratory and in-depth analysis of cases conducted in WP2.

Therefore, to re-affirm responsibilities, to avoid further delays, and to better align intended tools with other CLEARING HOUSE outputs in order to maximize project impact, an adaptation of the work programme seemed plausible, hence, particularly T4.2 has been significantly restructured. According to this alternative work plan for T4.2, it is proposed to develop two distinct decision support tools: First, a spatial impact classification and assessment tool (SIAC) as alternative to the initially proposed scenario tool. Second, a spatial information and knowledge hub (SIK-Hub), in lieu of the initially proposed online benchmarking tool (Figure 1).

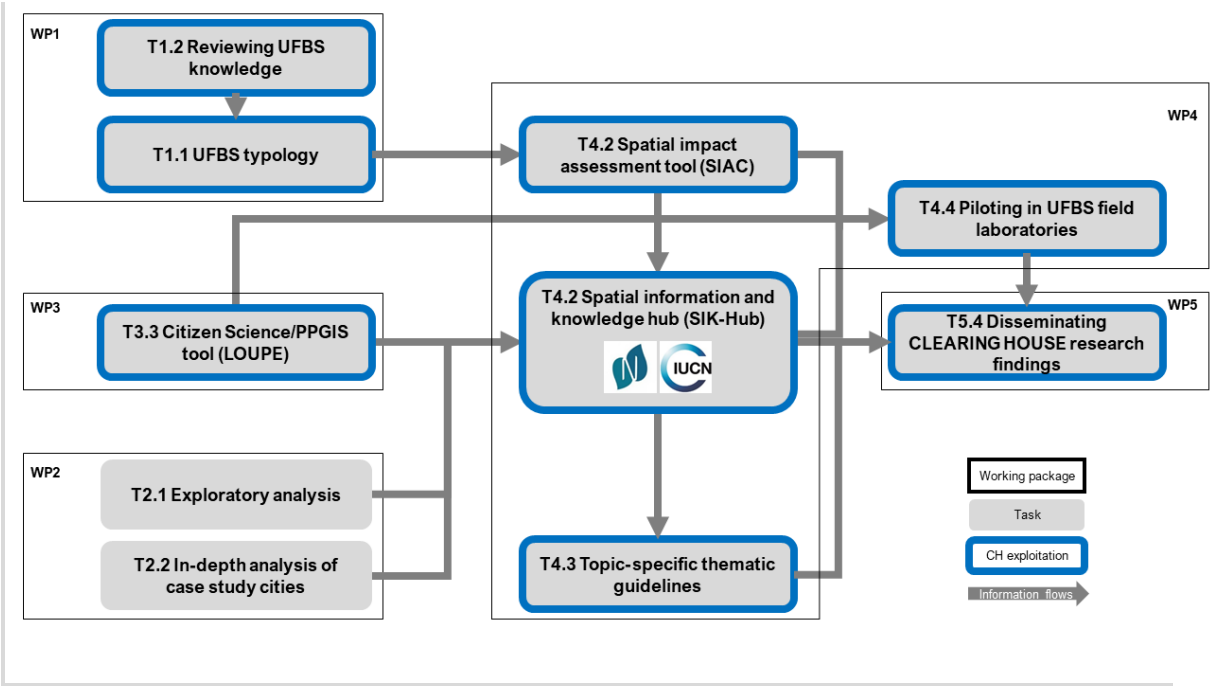

Figure 1. Proposed SIAC and SIK-Hub tools in restructured Task 4.2, and relationship of proposed tools with other tasks and work packages in CLEARING HOUSE.

The **SIAC tool** is intended to serve as a prototypical implementation of the UF-NBS typology developed in WP1 of CLEARING HOUSE. It is conceptualized as a set of tools facilitating UF-NBS assessment, with the typology providing the knowledge—i.e., trait-based classification rules—for conducting classification and assessment. The main outputs of the SIAC tool will be

- a comparable assessment of UF-NBS traits including spatial configuration of tree-based entities such as (tiny) forests, park tree stands, tree alleys or single trees,

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- a consistent classification of UF-NBS with consideration of their composition and spatial-topological relationships,
- a derivation of indicators, and
- an estimation of likely benefits of the UF-NBS under scrutiny.

The proposed knowledge-driven, trait-based UF-NBS classification and assessment is intended to be based on openly available, minimal but also case-specific data, and is considered a feasible means to consistently evaluate and discuss UF-NBS at a given spatial scale, and to facilitate cross-case comparison. If feasible, depending on the findings of T3.3 (Developing and implementing a citizen science monitoring of UF-NBS impact), it is intended to contrast SIAC outputs with perceptions of traits gathered by the application of citizen science/PPGIS tools in T3.3, as a form of reality check. The SIAC tool is conceptualized as QGIS plugin, with a mock-up template/demonstrator being under development for stakeholder evaluation by city partners and the stakeholder advisory group (M28 – M4.4: "Mock-up template of the application evaluated by users"), due February 2023. Evaluation criteria will be elaborated in a consensual co-development process including stakeholders and scientists. Following the evaluation, tool conceptualization and implementation is to be completed, under consideration of obtained stakeholder feedback.

The **SIK-Hub tool** is intended to become an interactive web-based application that synthesizes CLEARING HOUSE findings and thus serves as a knowledge hub for project outputs, allowing for an easy, interactive exploitation and dissemination of findings. SIK-Hub is planned to produce and visualize thematic key indicators of socio-ecological challenges and UF-NBS traits along three distinct spatial scales, i.e., continental scale, city scale, and local scale. As a function of scale, and thematically aligned to key IUCN products such as the Global Standard on Nature-Based Solutions for Societal Challenges and the as well as the IUCN Urban Nature Indexes, SIK-Hub is intended to deliver indicator-based evidence for e.g. policy analysts and decision-makers, but also for local residents or interest groups with complimentary degrees of detail. SIK-Hub is conceptualized as a set of interactive online components, i.e., dashboard, data hub, visualization, and storytelling in the form of case-specific or challenge-oriented story maps. SIK-Hub seeks to develop new knowledge by synthesizing different types of data and information, and making it available following the FAIR principles (Findable, Accessible, Interoperable, and available for Re-use) in line with the data management plan of CLEARING HOUSE (D6.2). Similar to SIAC, a mock-up is currently under preparation for stakeholder evaluation in February 2023 (MS29 - M4.5: "Mock-up template of the benchmarking tool evaluated by users"), with evaluation criteria to be elaborated, and with tool development to subsequently be conducted.

Simultaneously to the development of both tools, as part of T4.4, a piloting strategy for the application of SIAC in the case study cities, and for deploying the SIK-Hub to the partners will be elaborated. Hence, this piloting strategy guides the testing of the developed tools. For this testing, respective criteria will be compiled as part of the piloting strategy.

Given the revised approach, and following the second grant amendment, **D4.3, D4.4, M4.4 and M4.5** have been postponed to the 3rd reporting period.

Partners actively involved: HUB (lead)
Partners contributing: CFRI, CREAF, IUCN

Feedback from reviewers (RP2)

The project reviewers requested a revision of the Periodic Report, to include more details on project activities and outcomes that are not included in the deliverables due in the second reporting period.

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The project partners have provided additional comments (these are included above, in the section on RP2).

Reporting Period 3

In line with the 2nd grant amendment, this task is concerned with the development of two UF-NBS tools: (i) the Spatial Impact Assessment and Classification tool (in the following, SIAC); and (ii) the Spatial Information and Knowledge Hub (in the following, SIK-HUB). In the development of both tools, elicited user demands (**M4.3**) were closely considered. The concepts (mock-ups) for both tools were presented to the stakeholder advisory group in February 2023 (Workshop to achieve **M4.4** and **M4.5**). The presentation was supported by concept notes circulated to stakeholders, that detailed intended tool objectives, linkages to other CLEARING HOUSE outputs and products, envisaged key functionalities with respect to stated user demands, and the intended impacts to be realised by each tool. For the evaluation and testing of the proposed tools, mock-up evaluation criteria as well as testing criteria were jointly developed by HUB (**T4.2**) and CREAF (**T4.4**). Evaluation criteria include the perceived usefulness of the tool for filling of knowledge gaps, the suitability of tools' functionalities as well as intended impacts to support decision-making, and ease of use, as perceived based on presented tool mock-ups. Testing criteria further included a more-specific reflection on usability.

Following the mock-up evaluation workshop, participants and stakeholders were invited to provide anonymous feedback on the proposed tools through an online questionnaire, implemented at HUB, guided by the evaluation criteria. Considering the limited feedback received (n=5), presented mock-ups appeared to be perceived rather positively. Concerns were expressed mostly with respect to the anticipated/perceived ease of use of SIAC. Feedback was considered through adapting tools' functionalities/impacts, as well as in defining key user groups for each tool. In the following, the implementation of SIAC and SIK-HUB are described in more specifically.

Table 1. Summary of tools developed in T4.2.

Aspect	SIAC	SIK-HUB
Operationalization	GIS-based, QGIS plugin	Web-based dashboard
Intended key impact	Knowledge generation on local UF-NBS conditions and benefits (traits-based, indicator-based, aligned to ecosystem services concept)	Knowledge dissemination, sharing, and generation on local UF-NBS for various stakeholders (residents to planning authorities)
Principal relationships to CLEARING HOUSE products and outcomes	User demands (M4.3), trait-based UF-NBS typology (D1.1)	User demands (M4.3), citizen science tool (D3.3)
Target user group	Research/academia, (GIS-experienced) practitioners	Planning offices, non-profit and non-governmental organisations, neighbourhood initiatives, residents
License	Modified (3-clause) BSD	Free to use

Spatial Impact Assessment and Classification Tool (SIAC)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821242 and the National Key R&D Programme of China under grant No 2021YEF0193200. The content of this deliverable does not reflect the official opinion of the European Union. Responsibility for the information and views expressed lies entirely with the author(s).

SIAC has been developed as a plugin for the open-source geographic information system QGIS. As it requires GIS skills for its operation, the tool is aimed primarily at academia and research, as well as practitioners. SIAC is positioned to support an approximation of local urban forest conditions and tree cover-related benefits, reflecting on stated user demands (M4.3) including the modelling UF-NBS conditions; the modelling of relationships between urban grey buildings and green spaces; providing locally specific operational indicators on UF-NBS; assessing benefits of UF-NBS with respect to socio-environmental challenges and aligned to the ecosystem services concept; and raising awareness towards UF-NBS. In addition to the aforementioned stated user demands, SIAC functionality has also been aligned with selected themes of **IUCN's Urban Nature Indexes**, particularly theme 3.1 (Identification of trends in vegetation cover), 3.5 (Identification of trends in connectivity), 4.2 (Identification of trends in plant species diversity), and 5.3 (Human health).

To meet user demands, SIAC implements the following key functionalities:

- An assessment of UF-NBS qualities and traits, such as the identification of tree patterns as solitary, rows of trees, or otherwise grouped, or an identification of trees within streetscapes. In this regard, to connect more specifically to further CLEARING HOUSE outputs and products, this assessment is guided by the trait-based UF-NBS typology developed in WP1 (D1.1), i.e., with aspects of this typology being prototypically implemented in SIAC;
- An assessment of selected indicators, including, e.g., street tree density, tree species richness, abundance, as well as approximations of the (building-related) 3 and (neighbourhood-related) 30 components of the 3-30-300 rule (Konijnendijk, C. C. (2023). Evidence-based guidelines for greener, healthier, more resilient neighbourhoods: Introducing the 3–30–300 rule. Journal of forestry research, 34(3), 821-830);
- An assessment of selected ecosystem services, i.e., carbon storage and sequestration, air quality regulation/air pollutant removal, and climate regulation, that is based on the area of tree cover and user-specified ecosystem service potentials;
- A graph-based assessment of UF-NBS connectivity and fragmentation from a structural perspective at the tree canopy level, considering also recommendations by the Singapore Index on Cities' Biodiversity[1], and in so-doing, providing indicators on the connectivity of urban tree canopy features (including, e.g., number of patches and components, capacities of patches and components, indicators of centrality, or graph-based distance measures).

SIAC has been developed to use basic data, based on the following reasoning: (i) facilitating the transferability to data-sparser regions; and (ii) avoiding the replication of already existing tools, such as i-tree, that provide more-detailed results but require more comprehensive input data. A comprehensive user manual has been prepared that details data requirements and operation of SIAC, that is distributed together with the source code. **D4.2** further details the development of the SIAC tool.

SIAC is available as open source under the modified (3-clause) BSD license. SIAC is available through the CLEARING HOUSE Zenodo repository (https://doi.org/10.5281/zenodo.10255287), and a GitHub repository.

Spatial Information and Knowledge Hub (SIK-HUB)

SIK-Hub (https://sik-hub.hub.arcgis.com/) is a simple but effective benchmarking tool to compare UF-NBS in different settings along the user demands defined. This tool allows a quick assessment of UF-

[1] Chan, L., Hillel, O., Werner, P., Holman, N., Coetzee, I., Galt, R., Elmqvist, T. 2021. Handbook on the Singapore Index on Cities' Biodiversity (also known as the City Biodiversity Index). Montreal: Secretariat of the Convention on Biological Diversity and Singapore: National Parks Board, Singapore.

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NBS and their environmental, ecological, and social settings based on the visualisation, synthesise, and story-telling of spatial data and information. Thereby, SIK-Hub is not only to be used for comparing different UF-NBS in cities, but will also be useful for facilitating the communication, collaboration, and knowledge exchange or dissemination. The tool is closely linked with IUCN's Global Standard for Nature-Based Solutions, as well as the IUCN Urban Nature Indexes. Potential users have been closely involved in the development of SIK-Hub through a users' evaluation of a mock-up-template of the tool, as well as a corresponding piloting in selected cities (see T4.4).

To meet user demands, SIK-Hub implements the following key functionalities:

(1) ***Navigate through data and information:*** allowing users to explore the data and information stored in SIK-Hub via pre-defined categories, a key-word search, and a tailored filtering of the search. Data and information of SIK-Hub itself can be approached and downloaded, as well as open accessible data related to the thematic framing e.g. derived as web-based maps.
(2) ***Visualise data:*** allowing an easy and quick visual inspection of the provided data across different scales and themes by zooming in/out or (de)activating layers, including a quick visual demonstration for supporting public outreach or sectoral collaboration.
(3) ***Analyse data:*** spatial analytics using interactive data visualizations. By combining spatial and thematic filters across different layers, a tailored detection of locations relevant for a particular challenge or thematic comparison of several spatial units (e.g. cities) is possible. Interactive tables and summary graphs allow a real-time scoring and benchmarking.
(4) ***Explore information:*** This function allows to access information related to a particular thematic challenge, a specific location, or a particular use case as shared by users. It provides a short narrative in combination with a map or other multimedia content, as well as references to further material within and outside of SIK-Hub (e.g. guidelines, scientific papers, official documents etc.) that allows a deeper understanding of the material.
(5) ***Upload data and information:*** allows authorised stakeholders to add, manage, and showcase data and information. This function is allows to fill detected knowledge gaps e.g. for developing complementary storylines or storymaps, or to enable a deeper and tailored analysis of the material (e.g. intersect the data with own zoning plans).
(6) ***Share feedback, data, and information:*** This function allows a straightforward and intuitive form-based collection of user feedback with respect to the presented data and information within SIK-Hub, and/or for a specific location. Users can also upload small files displaying their opinion such as pictures of specific localities and challenges.

Partners actively involved: HUB (lead)
Partners contributing: CFRI, CREAF, IUCN

- **Task 4.3. Developing topic-specific thematic guidelines**

Reporting Period 2

The main product of T4.3 are the thematic guidelines, based on the findings of WP1–WP3 to assist the end-users in Europe, China and world-wide in delivering UF-NBS to their communities. Four sets of guidelines are to be elaborated:

(1) cost-effective urban ecosystem restoration, ecological rehabilitation and new planning approaches and methods;

(2) mechanisms for public and stakeholder engagement in planning and managing UF-NBS, with specific attention towards less-privileged groups;

(3) management guidelines for UF-NBS, which will deal with planning, policy and delivery; and

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(4) change management and institutional reform for the better management of UF-NBS.

The guidelines will be prepared in two language version (English and Mandarin), however other versions are considered, in a cooperation with the local partners, interested in their preparation and popularization (i.e. Polish, Spanish, German, etc.).

As a result of series of authors' workshops a template for the guidelines has been elaborated. Each guideline will includes:

(1) Preface/Lead (1 page);

(2) the main body (theoretical background) (10–20 p.);

(3) two comments (EU + China) on the broader relevance of the chapter to Chinese and European context, by a recognized person from European and Chinese institutions (each 0.5 p.) with a portrait of the author and their affiliation;

(4) two case studies (EU + China) illustrating the subject (each 2–3 p.), written in the common format (structure + key information + pictures + contact person + links);

(5) links to references and resources.

The guidelines will be prepared in an attractive and easy-to-read form, rich in graphics, photographs, practical information, infographics; the final format will be adopted from the guidelines by TSF (https://sendzimir.org.pl/wp-content/uploads/2019/11/ZRZ5_web.pdf).

The work on the guidelines has been advanced, especially:

(1) the broad team of authors have been gathered and organized (including several partners from CH consortium, but also external ones);

(2) the detailed guideline structure (concept) have been elaborated;

(3) some potential case studies have been identified;

(4) the format for case study has been adopted;

(5) the working version of one guideline has been written;

(6) some candidates to comment the guidelines have been identified.

The kick-off workshop **M4.6** took place during the Sino-European co-design workshop on 25 June 2021. Given the overall delay of the project, and to be able to include as much as possible input from the other work packages (mainly WP2), the due date for the draft guidelines (for internal review) (**M4.7**) has been delayed with the second grant amendment until May 2023 instead of August 2022. The final guidelines (**D4.4**) have been delayed until October 2023 instead of December 2022.

Partners actively involved: EFI (task lead), TSF, ULodzki
Partners contributing: BOKU, Metropolis, IUCN, LGI, CAF-RIF, AMB, City of Gelsenkirchen, VUB, HUB, UNIBA
External partners: Berner Fachhochschule (Switzerland), TreeDimensional (Germany), Zavita (Slovenia), City of Ljubljana (Slovenia), European Forum on Urban Forestry (EFUF)

Feedback from reviewers (RP2)

No specific comments.

Reporting period 3

Draft guidelines (**M4.7**) were developed for the consortium meeting in May 2023 (Krakow) where the state and further work (including lay-out and design) on the guidelines was discussed. A "reality check" with cities and consultants led to suggestions to make the guidelines more relevant for practice. Further elaboration has been done, which has led to the final draft being ready by the last consortium

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meeting in November 2023, including also descriptions of case studies that support the guidelines. IUCN facilitated the selection of case studies in China. External contributors were sought and provided by Fachhochschule Bern from Switzerland, Treedimensional from Germany, Zavita Company and the City of Ljubljana from Slovenia and Pan Bern from Switzerland and the European Forum on Urban Forestry (EU wide). These organisations have voluntarily contributed to the work, hence building the guidelines on a broader base then the CLEARING HOUSE work alone.

In December 2023 and January 2024, a review for internal consistence between the guidelines, and with the other CLEARING HOUSE deliverables was done by the task leader and the project coordinator (both at EFI). Basic lay-out work has been done by LGI and TSF in February 2024, followed by a last round of corrections and review in April 2024 (**D4.4**). A translation of the guidelines into Mandarin (including a revision to make the guidelines more applicable to the Chinese situation) is ongoing by CAF-RIF and these are expected to be finalised by September 2024. Further translations into Polish and German (depending funding) have been planned along with a short-run print edition in English.

Partners actively involved: EFI (task lead), TSF, ULodzki
Partners contributing: BOKU, Metropolis, IUCN, LGI, CAF-RIF, AMB, City of Gelsenkirchen, VUB, HUB, UNIBA
External partners: Pan Bern (Switzerland), Berner Fachhochschule (Switzerland), TreeDimensional (Germany), Zavita (Slovenia), City of Ljubljana (Slovenia), European Forum on Urban Forestry (EFUF)

- **Task 4.4. Piloting UF-NBS field laboratories**

Reporting Period 2

CLEARING HOUSE is currently developing and implementing various tools, e.g., in T3.3 and across WP4, to address research and innovation landscape around the concept of UF-NBS in various urban field laboratories.

One of the characteristics of the UF-NBS is that they also encompass societal perceptions and resulting demands for ecosystem services. The main aims of tools design and testing were to reinforce the entire (cycle) process of planning, designing, deploying, governing, managing, and monitoring UF-NBS, including feedback, (re-)planning, re-designing and adaptive management. To support these aims, the tools proposed by CLEARING HOUSE shall facilitate the integration of the various bodies of information, e.g., scientific knowledge and perceptions of UF-NBS, as outlined in the following Figure 2**.**

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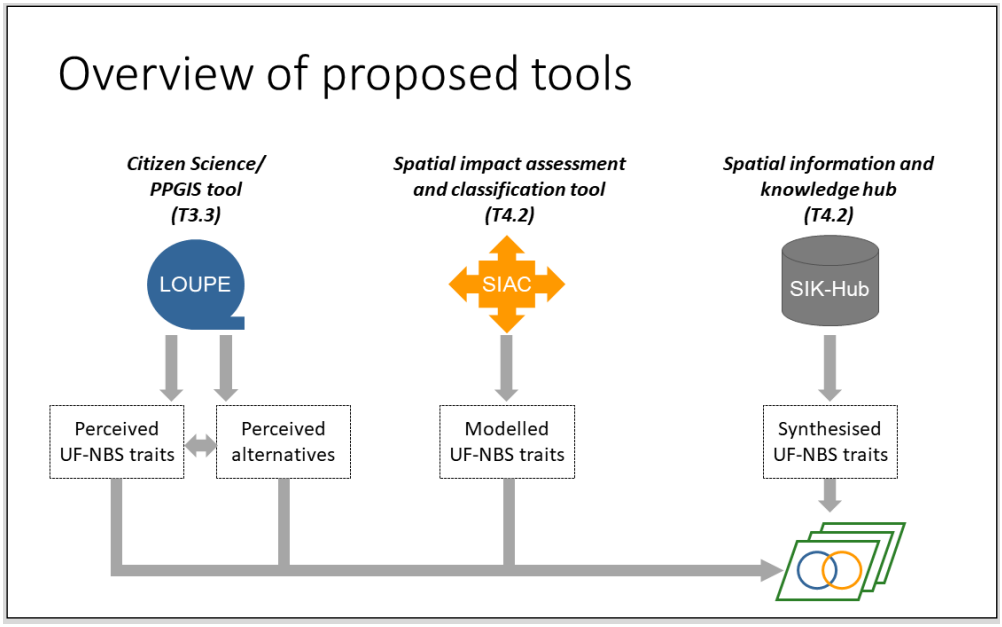

Figure 2. Conceptual scheme of the 3 tools developed by partners from HUB: LOUPE, SIAC and SIK-Hub

T4.4 is a key facilitator to achieve this integration, as it conceptualizes and implements the piloting of CLEARING HOUSE tools and their testing in case study cities. As such, T4.4 assists in the implementation of citizen science/PPGIS tool (T3.3), and of the decision-support tools (T4.2) across WP4.

Citizen Science (T3.3) is designed to identify perceived UF-NBS traits around the following broad themes:

- Understanding baseline UF-NBS conditions in terms of citizen appreciation and perception, including accessibility to UF-NBS, dangers and threats/ecosystem disservices, barriers, conflicts;
- Multifunctionalities of UF-NBS, including UF-NBS for recreation, social balance, green compensation, accommodation of overlapping functions;
- Cultural ecosystem service delivery;
- Assessment of tree health;
- Ecological connectivity and biodiversity;
- UF-NBS for climate change adaptation, including adaptation to heat;
- UF-NBS for promotion of health and well-being, including noise abatement;
- Citizen awareness towards UF-NBS benefits.

For each case, in the context of the aforementioned themes, a survey is designed in line with core interests of the case study partner (T3.3), and subsequently tested and kicked-off as joint activity (T3.3, T4.4). This process is guided by the CLEARING HOUSE citizen science methodological framework (M3.9) and a testing protocol developed by CREAF together with HUB. The testing protocol reflects on the tool's objectives. It thus (i) seeks to enable user (case)-oriented outputs and impacts in a flexible manner; (ii) emphasizes that activities are tailored to city needs, hence, filling knowledge gaps at this level in line with partners' interests; and (iii) seeks to support further UF-NBS implementation and/or encourage action.

In line with M3.9 and the testing protocol, the proposed process includes the following main steps (stages), conducted at case level: (i) establishment of a point of contact; (ii) definition of research interest, i.e., identification of key challenges or pressures to be investigated (e.g., drought stress, air

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pollution, etc.); (iii) survey design, i.e., the conceptualization of a brief and focused questionnaire, considering also re-use of available knowledge or previously conducted surveys etc.; (iv) definition of a geographical feature of interest, i.e., the research area of interest for which the survey will be made available; (v) localization, i.e., translation of the tool and survey into locally relevant languages; (vi) local testing, and (vii) kick-off of the public data collection.

Local testing of app and survey is a key pre-requisite to kick-off public data collection. It includes the actual use of the survey in the field, to evaluate its usefulness against the case-specific research interest and rationale, and to identify problematic issues in survey design that require attention, including wording, or missing response options deemed necessary etc. Local testing may be conducted at selected sites of interest, or along a pressure gradient, e.g., within areas that resemble existing, new or restored UF-NBS. T4.4 recommends sharing feedback based on a collection of at least 20 ground points within such sites, or along such transects, to properly evaluate app and survey under various conditions.

For Leipzig, the conceptualized survey was tested by a larger group of Bachelor and Master students, as part of an excursion/field trip. The students were asked to assess visible drought damages to park trees at selected locations, using the app and the implemented survey, resulting in more than 100 ground points. In so doing, the suitability of the survey as well as proper functioning of the app could be positively evaluated for this case. For Barcelona, the app is conceptualized to map perceived air pollution/air quality, with the rationale exemplified in **Box 1** guiding survey design and testing. Testing was conducted by CREAF, using the app at selected locations, as part of an iterative process. I.e., suitability of the app and survey were repeatedly tested, along a transect collecting recommend ground points, and issues in regard to app or survey design that were identified, including, e.g., items/options for answers missing, change of wording to items, etc., being addressed for a subsequent re-evaluation by CREAF.

The evaluation of local testing, i.e., comments to be collected, discussed after finalization of action) is guided by several open-ended questions, for example:

- ✓ Do you think this CS app is useful?
- ✓ Does it respond to your needs?
- ✓ Does it cover the major challenges in your area?
- ✓ Does it call for action?
- ✓ What would you improve?
- ✓ Other issues you´d like to comment?

Based on the shared feedback, e.g., the level of complexity of the surveys can be adapted/ decreased if deemed necessary, items be rephrased, wording optimized for brevity etc.

***Box 1**: Rationale for citizen science for the Barcelona case.*

- *Identification of perceived traits with respect to air pollution*
- *Elicitation of health/well-being impacts, including a personal evaluation of each impact. Thereby, site-specific severity of impacts can be assessed, as likely indicator of level of pollution/air quality.*
- *Elicitation of avoidance strategies, including intentions (avoidance of certain activities), and spatial (avoidance of certain locations), and temporal (avoidance of certain times) aspects, and a personal evaluation of each strategy with respect to their perceived effectiveness in helping to avoid air pollution.*

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- *Broad elicitation of perceived amount (and potentially, bad quality) of local greenery, and accessibility to urban green spaces.*
- *Elicitation of perceived pathways to improve air quality locally.*
- *Impacts of trees/green spaces indirectly considered as follows: (i) perceived amount of greenery may be related to perceived severity of health impacts/pollution; (ii) visiting green spaces as avoidance strategy may speak to tree benefits regarding air quality (demand), with perceived accessibility as indicator for supply; and (iii) green pathways.*

The described process is a "rolling process", with case studies being in different stages. In Barcelona and Leipzig, local testing is mostly completed; Gelsenkirchen is in the stage of survey design, with local testing anticipated to start in the second half of February 2023. Other partners are within earlier stages, with testing to conclude in the period March-June 2023 in the remaining cities.

The decision-support tools (the Spatial Impact Assessment and Classification - SIAC and the Spatial Information and Knowledge Hub - SIK-Hub, T4.2) developed within CLEARING HOUSE will be also evaluated and tested under T4.4. Therefore, similar to T3.3, T4.4 in cooperation with T4.2 is concerned with the development of respective protocol for conducting tool evaluation and testing of the proposed tools SIAC and SIK-Hub. Here, evaluation refers to the evaluation of tool mock-ups, due February 2023, in form on an online workshop. This workshop (mock-up presentation) has been scheduled for 21 February 2023, leading to milestones MS28 ("Mock-up template of the application evaluated by users") and MS29 ("Mock-up template of the benchmarking tool evaluated by users") being achieved. To support this evaluation, a protocol will be developed, that clarifies relevant stakeholders, sets the expectations towards/tasks for stakeholders that are part of the evaluation, and that elaborates evaluation criteria. The evaluation protocol is due February 2023.

Following further tool implementation, T4.4 will subsequently be concerned also with the testing of both tools in (selected) cases. To support this testing, a piloting strategy will be developed.

Finally, T4.4 will support an external launching of tools, together with T4.2 and WP5.

The final report on the piloting (**D4.5**) has been delayed until December 2023 instead of May 2023.

Partners actively involved: CREAF (task lead), AMB (Barcelona), Gelsenkirchen, UMKrakowa, TSF, EFI, BOS+
Partners contributing: BFU (co-lead), CAF-RIF, VUB, HUB, IBGE, Vlaams-Brabant, Gelsenkirchen, IUCN

Feedback from reviewers (RP2)

The project reviewers requested a revision of the Periodic Report, to include more details on project activities and outcomes that are not included in the deliverables due in the second reporting period. The project partners have provided additional comments (these are included above, in the section on RP2).

Reporting Period 3

The piloting task includes the testing of 4 tools developed by CLEARING HOUSE: MyDynamicForest (T3.3), the decision support tools (T4.2) SIAC (Spatial Impact Assessment and Classification) and SIK-Hub (Spatial Information and Knowledge Hub), and the educational package (T5.2) City of Trees. The main aims of tools design and testing were to reinforce the entire (cycle) process of planning,

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designing, deploying, governing, managing, and monitoring UF-NBS, including feedback, (re-)planning, re-designing and adaptive management.

Testing MyDynamicForest

For Barcelona, the app is conceptualized to map perceived air pollution/air quality, with the rationale exemplified in Box 1 (above) guiding survey design and testing. Testing was conducted by CREAF in Barcelona, using the app at selected locations, as part of an iterative process. I.e., suitability of the app and survey were repeatedly tested, along a transect collecting recommend ground points, and issues in regard to app or survey design that were identified, including, e.g., items/options for answers missing, change of wording to items, etc., being addressed for a subsequent re-evaluation by CREAF.

For Leipzig, the conceptualized survey was tested by a larger group of Bachelor and Master students, as part of two excursions/field trips. The students were asked to map perceived tree damage traits for park trees at selected UF-NBS locations (i.e., within selected urban green areas), using the app and the implemented survey, resulting in several thousand ground points. In so doing, the suitability of the survey as well as proper functioning of the app could be evaluated for this case.

The focus of the Gelsenkirchen case was on the identification of green space uses, the elicitation of user expectations/user demands, and of potential barriers/conflicts. Therefore, the survey is overall in line with the CLEARING HOUSE citizen science theme to understand baseline UF-NBS conditions and perceptions. Moreover, in this case, anchor points to previous research conducted locally were identified and subsequently considered in the survey conceptualization. More specifically, this especially refers to a previously identified local sense of place, i.e., with citizens tending to revisit specific urban green spaces/UF-NBS for long periods of time. By determining perceived trends of place-based local change, i.e., potential improvements of local conditions, e.g., due to management, or diminishing appreciation due to an increase of conflicts/barriers, CLEARING HOUSE considers such previous findings.

Understanding citizen's awareness towards UF-NBS and their perceptions of selected UF-NBS traits has also been the main theme for the Krakow case study. Here, a spatial focus was on the Drwinka river park, and CLEARING HOUSE activities supported the elicitation of green space user perceptions, including a valuation of beneficial traits supporting use intentions, as well as of potential conflicts and barriers. In line with the local city partner's interests, citizen support for local action, particularly of establishing formal protection for the research area, were additionally identified.

For the Brussels case study, piloting of the tool was planned to take place as part of the 30-30 campaign by CLEARING HOUSE partner BOS+ and the Health Insurance Association CM in 2023. The campaign has however only been confirmed at a very late moment, too late to include the testing of the citizen science tool within Belgium.

Testing SIAC

Following a first series of internal tests regarding deployment, functionality, and overall software stability involving CLEARING HOUSE partners HUB and CFRI, a more in-depth testing and evaluation was conducted by a small team from CREAF. Experts in GIS and green urban planning tested the SIAC plug-in (WP4) during a couple of weeks (July 2023), simultaneously evaluating the tool's documentation (D4.2), based on previously elaborated testing guidelines, questions, and criteria. A summary of the feedback sent to developers (September 2023) is presented bellow for the decision tools developed in WP4.

According to the version tested in July 2023, the installation was successful. It should be noted that the installation requires knowledge of a GIS expert. However, there were not crashes or technical problems when installing the tool.

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Overall documentation accompanying the plug-in GIS is complex and very well structured. Where needed, suggestions for improvements were made for certain sections and documented for HUB team. The tool provides relevant outputs for decision-making processes, with a large array of parameters and indicators.

Testing SIK-Hub

SIK-Hub has a friendly and appealing interface, inviting the users to explore the data on urban trees and forests and providing an excellent database, methods explanation and storytelling. It also allows exploring other tools and it successfully integrates other CLEARING HOUSE outputs. The tool follows the concept and narrative presented in previous meetings and during the mock-up workshop. It also integrates data on ecosystem functions and specific demands (i.e. perceptions), providing a realistic and meaningful "data lake" for a broad public. SIK-Hub fills data gaps, especially related to more local spatial scales and brings an inclusive view on indicators.

It is successfully designed for a large array of users (stakeholders), integrating both robust scientific indicators and clear explanation for a broad public (i.e. Explore the story behind indicators). It allows indicators to become more operational (i.e. for planning) and at the same time they are transformed at a more human scale view (better visualized and understood).

Piloting City of Trees in Barcelona

The design and launch of the educational package were preceded by a survey, to understand educational needs of schools. The survey was also translated in Catalan and sent, embedded in a blog post, to the schools in the region of Catalonia (Spain).

Together with BOS+, CREAF has been involved in disseminating and piloting the educational package at regional scale, designing a roadmap for piloting, that included an important communication strategy that accompanied the process from the very beginning. Storytelling promoted attractive key messages (why not hold more classes outdoors?, regreening childhood or rethinking learning environments) to raise awareness and to engage the educational community with "City of Trees".

The piloting was built as an opportunity for trees and urban regeneration and promoted the following key messages:

- Reconnection with nature,
- Enhancing outdoor learning and implementation of NBS for schools (i.e. green schoolyards),
- Enforcing synergies with initiatives in transversal areas (science-policy interface).

Communication strategy begun in autumn 2020, with a post on CREAF´s blog (https://blog.creaf.cat/es/noticias/nueva-normalidad-escuelas-verdes/), in Spanish and Catalan, on the importance of outdoor learning. This message was very powerful, especially in the post lockdown context in Spain. The post also highlighted the main results of the survey, sent a few months earlier.

Once the educational material was developed (in English), City of Trees material was translated in Catalan and terminology was reviewed by a researcher. The final version was first included for download in Green4children web and a webinar was presented in parallel. The webinar Naturalising the childhood, with participants from CLEARING HOUSE (Katriina Kilpi and Tine de Kezel from BOS+) and the City Council of Barcelona (Marta Carranza, one of the responsible of Transforming the schoolyards strategy), registered more than 70 participants from schools from whole Catalonia (November, 2021, https://www.youtube.com/watch?v=rQX9gK4oU6U).

The material was downloaded by more than 100 schools. However, due to the pandemics and difficult post-pandemic time for education, feed-back and evaluations from schools were difficult to achieve.

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One face-to-face workshop targeting the educational community in Barcelona (planned for May-June 2022), designed within WP3 together with AMB, and having as objective the feed-back of the educational package, was cancelled, due to busy period for teachers and general low interest for presential participation in post-COVID era.

Partners actively involved: CREAF (task lead), HUB, IUCN , Gelsenkirchen, UMKrakowa, TSF, EFI, BOS+
Partners contributing: BFU (co-lead), CAF-RIF, VUB, , IBGE, Vlaams-Brabant, Gelsenkirchen, AMB (Barcelona)

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1.2.5 Work package 5. Communicating and disseminating CLEARING HOUSE

- **Task 5.1. Communicating CLEARING HOUSE**

Reporting Period 3 (update of the entry for Reporting Period 1&2)

Task 5.1 included

- Development (**D5.1**, November 2019), first update (**D5.5**, April 2021), and second update (**D5.6**, October 2022) of the communication and dissemination plan. The update is based on monitoring and evaluation of its impacts;
- Development of promotional materials. Promotional materials have been created at the start of the project and updated when necessary (poster and flyer updated in September 2022). Additional promotional materials have also been created to answer the communication needs of the project such as
    - **videos on the CLEARING HOUSE case studies in Europe and China**, under interview format, to explain the objective of each case studies, the challenges faced as well as the main outcomes,
    - a series of **videos about Nature-Based Solutions**, created together with the NetworkNature task force on communication, namely "what are NBS", "how are NBS co-created", "What type of NBS are there", as well as a follow up video under the same style of the series but dedicated to CLEARING HOUSE and entitled "Advantages of Urban Forests as NBS";
    - **graphic design materials** prepared to promote certain achievements in the project (such as posters to promote the citizens science App), to advertise key milestones (such as visuals for the knowledge exchange mechanisms), and to help disseminate key results (such as info sheets about the projects case studies or the guideline summary factsheets). Promotional materials are available from the resources page;
- Development and maintenance of the **bilingual CLEARING HOUSE website** http://ww.clearinghouseproject.eu; The website was updated whenever relevant to highlight the key milestones and results of the project. As a matter of example, a few additional pages have been added, such as a new section entitled "Get Involved" that contains subpages about the Knowledge Exchange Mechanism, the City of Trees Inspirational Package, as well as the Citizen Sciences App "My DynamicForest". Subpages have also been created to highlight key events such as the series of webinars and the Science-Policy Symposium. Finally, a page has also been dedicated to the guidelines. Regular posts (77 in total) have been published whenever relevant to draw attention to the project's achievements.
- Creation of **social media accounts** and regular posts (on Twitter, Instagram, LinkedIn, WeChat, Weibo, and ResearchGate). The social media accounts are active on a regular basis (1450 tweets in total on Twitter) and grew an interesting amount of followers (1099 on Twitter, 1103 on LinkedIn, 192 on Instagram, 41 on Weibo);
- Organisation of **awareness-raising campaigns** on social media. The first campaign, carried out in March 2022, focused on the importance of trees in cities, under the hashtag #HugATree. It consisted of daily posts during the 3 weeks before the International Day of Forest, with key facts about urban forests, as well as calls to action for followers to interact with their surrounding urban nature. This campaign triggered great interest, with an average of 77 likes and 19 retweets per posts, resulting in 173 new profile visits for the project and 47 additional followers over the 3 weeks on Twitter, as well as an increase of 16.90% of visits on the project's website over the period. The campaign was also carried in China and the @IUCN 中国's Weibo

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page counted a total of 47118 views to be attributed to the #HugATree campaign Also, the interest in our messaging resulted in the creation of awareness-raising posters to be displayed in public spaces, such as in parks, following a request from the municipality of Uccle in Belgium (September 2022); The second campaign took place in March 2023. This edition focused on the project case studies' cities and consisted of a series of quizzes to raise awareness about urban forests while highlighting the achievements and specificities of the project's case studies. This campaign resulted in a total of 55 new followers on Twitter, 45 on LinkedIn and 4 on Instagram.

- Publication of **8 bilingual e-newsletters** to stakeholders to inform them of project updates, upcoming activities etc, as well as 8 special releases to inform the mailing list subscribers of specific timely information (campaigns, events, call for contributions to the guideline, call for application to the knowledge exchange mechanism, webinars). As the project ends, these newsletters are sent to a mailing list of 1132 persons. A final Newsletter is about to be released to disseminate the latest achievements of the projects, namely the guidelines, together with other key valuable outputs.

A survey has been encoded (https://ec.europa.eu/eusurvey/runner/CH_ContReporting_Dissemination) to keep track of **communication and dissemination activities** where CLEARING HOUSE is involved.

Partners actively involved: LGI (task lead), GZIFLA (co-leader), IUCN (supporting communication in China and translation of the materials into Mandarin), CAF-RIF
Partners contributing: VUB, TSF, AMB, CREAF, BOS+, HUB, EFI

- **Task 5.2. Engaging stakeholders and citizens**

Reporting Period 1

This task is focussed on involving (1) institutional stakeholders through the Sino-European Stakeholder Mirror Group, and (2) citizens and civil society groups.

The Sino-European Stakeholder Mirror Group (SMG) includes ICLEI, Cities4Forests, TCPA, Isocarp, IUFRO, INBAR, Chinese Society of Forestry. The aim of this group is to support the dissemination of the CLEARING HOUSE outcomes through their networks. The group has met a first time on 13 November 2020, and a second meeting is foreseen during the Sino-European co-design workshop in June 2021.

The inspirational education package for 10-14 year old pupils (**D5.3**) has been finalised by BOS+, EFI and LGI, although with a delay as the testing in schools was not allowed under COVID-19 restrictions. See https://clearinghouseproject.eu/city-of-trees/ for an insight in the package.

Partners actively involved: LGI (task lead), GZIFLA (co-leader)
Partners contributing: VUB, TSF, AMB, CREAF, BOS+, HUB, EFI

Feedback from reviewers (RP1)

Efforts should be made to ensure that the material is disseminated as broad as possible to appropriate educational institutions. In addition, the current version appears to be only in English, whereas both from a European and Chinese perspective it may be required in various Languages. Clarification is required how the language aspect is to be addressed.

Reporting Period 2

The Sino-European Stakeholder Mirror Group (SMG) includes ICLEI, Cities4Forests, TCPA, Isocarp, IUFRO, INBAR, Chinese Society of Forestry. The aim of this group is to support the dissemination of the

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CLEARING HOUSE outcomes through their networks. The SMG as met two times (13 November 2020, and at the Sino-European co-design event in June 2021). Further meetings are planned in Spring 2023.

The inspirational education package for 10-14 year old pupils (**D5.3**) has been finalised in March 2021 by BOS+, EFI and LGI, see https://clearinghouseproject.eu/city-of-trees/ for an insight into the package. Until now, 6 workshops have been organized in Belgium to introduce the workshop to school children, environmental educators, but also city officials. Since less-privileged groups are the most vulnerable and would benefit the most from accessible UF-NBS, one of the workshops also focused on a group of immigrant children in Brussels who are learning Dutch as a second language. The educational package has been translated in Italian, Chinese and Catalan. More translations are planned to be made available on the CLEARING HOUSE website.

Partners actively involved: LGI (task lead), GZIFLA (co-leader)
Partners contributing: VUB, TSF, AMB, CREAF, BOS+, HUB, EFI

Feedback from reviewers (RP2)

No specific feedback

Reporting Period 3

The Sino-European Stakeholder Mirror Group (SMG) has been invited to participate in the final Science-Policy event (November 2023, Brussels), but unfortunately only ICLEI could send a delegate. ICLEI China and the Chinese Society for Forestry have been participating in the Scientific Seminar in GuangZhou (September 2023). In the end, the Stakeholder Mirror Group has been less supportive then planned, which has been a missed opportunity for networking and dissemination. However, other dissemination activities have been very successful, so the underperformance of the Stakeholder Mirror Group did not have a major impact.

The inspirational education package for 10-14 year old pupils (**D5.3**), see https://clearinghouseproject.eu/city-of-trees/, is available in 8 languages (Italian, Catalan, Polish, Spanish, Dutch, French, Mandarin and English). The package has been widely promoted during CLEARING HOUSE events.

Due to time and staff restrictions, further activities for less-privileged groups have not been organised. The city partners have not been able to spend more time to support these events. Although, members of less-privileged groups have been attending some of the local co-design and co-learning workshops in Gelsenkirchen. We learned that this specific target group is time-consuming to reach, and the pandemic has negatively impacted on the possibilities and time to organise specific events for this target group.

- **Task 5.3. Maintaining a webinar platform for knowledge exchange and upskilling**

Reporting Period 2

This task focus on the organisation of six webinars, which will be kept available on the CLEARING HOUSE dedicated website platform here. So far, only the first webinar of the series of six took place. Focusing on *"Urban Forests as Nature-Based Solutions, State-of-the-Art"*, it gathered a total of 60 participants. The following five webinars are based on the Guidelines and will therefore be held after the publication of the later, namely in Autumn 2023.

Additional webinars have been organised during the Urban Forestry Days (March 2021), and the European Week of Regions and Cities (in collaboration with the sister projects funded under the same call, October 2022).

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Feedback from reviewers (RP2)

No specific feedback

Reporting Period 3

In 2023, with the research most advanced, Metropolis organized a series of 4 thematic topics based on the thematic guidelines developed by CLEARING HOUSE experts to assist stakeholders across Europe, China, and globally in implementing Urban Forests as Nature-Based Solutions (UF-NBS).

These webinars were thematically organised (link to description, agenda and recording):

- 15 November 2023 – An introduction to urban forest strategic planning
- 17 November 2023 – Urban Forest Governance: achieving effective and collaborative management
- 22 November 2023 – Empower your local communities: Participatory Urban Forest Design and Management
- 24 November 2023 – Protection and Restoration: How to maintain and improve your urban forest

For these webinars, a comprehensive set of indicators was established to gauge anticipated outcomes, aligning with specific objectives. These objectives include 1) Training attendees in urban forests as NbS; 2) Fostering sustainable practices throughout the events while considering geographical diversity; and 3) Encouraging the active participation of a notable cohort from diverse regions in each session.

In terms of training the attendees in urban forests as nature-based solutions, it can be affirmed that it has been achieved. Each of the four webinars featured a practical and insightful keynote speech. Participants had the privilege of learning from the expertise of Clive Davies on urban forest strategic planning, Ivana Zivojinovic and Jiali Emily Jin on Urban Forest Governance, Jerylee Wilkes-Allemann on participatory urban forest design and management, and Magdalena Biernacka and Jakub Kronenberg on the protection and restoration of urban forests.

It is noteworthy that in selecting speakers, we prioritized gender balance to address the prevailing male dominance in the academic sector. While ensuring a comprehensive understanding of the topics presented, particular emphasis was placed on providing opportunities to women. Across all four webinars, a total of 15 speakers and moderators participated, with 66% being female. This deliberate effort underscores our commitment to inclusivity and diversity within the discourse.

Regarding the methodology, each event incorporated a novel participatory activity aimed at enabling participants to apply their acquired knowledge and deepen their understanding of various topics. In the first webinar, participants engaged in a classification exercise, identifying key elements for an urban forest strategic plan, followed by an organized discussion. The second webinar involved the development of a word map to delineate essential aspects of Urban Forest Governance, leading to a structured discussion. During the third webinar, participants utilized a graphic with two axes on impact and feasibility to position different strategies for involving civil society in urban forest design and management, with ensuing discussions informed by the results. Finally, in the fourth webinar, a role-playing game was conducted where participants, acting as urban forest foresters, were tasked with selecting initiatives to address hypothetical problems, aiming to maximize environmental and social impact.

Moreover, in each session, a little test or an open question on the lessons learned was conducted after the keynote speeches to make sure that the participants of the session understood the main concepts that the keynote speech sought to provide. It is worth mentioning that the average result of those tests has been 8,1.

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Regarding the goal of promoting sustainable practices during the events taking into consideration the geographical diversity, it also has been successfully achieved. Each webinar included case studies from both Europe and China, enriching the learning experience with diverse perspectives. Attendees had the opportunity to delve into case studies such as Gelsenkirchen and Beijing in the first webinar, Shenzhen and the UK in the second webinar, Barcelona and Fuzhou in the third webinar, and Guangzhou, Krakow, and Berlin in the fourth webinar.

In terms of the indicator of the number of participants per event, we can affirm that the expectations have been exceeded. While we were expecting to have 100 participants per webinar, the final numbers of participants are the following ones: 282 (W1), 226 (W2), 250 (W3), 214 (W4). People from Europe, Eurasia-Middle East, and Asia-Pacífic participated in each webinar. Additionally, concerning individuals registered who correspond to the desired audience in terms of professional experience, we have effectively engaged a significant portion of them: members from the industry represented around 30% of the attendees, whereas urban developers represented 4% of the audience.

As conclusion of the thematic webinar series (**M5.3**), the sixth (final) webinar was arranged on 2 February 2024, with 178 participants, to present the three tools developed within the CLEARING HOUSE project. These tools include 1) Spatial Impact Assessment and Classification tool (SIAC), which supports practitioners and researchers in addressing critical questions about urban forests by providing selected indicators aligned with key themes related to IUCN's Urban Nature Indexes, with a specific focus on tree cover; 2) Spatial Information and Knowledge Hub (SIK-Hub), an interactive online application designed for exploring, downloading, and synthesizing traits of UF-NBS generated during the CLEARING HOUSE project; and 3) MyDynamicForest: an approach that engages citizens through smartphones in identifying locally relevant challenges, aiming to uncover feedback loops between UF-NBS qualities and specific challenges, purposes, uses, or users.

Partners actively involved: Metropolis (task lead), CAF-RIF (co-leader)
Partners contributing: EFI, BOKU, ULodzki, AMB, HUB, LGI, IBGE, TSF, Gelsenkirchen, IUCN
External partners contributing: Fachhochschule Bern, European Forum on Urban Forestry

- **Task 5.4. Disseminating CLEARING HOUSE research findings**

Reporting Period 1

This task started earlier as planned, with 8 published scientific articles and several more submitted at the end of the 1st reporting period. CLEARING HOUSE communities have been initiated at Zenodo (https://www.zenodo.org/communities/clearinghouse/) and ResearchGate (https://www.researchgate.net/project/CLEARING-HOUSE-Collaborative-Learning-in-Research-Information-sharing-and-Governance-on-How-Urban-forests-as-nature-based-solutions-support-Sino-European-urban-futures).

CLEARING HOUSE has been active in several NBS Task Forces (TF2, TF3, TF4, TF6) and joint activities with REGREEN and SINCERE have been planned. CLEARING HOUSE will soon be an official member of the NATURA network (www.natura-net.org). CLEARING HOUSE is member of the NBS Project Board at Network Nature. These activities are summarised in **D5.7** (submitted April 2021).

Partners actively involved: HUB (task lead), HKU (co-leader), EFI, CREAF, UNIBA, CAF-RIF, VUB
Partners contributing: all partners

Feedback from reviewers (RP1)

No specific comments

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Reporting Period 2

A total of 25 scientific articles have been published so far, all available through the CLEARING HOUSE communities initiated at Zenodo (https://www.zenodo.org/communities/clearinghouse/) and ResearchGate (https://www.researchgate.net/project/CLEARING-HOUSE-Collaborative-Learning-in-Research-Information-sharing-and-Governance-on-How-Urban-forests-as-nature-based-solutions-support-Sino-European-urban-futures).

CLEARING HOUSE has been active in sharing knowledge with other relevant projects, and especially with the "sister projects" REGREEN, INTERLACE and Conexus, funded under the same call. Those join activity include for instance the organisation of join events, such as the Webinar "Ecosystem restoration and benefits of forests and urban trees Summit" organised with REGREEN project in June 2022 within the UrbanByNature China webseries, or the "Sustaining Cities, Naturally: Urban ecosystem restoration" event organised with REGREEN, INTERLACE and Conexus at the occasion of the European Week of Regions and Cities in October 2022.

CLEARING HOUSE has also been active in several NBS Task Forces (TF2, TF3, TF4, TF6). Among other, awareness raising videos on NBS are under developments within the NBS TF4, and TF6 led to the joint publication: "The Vital Role of NBS in the Nature-Positive Economy", presented to EU policy-makers at the Connecting Nature Final Summit on Nature-Based Solutions. CLEARING HOUSE contributed to the development of the new Research & Innovation Roadmap. CLEARING HOUSE is also an official member of the NATURA network (www.natura-net.org). and a member of the NBS Project Board at Network Nature. Further, CLEARING HOUSE is represented in the Network of Experts on Sustainable Urban Forestry organised by UNECE and FAO.

These dissemination activities on knowledge exchange and building are summarised in **D5.8** (submitted November 2022).

Feedback from reviewers (RP2)

No specific comments

Reporting Period 3

A total of 72 CLEARING HOUSE-related **scientific articles,** one **book,** two **reports** and six **book** chapters have been published so far, all available through the CLEARING HOUSE community at Zenodo (https://www.zenodo.org/communities/clearinghouse/). Further publications are in review (at least 5) or in development (another 5). Due to the decision of ResearchGate to discontinue its Projects feature, the CLEARING HOUSE project page on ResearchGate was not longer available.

Scientific seminars have been organised in Krakow (Poland, May 2023, European Forum on Urban Forestry 2023, 133 participants) and GuangZhou (China, September 2023, about 180 participants). On 28 and 29 November 2023, REGREEN and CLEARING HOUSE jointly organised their science-policy event under the title "Re-greening Cities with Nature-Based Solutions in Europe and China". About 150 people attended the event in-person (179 registered), and 91 attended online. Another science-policy event in China is still to be organised (autumn 2024), in the final months of the funding by the Chinese Ministry of Science and Technology.

Other dissemination was done at the Brussels Urban Summit (13 June 2023, 85 participants), the World Forum on Urban Forestry (October 2023, Washington DC, 15 participants), the NBS as Urban Infrastructure Conference in Hong Kong (25-26 April 2024, about 120 participants), EFUF 2024 (22 May 2024, 150 participants).

Finally, a **special issue** "Urban Forestry and Sustainable Cities" has been published in Forests.

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- **Task 5.5. Conducting innovation and exploitation management**

Reporting Period 1

The User Advisory Group has been set up and has met a first time on 13th November 2020. This group consists of 7 individual experts representing key users of CLEARING HOUSE outcomes and results.

Two IP workshops have been organised (one in Europe and one in China) to discuss the use and exploitation of CLEARING HOUSE results. This has led to a first version of the Exploitation Plan (**D5.4**) which is detailing the exploitation strategy.

Partners actively involved: LGI (task lead), CAF-RIF (co-lead)
Partners contributing: all partners

Feedback from reviewers (RP1)

No specific comments

Reporting Period 2

The User Advisory Group has been established. This group consist of seven individual experts representing key users from the EU and China, in order to tailor the project's actionable results to the needs of end-users. Given the diversity of potential users, the UAG represents the voices of various professional communities, providing feedback for key project deliverables. Together with the SMG, the UAG has met two times (13 November 2020, and at the Sino-European co-design event in June 2021). Further meetings are planned in Spring 2023.

Initially, two IP workshops have been organised (one in Europe and one in China) to discuss the use and exploitation of CLEARING HOUSE results. To better define the exploitation strategy, four additional workshops have been organised in 2022, focusing on "Beyond CLEARING HOUSE" to develop an exploitation strategies from the project results and scope collaboration opportunities between partners. The outcomes of those workshops will feed into the Exploitation Plan (**D5.4**) detailing the exploitation strategy.

Feedback from reviewers (RP2)

No specific comments

Reporting Period 3

Overall, in order to match the expected level of quality, more partner support and engagement were required for Task 5.5 activities and for the delivery of deliverable D5.10 Exploitation plan final version.

LGI organized interviews with all EU CLEARING HOUSE partners to identify and further deepen their individual and collective exploitation strategies. A total of 19 meetings were conducted during the period from November 2023 to January 2024. The workshops helped identify more specific CLEARING HOUSE results and specific partner exploitation goals, risks and actions. To strengthen the exploitation strategy per partner we developed exploitation ID cards for each partner.

During January, February and March, LGI developed the final **Deliverable D5.10 Exploitation Plan** (added as annex to this periodic report for RP3). This report combines individual and joint exploitation strategies to ensure the project results go beyond the scope of the CLEARING HOUSE project. To strengthen the insights and relevance of the report, LGI contacted partners to review the reports and give any remaining inputs and feedback to ensure it is most up-to-date at the moment of the project end in February 2024.

Partners actively involved: LGI (task lead), CAF-RIF (co-lead)
Partners contributing: all partners

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1.2.6 Work package 6. Managing CLEARING HOUSE

- **Task 6.1. Managing CLEARING HOUSE**

Reporting Period 1

In the first half year of the project, the project management plan (**D6.1**) and the data management plan (**D6.2**) have been compiled. These have been reviewed in April 2021, but no major changes deemed to be necessary. The 1st general assembly was organised on the 5th and 6th of September 2019 (**M6.1**). The 2nd General Assembly has taken place on the 25th and the 26th of March 2021 (online due to the COVID-19-related restrictions). The Steering Committee has met 11 times during the reporting period, to follow-up on the progress of the report, to discuss the impact of COVID-19 and consequently to amend the project flow, and to discuss communication, dissemination and outreach of the project.

Partners actively involved: EFI (task lead & WP3 lead), CAF-RIF (co-lead), HUB (WP1 lead), VUB (WP2 co-lead), TSF (WP4 co-lead), LGI (WP5 lead)
Partners contributing: all partners

Feedback from reviewers (RP1)

No specific comments

Reporting Period 2

During this period, the full project consortium has met several times

- 19 & 20 January 2022 – project consortium meeting (online)
- 22 & 23 February 2022 - kick-off meeting of the MOST-funded project part
- 14 to 16 September 2022 – project consortium meeting & 3rd General Assembly (hybrid) in Gelsenkirchen (Germany). All Chinese partners and some European partners participated online. Due to the entry restrictions into China, it was not possible to organise this meeting in China, as originally planned in the grant agreement.

The Steering Committee has been meeting 11 times during the second reporting period, to follow-up on the implementation of the project, impact of COVID-19 and to amend the project flow. The Steering Committee also discussed communication, dissemination and outreach of the project. To strengthen the information flow, also the co-leaders of the WPs joined the meetings. The Steering Committee had discussed several times of the delays related to the implementation of the Chinese activities which have caused counter-delays to European activities. The Chinese project officially started in January 2022 (month 29 of CLEARING HOUSE), which, despite of China's COVID-19 restrictions, has contributed significantly to the possibilities to reduce delays. Numerous meetings have taken place at task and WP level to discuss work planning, approach and status.

Partners actively involved: EFI (task lead & WP3 lead), CAF-RIF (co-lead), HUB (WP1 lead), VUB (WP2 co-lead), TSF (WP4 co-lead), LGI (WP5 lead)
Partners contributing: all partners

Feedback from reviewers (RP2)

No specific comments

Reporting Period 3

During this period, the full project consortium has met several times

- 22 to 23 May 2023 – project consortium meeting & 4th General Assembly (hybrid) in Krakow (Poland). Most Chinese partners and some European partners participated online.

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- 30 November 2023 – project consortium meeting & 5th General Assembly (hybrid) in Brussels (Belgium).

The Steering Committee has been meeting 5 times during the second reporting period, to follow-up on the implementation of the project, and to amend the project flow. The Steering Committee also discussed communication, dissemination and outreach of the project. To strengthen the information flow, also the co-leaders of the WPs joined the meetings.

Numerous meetings have taken place at task and WP level to discuss work planning, approach and status.

Partners actively involved: EFI (task lead & WP3 lead), CAF-RIF (co-lead), HUB (WP1 lead), VUB (WP2 co-lead), TSF (WP4 co-lead), LGI (WP5 lead)
Partners contributing: all partners

- **Task 6.2. Supervising project quality and reporting**

Reporting Period 3

The project quality is guaranteed through regular meetings with the Steering Committee, and within the task and WP teams. The project's intranet ("Flexx", managed by LGI and EFI) requires that deliverables are uploaded by the task leaders, and consequently be reviewed and approved by the work package leaders and the project manager before they can be submitted to the European Commission.

Partners actively involved: EFI (co-lead), CAF-RIF (co-lead)

1.2.7 Work package 7. Ethical requirements

No specific work done during this reporting period. The ethics issues are followed up in the Steering Committee meetings and by the WP leaders in their WPs.

Partners actively involved: EFI

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2 Impact of the CLEARING HOUSE project

Below we provide an overview and score for the impact indicators, as defined in the project proposal.

Impact indicators	Targets	Impact at the end of the project (April 2024)
Pathway I: Enhance the sustainable provision ecosystem services through locally adapted UF-NBS		
1.1: Assessment of the impacts of UF-NBS through CLEARING HOUSE scientists and uptake through UF-NBS managers.	**1.1**: The synthesis report summarising the comparative analysis of UF-NBS implementation demonstrates (a) an overall positive impact on sustainable urban development and (b) at least 60% of all UF-NBS managers involved in all co-design, learning (WP3) and dissemination (WP5) activities in CLEARING HOUSE indicate that they will practically use the knowledge for UF-NBS or other NBS.	(a) as indicated in D2.2, the overall impact of UF-NBS impact is positive (b) 29% of the respondents indicated that they will probably or most probably implement CLEARING HOUSE solutions. Another 38% indicate that they will maybe use the tools..
1.2: Successful replications of UF-NBS innovations analyses and proposed in CLEARING HOUSE in other regions and settings.	**1.2**: At least 6 replications outside the consortium are shown during CLEARING HOUSE project duration.	We have not been able to monitor this indicator
Pathway II: Improve the governance, management and monitoring of UF-NBS and other NBS		
2.1: Participation of, and feedback from, policy stakeholders and UF-NBS managers in all CLEARING HOUSE events.	**2.1**: At least 200 distinct policy stakeholders and UF-NBS managers participate in all CLEARING HOUSE events, with 80% of them providing positive feedback	We estimate that at least 2475 policy-makers have been reached, and 5000 distinct participants from Industry (incl. UF-NBS managers). Of the respondents who replied to our evaluation surveys, 70% provided a good to very good score to the events.
2.2: Number of additional outreach activities initiated from outside the consortium by policy stakeholders and NBS managers.	**2.2**: Consortium partners give at least 25 presentations invited by policy stakeholders and NBS managers outside the consortium.	CLEARING HOUSE partners have given 40 presentations to policy makers, city makers, and the UF-NBS industry outside the project consortium.
2.3: Feedback on and uptake of CLEARING HOUSE final recommendations on governance, management and monitoring of NBS by policy stakeholders.	**2.3**: 80% of all participants of the two science-policy symposia (1 in China, 1 in Europe) provide positive feedback, 60% of them indicating the readiness to take up concrete measures as recommended through the consortium partner.	No specific evaluation survey has been send out, but the overall feedback during and after the event was very positive.
Pathway III: Improve the academic and professional capabilities for NBS through intersectoral and intercontinental learning		

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3.1: Number of academic and professional UF-NBS experts reached outside the consortium.	**3.1** At least 15 applications are received from outside the project consortium for CLEARING HOUSE learning mechanism calls.	12 applications have been received.
3.2: Evaluation of the collaborative learning process (T3.1 and 3.2) by all participants	**3.2** At least 80% of all participants evaluate the impact of the activities in T3.1 (co-design and learning) and T3.2 (learning architecture) on their knowledge and capacities to innovate with NBS as positive.	80% indicated that they learned something to a lot about UF-NBS
3.3 Attendance in the webinar series (quantity and distribution) and feedback.	**3.3:** The 6 webinars in CLEARING HOUSE attract altogether at least 150 NBS participants with an even distribution between China and Europe, and between scientists, policymakers, and NBS managers, with 80% of them providing positive feedback.	About 1200 people participated in the 6 CLEARING HOUSE webinars (17/11/21, November 2023, 02/02/24). A further 670 people participated in the webinars organised with the 4 Urban Restoration Sister projects (October 2022), and 1075 people participated in the Urban Forestry Days (March 2021). For some events, we organised an evaluation survey, with 74% being positive or very positive towards the events.
3.4: Number of knowledge exchange activities in CLEARING HOUSE that are reaching out beyond China and Europe.	**3.4**: At least 20 knowledge-exchange activities (meetings, collaborations, joint publications) that connect the consortium with partners beyond China and Europe are recorded.	44 activities have been organised with the explicit target audience beyond Europe and China, and 33 other activities included participants from outside China and Europe (e.g. webinars).
Pathway IV: Make UF-NBS attractive as cost-effective solutions as well as to the business world		
4.1: Participation of, and feedback from, business representatives in all CLEARING HOUSE events.	**4.1**: At least 50 representatives from business participate in all CLEARING HOUSE events, with 80% of them providing positive feedback.	5000 distinct participants from Industry (incl. UF-NBS managers) have participated in the events, including 7 who were identified as investors.
4.2: Additional outreach activities initiated from outside the consortium by the business world.	**4.2**: Consortium partners give at least 7 presentations invited by business representatives.	We have given 6 presentations to private businesses or their associations.
Pathway V: Improve the awareness of China's and Europe's citizens towards NBS and their importance for sustainable urban development		
5.1: Number of website unique visitors and return visitors, average length of stay, backlinks, social media followers and traffic directed back to website via social media.	5.1: At least 3000 unique web visitors, at least 100 followers on social media in year 1, rising each year of the project thereafter; at least 10 newsletter subscriptions in year 1 via website with 10 more each year thereafter.	Over 30.000 unique website visitors have been counted (difficult to assess, as the provider changed system during the project period). Social media: 1099 followers on Twitter, 1103 followers on LinkedIn, 192 followers on Instagram. We have 1132 newsletter subscriptions.

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5.2: Number of participants in the activities organised for less-privileged groups.	**5.2** At least 4 activities for less-privileged groups to be conducted (1 in China, 3 in Europe), with altogether 60 participants, including at least 10 multiplicators.	Given the Pandemic, it was difficult to organise specific events, representatives from less-privileged groups have been specifically invited for the workshops in some case study cities (Gelsenkirchen, Barcelona). BOS+ organised one activity for immigrant children (about 15 participants)
5.3 Number of users of the educational package (T5.2).	**5.3** At least 6 concrete applications by end-users (schools, teachers, pupils).	The material has been downloaded by more than 100 schools, and has been tested by 6 schools (with coaching by BOS+ or CREAF). We assume that more schools have been using ther material, but have no figures.

Further, based on our continuous monitoring of the impact of communication and dissemination activities, we estimated the following impact for specific groups:

Scientific Community (Higher Education, Research)	18843
Industry	5017
Civil Society	3473
General Public	836900
Policy Makers	3326
Media	123
Investors	6
Customers	7
Other	47694

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3 Concluding discussion – learnings on international collaborative approaches for innovative urban forestry

CLEARING HOUSE was innovative in its collaboration between China and Europe, and in the conceptualisation of urban forests as providers of nature-based solutions. It was interesting to see how urban forestry originated in diverging traditions, disciplines, and policies in the two continents, and how the project eventually has led to a common understanding of urban forests as nature-based solutions. However, it was challenging to combine different research foci in the two continents; this divergence not only originated in different foci with the different partners, but also in the different research traditions and research frameworks expected by the funders (the European Commission's call text included governance, co-design and social science aspects, while the Chinese Ministry of Science and Technology's was focused on technological progress in biodiversity and ecology modelling and measurement). Unfortunately the pandemic (and the resulting delays and unavailability of some of the staff) and administrative hurdles prevented the convergence of both paradigms into a reviewed proposal. Nevertheless, the project has resulted in increased common understanding of the diverging urban forest paradigms in the two continents. To continue the joint Sino-European work, the project coordinator (EFI) signed a collaboration agreement with the Chinese CLEARING HOUSE partners on 30 April 2024, the "**International Initiative for R&I on Urban Forests as Nature-based Solutions in the Greater Bay Area**". Funding has become available through the GuangZhou City Government for 2024 and 2025.

Another learning point was that interpretation and translation often miss out translating the different contexts we are operating in. The CLEARING HOUSE consortium early in the project decided to provide interpretation for the most important meeting, but this did not solve the issue of being "lost in translation". Only a long-term collaboration, with on-site exchanges, stud visits and research stays, can contribute to increased mutual understanding. Therefore, the mentioned International Initiative will be investing in three research stays by staff members in 2024 and 2025. Additionally, the **Community of Practice for Nature-Based Solutions to be set up and coordinated by Metropolis** is starting from the same learning points. The pandemic learned us to integrate remote working and video meetings, but live exchanges are also still needed for academic collaboration and scientific advancement.

Also in the **science-policy interface**, a good balance has to be found between virtual awareness-raising events (such as webinars), and in-person meetings. Webinars have the advantage that they make the knowledge more broadly available, also to stakeholder groups that have no funding or time for attending in-person events. On the other hand, to make real impact on policies, in-person meetings are mandatory, particularly in cultures as China. Similarly, the **European Forum on Urban Forestry** – for which CLEARING HOUSE acted as a facilitator for its incorporation as an international non-for-profit – will offer both in-person and virtual events, including on the outcomes of CLEARING HOUSE.

Finally, the legacy of CLEARING HOUSE will also be feeding the Horizon Europe **Urban Nature Plans+ (UNPplus)** project, coordinated by POLIMI. UNPplus will integrate some of the CLEARING HOUSE outcomes in guidance for drafting and implementing urban nature plans (previously termed urban greening plans), as defined in the EU Biodiversity Strategy and the EU Nature Restoration Law.

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