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PLEC DE PRESCRIPCIONS TÈCNIQUES PER L'ASSISTÈNCIA TÈCNICA EN
L'ORGANITZACIÓ I DINAMITZACIÓ DEL PROCÉS PARTICIPATIU DEL PROJECTE
EUROPEU COMMIT2GREEN.

PLEC DE PRESCRIPCIONS TÈCNIQUES

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1. MARC DE L'ENCÀRREC

El projecte Horizon Europe Innovation Action Commit2Green [C2G] és un projecte del programa europeu Horizon integrat per 25 socis i liderat per ICLEI, amb un pressupost de 12.268.892,50€ i una durada de 4 anys i mig (2025-2029).

El focus del projecte recau en la renaturalització participativa de les ciutats per tal d'afavorir la neutralitat climàtica i la resiliència del territori. Més concretament, el projecte dona suport a 8 ciutats (Vejle, l'Haia, Varsòvia, Mannheim, Milà, Sarajevo, Tessalònica i l'AMB) en la implementació de Solucions Basades en la Natura [SBN]. Aspectes claus són la planificació i el valor estratègic de les SBN, el treball a diferent escales (barri, ciutat, àrea metropolitana), l'atenció a col·lectius vulnerables i la provisió de serveis ecosistèmics. En el cas de l'AMB, que compta amb un pressupost de 840.000,00 € finançats al 100%, el projecte se centra en les vores urbanes i preveu la implementació d'un pilot a l'entorn de la riera de Can Gavarrot (Sant Boi de Llobregat).

El projecte C2G aplica un enfocament basat en els serveis ecosistèmics a la presa de decisions, centrant-se tant en l'oferta (serveis ambientals i culturals) com en la demanda (necessitats identificades per la comunitat) de serveis ecosistèmics. Les vulnerabilitats locals, com ara l'alteració dels fluxos hidrològics, el risc de calor, l'accés limitat a espais verds, la manca de seguretat o l'exclusió social, es cartografien en col·laboració amb les parts interessades. Aquest procés basat en l'evidència garanteix que les estratègies de renaturalització aborden els reptes urbans del món real d'una manera específicament espacial i social.

La participació de la comunitat en els processos de planificació i implementació de les estratègies de renaturalització urbana és un eix central del projecte C2G. En el cas de l'AMB, s'està avançant cap a una estratègia a nivell de districte per integrar solucions basades en la natura de manera (SBN) que enforteixin la inclusió social, la resiliència climàtica i el foment de la biodiversitat. Així, s'implementarà un projecte pilot en el barri de Camps Blancs, on es provaran solucions basades en la natura dissenyades conjuntament amb la comunitat i actors locals i territorials en condicions urbanes reals. Aquest lloc servirà com a terreny d'aprenentatge per a la participació inclusiva, el mapeig dels serveis ecosistèmics i l'avaluació de l'impacte de les mesures de renaturalització tant a escala local com a escala urbana.

El projecte C2G defineix dues agrupacions o estructures en el procés participatiu: els Punts focals, que recull els principals actors i representants de la metròpolis/ciutat, i el Fòrum Commit2Green, un grup seleccionat de parts interessades, incloent els ciutadans, encarregats de co-crear les SBN. Tot el procés de participació està estructurat a partir d'aquestes dues agrupacions. A l'inici del projecte, a més, dins del subgrup del Fòrum Commit2Green, se constitueixen els Laboratoris d'Acció de la ciutat (City Action Labs), que consisteixen en la infraestructura que facilita la trobada entre persones amb perfils diversos per a la col·laboració, l'experimentació i la creació col·lectiva d'iniciatives.

Per tal d'aconseguir la implicació efectiva i inclusiva dels ciutadans i les parts interessades al llarg del horitzó del projecte C2G es planteja un procés participatiu ambiciós i actiu al llarg de l'horitzó del projecte C2G. Aquest procés està plantejat en diferents fases, que es desenvolupen als apartats següents.



2. OBJECTE DEL PLEC

El present Plec de prescripcions tècniques particulars (en endavant, PPTP), part integrant del contracte, té com a objecte descriure i enumerar els treballs a desenvolupar; definir les condicions, necessitats, directrius i criteris que han de servir de base per a la realització dels treballs; i establir les fases de desenvolupament dels documents associats, així com els terminis previstos i altres condicions tècniques vinculades a la seva execució; així mateix, el sistema de control i seguiment de la prestació. Tot això, dins dels paràmetres establerts en la legislació vigent i amb la finalitat de garantir la qualitat, coherència i homogeneïtat dels treballs objecte del contracte.

3. DEFINICIÓ DEL CONTRACTE

3.1. Objecte del contracte

L'objecte del contracte és l'assistència tècnica en l'organització i dinamització del procés participatiu del projecte europeu Commit2Green així com el suport a Oficina de planificació d'espais del Servei d'infraestructura verda (OTG) de l'AMB en les tasques relatives a aquest procés.

3.2. Plantejament global del procés de participació

Les sessions/ tallers pertanyen a **dos processos** participatius complementaris, el procés de **co-creació**, que modularà el disseny del projecte pilot i el procés de **co-gestió** un cop el pilot estigui implementat. Tot el procés, a més, s'estructura a partir de les dues agrupacions que defineix el projecte Commit2green, Punts focals i Fòrum C2G.

L'enfocament de les sessions/ tallers a desenvolupar, seguint aquest marc, és:

Procés de co-creació:

Reunions informatives i de debat, plantejades de la següent manera:

- A nivell de Punts focals, una sessió amb els diferents departaments de l'ajuntament i empreses municipals que puguin incidir en el projecte. L'objectiu és, a banda d'informar i explicar el plantejament del projecte, recollir les necessitats des de la perspectiva de l'ajuntament i poder establir taules de treball pel co-disseny del projecte (sessió S1).
- A nivell de Fòrum C2G, una sessió amb les associacions veïnals i els grups ambientalistes de l'entorn, per tal d'informar sobre el projecte i plantejar les problemàtiques detectades i les solucions plantejades. Interessa molt, a més, recollir les opinions, preocupacions i necessitats del barri – districte, vistes des de la perspectiva social i ambiental (sessió S2). Aquesta sessió inclourà una dinàmica participativa desenvolupada per l'ICTA - UAB (Institut de Ciència i Tecnologia Ambientals de la Universitat Autònoma de Barcelona), centrada en identificar les percepcions inicials dels residents sobre les condicions de l'àmbit d'intervenció del pilot abans de la implementació de les NBS, així com les seves necessitats i expectatives (Ex-ante satisfaction assessment). Aquesta dinàmica recull un qüestionari d'identificació de percepcions/ necessitats etc., unes taules rodones de debat/ discussió i un llistat obert de necessitats, beneficis detectats per a prioritzar per part dels assistents.



Sessions de retorn, plantejades de la següent manera:

- A nivell de Punts focals, una sessió amb els diferents departaments de l'ajuntament i empreses municipals de la fase anterior (Reunions informatives i de debat), per explicar com ha evolucionat el projecte de co-creació a través de les taules de treball i les aportacions i suggeriments dels participants (sessió S3).
- A nivell de Fòrum C2G, una sessió amb les associacions veïnals i els grups ambientalistes de l'entorn, per explicar l'evolució del projecte i com s'hi han incorporat les aportacions i suggeriments dels participants de la sessió informativa (sessió S4).

Sessió participativa vores urbanes, a nivell de Punts locals, amb invitació als tècnics dels ajuntaments dels 36 municipis de àrea metropolitana. Objectiu de la sessió és explicar el projecte i com aquest pot contribuir a la planificació, disseny i gestió de les vores urbanes de la metròpolis (sessió S5).

Activitats interactives in-situ amb l'institut de Camps Blancs, centrat en el Fòrum C2G. Es tracta d'aprofitar la proximitat de l'àmbit de la pilot per convertir-lo en aula a la natura, generar coneixement, conscienciar i implicar en la cura del lloc. Les temàtiques de les activitats es definiran conjuntament amb l'equip docent de Institut i en coherència amb el currículum dels alumnes. Es preveu, de manera provisional i pendent de confirmació amb l'Institut, un màxim de 4 tallers.

Procés de co-gestió:

Taller de capacitació, a nivell de Punts focals, de les empreses municipals encarregades del manteniment i gestió de l'àmbit del pilot, per formar i fer traspàs dels objectius, criteris, mètodes de gestió que planteja el projecte (sessió S6).

Sessió reflexiva i de tancament de procés, a nivell de Fòrum C2G (associacions veïnals i els grups ambientalistes de l'entorn), per avaluar el procés i resultats a través les aportacions de la ciutadania. A banda de la presentació dels resultats i reflexions generals, aquesta sessió inclourà una dinàmica participativa desenvolupada per l'ICTA – UAB, que avalua com han canviat les percepcions, la satisfacció i les expectatives després de la implementació de la intervenció de la NBS i si el procés es va percebre com a inclusiu i just (Ex-post satisfaction assessment). Aquesta dinàmica, de manera similar que la sessió informativa del Fòrum C2G (Ex-ante satisfaction assessment), recull un qüestionari d'identificació de percepcions/ necessitats etc., unes taules rodones de debat/ discussió i un llistat obert de necessitats, beneficis detectats per a prioritzar per part dels assistents (sessió S7).

Activitat d'educació ambiental, enfocada al Fòrum C2G, dissenyada ad hoc a l'àmbit del projecte pilot centrada en temes com les Solucions basades en la natura, el cicle de l'aigua, la gestió de l'escorrentia, l'adaptació al canvi climàtic i resiliència, per generar coneixement i difondre els valors associats amb les accions

3.3. Objectius bàsics de la prestació dels serveis

Els objectius bàsics de la prestació de serveis és donar suport en el procés de participació vinculat al projecte Horizon Europe Commit2Green. Per tal d'assolir satisfactòriament aquests objectius es preveuen les actuacions següents:



1. Definició metodològica del procés participatiu per cada fase
2. Disseny i organització de les sessions participatives:
 - Disseny i organització de 2 sessions informatives i 2 sessions de retorn, una sessió centrada en vores urbanes (visió metropolitana), una sessió reflexiva i de tancament del procés i un taller de capacitatció
 - 4 tallers (activitats participatives) amb l'Institut de Camps Blancs
 - Dinamització de les sessions i activitats
 - Disseny i co-producció del material necessari per les sessions
 - Provisió del material necessari per a les sessions

Les tasques a desenvolupar en relació a totes les sessions participatives/ tallers estan indicades a continuació:

- Prestar suport a l'equip de l'AMB amb la comunicació entre l'AMB i els diferents agents que conformen el/s mapa d'actors, tant des del punts de vista de l'elaboració dels continguts, com en la gestió i manteniment dels canals de comunicació oficials de l'AMB. Aquest suport haurà de tenir lloc, tant abans dels tallers a l'hora de fer les convocatòries, com un cop finalitzats, per tal de mantenir-los informats dels resultats del projecte.
- Donar suport en la recopilació de la informació per a la redacció de les comunicacions oficials de les sessions i coordinació amb l'equip de l'AMB segons les accions de comunicació/difusió establertes.
- Facilitar la participació a les sessions amb la realització d'accions adients per a la convocatòria i la recollida de suggeriments dels millora que puguin fer arribar (prèviament, és a dir a la convocatòria, o durant la realització dels tallers) els agents convocats.
- Preparar els materials (físics o virtuals) necessaris per al correcte desenvolupament de les sessions. En el cas que es requereixi, la impressió d'aquest material anirà a càrrec de l'AMB.
- En quan a les sessions participatives, l'adjudicatari serà el responsable de la sessió (presencial o virtual) encarregant-se de la moderació, dinamització i exposició de les principals conclusions recollides. En aquest sentit, es preveu que cada sessió consti de quatre moments i/o espais diferenciats: presentació de la sessió i objectiu que es pretén abordar, exposició general dels continguts del projecte i de l'estat dels treballs, dinàmiques de treball centrades a l'àmbit d'estudi (entorn de la riera de Can Gavarrot a la vora urbana de Sant Boi de Llobregat), i exposició de les principals conclusions.
- Enregistrar les quatre sessions més rellevants, una per cada fase del procés (a decidir amb l'adjudicat). Dins de l'horitzó del projecte Commit2Green es preveu una exposició acompanyada per un vídeo que expliqui el procés de disseny i participació, que no forma part d'aquest contracte. No obstant això, amb la idea de tenir material per a la futura exposició i vídeo d'acompanyament, es demana que l'adjudicatari gravi determinats moments de les sessions i faciliti aquestes gravacions, així com fotografies de les sessions, a l'equip de l'AMB. Es preveu la gravació de 6 entrevistes curtes (2 minuts aprox. cadascuna) i la gravació dels quatre moments de les tres sessions (presentació, exposició dels continguts, dinàmiques de treball i exposició de conclusions (1 minut aproximadament de cada moment). L'adjudicatari haurà d'editar els diferents moments de gravació de cada sessió en qüestió en un únic vídeo que servirà també com a material audiovisual resum de les sessions. A banda dels gravacions editades com un únic vídeo resum, també caldrà entregar els editables i els clips gravats per separat. Caldria entregar els audiovisuals en format horitzontal, i fer uns resums



tipus reel per xarxes socials en format vertical. Els vídeos de s'han d'entregar amb veu. En relació a les fotografies, es preveuen 15 fotografies per sessió, en aquest cas de totes les sessions del procés participatiu. Els requeriments mínims de qualitat de les gravacions s'especifiquen a l'apartat 4.4 del present plec.

- Recopilar la informació més rellevant de les sessions (plantejament, desenvolupament de les sessions, resultats obtinguts, imatges, anàlisi dels suggeriments rebuts i recull de bones pràctiques i millores aplicables a les fases de participació posteriors del present contracte) de cara a la redacció dels informes.
 - Preparar i recopilar la informació necessària per al retorn i agraïment als assistents de les sessions, així com per la comunicació que es durà a terme des de l'AMB per tal de donar a conèixer com avancen els treballs, notícies rellevants o d'interès relacionades amb el projecte i properes convocatòries.
3. Disseny i producció d'una activitat d'educació ambiental a l'àmbit del pilot. L'activitat serà plantejada per un públic ampli i tractarà temes com la gestió de l'aigua, la mitigació de riscos, el canvi climàtic i les Solucions Basades en la Natura.
4. Suport en les següents tasques:
- Elaboració dels tres informes previstos en el projecte, en anglès i català
 - Disseny i elaboració de quatre posts al finalitzar les diferents fases del procés
 - Suport a la creació i dotació del contingut de comunicació
 - Elaboració de materials de difusió (paper o digital) i col·laboració en l'elaboració de continguts

Aquests aspectes es detallen amb més precisió en els següents apartats.

4. EXECUCIÓ DE L'ENCÀRREC

4.1. Abast i contingut del contracte

Per dur a terme l'objecte del contracte, l'adjudicatari haurà d'elaborar els materials i la documentació que s'adeqüin als requeriments establerts en el present plec. En tot cas, la documentació escrita i gràfica serà l'adequada a llur naturalesa i finalitat en resposta a les necessitats d'assistència tècnica a l'Oficina de planificació d'espais del Servei d'infraestructura verda (OTG) en el desenvolupament del procés participatiu del projecte C2G.

Pel que fa al servei d'assistència tècnica, en aquelles qüestions rellevants, així com en els seus objectius de comunicació i difusió dels seus aspectes significatius, es requeriran a l'adjudicatari els mitjans documentals de comprensió i de presentació adients. Aquestes tasques es realitzaran sota la supervisió del Servei de Comunicació de l'AMB.

Tota la documentació necessària per al compliment de les diferents fases es pre-lliurarà juntament amb un escrit fent constar el contingut indexat. Aquest escrit ha de rebre la conformitat per part del responsable dels treballs de l'Oficina de planificació d'espais del Servei d'infraestructura verda (OTG). Sense aquest escrit no es considerarà rebut el treball. Un retard en qualsevol dels terminis haurà de ser justificat i posat de manifest per escrit al responsable dels treballs del Servei d'infraestructura verda.



4.2. Fases de treball

El contracte tindrà la durada necessària fins assolir la conformitat de finalització del procés de participació. S'estima un període total de 3 anys i 4 mesos per a la completa execució, a comptar des de la formalització del contracte. No obstant, s'estableixen uns terminis d'execució parcial, per fases, per al desenvolupament de les diferents actuacions requerides. Concretament, el procés participatiu es diferencia en 5 fases temporals (fases 0, 1, 2, 3 i 4), de les quals la primera (fase 0) queda exempta d'aquest encàrrec, ja que es desenvoluparà amb antelació a la formalització del contracte.

Les fases proposades corresponen a diferents moments del procés participatiu i són contigües temporalment. La fase 0 comprèn la definició i posada en marxa del procés corresponents als Punts focals. La fase 1 abasta la concreció del plantejament general per a cadascuna de les fases del procés de participació, el disseny de les sessions al llarg del procés participatiu i inclou també el desenvolupament de les sessions informatives i de recollida de necessitats; la fase 2 recull el desenvolupament de les sessions de retorn; la fase 3 se centra en la difusió de les intencions del projecte just abans de la seva implementació així com l'escalabilitat i replicabilitat del pilot, amb el desenvolupament d'una sessió participativa amb un enfocament metropolità; la fase 4 se circumscriu al manteniment i gestió de l'actuació pilot i entorn, que correspon a la vora urbana de la riera de Can Gavarrot. Així, aquesta fase recull un taller centrat en el manteniment i gestió de les accions (taller de capacitat) i el disseny d'una activitat d'educació ambiental a l'entorn del pilot contribuint, així, al Programa d'educació ambiental del Parc ambiental Torre de la Vila, parc pròxim a l'àmbit d'estudi. En cadascuna de les fases esmentades (fases 1 – 4) es preveu, a més, una activitat participativa amb l'Institut de Camps Blancs.

D'acord amb la programació inicial proposada a l'annex 1, i en relació a la prestació dels serveis d'assistència tècnica, a continuació es relaciona, per fases, les tasques a desenvolupar, els terminis parcials congruents amb el procés de participació dissenyat, les funcions que seran assignades a l'adjudicatari i la documentació escrita i gràfica requerida en cada cas.

Fase 0: mapa d'actors i activació del procés

Consisteix en la fase d'activació del procés participatiu del projecte. Comprèn, per una banda, la definició del Mapa d'actors a implicar i la posada en marxa dels Laboratoris d'Acció de la ciutat (CALs). Aquesta fase ja està en procés. Es preveu que finalitzi el setembre de 2025 i, en qualsevol cas, abans de l'inici del present encàrrec.

Fase 1: Pla de treball, plantejament global de les sessions i implementació de les sessions informatives.

Es la primera fase de l'encàrrec. Comprèn el plantejament del pla de treball previst en el marc del projecte des del moment de formalització del contracte, el disseny i plantejament dels treballs a nivell global, així com el disseny, organització i



implementació de les sessions informatives i de recollida de necessitats. La durada d'aquesta fase es preveu de setembre fins desembre de 2025 o, en tot cas, de 4 mesos a partir de l'inici de contracte. Concretament les tasques a desenvolupar establertes per aquesta fase són:

- A. Establir el **pla de treball i de proposta de comunicació amb l'AMB**: A l'inici de la prestació de serveis, es requerirà la redacció, per part de l'adjudicatari, d'una programació (mitjançant un cronograma o altra eina documental de planificació) que haurà d'indicar el règim de reunions, els professionals que s'encarregaran de les diferents tasques establertes als plecs, les dates aproximades, el seu contingut i els objectius a assolir. Tot plegat, sempre de manera coordinada i consensuada amb l'equip de l'AMB.
- B. **Disseny global de les sessions/ tallers** al llarg del procés. Plantejament de l'enfocament de cada taller, format del taller (presencial o virtual), definició del programa de cada sessió, proposta de metodologies i dinàmiques de participació de co-creació, co-aprenentatge i co-disseny (implicació dels agents per la creació de coneixement i disseny de manera conjunta) previstes per al seu desenvolupament, materials escrits, gràfics i audiovisuals que es proposen utilitzar, etc. L'AMB facilitarà a l'adjudicatari el mapa d'actors a implicar en el procés i l'enfocament segons tipologia de sessió. Disseny de les activitats participatives amb l'Institut, en coordinació amb l'equip directiu, la interlocució serà a càrrec de l'AMB. Els espais on es desenvoluparan els tallers, formen part dels espais del CALs i aniran a càrrec de l'AMB.

A banda del disseny del procés participatiu en la seva globalitat durant aquesta primera fase s'han de preveure les següents tasques:

- C. Desenvolupar les **2 sessions participatives** previstes adreçades, per una banda, a l'ajuntament i empreses municipals (Punts focals) i, per altra, a la ciutadania (Fòrum C2G), segons el mapa d'actors i l'acordat en aquesta fase i seguint les prescripcions descrites prèviament a l'apartat 4.2 Plantejament global del procés de participació).
- D. Desenvolupar la **primera activitat amb l'Institut**.
- E. **Enregistrar** una de les sessions participatives o activitat amb l'Institut tal com s'explica a l'apartat 3.3 del present plec.
- F. Elaborar un **post** per comunicar les accions i resultats d'aquesta fase del procés

Fase 2: Disseny, organització i implementació de les sessions de retorn

Aquesta fase recull les sessions participatives de retorn i la seva durada es preveu d'un any. Les tasques a preveure en aquesta fase són les següents:

- A. Desenvolupar les **2 sessions participatives de retorn**, adreçades, per una banda, a l'ajuntament i empreses municipals (Punts focals) i, per altra, a la ciutadania (Fòrum C2G), seguint les prescripcions descrites prèviament a l'apartat 3.2 Plantejament global del procés de participació.
- B. Desenvolupar la **segona activitat amb l'Institut**.
- C. **Enregistrar** una de les sessions participatives o activitat amb l'Institut tal com s'explica a l'apartat 3.3 del present plec.
- D. Elaborar i entregar el **primer informe** resum de les accions associades amb el procés participatiu fins el moment.



Fase 3: Difusió, escalabilitat i replicabilitat.

Aquesta fase se centra en la sessió participativa de vores metropolitanes amb l'objectiu de poder escalar els aprenentatges a nivell metropolità, així com informar sobre el procés participatiu fins el moment i els passos a seguir.. La duració d'aquesta fase es preveu d'un any. Les tasques associades a aquesta fase són:

- A. **Desenvolupar la sessió participativa** de les vores metropolitanes, dissenyada prèviament durant la fase 1 i seguint les prescripcions descrites prèviament a l'apartat 3.2 Plantejament global del procés de participació.
- B. Desenvolupar la **tercera activitat amb l'Institut**, dissenyada prèviament durant la fase 1.
- C. **Enregistrar** una de la sessió participativa o activitat amb l'Institut tal com s'explica a l'apartat 3.3 del present plec.
- D. Elaborar i entregar el **segon Informe** resum de les accions associades amb el procés participatiu d'aquesta fase.
- E. Elaborar el segon **post** per comunicar les accions i resultats d'aquesta fase del procés

Fase 4: Post- implementació: Activitat educació ambiental i Taller de capacitatíó

Aquesta fase té lloc posteriorment a la implementació de la prova pilot i s'enfoca a la co-gestió del pilot. La duració d'aquesta fase es preveu d'un any. Les tasques previstes a desenvolupar són:

- A. Desenvolupar la **sessió reflexiva i de tancament de procés**, dissenyada prèviament durant la fase 1 i seguint les prescripcions descrites prèviament a l'apartat 3.2 Plantejament global del procés de participació.
- B. Desenvolupar el **taller de capacitatíó** adreçat als empleats de les empreses públiques (Brigada municipal, Centre especial de treball Igualssom,...) que estaran a càrrec del manteniment i gestió de l'àmbit del pilot.
- C. Dissenyar una **activitat d'educació ambiental** explicant el projecte del pilot i els beneficis obtinguts
- D. Desenvolupar la **quarta activitat amb l'Institut**.
- E. **Enregistrar** una de les sessions d'aquesta fase (sessió reflexiva i de tancament del procés, taller de capacitatíó, activitat d'educació ambiental o activitat amb l'Institut) tal com s'explica a l'apartat 3.3 del present plec.
- F. Elaborar i entregar el **tercer Informe** resum de la totalitat del procés, incorporant les accions associades amb el procés participatiu d'aquesta última fase.
- G. Publicar el tercer **post** per comunicar les accions i resultats d'aquesta fase del procés

4.3. Control i seguiment del desenvolupament de la prestació

El control i seguiment del desenvolupament de la prestació es realitzarà per part del responsable de Oficina de planificació d'espais del Servei d'infraestructura verda (OTG)



de l'AMB, el qual fixarà les directrius metodològiques i tècniques sota les quals es redactaran els documents objecte del contracte.

Per poder dur a terme aquestes tasques, el personal tècnic de l'AMB tindrà accés, en qualsevol moment, a les dades i els documents que l'adjudicatari estigui elaborant, sigui quin sigui l'estat de desenvolupament en què es trobin. A aquests efectes, l'adjudicatari estarà obligat a informar detalladament sobre l'estat de desenvolupament de les feines, així com a facilitar la revisió dels treballs en curs i prestar l'assistència tècnica que li sigui requerida pel personal tècnic de l'Oficina de planificació d'espais del Servei d'infraestructura verda (OTG).

Així mateix, es duran a terme reunions periòdiques de seguiment amb el personal tècnic de l'AMB. La previsió temporal d'aquestes reunions s'especificarà en la programació que l'adjudicatari presentarà al responsable de l'Oficina de planificació d'espais del Servei d'infraestructura verda (OTG) a l'inici dels treballs.

A les reunions periòdiques de seguiment, l'adjudicatari aportarà la documentació que s'hagi acordat amb el responsable dels treballs de l'AMB, tenint cura que els documents siguin intel·ligibles. Per a les reunions de seguiment es prioritzarà la utilització de sales de reunions amb projector. Així doncs, preferentment la informació es presentarà en format digital i serà lliurada com a document de treball i exposada visualment a través de la pantalla, reduint la informació presentada en format paper. Tot i que es prioritzaran les reunions presencials es valorarà la possibilitat de dur-ne a terme alguna via telemàtica.

D'aquestes reunions se n'aixecaran les actes corresponents, que seran redactades per l'adjudicatari, signades i enviades en format no editable al responsable de l'Oficina de planificació d'espais del Servei d'infraestructura verda (OTG), dins dels quatre dies hàbils següents a la data de la reunió realitzada.

L'adjudicatari donarà suport al Servei d'Infraestructura verda de l'AMB en les accions, recopilació de la informació i els materials de comunicació relacionades amb els tallers plantejats i a les trobades internacionals.

Les accions de comunicació, i el desenvolupament dels materials necessaris per garantir la correcta participació en els tallers, haurà d'anar alineat amb el posicionament i estratègia de comunicació de l'AMB, i cenyir-se a nivell gràfic tant als Manual d'Identitat Corporativa de l'AMB com a la línia gràfica ja desenvolupada pel projecte Commit2green. Aquestes tasques seran supervisades pels Serveis de Comunicació de l'AMB i pel Servei d'Infraestructura verda de l'AMB.

4.4. Format de presentació de la prestació

Tota la documentació es presentarà digitalitzada, d'acord amb les indicacions del responsable dels treballs de l'AMB, el qual també podrà requerir la presentació en format paper, suport aquest que haurà de disposar de segell o etiquetat ecològic. Com a punt de referència, es tindrà en compte les plantilles existents a l'AMB de presentació d'aquest tipus de projectes.

La documentació a lliurar s'haurà d'adaptar a les demandes del personal tècnic de l'AMB, així com a les especificacions següents:



- La informació gràfica vectorial serà lliurada en format editable, adjuntant els corresponents fitxers no editables. La informació vectorial estarà convenientment georeferenciada utilitzant el sistema geodèsic de referència oficial (ETRS89).
- La informació alfanumèrica es lliurarà en el format editable corresponent i en el format no editable.
- La part escrita es lliurarà en format editable i no editable.
- Es lliurarà un document resum en format editable i en format presentació en cadascuna de les fases de treball amb la finalitat de facilitar la comprensió, presentació i la difusió dels treballs.
- S'adjuntarà un índex en el qual s'indicaran tots i cadascun dels documents que conformen el lliurament, detallant el tipus d'arxiu que és, amb una descripció del seu contingut, així com les referències legals que s'estimin oportunes.
- Les gravacions han de complir amb uns requeriments mínims de qualitat: S'han de lliurar en un format compatible de programes de vídeo (arxius .mp4, .mov, .avi, etc.), relació aspecte 16:9 pel format horitzontal, resolució 1920x1080, Còdec H264, frame rate 25FPS i Àudio: AAC-LC@320 kbit/s – 48 kHz..

S'hauran de lliurar dues còpies dels informes generats: suport paper DIN A-4. Tots els elements gràfics hauran de realitzar-se en color, cosa que haurà de permetre la seva reproducció, per fotocòpia o offset, sense pèrdua de llegibilitat respecte a l'original.

5. DOCUMENTACIÓ A LLIURAR PER L'AMB A L'EMPRESA SELECCIONADA

L'AMB lliurarà a l'empresa seleccionada la següent informació:

- Mapa d'actors
- La Informació associada amb el procés de la fase 0 (sessions informatives i de debat amb els diferents actors)
- Presentació de la sessió informativa del projecte Commit2Green amb els tècnics de l'AMB.



ANNEX 1. Proposta de calendari previst del projecte: principals fites relacionades amb l'objecte del contracte

ILLOU, Kyraki (1 de 2)
Tècnica superior arquitecte Infraestructures 4
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Cap de Servei Infraestructura verda
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ANNEX 2. Documentació metodològica produïda pel Commit2Green

- Strategy for ensuring inclusive participation and distribution of benefits arising from NBS. ICTA - UAB
- People's satisfaction with Nature-Based Solutions. Methodology for an Ex-ante and Ex-post Satisfaction Assessment. ICTA - UAB





Delivery 2.3

Strategy for ensuring

inclusive participation and

distribution of benefits

arising from NBS





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Introductory table

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**COMMIT2
GREEN**



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Introduction

Nature-Based Solutions (NBS) are increasingly recognized as multifunctional interventions that can simultaneously deliver climate mitigation and adaptation outcomes, support urban biodiversity, and improve the quality of life for residents (Frantzeskaki et al., 2019). However, the success of NBS projects depends not only on their technical and ecological effectiveness, but also on the capacity to adapt them to the plurality of local needs ((Kabisch et al., 2017). In this sense, it has been observed that the effectiveness of NBS — that is the adaptation to local needs — is strongly influenced by the participation of stakeholders in their planning processes (Raymond et al., 2017). Furthermore, effective participation strategies are able to enhance the legitimacy and acceptance of NBS interventions by integrating diverse types of knowledge, values, and priorities (Wamsler, 2017). Conversely, top-down or tokenistic forms of participation can lead to interventions that fail to address local needs, generate social resistance, or reproduce existing inequalities in access to green space and the distribution of its benefits (Anguelovski et al., 2019).

For this matter, considerations of justice can be useful when conducting NBS participatory planning processes. Environmental justice provides a conceptual framework for understanding and addressing inequalities in access to environmental benefits, exposure to harms, and participation in decision-making (Agyeman et al., 2016). In the context of NBS planning and governance, the triad of Distributional, Procedural and Recognition justice are often considered (Schlosberg, 2013). Distributional justice focuses on an equal distribution of environmental goods and harms, ensuring that no community or individual is disproportionately privileged to, or exposed to, the benefits or harms of an environmental good or service (Rawls, 1971). For example, (Benati et al. (2024) found widespread inequalities in the access to, and in the quality of benefits provided by urban green spaces across different socio-demographic groups. Procedural justice refers to the even, fair, and meaningful involvement of stakeholders in the decision-making capacity of space (Schlosberg, 2013). Recognition focuses on the inclusion of a diverse, representative range of stakeholder opinions, values, and feelings into the decision-making processes of space (Schlosberg, 2013). Hoelting et al. (2024) argue that achieving recognition justice requires meaningful consideration of plural knowledge and plural values as they arise from diverse understandings of well-being and human–nature relationships. Instances of procedural and recognition inequities have been observed in cities like Baltimore (USA) and rural areas of South Africa, where historical disparities in financial and social resources for marginalized groups have influenced present-day access to urban green spaces (Boone et al., 2009; Matthew McConnachie & Shackleton, 2010). Despite this, urban planning for NBS has often



prioritized distributional equity over procedural and recognitional dimensions (Kato-Huerta & Geneletti, 2022).

While the triad of justices is key for assuring the effectiveness of NBS in urban environments, distributive injustice can be transformed through meaningful exercises that tackle recognitional and procedural justices (Anguelovski, Connolly, Masip, et al., 2018a). This is explained by the interdependence of these justice dimensions: when diverse stakeholder identities, values, and knowledges are explicitly recognized (recognitional justice), and when those stakeholders are meaningfully included in planning and decision-making processes (procedural justice), the resulting interventions are more likely to reflect a fairer spatial distribution of benefits and burdens (distributional justice). For instance, early-stage and continuous engagement has been shown to yield better outcomes in terms of both social acceptance and ecological effectiveness (Buijs et al., 2016). Participation that is merely consultative or restricted to late stages of project development may limit opportunities for transformative change and co-ownership (Wamsler et al., 2020). These findings underscore the need for inclusive and context-specific participatory approaches that go beyond sporadic stakeholder consultation.

Because of this, recent literature has called for the operationalization of justice in NBS planning through integrative frameworks that make explicit the presence of just participatory processes (Langemeyer & Connolly, 2020). In this context, planning for NBS is not only a technical or ecological challenge but a socio-political process in which questions of power, representation, and equity play a role.

Based on this understanding, the present Deliverable 2.3 proposes a strategy for ensuring inclusive participation and distribution of benefits arising from NBS. The strategy builds on established principles of environmental justice and participatory planning and aims to offer practical guidance to project partners for structuring just stakeholder engagement for urban NBS. The report is structured to be versatile enough to be useful for the different spatial scales worked in the project (local, district and city level), while putting attention to each of the stages from the conception to the implementation of NBS.



1 Strategy for inclusive participation and distribution of benefits arising from NBS

The strategy for inclusive participation is structured in a stepwise approach (See Table 1), inspired by the work of Langemeyer et al. (2024) Langemeyer et al. (2024) that proposes a set of guidelines for planning, designing, and monitoring NBS for urban transformations. In this sense, the guidelines have been adapted to C2G objectives and have been used a starting point to describe the implications of justice throughout the NBS planning and implementation process.

As previously explained, stakeholder participation plays a key role in developing effective NBS that address socio-ecological challenges. Stakeholders are defined as any group or individual who might have a direct or indirect interest in, be affected by, or influence a project (Reed, 2008). In the context of NBS, these stakeholders include those who can provide essential knowledge and expertise resources, those affected by the city's challenges, those who influence the planned NBS interventions to address them, and even those more distant from but interested in restorative NBS (Leone et al., 2021).

Stakeholders are typically selected to represent a plurality of values and knowledge (Herreros-Cantis et al., 2024). Engaging stakeholders allows for the exploration of issues, concerns, expectations, interests, and opportunities related to NBS from various perspectives (Sekulova et al., 2021). Engaging a diverse array of public

Stakeholder are classified in two ways

By role or function in the NBS process

- **Developers:** Design and initiate NBS (e.g., planning departments, urban designers)
- **Shapers:** Provide knowledge and insights (e.g., researchers, NGOs, community leaders)
- **Enablers:** Offer support through policies or funding (e.g., government agencies, investors)
- **Users:** Interact with and benefit from NBS (e.g., residents, commuters)
- **Maintainers:** Ensure long-term management (e.g., municipal staff, volunteers)
- **Opponents:** May resist or critique NBS (e.g., displaced residents, tenant groups)

By stakeholder group

- **Political representatives:** Elected officials who influence policy (e.g., mayors, ministers)
- **Governmental authorities:** Institutions that design and enforce regulations (e.g., regional agencies, urban planners)
- **Civil society:** Grassroots and organized collectives (e.g., neighbourhood associations, NGOs)
- **Beneficiaries:** Those who benefit directly from NBS (e.g., residents)
- **Negatively impacted communities:** Those who may face unintended consequences (e.g., neighbouring residents at risk of displacement)
- **Academia:** Research bodies contributing evidence (e.g., universities, research institutes)
- **Private sector:** Economic actors supporting or profiting from NBS (e.g., funders, developers)
- **Media & networks:** Communicators of narratives and public opinion (e.g., journalists, press outlets)



institutions, formal and informal community organizations, and private entities, with special consideration for non-traditionally engaged or marginalized groups, may enhance the representation of diverse values (Kiss et al., 2022).

Stakeholders are categorized based on their roles or functions in the process and grouped according to their profession, knowledge, expertise, needs, or interests. Initially, five key stakeholder roles are considered. A single stakeholder may assume one or more of these roles, which can change throughout the assessment framework.

The strategy is structured into three core modules, which focus on understanding the current state and needs for NBS in urban areas, followed by one optional module that concentrates on the design of NBS. Below, each module will be outlined along with its corresponding steps. Each step will include a brief description, highlight the need for stakeholder involvement, and specify the expected outcome.

Table 1. Modules and steps of the strategy for inclusive participation and distribution of benefits arising from NBS, along with the recommendations for stakeholder participation

Module	Step	Stakeholder participation	Recommended stakeholders to include (if needed)	
			Role	Typology
Decision framing module	Understanding policy context	Optional	Developers, shapers	Governmental authorities; Civil Society; Academia and education
	Predefinition of challenges	Not necessary		
	Definition of scale	Not necessary		
Co-creation module	Setting co-creation goals	Not necessary		
	Stakeholder identification	Necessary	Shapers, enables, users, opponents	Government authorities; Civil society; Academia and education; Beneficiaries; Negatively impacted communities
	Developing an implementation plan	Optional	Shapers, enablers	Governmental authorities; Civil Society; Academia and education
Planning Module	Selection and weighting of criteria	Necessary	Shapers, enables, users, opponents	Civil society; Academia and Education; Beneficiaries; Negatively impacted communities
	Stablishing indicators	Optional	Shapers	Academia, research and education
	Assessing vulnerabilities	Not necessary, except for the local scale	Users, opponents	Beneficiaries; Negatively impacted communities
Design Module	Design strategy	Optional	Developers, shapers, users, opponents	Government authorities; Civil society; Beneficiaries; negatively impacted communities
	Space design and Modeling	Not necessary	Developers, shapers	Government authorities; Private sector
Monitoring module	Ex-Ante Assessment	Necessary	Users, opponents	Beneficiaries; Negatively impacted communities
	Ex-Post Assessment	Necessary	Users, opponents	Beneficiaries; Negatively impacted communities



1.1. Decision framing module

This module focuses on understanding the context in which the desired NBS will be developed and the general urban needs identified by urban authorities. By doing so, it is intended to align NBS with local priorities and governance frameworks, providing a coherent starting point for assessing and planning NBS.

Understanding policy context

- Description: Understanding the policy context by identifying the urban policy frameworks, regulations, and institutional dynamics that may affect the development of NBS. This step allows for the alignment with existing goals (e.g., climate adaptation, biodiversity strategies) and anticipating governance constraints.

Urban policies, while intended to tackle and reduce urban challenges, can also miss to portray local realities, creating mismatches between formal planning discourses and user's experiences (van Hulst & Yanow, 2016). As a way of example, (Langemeyer et al., 2015) show how residents in Barcelona perceived green infrastructure benefits and risks differently than those assumed by policy. Considering possible injustices present in urban policies, can prevent exclusionary trajectories by identifying policy blind spots, conflicting mandates, or unintended consequences (Fainstein, 2010).

- Stakeholder participation: Optional
- Suggested approaches: See **Table 2**
- Expected outcome: an overview of the policy, regulatory, and institutional aspect that may enable or constrain effective NBS implementation.

Predefinition of criteria

- Description: Identifying the key urban criteria that the planned NBS interventions could be addressing, as portrayed in policy documents (e.g., climate risks, biodiversity loss, social vulnerability). A criterion refers to a specific dimension or theme that depicts demand for NBS, such as exposure to heat, access to green space, or flood risk. It serves as a guiding lens to evaluate where and how NBS can be most impactful. Examples of commonly used criteria include heat stress, flood risk, green space inequity, degraded soils, or lack of access to nature. These criteria will be revised with stakeholders in upcoming steps, in order to avoid overlooking local knowledge and lived experiences, and therefore, risking reproducing or exacerbating existing injustices.
- Stakeholder participation: Not necessary
- Suggested approaches: See **Table 2**

- Expected outcome: a set of criteria to assess the effectiveness of NBS in the implementation site.

Definition of scale:

- Description: determining the spatial scale at which NBS will be planned and implemented. Whether the intervention is conceived at a neighbourhood, district, or city level, there can be implications for distributional outcomes. For example, selecting only large-scale interventions may neglect neighbourhood-specific vulnerabilities. Justice considerations in this step can surface cross-scalar connections (e.g., how a local flooding issue can be associated to upstream watershed dynamics) and ensure that interventions respond to actual lived geographies rather than arbitrary administrative boundaries. In order to define the scale, it is recommended to understand the possible justice implications that its implementation could entail for the spatial dynamics of the urban environment. At the local scale, NBS interventions are inherently site-specific. Therefore, assessing the appropriateness of the spatial scale is not required, as justice-related risks are better addressed in subsequent participatory planning and design steps.
- Stakeholder participation: Not necessary
- Suggested approaches: See **Table 2**
- Expected outcome: a defined scale for NBS intervention or assessment.

Table 2. Overview of tools to support inclusive participation and fair benefit distribution in each step of the Decision Framing module, across the different spatial scales of NBS.

Module	Step	NBS scale		
		Local	District	City-level
Decision framing module	Understanding policy context	Storytelling workshops: community members and civil society narrate experiences of exclusion or interaction with local policies (e.g., zoning, housing, green space access). These workshops can reveal gaps between policy intentions and lived urban realities. Ref: Mateus et al. (2021)		Policy Delphi workshops: an iterative consultation with policymakers, planners, and community actors to assess how current urban policies support or constrain NBS. Participants refine their inputs across rounds, revealing contradictions, blind spots, and justice-related gaps in existing governance frameworks. Suitable for both online and in-person formats on the city or district scale. Ref: Linstone & Turoff (2002)
		Cross analysis of urban strategic plans: comparison of relevant strategic documents and reports (e.g., on climate, equity, housing, biodiversity) that influence the site. The aim is to assess whether these reports acknowledge previous community conflicts or explicitly reference justice-related terms (e.g., equity, participation, vulnerable groups). The analysis also seeks to identify blind spots or conflicting mandates that could lead to exclusion. Ref: Wamsler (2017)		
	Predefinition of criteria	Revision of urban agendas: includes examining documents such as climate action plans, biodiversity strategies, and SDG roadmaps to identify key urban challenges that Nature-Based Solutions (NBS) can help address (e.g., heat reduction, lack of social spaces). Attention should be given to which challenges are prioritized and whether any relevant issues, especially those affecting vulnerable groups, are being overlooked. These identified challenges will later be reviewed and validated by stakeholders during the Planning module. Ref: Camacho-Caballero et al. (2024)		
	Definition of scale	At the local scale, NBS interventions are inherently site-specific. Therefore, assessing the appropriateness of the spatial scale is not required, as justice-related risks are better addressed in subsequent participatory planning and design steps.	District boundary analysis: understanding how district boundaries (mis)align with actual social and ecological needs in the periphery. This involves analyzing demographic and environmental indicators across district borders to understand the socio-ecological needs in the district periphery. Particular attention should be paid to whether marginalized communities fall at the edges of districts and risk exclusion due to administrative fragmentation. This method helps to flag spatial blind spots and assess whether the district is an appropriate unit to plan for justice-sensitive NBS. Ref: Boone et al. (2009)	Distributive analysis: assessment for examining whether city-wide NBS planning explicitly accounts for the uneven distribution of vulnerabilities and capacities across neighborhoods. While the <i>planning module</i> will later focus on spatial injustices, an early revision of literature is recommended to identify how benefits and burdens are currently (un)justly distributed in the city. This helps anticipate risks where NBS plans might unintentionally reinforce existing disparities. Justice concerns emerge when interventions are concentrated in flagship zones or when highly vulnerable areas are deprioritized due to technical or administrative constraints. Ref: Anguelovski et al., (2018)



1.2. Co-creation module

This module emphasizes stakeholder engagement in the NBS planning process. It involves identifying and involving diverse stakeholders to ensure that NBS are tailored to local needs and priorities. The module plans for participation throughout the assessment.

Setting co-creation goals

- Description: this step defines the strategic purpose and intended outcomes of stakeholder participation in the NBS planning process. It ensures that participation is meaningfully integrated rather than tokenistic by clarifying what roles stakeholders will play, in which stages they will be involved, and how their inputs will influence decisions. Key aspects to define at this stage include: (i) what planning decisions will be open to participation and (ii) the expected level of stakeholder influence and (iii) criteria for selecting participants based on their relationship to the intervention area. Early reflection on these points allows the participatory process to be tailored to the local governance context and justice objectives, while also helping identify risks such as consultation fatigue or exclusion of relevant voices.
- Stakeholder participation: Not necessary
- Suggested approaches: See **Table 3**
- Expected outcome: A defined set of goals for stakeholder participation, including what types of input are expected, how these will inform specific planning decisions, and which stakeholder roles are involved at each stage.

Stakeholder Identification

- Description: this step entails identifying, categorizing, and recruiting stakeholders relevant to the NBS process. It goes beyond traditional actors (e.g., city officials, planners) to include those affected by interventions, underrepresented groups, and non-institutional actors with local knowledge. Identification should be iterative and inclusive to avoid reproducing power imbalances. Without careful identification, engagement may only reach those already connected to formal processes, while excluding those with clear stakes but unnoticed by the institutionalized processes (Reed et al., 2009).
- Stakeholder participation: Necessary
- Suggested approaches: See **Table 3**
- Expected outcome: comprehensive list of stakeholders representing diverse interests and knowledge, ensuring inclusive and representative participation in the NBS process.



Developing an implementation plan

- Description: this step focuses on designing the participatory process throughout the rest of the NBS planning and assessment cycle. It entails selecting engagement methods, defining when and how stakeholders will participate, and planning for logistics, facilitation, and feedback. The aim is to ensure that participation is not one-off or extractive, but sustained and meaningful across the project lifecycle.

Even when stakeholders are identified and willing to participate, lack of planning can lead to stakeholder fatigue or imbalanced influence (Few et al., 2007). Ensuring inclusive participation at this stage means choosing tools and formats that match stakeholder capacities, clarifying expectations, and proactively addressing barriers (e.g., language, mobility, care responsibilities).

- Stakeholder participation: Optional
- Suggested approaches: See **Table 3**
- Expected outcome: a logical order of planned engagement activities, their objectives, who to engage with and through which format and tools.

Table 3. Overview of tools to support inclusive participation and fair benefit distribution in each step of the Co-creation module, across the different spatial scales of NBS.

Module	Step	NBS scale		
		Local	District	City-level
Co-creation module	Setting co-creation goals	Three horizon framework: this approach helps ground the participation goals by reflecting in past participatory processes, its successes, and potential improvements. The framework structures reflection around three key questions: - Horizon 1 (Current system): What are the existing limitations in how NBS are planned and governed? How have past participatory processes fallen short? - Horizon 2 (Transition zone): What new forms of stakeholder collaboration or engagement are emerging or needed to overcome these limitations? - Horizon 3 (Vision): What does a fully just and inclusive NBS planning process look like? How would stakeholder engagement contribute to this vision? This reflection helps define clear goals for participation that will guide the rest of the participatory exercises for the NBS planning and implementation. Ref: Sharpe et al. (2016)		
	Stakeholder identification	Snowball sampling: a tool for recruiting stakeholders through peer recommendations. The process begins with a small number of known, trusted stakeholders (e.g., neighborhood representatives, civil society leaders, or municipal contacts) who are asked to suggest other individuals or organizations who may be relevant to the NBS implementation. This exercise continues until no new profiles emerge. This approach is particularly useful in discovering less-visible actors or groups often excluded from institutional spaces. Attention needs to be paid in order to balance representation across institutional, demographic, and territorial dimensions. Ref: Parker et al. (2019)		
	Developing an implementation plan	Workshop design: If possible, engage through meetings or written communication with key shapers and enablers (e.g., local NGOs, neighborhood associations, schools, local administrations) to co-develop a feasible and inclusive engagement plan for the NBS process. This includes identifying: - which engagement spaces are most accessible and legitimate to participants - appropriate frequency and timing of activities (e.g., avoiding work hours or religious holidays) - needed support mechanisms (e.g., translation services, childcare, transportation) - communication channels tailored to different publics (e.g., WhatsApp, flyers, email) - incentives for participation (e.g., influence on outcomes) Special attention should be paid to preventing consultation fatigue, especially in neighborhoods or groups that are often targeted for engagement but rarely see tangible benefits. This approach helps tailor the participation format to community capacities, reduce dropout rates, and increase procedural legitimacy. Ref: Morello et al., (2018)		

1.3. Planning Module

This module focuses on vulnerability assessment to identify the need for NBS interventions. It helps cities determine their most pressing challenges ensuring that NBS planning addresses areas with the highest social and ecological vulnerabilities.

The planning module can take a spatially explicit approach, producing mapped vulnerabilities that highlight areas experiencing multiple risks simultaneously. Alternatively, it can support non-spatial and qualitative assessments of NBS. The goal is to systematically



evaluate vulnerabilities, prioritize interventions, and ensure that NBS align with local social and ecological needs.

Selection of criteria

- Description: this step focuses on identifying, validating, and prioritizing the criteria that will be used to assess the demand for NBS. Selecting criteria without stakeholder input risks reproducing injustice by overlooking relevant knowledge, experiences, or locally concerns (Reed, 2008). Participatory identification ensures that the assessment captures multiple dimensions for the understanding of NBS effectiveness, including those that may be invisible to purely technical evaluations. Once criteria has been validated, stakeholders are engaged in a structured process to assign relative weights to each one. While all selected criteria represent meaningful concerns, weighing allows the process to reflect what matters most in the specific context, a particularly important aspect when decisions must be made under resource or spatial constraints. Incorporating diverse values and lived experiences into this prioritization step is essential to support context-sensitive and justice-informed NBS planning (Langemeyer & Connolly, 2020).
- Suggested approaches: see **Table 4**
- Stakeholder participation: Necessary
- Expected outcome: A validated and weighted set of criteria to assess the demand of NBS in the implementation site.

Stablising indicators

- Description: this step focuses on identifying robust and context-appropriate indicators that operationalize each criterion into measurable variables. Indicators should be capable of capturing the multiple dimensions (e.g., exposure, sensitivity, adaptive capacity) of the selected vulnerabilities. It is recommended reviewing the existing literature to identify commonly used and validated indicators, and consulting with local experts to ensure their relevance and feasibility in the specific urban context.
- Stakeholder participation: Optional
- Suggested approaches: see **Table 4**
- Expected outcome: A set of indicators for each vulnerability criterion.

Assessing vulnerabilities

- Description: This step involves calculating the selected indicators to analyze the extent and distribution of socio-ecological vulnerabilities associated to the selected criteria. It typically relies on spatial data analysis and GIS mapping. The results aim to reveal where the most critical needs for NBS interventions lie, and which populations or ecosystems are most at risk.
- Stakeholder participation: Not necessary, except for the local scale
- Suggested approaches: see **Table 4**



- Expected outcome: A spatially explicit representation of indicators related to the selected vulnerability criteria, serving as a basis for prioritizing NBS interventions.

Table 4. Overview of tools to support inclusive participation and fair benefit distribution in each step of the Planning module, across the different spatial scales of NBS.

Module	Step	NBS scale		
		Local	District	City-level
Planning Module	Selection of criteria and weighting of criteria	Focus groups and pebble distribution involves facilitated participatory sessions in which stakeholders assess the relevance of urban challenges identified in the previous “Predefinition of challenges” step, and expand it if they consider to be necessary. This procedure aims to uncover overlooked or misrepresented concerns, particularly from vulnerable or underrepresented groups. For doing so, it is recommended to carry out a workshop and invite relevant stakeholders to: 1) Present predefined challenges, derived from the review of urban agendas 2) Facilitate discussion to explore perceptions of participants, by asking questions such as <i>Do these challenges reflect your lived or professional experience? Were any challenges overlooked?</i> 3) Revision and expansion of the challenges, by integrating new concerns and ensuring no duplication 4) Priorization of the challenges from more important to least important by using the Pebble distribution method: first, preparing board with labeled challenges. Then, providing: ~100 pebbles per group. Next, participants distribute pebbles based on personal priority (more pebbles = higher demand), and finally pebbles are redistributed collectively to finalize shared priorities. Ref: Chambers (2012)		
	Stablishing indicators	Indicator selection through vulnerability lens: it is recommended that indicators reflect the three dimensions of vulnerability exposure (the degree to which a system or population is physically exposed to hazards), sensitivity (the degree to which that system or population is likely to be affected), and adaptive capacity (the ability to respond, cope, or adapt to those effects). Justice concerns often arise when one or more of these dimensions are overlooked. For selecting indicators, the contribution of researchers and municipal technicians is highly valued, as these can assess the contextual relevance, interpretability, and availability of data. Ref: Turner et al. (2003)		
	Assessing vulnerabilities	Participatory mapping: in those cases where local scale interventions are too small to be assessed using the spatial vulnerability mapping described for the district and city-scale, participatory mapping can also provide insights into the states of vulnerabilities. For doing so, facilitated sessions should take place, where residents and local stakeholders visually identify areas, they perceive as vulnerable (e.g., heat, flooding, or lack of recreational spaces). Using printed or digital maps (PPGIS), participants are invited to locate zones they associate with specific vulnerability dimensions. This approach naturally emphasizes exposure, as participants highlight where environmental stressors are directly experienced. To capture sensitivity, the process should include individuals from groups especially vulnerable to urban risks (e.g., elderly, children, persons with health conditions). Finally, adaptive capacities of the area should be previously assessed by the planning team based on neighborhood characteristics (e.g., income, health facilities), and later discussed with participants, in order to understand their use to these spaces. Ref: Brown & Kyttä (2014); Kotsila et al. (2025)	Spatial vulnerability mapping: this method involves combining normalized indicators for each selected criterion, considering exposure (e.g., frequency of extreme heat), sensitivity (e.g., proportion of elderly residents), and adaptive capacity (e.g., access to healthcare or green space), into aggregated vulnerability scores. Spatial layers are processed using GIS to generate vulnerability maps. Weights can be equal or based on previously defined stakeholder input. The analysis reveals priority areas for NBS interventions by visualizing where vulnerabilities are most concentrated. Ref: Camacho-Caballero et al. (2024)	



1.4. Design Module

The design module translates NBS planning into concrete interventions. It guides urban designers in creating NBS that address specific vulnerabilities and enhance ecosystem services. The module emphasizes site diagnosis, design strategies, and the use of modeling tools to visualize and compare design alternatives. It also incorporates stakeholder feedback through co-creation, ensuring that the final design aligns with local needs and priorities. Finally, it also aims to create multifunctional NBS.

Design strategy

- Description: this step involves translating the findings from the planning phases into a coherent design strategy for the NBS intervention. The strategy outlines key functions (e.g., stormwater retention, temperature regulation, biodiversity support), ecosystem services to be enhanced, and spatial principles to be followed (e.g., connectivity, accessibility). It also addresses social functions such as public use, recreational needs, safety, and cultural relevance. The aim is to create multifunctional interventions that reflect both environmental needs and human values. Marginalized groups often have specific spatial needs that may not be captured by design standards (e.g., accessibility needs, specific features for social gatherings). Without inclusive participation, designs risk becoming ecologically effective but socially exclusionary ((Anguelovski et al., 2018b).
- Stakeholder participation: Optional
- Suggested approaches: see **Table 5**
- Expected outcome: Clear intervention strategies that address specific vulnerabilities.

Space design and Modeling

- Description: This step operationalizes the selected design strategy into concrete and technically viable plans. It ensures that the final NBS design can be implemented effectively, meets technical standards, and performs the intended functions. Feedback from earlier participatory design phases should be integrated into this phase.
Participation is not necessary in this step because justice considerations have already been co-defined with stakeholders in earlier phases. As long as the technical modelling faithfully translates these agreed design strategies, justice concerns are covered.
- Stakeholder participation: Not necessary
- Suggested approaches: see **Table 5**



- Expected outcome: a set of technically sound, stakeholder-informed NBS design plans that are ready for implementation.

Table 5. Overview of tools to support inclusive participation and fair benefit distribution in each step of the Design module, across the different spatial scales of NBS

Module	Step	NBS scale		
		Local	District	City-level
Design module	Design strategy	Co-design workshops supporting inclusive design Participants (residents, civil society groups, municipal staff) collaboratively explore how they imagine new NBS spaces that can address the criteria selected in previous exercises and identify if there are any urban features to maintain in the implementation site. Justice concerns such as lack of amenities for elderly people, unsafe areas for women, or inaccessible infrastructure can be tackled through this type of mapping and shared storytelling. Ref: (Rinaldi et al., 2019)		
	Space design and Modeling	Co-design workshops (inter-district approach) At the city level, NBS interventions must address broad systemic needs (e.g., urban heat islands, biodiversity corridors) while remaining responsive to diverse social contexts. A suitable approach is the use of inter-district co-design workshops. These are facilitated encounters where representatives from multiple districts (including civil society, neighborhood groups, and public agencies) collaborate to shape design principles for city-wide NBS. Rather than co-designing specific sites, the goal is to develop shared criteria and typologies that reflect distributed needs across different areas of the city. The process begins by presenting a synthesis of spatial vulnerability mappings (from earlier modules), followed by small-group sessions in which participants develop design configurations for interconnected NBS interventions. To ensure justice, attention should be given to recruiting districts with different socio-economic profiles and environmental risks. Ref: Ferraro et al. (2025)		
		Participation is not necessary in this step because justice considerations have already been co-defined with stakeholders in earlier phases. As long as the technical modelling faithfully translates these agreed design strategies, justice concerns are covered.		

1.5. Monitoring Module

The Monitoring module aims to assess how citizens' satisfaction throughout the implementation of NBS, using a structured ex-ante and ex-post evaluation framework. The satisfaction assessment focuses on the degree to which individuals or communities feel that a NBS has met their expectations, delivered benefits and aligned with their social, environmental and emotional values. The assessment is based on the perceived benefits of NBS, relational values (e.g., connections with nature and community that support identity and responsibility), sentiment (e.g., feelings of safety, tranquillity, conflict, or belonging), acceptability of NBS (e.g., perception of interventions as appropriate, beneficial, and feasible), changes in behavioural responses to the intervention (frequency of visits, variety of users, and demographics of users). The satisfaction assessment ensures that interventions are not only environmentally effective but also socially accepted and perceived as just.



Monitoring draws on multiple methods defined in Deliverable 4.3 *Ex-ante and ex-post satisfaction assessments*: (i) community meetings, (ii) participatory GIS surveys, and (iii) social media analysis. These tools are conducted at both before and after implementation of NBS stages to assess satisfaction and perception changes.

Ex-ante assessment

- Description: aims to assess residents' satisfaction with the NBS interventions before the implementation. It is focused on how residents experience the area, where it may or not exist natural space. Their experiences can be both positive and negative and vary between users.
- Suggested approaches: see **Table 6**
- Expected outcome: A baseline understanding of the community's initial perceptions of physical conditions before NBS implementation, expectations of NBS benefits.

Ex-post assessment

- Description: it assesses how perceptions, satisfaction, and justice-related sentiments have shifted following the implementation of the NBS intervention. The evaluation focuses on whether the intervention met stakeholder expectations, how benefits and burdens were experienced across groups, and whether the process was perceived as inclusive and fair. It also explores whether previously marginalized voices feel recognized after implementation.
- Suggested approaches: see **Table 6**
- Expected outcome: An updated post-intervention understanding of shifts in community perceptions around the effectiveness of the NBS intervention.

Table 6. Overview of tools to support inclusive participation and fair benefit distribution in each step of the Monitoring module, across the different spatial scales of NBS

Module	Step	NBS scale		
		Local	District	City-level
Monitoring module	Ex-Ante Assessment	Community meetings: structured gatherings where residents and users evaluate the current state of the area where NBS is about to be implemented. Community meetings include three different types of actions: surveys, focus group discussions and prioritization exercises. For more details, please review the C2G Methodology for Ex-ante and Ex-post Evaluation.		
			Public Participatory GIS Survey: assesses how citizens perceive and experience urban features across time and space. It combines geospatial inputs (where benefits or issues are perceived) with survey data (demographics, values, attitudes), enabling a spatially explicit analysis of satisfaction.	
			Social Media analysis: conducted using geotagged, multi-platform data within the defined area of the planned NBS intervention. The findings will be synthesized into a weighted satisfaction index.	
	Ex-Post Assessment	Community meetings: similar to the ex-ante assessment, community meetings actions are repeated after the implementation of the NBS to understand how satisfaction from residents has shifted.		
			Public Participatory GIS Survey: the same ex-ante analysis will be carried out after the implementation of NBS to understand how and where satisfaction of residents has changed.	
			Social Media analysis: the same analysis will be conducted after the implementation of NBS. This second analysis will allow to perform quantitative and spatial analyses to assess changes in satisfaction and perceptions from users in the area of implementation.	



2. Continuity strategy

The proposed strategy aims to ensure continuity across time in the participatory assessment of NBS satisfaction by maintaining consistent stakeholder group representation, even if the individual participants differ between ex-ante and ex-post stages. This approach prioritizes consistent typological representation over identical individual participation, enabling meaningful longitudinal comparison of NBS intervention outcomes.

Premise 1: Representational parity and proportionality

This premise ensures that both ex-ante and ex-post community meetings include representatives from a comparable range of stakeholder types, rather than requiring the participation of the exact same individuals. The goal is to maintain longitudinal comparability across the ex-ante and ex-post meetings by ensuring a consistent distribution of stakeholder perspectives over time (Fung, 2006; Reed, 2008).

To achieve this, it is assumed that the stakeholder mapping and engagement process captures the diversity of actors relevant to the case study. The first community meeting (focused on the ex-ante assessment) serves as the baseline for evaluating representation in the second meeting (focused on the ex-post assessment).

The implementation of representational parity and proportionality involves categorizing stakeholders from the first community meeting using two classification systems. The primary system identifies eight broad stakeholder groups (see Table 7). The secondary system further subcategorizes participants who are either beneficiaries or negatively impacted communities, based on key demographic characteristics (Table 8).

This categorization process results in a participation profile that documents the types and proportions of stakeholders involved in the first meeting. The second community meeting should aim to replicate this distribution as closely as possible, both in terms of stakeholder typologies, demographics and their relative proportions. This approach helps ensure that no stakeholder group is under/overrepresented compared to the initial meeting.

Table 7. Stakeholder typologies that participate in community meetings. Source: Langemeyer et. al, 2024

Stakeholder group	Definition	Examples
Political representatives	Those who are elected to public office and make political decisions within governmental settings.	» Mayors » Ministers » Elected officials
Governmental authorities	Those who develop, control, or maintain laws, strategies, or plans.	» National government » Regional administration » Municipal urban planners
Civil society	Those who hold the space for collective action around shared interests, purposes, and values. This group is generally distinct from government and commercial for-profit actors	» Community-based organization/ neighborhood association » NGO » Environmental and social movements
Beneficiaries	Those who use NBS and benefit from them in diverse forms, including provisioning, regulating, and cultural ecosystem services	» Residents » Environmental stewards
Negatively impacted communities	Those who might experience adverse outcomes (encompassing both social and environmental impacts) from the implementation of NBS.	» Residents » Vulnerable groups
Academia, research, and education	Those doing research and wanting to advance knowledge and/or share knowledge with students and interested parties.	» Research institutes » Universities » Highschool or primary schools » Environmental education projects
Private sector	Those who make part of a country's economic system and run individual and company businesses to make a profit	» Finance sector and funders » Private company / consultancy » Design and/or architecture office » Cooperatives / foundations » Landowners and land managers » Farmers
Media & networks	Those who produce and spread news and stories	» Press representatives » Online influencers » Professional associations » National and regional associations of municipalities



Table 8. Subcategories for beneficiaries and negatively impacted communities

Stakeholder role	Definition	Examples
Developers	Stakeholders directly responsible for initiating, designing, and implementing NBS interventions.	» Municipal planning departments » Urban designers » Construction firms
Shapers	Those who use the outputs of the C2G project	» Community leaders » Researchers » NGOs
Enablers	Those who create the institutional, financial, or policy conditions that allow NBS to be initiated or sustained.	» EU and national funders » Government agencies » Investors
Users	Those who interact with and benefit from NBS on a regular basis.	» Residents » Commuters
Maintainers	Stakeholders involved in the long-term management and stewardship of NBS once implemented.	» Municipal maintenance teams » Volunteers
Opponents	Stakeholders who may oppose or critique NBS plans, either because of potential risks or perceived injustices.	» Displaced or affected residents » Tenant associations

Premise 2: Anchoring Institutions

To further mitigate the loss of continuity across the ex-ante and ex-post phases, it is suggested to include in the process anchoring institutions (i.e., locally embedded organizations or actors with stable, long-term ties to the area or communities). These entities act as overarching element along the assessment process (Ansell & Gash, 2008).

Implementation requires identifying, during the initial stakeholder mapping, institutions with established relationships to key demographic, place-based, or interest-based groups (e.g., local NGOs or neighbourhood associations). These institutions are then invited to actively support both assessment phases by suggesting participants, disseminating invitations, and hosting or co-facilitating meetings.

By involving such actors throughout the process, stakeholder recruitment is grounded in existing trust networks, and knowledge of earlier discussions is more likely to be retained within stakeholder communities (Pretty & Ward, 2001).

Premise 3: Reflexive framing in Ex-post community meetings

To ensure temporal coherence in participatory assessments, ex-post participants can engage with the opinions raised during the ex-ante phase, enabling new participants to revisit and reflect on earlier stakeholder contributions (Hölscher et al., 2018)

For doing so, it is encouraged to prepare a structured synthesis of ex-ante results, including: results from previous questionnaires, list of prioritized benefits demanded in the area, and summaries around the acceptability discussions, including a anonymized quotes

from the diverse typologies of stakeholders. During the ex-post meeting, facilitators should invite participants to assess the relevance of these earlier views by inviting new participants to reflect on the context when these results were produced and assess how these results have changed over time.

This process reconstructs continuity by fostering deliberation between temporally distinct stakeholder groups, enabling a more robust interpretation of perceived outcomes (Chaffin et al., 2016)

References

- Agyeman, J., Schlosberg, D., Craven, L., & Matthews, C. (2016). Trends and Directions in Environmental Justice: From Inequity to Everyday Life, Community, and Just Sustainabilities. *Annual Review of Environment and Resources*, 41(Volume 41, 2016), 321–340. <https://doi.org/10.1146/ANNUREV-ENVIRON-110615-090052/CITE/REFWORKS>
- Anguelovski, I., Connolly, J., & Brand, A. L. (2018). From landscapes of utopia to the margins of the green urban life. *City*, 22(3), 417–436. <https://doi.org/10.1080/13604813.2018.1473126>
- Anguelovski, I., Connolly, J. J. T., Masip, L., & Pearsall, H. (2018a). Assessing green gentrification in historically disenfranchised neighborhoods: a longitudinal and spatial analysis of Barcelona. *Urban Geography*, 39(3), 458–491. <https://doi.org/10.1080/02723638.2017.1349987>;REQUESTEDJOURNAL:JOURNAL:RURB20;WGROU:STRING:PUBLICATION
- Anguelovski, I., Connolly, J. J. T., Masip, L., & Pearsall, H. (2018b). Assessing green gentrification in historically disenfranchised neighborhoods: a longitudinal and spatial analysis of Barcelona. *Urban Geography*, 39(3), 458–491. <https://doi.org/10.1080/02723638.2017.1349987>;REQUESTEDJOURNAL:JOURNAL:RURB20;WGROU:STRING:PUBLICATION
- Anguelovski, I., Connolly, J. J. T., Pearsall, H., Shokry, G., Checker, M., Maantay, J., Gould, K., Lewis, T., Maroko, A., & Roberts, J. T. (2019). Why green “climate gentrification” threatens poor and vulnerable populations. *Proceedings of the National Academy of Sciences of the United States of America*, 116(52), 26139–26143. <https://doi.org/10.1073/PNAS.1920490117/ASSET/B7352BD0-F982-41E6-A0B4-018A8F93BAF2/ASSETS/GRAPHIC/PNAS.1920490117FIG03.JPEG>
- Ansell, C., & Gash, A. (2008). Collaborative Governance in Theory and Practice. *Journal of Public Administration Research and Theory*, 18(4), 543–571. <https://doi.org/10.1093/JOPART/MUM032>



- Benati, G., Calcagni, F., Matellozzo, F., Ghermandi, A., & Langemeyer, J. (2024). Unequal access to cultural ecosystem services of green spaces within the city of Rome – A spatial social media-based analysis. *Ecosystem Services*, 66, 101594. <https://doi.org/10.1016/J.ECOSER.2023.101594>
- Boone, C. G., Buckley, G. L., Grove, J. M., & Sister, C. (2009). Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland. *Http://Dx.Doi.Org/10.1080/00045600903102949*, 99(4), 767–787. <https://doi.org/10.1080/00045600903102949>
- Brown, G., & Kyttä, M. (2014). Key issues and research priorities for public participation GIS (PPGIS): A synthesis based on empirical research. *Applied Geography*, 46, 122–136. <https://doi.org/10.1016/J.APGEOG.2013.11.004>
- Buijs, A. E., Mattijssen, T. J., Van der Jagt, A. P., Ambrose-Oji, B., Andersson, E., Elands, B. H., & Steen Møller, M. (2016). Active citizenship for urban green infrastructure: fostering the diversity and dynamics of citizen contributions through mosaic governance. *Current Opinion in Environmental Sustainability*, 22, 1–6. <https://doi.org/10.1016/J.COSUST.2017.01.002>
- Camacho-Caballero, D., Langemeyer, J., Segura-Barrero, R., Ventura, S., Beltran, A. M., & Villalba, G. (2024). Assessing Nature-based solutions in the face of urban vulnerabilities: A multi-criteria decision approach. *Sustainable Cities and Society*, 103, 105257. <https://doi.org/10.1016/J.SCS.2024.105257>
- Chaffin, B. C., Garmestani, A. S., Gunderson, L. H., Benson, M. H., Angeler, D. G., Tony, C. A., Cosens, B., Craig, R. K., Ruhl, J. B., & Allen, C. R. (2016). Transformative Environmental Governance. *Annual Review of Environment and Resources*, 41(Volume 41, 2016), 399–423. <https://doi.org/10.1146/ANNUREV-ENVIRON-110615-085817/CITE/REFWORKS>
- Chambers, R. (2012). *Participatory Workshops*. Routledge. <https://doi.org/10.4324/9781849772136>
- Fainstein, S. S. (2010). JUSTICE AND URBAN TRANSFORMATION: PLANNING IN CONTEXT. In *The Just City* (pp. 57–86). Cornell University Press. <http://www.jstor.org/stable/10.7591/j.ctt7zhwt.6>
- Ferraro, A., D'Andria, E., & Fiore, P. (2025). Experiences of Participatory and Shared Co-Design: The Metaplan Method for a “Possible City” in Calitri (AV), Italy. *Lecture Notes in Civil Engineering*, 612 LNCE, 336–352. https://doi.org/10.1007/978-3-031-71867-0_23/FIGURES/13
- Few, R., Brown, K., & Tompkins, E. L. (2007). Public participation and climate change adaptation: Avoiding the illusion of inclusion. *Climate Policy*, 7(1), 46–59. <https://doi.org/10.1080/14693062.2007.9685637;PAGE:STRING:ARTICLE/CHAPTER>



- Frantzeskaki, N., McPhearson, T., Collier, M. J., Kendal, D., Bulkeley, H., Dumitru, A., Walsh, C., Noble, K., Van Wyk, E., Ordóñez, C., Oke, C., & Pintér, L. (2019). Nature-Based Solutions for Urban Climate Change Adaptation: Linking Science, Policy, and Practice Communities for Evidence-Based Decision-Making. *BioScience*, 69(6), 455–466. <https://doi.org/10.1093/BIOSCI/BIZ042>
- Fung, A. (2006). Varieties of Participation in Complex Governance. *Public Administration Review*, 66(SUPPL. 1), 66–75. <https://doi.org/10.1111/J.1540-6210.2006.00667.X>
- Herreros-Cantis, P., Hoffman, L., Kennedy, C., Kim, Y., Charles, J., Gillet, V., Getzin, A., Littlefield, D., Zielinski, A., Bernstein, J., Settle-Robbinson, R., Langemeyer, J., Neumann, M., & McPhearson, T. (2024). Co-producing research and data visualization for environmental justice advocacy in climate change adaptation: The Milwaukee Flood-Health Vulnerability Assessment. *Cities*, 155, 105474. <https://doi.org/10.1016/J.CITIES.2024.105474>
- Hoelting, K. R., Morse, J. W., Gould, R. K., Martinez, D. E., Hauptfeld, R. S., Cravens, A. E., Breslow, S. J., Bair, L. S., Schuster, R. M., & Gavin, M. C. (2024). Opportunities for improved consideration of cultural benefits in environmental decision-Making. *Ecosystem Services*, 65, 101587. <https://doi.org/10.1016/J.ECOSER.2023.101587>
- Hölscher, K., Wittmayer, J. M., & Loorbach, D. (2018). Transition versus transformation: What's the difference? *Environmental Innovation and Societal Transitions*, 27, 1–3. <https://doi.org/10.1016/J.EIST.2017.10.007>
- Kabisch, N., Korn, H., Stadler, J., Bonn, A., Kabisch, N., Korn, H., Stadler, • J, & Bonn, A. (2017). Nature-Based Solutions to Climate Change Adaptation in Urban Areas—Linkages Between Science, Policy and Practice. *Theory and Practice of Urban Sustainability Transitions*, 1–11. https://doi.org/10.1007/978-3-319-56091-5_1
- Kato-Huerta, J., & Geneletti, D. (2022). Environmental justice implications of nature-based solutions in urban areas: A systematic review of approaches, indicators, and outcomes. *Environmental Science & Policy*, 138, 122–133. <https://doi.org/10.1016/J.ENVSCI.2022.07.034>
- Kiss, B., Sekulova, F., Hörschelmann, K., Salk, C. F., Takahashi, W., & Wamsler, C. (2022). Citizen participation in the governance of nature-based solutions. *Environmental Policy and Governance*, 32(3), 247–272. <https://doi.org/10.1002/EET.1987>
- Kotsila, P., Cuenca, V. C., Franco, M., Melo, L., & Pickard, S. (2025). EMBODYING AND RESISTING URBAN HEAT INJUSTICE: Migrant Vulnerabilities and Radical Adaptations in El Raval, Barcelona. *International Journal of Urban and Regional Research*. <https://doi.org/10.1111/1468-2427.13359>;WGROU:STRING:PUBLICATION
- Langemeyer, J., Baró, F., Roebeling, P., & Gómez-Baggethun, E. (2015). Contrasting values of cultural ecosystem services in urban areas: The case of park Montjuïc in Barcelona. *Ecosystem Services*, 12, 178–186. <https://doi.org/10.1016/J.ECOSER.2014.11.016>



- Langemeyer, J., & Connolly, J. J. T. (2020). Weaving notions of justice into urban ecosystem services research and practice. *Environmental Science and Policy*, 109(April), 1–14. <https://doi.org/10.1016/j.envsci.2020.03.021>
- Langemeyer, J., Maestre Andrés, S., Melo, I., & Salmon, N. (2024). Planning, designing and monitoring of nature-based solutions: Guidelines to urban transformations. Interlace, Universitat Autònoma de Barcelona. ISBN 978-628-7721-30-2
- Leone, M., Lammens, L. & Callebaut, J. (2023) INTERLACE Stakeholder Engagement Strategy. Deliverable 1.5. INTERLACE project.
- Linstone, H. A., & Turoff, M. (Eds.). (2002). *The Delphi Method: Techniques and applications* (2nd ed.). Newark, NJ: New Jersey Institute of Technology
- Mateus, A., Martins, S., Leonor, S., Moniz, G. C., Ferreira, I., da Silva, B. C., Nunes, N., Borjner, E., Hallman, K. E., & Andersson, I. (2021). *Project report on pilot participatory workshop on community-driven process for the co-creation of healthy corridors and NBS* URBiNAT Project
- Matthew McConnachie, M., & Shackleton, C. M. (2010). Public green space inequality in small towns in South Africa. *Habitat International*, 34(2), 244–248. <https://doi.org/10.1016/J.HABITATINT.2009.09.009>
- Morello, E; Mahmoud, I; Gulyurtlu, S; Boelman, V; Davis, H (2018). CLEVER Cities Guidance on co-creating nature-based solutions: PART I - Defining the co-creation framework and stakeholder engagement. Deliverable 1.1.5, CLEVER Cities, H2020 grant no. 776604.
- Parker, C., Scott, S., & Geddes, A. (2019). *Snowball Sampling*. <http://methods.sagepub.com/foundations/snowball-sampling>
- Pretty, J., & Ward, H. (2001). Social Capital and the Environment. *World Development*, 29(2), 209–227. [https://doi.org/10.1016/S0305-750X\(00\)00098-X](https://doi.org/10.1016/S0305-750X(00)00098-X)
- Rawls, J. (1971). *A Theory of Justice* (Original Edition). Harvard University Press. <https://doi.org/10.2307/j.ctvjf9z6v>
- Raymond, C. M., Pam, B., Breil, M., Nita, M. R., Kabisch, N., de Bel, M., Enzi, V., Frantzeskaki, N., Geneletti, D., Cardinaletti, M., Lovinger, L., Basnou, C., Monteiro, A., Robrecht, H., Sgrigna, G., Munari, L., & Calfapietra, C. (2017). An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects. In *EKLIPSE Expert Working Group report* (Issue February).
- Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141(10), 2417–2431. <https://doi.org/10.1016/j.biocon.2008.07.014>
- Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C. H., & Stringer, L. C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, 90(5), 1933–1949. <https://doi.org/10.1016/J.JENVMAN.2009.01.001>

- Rinaldi, A., Caon, M., Khaled, O. A., & Mugellini, E. (2019). Designing Urban Smart Furniture for Facilitating Migrants' Integration: The Co-design Workshop as Approach for Supporting Inclusive Design. *Advances in Intelligent Systems and Computing*, 824, 461–470. https://doi.org/10.1007/978-3-319-96071-5_49
- Schlosberg, D. (2013). Theorising environmental justice: The expanding sphere of a discourse. *Environmental Politics*, 22(1), 37–55. <https://doi.org/10.1080/09644016.2013.755387>;JOURNAL:JOURNAL:FENP20;REQUESTEDJOURNAL:JOURNAL:FENP20;CSUBTYPE:STRING:SPECIAL;PAGE:STRING:ARTICLE/CHAPTER
- Sekulova, F., Anguelovski, I., Kiss, B., Kotsila, P., Baró, F., Palgan, Y. V., & Connolly, J. (2021). The governance of nature-based solutions in the city at the intersection of justice and equity. In *Cities* (Vol. 112). Elsevier Ltd. <https://doi.org/10.1016/j.cities.2021.103136>
- Sharpe, B., Hodgson, A., Leicester, G., Lyon, A., & Fazey, I. (2016). a pathways practice for transformation. *Ecology and Society*, 21(2). <http://www.jstor.org/stable/26270405>
- Turner, B. L., Kasperson, R. E., Matsone, P. A., McCarthy, J. J., Corell, R. W., Christensene, L., Eckley, N., Kasperson, J. X., Luers, A., Martello, M. L., Polsky, C., Pulsipher, A., & Schiller, A. (2003). A framework for vulnerability analysis in sustainability science. *Proceedings of the National Academy of Sciences*, 100(14), 8074–8079. <https://doi.org/10.1073/PNAS.1231335100>
- van Hulst, M., & Yanow, D. (2016). From Policy “Frames” to “Framing”: Theorizing a More Dynamic, Political Approach. *American Review of Public Administration*, 46(1), 92–112. <https://doi.org/10.1177/0275074014533142>;CTYPE:STRING:JOURNAL
- Wamsler, C. (2017). Stakeholder involvement in strategic adaptation planning: Transdisciplinarity and co-production at stake? *Environmental Science & Policy*, 75, 148–157. <https://doi.org/10.1016/J.ENVSCI.2017.03.016>
- Wamsler, C., Alkan-Olsson, J., Björn, H., Falck, H., Hanson, H., Oskarsson, T., Simonsson, E., & Zelmerlow, F. (2020). Beyond participation: when citizen engagement leads to undesirable outcomes for nature-based solutions and climate change adaptation. *Climatic Change*, 158(2), 235–254. <https://doi.org/10.1007/S10584-019-02557-9/TABLES/2>





Assessing Satisfaction with Nature-Based Solutions Interventions

A Methodology for Ex-ante and Ex-post Evaluation

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Background

Task description

This task aims to evaluate citizens' perceptions and levels of satisfaction with Nature-Based Solutions (NBS) interventions before (ex-ante) and after (ex-post) their implementation, in order to capture any shifts resulting from the intervention itself. By comparing perceptions at different points in time, we can assess how the implemented NBS have influenced public attitudes and satisfaction. To achieve this, three methodological approaches are proposed, each tailored to the specific characteristics of the interventions and the contextual needs of the cities involved in the Commit2Green project.

Box 1: Task description from the project proposal

T4.3 Ex-ante and ex-post satisfaction assessments (M1-M54) (Leader: UAB, Contributors: R-Cities, CNR, All Cities, All local implementation partners)

This task will be responsible for providing a set of tools in order to examine the ex-ante and ex-post satisfaction of citizens with the NBS interventions that can be combined in a modular way and, thereby, be adapted to the city- and intervention-specific needs and capabilities. The toolbox will be developed by UAB, building on and refining the tools previously used within the project cities, including (i) community meetings, (ii) public surveys, (iii) social media analytics, (iv) mobile apps, and (v) geotagging. The coordination of the development of city-tailored assessment approaches will be supported by R-Cities (T4.1), the implementation will be supported by all cities and their local implementation partners. Results will feed into the monitoring and evaluation (T4.4). Multi-media methodology for ex-ante and ex-post satisfaction assessments and its application in the C2G demonstrators (D4.3) will support the inclusive engagement and citizen participation throughout the project. The assessment for each city is happening in two phases: the t0 study which establishes the baseline, and the t1 study which captures the satisfaction impact. This has been described in more detail in subsection 1.2. Lastly, increased satisfaction is a function of (profound) engagement, which is happening in all pilot cities using the guidance of T2.3.

Related Milestones and Deliverables

- MS13: t0 study carried out (M24)
- MS17: t1 study completed (M52)
- D4.3: Multi-media methodology for ex-ante and ex-post satisfaction assessments and its application in the C2G demonstrator (M54)



Introduction

Cities worldwide are increasingly adopting Nature-Based Solutions (NBS)—such as green corridors, restored wetlands, and tree canopies—to address challenges including climate adaptation, urban heat mitigation, and improved public well-being (Frantzeskaki, 2019; Kabisch et al., 2016; Soga & Gaston, 2020). While the ecological impacts of these interventions—such as enhanced biodiversity, temperature reduction, and flood risk management—have been well documented, considerably less attention has been given to understanding how citizens' satisfaction with NBS evolves over time. In particular, there is a notable gap in studies that compare user perceptions before implementation (ex-ante) with those after NBS are established (ex-post) (Raymond et al., 2017; Rall et al., 2017).

By collecting ex-ante and ex-post feedback from local communities, practitioners can refine NBS designs in response to evolving stakeholder perceptions, thus enhancing adaptive management (Kabisch et al., 2016). At the same time, equity and inclusion are better addressed by identifying differences in satisfaction among socio-demographic groups, supporting more equitable policy interventions. Finally, by assessing user perceptions before and after NBS installation, planners and policymakers can more effectively validate outcomes—i.e., determine whether these interventions truly meet social and environmental objectives.

Despite their widespread use, traditional questionnaires and surveys—though valuable for evaluating citizens' perceptions and satisfaction with NBS—often face significant challenges when deployed at large scales. These methods can be time- and cost-intensive and may struggle to maintain representativeness across diverse urban contexts. This limitation creates a gap in our ability to comprehensively capture public sentiment.

To bridge this gap, we offer three alternative approaches, including qualitative insights obtained from community meetings with the spatially explicit data gathered through PPGIS and surveys, and further complemented by the quantitative analysis of social media data. This triad of methods promises to deliver both the depth of localized feedback, and the extensive scale required for robust, evidence-based NBS evaluation.

General Approach

The overarching methodological framework for this evaluation adopts an interchangeable triad of methods—community meetings, PPGIS combined with surveys, and social media data analysis—to assess citizens' satisfaction with Nature-Based Solutions (NBS) before (ex-ante) and after (ex-post) implementation.

Rather than employing these methods in a strictly complementary manner, our framework emphasizes their interchangeability. Each method can be applied independently or in various combinations, depending on the specific context of the NBS intervention, available resources, data requirements, and local stakeholder engagement conditions. This adaptive flexibility ensures suitability across diverse urban scenarios.

1. **Community meetings** offer in-depth qualitative insights into local perceptions, values, and context-specific nuances through direct dialogue. They are effective for capturing detailed stakeholder views and exploring emerging concerns or ideas.
2. **PPGIS and surveys** provide systematic, spatially explicit quantitative data, capturing how residents perceive and interact with NBS interventions. This method facilitates precise spatial mapping of areas with high satisfaction or potential conflicts.
3. **Social media data analysis** captures broad-scale, dynamic public sentiment, delivering real-time insights into a diverse range of public opinions and reactions. This method is particularly useful for monitoring public sentiment continuously and at scale.

This interchangeable methodological approach addresses limitations common to single-method evaluations, such as high costs, scalability issues, and limited representativeness. Cities and researchers can select methods according to their needs, ensuring practical adaptability, reliable data collection, and effective resource use.

Spatial and temporal considerations remain critical:

- **Spatial considerations:**
 - *Social media*: Provides point-based coordinates or place identifiers with varying degrees of spatial accuracy.
 - *PPGIS*: Allows detailed spatial input through user-defined polygons or precise point locations.
 - *Community meetings*: Offer targeted, site-specific insights by engaging local stakeholders within defined neighborhoods or user groups.

- **Temporal considerations:** Data collection will consistently align the timeframes for ex-ante and ex-post assessments to control for seasonal variations that might influence usage and perception of spaces (e.g., parks may be visited more frequently in summer than winter).

In summary, this interchangeable methodological framework provides the flexibility and adaptability required to comprehensively evaluate satisfaction with NBS interventions across various urban contexts.

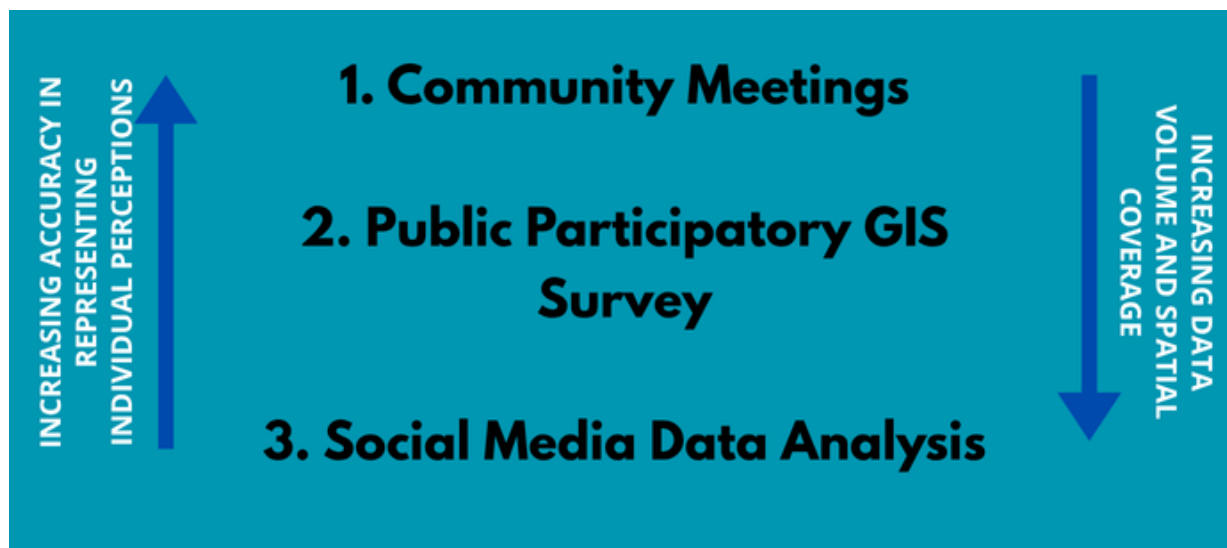


Figure 1 - Comparison of Methodological Approaches by Spatial Coverage and Detail of Perception

Framework for Evaluating Satisfaction with Nature-Based Solutions Interventions

This section outlines the conceptual and methodological framework adopted to evaluate satisfaction with Nature-Based Solutions (NBS) interventions before (ex-ante) and after (ex-post) their implementation. Based on the literature, satisfaction is conceptualized as a complex, multidimensional phenomenon, which is assessed through two complementary categories of proxies: i. perceived benefits and ii. behavioral responses. These proxies enable the exploration of both subjective perceptions and observable patterns of engagement, offering a comprehensive understanding of how individuals and communities relate to NBS interventions over time.

I. Perceived Benefits of the Intervention

Perceived benefits encompass socio-cultural, environmental, and emotional dimensions of human–nature interaction, and are operationalized through the following components:



- **Cultural Ecosystem Services (CES):** These represent the intangible socio-cultural benefits associated with green and blue spaces, such as aesthetic enjoyment, recreation, social cohesion, and physical activity. CES are widely recognized as indicators of green space quality and their contribution to urban well-being (Tian et al., 2024; Langemeyer & Connolly, 2020). Benati et al. (2023) demonstrated that CES, as inferred from geotagged social media data, can reveal spatial inequalities in access to high-quality green infrastructure, highlighting their relevance for justice-oriented urban planning.
- **Regulating Ecosystem Services:** These refer to the perceived environmental benefits of NBS, including temperature moderation, flood risk reduction, and air purification. Such perceptions are critical for fostering long-term public support and are frequently used in climate adaptation and environmental justice frameworks (Raymond et al., 2017).
- **Relational Values:** Defined as the values that emerge from relationships between people and nature, and among people through nature, relational values contribute to well-being, identity, and a sense of responsibility (Chan et al., 2016). They offer insight into the development of meaningful connections with places and communities, and their evolution following the implementation of NBS.
- **Sentiment:** Emotional responses toward places—ranging from perceived tranquillity and safety to discomfort or conflict potential—are assessed through sentiment analysis. This method enables scalable evaluations of public perception, with studies showing strong correlations between social media sentiment and socio-spatial dynamics (Yang et al., 2022; Liu & Xiao, 2020). Sentiment is thus an important proxy for perceived emotional well-being and place attachment.
- **Acceptability of NBS:** Acceptability reflects the degree to which individuals and communities perceive NBS interventions as appropriate, beneficial, and aligned with their needs and values. It is a multidimensional construct comprising several elements:
 - *Perceived Effectiveness:* The belief that NBS can successfully address urban challenges such as climate adaptation and disaster risk reduction (Anderson & Renaud, 2021).
 - *Public Acceptance:* The extent to which the community embraces the intervention, shaped by trust, place attachment, and perceived legitimacy (Anderson & Renaud, 2021; Maestre-Andrés et al., 2021).

- *Integration into Urban Planning:* The degree to which NBS are incorporated into broader urban development frameworks and policies (Kauark-Fontes et al., 2023).
- *Perceived Benefits and Trade-offs:* Awareness of the multifunctionality of NBS and of any trade-offs or conflicts they may generate (Bush & Doyon, 2019).

Studies emphasize that acceptability is not fixed but evolves over time. Once NBS are implemented, they are perceived as innovations within the urban context, and their acceptability may shift depending on whether stakeholders' expectations are met in practice (Han & Kuhlicke, 2021; López-Maciel et al., 2023). The IUCN Global Standard for Nature-based Solutions reinforces the importance of participatory and inclusive governance in this regard (IUCN, 2020).

II. Behavioral Responses to the Intervention

In addition to perceptions, satisfaction is also assessed through behavioral proxies, which capture tangible indicators of how people interact with NBS over time. These include:

- **Frequency of Visits:** Visit frequency is a robust indicator of user engagement and attachment. Calcagni et al. (2022) and Song et al. (2020) have shown that social media-derived data such as photo-user-days can serve as reliable proxies for visitation patterns and the popularity of intervention areas.
- **Variety of Uses:** The diversity of activities supported by a space reflects its multifunctionality and the extent to which it meets diverse user needs. According to Brown and Kyttä (2014), spaces that support a wide range of uses are more likely to foster inclusive and sustained engagement.
- **Diversity of User Profiles:** Evaluating the variety of demographic groups that use the space provides critical insights into social equity and the inclusiveness of NBS interventions. Benati et al. (2023) underscore the importance of monitoring disparities in access to and use of green spaces, particularly in cities where socio-spatial inequalities persist.

By combining perceived and behavioral dimensions, this framework enables a nuanced and dynamic evaluation of how satisfaction with NBS interventions evolves over time. The integration of subjective perceptions and tangible behaviors not only provides a comprehensive view of intervention impacts but also informs adaptive, equity-oriented planning and governance.

Methodology 1 – Community Meetings

Description of methodology

The assessment through community meetings will take place in order to co-create a joint understanding of the state, objectives and success of NBS to be implemented. It is based on the premise that the NBS interventions have the capacity to tackle two different aspects: 1) Meeting residents' self-identified needs for ecosystem services (e.g., temperature regulation, recreational spaces) 2) Transforming the relationship between residents and public spaces by fostering a sense of ownership (placemaking, sense of belonging) (Kabisch & Haase, 2014).

To achieve this, the assessment adopts a participatory approach that is inspired by but not limited to the multi-criteria decision analysis premises, especially those adapted in the Interlace guidelines to urban transformations (Langemeyer et al., 2024). This approach provides a flexible framework for evaluating NBS, allowing for the integration of diverse methodologies tailored to the specific context of each case study.

The objective of the community meetings is to provide a participatory and qualitative approach to understanding citizens' perceptions, needs, and values regarding NBS. The capacity of the community meetings includes co-creation of knowledge, in depth discussion around NBS (capturing nuanced, contextual details that may not emerge in structured surveys), local ownership (fostering a sense of belonging and placemaking by involving residents in the planning and evaluation process) and addressing equity and inclusion (identifying differences in satisfaction among socio-demographic groups, which can inform more equitable policy interventions) (Frantzeskaki & Kabisch, 2016)

Participatory engagements for ex-ante and ex-post satisfaction assessments may face challenges if they aim for a consistent participation of local residents (that is, having the same specific people participate in workshops widely set apart in time) (Few et al., 2007). This limitation is tackled by the Stakeholder Continuity strategy, presented in the next sessions.

Steps for implementation

Table 1- Steps for implementation of Community Meetings Methodology

Module	Step	Objective	Support from City/Partners
Community meetings setup	Definition of objectives of participatory process	Providing insights about the existing and future participatory processes in the city (if any) where community meetings could be carried out	Yes
	Selection and engagement with stakeholders	Mapping and stakeholders for the community meetings	Yes
	Preparation of workshop for community meetings	Defining the when, where and how to carry out a workshop where community meeting ex ante/ex post assessment can be carried out	Yes
Data collection (t0)	Workshop implementation	Pre-implementation workshop where to carry out the different approaches from the community meetings	Yes
Data Collection (t1)	Workshop implementation	Post-implementation workshop where to carry out the different approaches from the community meetings	Yes
Analysis & Integration	Compare t0 & t1 Data	Perform quantitative and spatial analyses to assess changes in satisfaction and perceptions	Yes (data support with local language)
Reporting	Share preliminary & final findings	Deliver updates and final conclusions for inclusive urban planning	Yes (eventually) (facilitate communication)

Data sources

- Local government reports: on urban planning, sustainability strategies, and climate action plans.
- Historical data: past surveys or studies on public perceptions of green spaces or urban interventions in the city.

Detailed description of the approach

a) Focus group discussions

Focus group discussions are a qualitative research method that brings together small groups of stakeholders to engage in guided conversations about their experiences, perceptions, and opinions regarding the NBS intervention. Unlike surveys, they allow for in-depth exploration of themes such as emotional responses, community dynamics, and nuanced aspects of acceptability that may not emerge from closed-ended questions. A



facilitator guides the discussion, encouraging participants to share personal perceptions. Interventions are recorded for later analysis. These discussions can be conducted before the intervention to capture expectations and concerns, and afterward to assess whether those expectations were met.

Criteria covered

- Acceptability

Methodology

1. Participant Selection and Format

Each group should bring together 6–10 participants, selected based on the stakeholder typologies defined in the stakeholder mapping (e.g., Civil society, beneficiaries, negatively impacted communities). If possible, it is suggested that each group include single stakeholder typologies (e.g., beneficiaries). Discussions should be conducted in safe, accessible locations, and moderated by a trained facilitator. Sessions are audio-recorded and transcribed for analysis.

Ideally, several groups of 5–8 stakeholders are organized to ensure diversity, avoiding homogenous demographics or stakeholder types. This allows for a richer exchange of perspectives and more inclusive decision-making. Facilitators should ensure that less vocal individuals are ensured space to speak, so more dominant participants do not take over the whole debate

2. Ex-Ante: Expectations

Objective: Capture how participants perceive the planned NBS before it is implemented, focusing on the aspects of what they expect it to do and how it aligns with their needs and values.

Before starting the discussion within the groups, it is recommended to carry out a clear explanation of the planned NBS, using visuals or site maps where possible, allowing participants to have a common understanding of the implementation plans. Followed by this, participants are divided into groups, each one counting with a facilitator. Start the discussion by asking each participant to describe how are they feeling about the intervention using 1 word (e.g., excited, nervous, curious, etc). Followed by this, continue the discussion with the following questions:

- Expectations:
 - What do you believe it is trying to solve or improve?
- Perceived Effectiveness
 - Do you think this solution will help solve local problems?



- Do you think this solution will create new local problems?
- Fairness and distribution
 - Who do you think will benefit most from the NBS?
 - Who might be left out, or negatively affected?

3. Ex-post: Lived Experience

Objective: Assess how participants evaluate the NBS after its implementation, considering whether expectations were met, what unanticipated impacts occurred, and how perceptions of effectiveness, fairness, and social acceptance have changed.

Begin the event by showing visual material from both before and after the NBS implementation (photos, videos or any material representing the shift in the area). Then, briefly summarize themes that emerged during the ex-ante focus group(s), including concerns, hopes, or expectations raised by previous participants. Emphasize that participants are invited to respond to those earlier views, even if they did not participate in the first discussion. Start the discussion by asking each participant to describe how are they feeling about the intervention using 1 word (e.g., excited, nervous, curious, etc). Followed by this, continue the discussion with the following questions:

- Expectations:
 - Looking back at what was planned, how do you think the intervention has turned out?
- Perceived Effectiveness
 - Has the NBS addressed the issues it was meant to solve (e.g., heat, flooding, lack of green space)?
 - What has improved, stayed the same, or worsened in your experience?
- Fairness and distribution
 - Who has benefited the most from the NBS?
 - Is there anyone who has been left out or adversely affected?

Indicators

Stakeholder	interventions	(qualitative)
Coded stakeholders' interventions (quantitative)		

b) Priorization exercise

Prioritization exercises are interactive, participatory methods used to measure collective preferences, concerns, or levels of agreement among stakeholders. These exercises invite participants to allocate points or marks to different options based on their priorities. Voting exercises produce aggregated results that reflect group consensus or divergence. By



repeating the same exercises before and after the intervention, it can track shifts in collective priorities and measure how perceptions of the NBS evolve over time.

Criteria covered

- Nature socio-cultural benefits
- Nature environmental benefits

Methodology

Participatory pebble allocation allows to measure benefit demand (ex-ante) and benefit supply (ex post), allowing stakeholders to visually prioritize and evaluate NBS impacts.

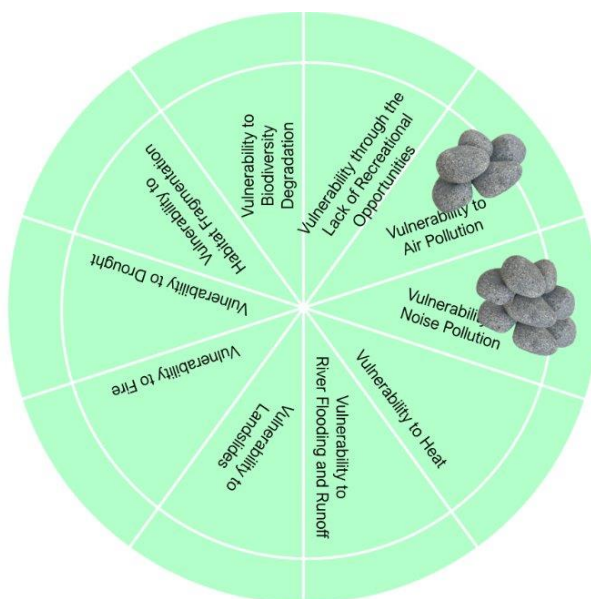
Step 1: Benefits demand – Ex ante

Objective: Determine which socio-cultural and environmental benefits are most desired before NBS implementation.

- Define benefit categories that could be provided by the planned NBS
 - Regulating (air purification, temperature reduction, flood control, noise reduction)
 - Cultural (recreation, aesthetics, social cohesion)
 - Supporting (habitat provision)
- Prepare weighting boards: board with labelled sections for each demanded benefit
- Provide pebbles to participants: approx. 100 pebbles per group
- Instruction:
 - *Allocate individually your pebbles to the benefits you believe are most needed in this area where NBS implementation will happen. Place more pebbles on what matters most to you. Those benefits with higher number of pebbles indicate a higher demand.*
 - *As a group, re distribute the pebbles and agree on the final result*

Step 2: Benefits provision– Ex post

- Use the same benefit categories than in Ex ante exercise
- Repeat pebble exercise, but with a new instruction: *Now that the NBS is implemented, allocate pebbles based on which benefits you feel are being well provided. More pebbles = better delivery.*



Please distribute 100 pebbles among the criteria



Indicators

Weighted ES benefits

c) Questionnaires

Designed to systematically collect standardized responses from participants, surveys use predefined questions. Questions are closed-ended in formats such as Likert scales, multiple-choice, or yes/no answers, to measure perceptions, attitudes, and behaviours related to the NBS intervention. By administering the same survey before (ex ante) and after (ex post) implementation, it can compare changes in satisfaction across key dimensions, including perceived socio-cultural and environmental benefits, relational values, sentiment, and acceptability. They can be distributed in community meetings via paper forms, tablets, or online platforms, making them accessible to diverse stakeholders.

Criteria covered:

- Sentiment
- Relational values

Methodology

Survey uses identical questions in both phases (ex-ante/ex post), it tracks how the intervention influences participants' sense of belonging, responsibility, and emotional attachment to the space. Questions from the PPGIS approach has been adapted to be used in the questionnaires. The full questionnaire is included in Appendix A.



Stakeholder continuity strategy

The proposed strategy aims to ensure continuity across time in the participatory assessment of NBS satisfaction. While ideally the same stakeholders would participate in both the ex ante and ex post stages, this is often not realistic. In such cases, this strategy intends to maintain a consistent stakeholder group representation, even if the individual participants differ between ex-ante and ex-post stages. This approach prioritizes consistent typological representation over identical individual participation, enabling meaningful longitudinal comparison of NBS intervention outcomes.

Premise 1: Representational parity and proportionality

This premise ensures that both ex-ante and ex-post community meetings include representatives from a comparable range of stakeholder types, rather than requiring the participation of the exact same individuals. The goal is to maintain longitudinal comparability across the ex-ante and ex-post meetings by ensuring a consistent distribution of stakeholder perspectives over time (Fung, 2006; Reed, 2008).

To achieve this, it is assumed that the stakeholder mapping and engagement process captures the diversity of actors relevant to the case study. The first community meeting (focused on the ex-ante assessment) serves as the baseline for evaluating representation in the second meeting (focused on the ex-post assessment).

The implementation of representational parity and proportionality involves categorizing stakeholders from the first community meeting using two classification systems. The primary system identifies eight broad stakeholder groups (see Table 1). The secondary system further subcategorizes participants who are beneficiaries, negatively impacted communities or users affected in heterogenous ways by the implementation of NBS. This groups based characterised by key demographic characteristics (Table 2)

This categorization process results in a participation profile that documents the types and proportions of stakeholders involved in the first meeting. The second community meeting should aim to replicate this distribution as closely as possible, both in terms of stakeholder typologies, demographics and their relative proportions. This approach helps ensure that no stakeholder group is under/overrepresented compared to the initial meeting.

Table 2. Stakeholder typologies that participate in community meetings. Source: Langemeyer et. al, 2024

Stakeholder group	Definition	Examples
Political representatives	Those who are elected to public office and make political decisions within governmental settings.	» Mayors » Ministers » Elected officials

Governmental authorities	Those who develop, control, or maintain laws, strategies, or plans.	» National government » Regional administration » Municipal urban planners
Civil society	Those who hold the space for collective action around shared interests, purposes, and values. This group is generally distinct from government and commercial for-profit actors	» Community-based organisation/ neighbourhood association » NGO » Environmental and social movements
Beneficiaries	Those who use NBS and benefit from them in diverse forms, including provisioning, regulating, and cultural ecosystem services	» Neighbouring residents » Environmental stewards
Negatively impacted communities	Those who might experience adverse outcomes (encompassing both social and environmental impacts) from the implementation of NBS.	» Neighbouring residents » Vulnerable groups
Academia, research, and education	Those doing research and wanting to advance knowledge and/or share knowledge with students and interested parties.	» Research institutes » Universities » Highschool or primary schools » Environmental education projects
Private sector	Those who make part of a country's economic system and run individual and company businesses to make a profit	» Finance sector, funders, insurance » Private company / consultancy » Design and/or architecture office » Cooperatives / foundations » Landowners and land managers » Farmers
Media & networks	Those who produce and spread news and stories	» Press representatives » Online influencers » Professional associations » National and regional associations of municipalities



Table 3. Subcategories for beneficiaries and negatively impacted communities

Sub-category	Description	Applied to which stakeholders ?
Migration Status	Native-born / Migrant (<5 yrs) / Migrant (>5 yrs) / Refugee	Beneficiaries/Negatively impacted communities
Age Group	<18, 18-30, 31-50, 51-65, 65+	
Gender	Woman, Man, Non-binary, Prefer not to say	
Income Level	Low, Middle, High (to be defined based on local context)	
Housing Tenure	Owner, Renter, Social housing, Homeless	
Disability Status	Physical, Sensory, Cognitive, None	
Ethnicity/Language	Majority/Minority group, Primary language	
NBS use	Daily use, Occasional use, Never use	Beneficiaries
Impact Type	Displacement, Noise pollution, Lost livelihoods	Negatively impacted communities

Premise 2: Anchoring Institutions

To further mitigate the loss of continuity across the ex-ante and ex-post phases, it is suggested to include in the process anchoring institutions (i.e., locally embedded organizations or actors with stable, long-term ties to the area or communities). These entities act as overarching element along the assessment process (Ansell & Gash, 2008).

Implementation requires identifying, during the initial stakeholder mapping, institutions with established relationships to key demographic, place-based, or interest-based groups (e.g., local NGOs or neighborhood associations). These institutions are then invited to actively support both assessment phases by suggesting participants, disseminating invitations, and hosting or co-facilitating meetings.

By involving such actors throughout the process, stakeholder recruitment is grounded in existing trust networks, and knowledge of earlier discussions is more likely to be retained within stakeholder communities (Pretty & Ward, 2001).

Premise 3: Reflexive framing in Ex-post community meetings

To ensure temporal coherence in participatory assessments, ex-post participants can engage with the opinions raised during the ex-ante phase, enabling new participants to revisit and reflect on earlier stakeholder contributions (Hölscher et al., 2018).

For doing so, it is encouraged to prepare an structured synthesis of ex-ante results, including: results from previous questionnaires, list of prioritized benefits demanded in the area, and summaries around the acceptability discussions, including a anonymized quotes from the diverse typologies of stakeholders. During the ex-post meeting, facilitators should invite participants to assess the relevance of these earlier views by inviting new participants to reflect on the context when these results were produced and assess how these results have changed over time.

This process reconstructs continuity by fostering deliberation between temporally distinct stakeholder groups, enabling a more robust interpretation of perceived outcomes (Chaffin et al., 2016).

Implementation risks and limitations

- Unequal representation among stakeholders
- Risk of lack of measurable indicators for qualitative aspects such as NBS acceptance
- Long-term monitoring challenges around NBS benefits that take longer to materialize (e.g., social cohesion)
- Challenges in applying the community meetings approach to urban scales larger than the neighbourhood level

Methodology 2 – Public Participatory GIS Survey

Introduction

Public Participation Geographic Information Systems (PPGIS) provide a unique methodological framework for assessing how citizens perceive and experience urban features across time and space. By combining geospatial inputs (where benefits or issues are perceived) with survey data (demographics, values, attitudes), PPGIS enables a spatially explicit analysis of satisfaction and perceived impact both before (ex-ante) and after (ex-post) the implementation of an intervention. This is particularly valuable in urban planning, where interventions are inherently place-based and their success depends not only on technical performance but also on how people relate to them spatially.

Unlike conventional surveys, PPGIS captures geographically anchored feedback, allowing the detection of spatial patterns such as clusters of perceived benefits, conflicts, or unmet needs. It also enables longitudinal comparison: changes in spatial perceptions over time can be tracked by comparing ex-ante and ex-post responses from demographically similar groups. This layered approach reveals whether and where perceived improvements or problems emerge in relation to specific NBS elements (e.g., shaded areas, biodiversity corridors).

PPGIS also allows the integration of physical and digital experiences. Participants who have not visited the intervention site can still provide meaningful input through simulated digital visits—an approach that increases inclusiveness while maintaining spatial rigor. In this way, PPGIS strengthens both the equity and robustness of urban satisfaction assessments, supporting data-driven decision-making in complex, multi-scalar urban environments (Brown & Kyttä, 2014; Kahila-Tani et al., 2019).

PPGIS is particularly effective for capturing local perceptions at fine spatial resolutions, allowing the identification of sentiment hotspots (Brown & Raymond, 2014; Rall et al., 2017). In this study, data is collected entirely online through the interactive Maptionnaire platform, which allows respondents to engage with a web-based interface where they can draw polygons or points directly on a map to spatially express their experiences, needs, and perceptions. This interactive component is essential to spatially anchoring subjective feedback, ensuring that every reported benefit or concern is geographically contextualized. The platform's logic settings guide users through this mapping process, enabling consistent and methodologically rigorous data collection across both ex-ante and ex-post phases. The methodology is strengthened by integrating:

- Perceived socio-cultural and environmental benefits
- Relational values

- Emotional sentiment
- Perceived acceptability

Participants can respond based on physical visits or through a guided digital experience using georeferenced images and descriptions to ensure inclusive participation. This dual strategy enhances representativeness, especially in the early stages of intervention planning. A brief visual tour is included at the start of the survey to support participants unfamiliar with the intervention area.

While PPGIS is not a substitute for deliberative processes like stakeholder meetings (Kenter et al., 2016), it offers a cost-effective and scalable way to gather spatialized public feedback.

The survey included a data protection and informed consent section that is fully aligned with GDPR requirements, including anonymization, data rights communication, and ethical standards for data sharing and withdrawal.

Structure of the Integrated Survey

Each section of the survey is critical in capturing different dimensions of public perception and experience related to the nature-based solution. Below is a summary of the five key sections:

1. **Life Satisfaction:** 0–10 scale on overall life satisfaction.
2. **Satisfaction with the Intervention Area:** Includes current use, visit frequency, activity diversity, and mapped activity locations.
3. **Needs Assessment:** Participants map six environmental/well-being needs and rate their importance:
 - Need for more nature spaces
 - Need for better protection from heat
 - Need for improved rainwater management or flood protection
 - Need for better buffering from urban noise
 - Need for shelter from strong winds
 - Need for improved air quality
4. **Perceived Benefits of the NBS:** These are categorized into five dimensions:
 - **4.1 Socio-Cultural Benefits**
 - **4.2 Environmental Benefits**

- **4.3 Relational Values**
- **4.4 Sentiment**
- **4.5 Acceptability**

Each question requires a spatial response (polygon or point) if the participant answers "Yes."

5. **Demographics:** Includes age, gender, country of origin, education, employment, income, transport, leisure activity frequency, and a pinned residence location.

The detailed survey is found in Appendix B. Local details are provided as illustrative examples and are drawn from the pilot case study conducted in The Hague.

Purpose of Each Section

The first section on life satisfaction serves as a broad contextual anchor. By asking respondents to rate their general life satisfaction, the survey can explore how overall well-being influences their perception of urban spaces. This measure functions as a control variable that supports a nuanced interpretation of satisfaction and values expressed in later sections.

The second section addresses satisfaction with the intervention area, providing two key proxies for evaluating satisfaction: behavioural responses and spatial use patterns. Questions on visit frequency and variety of activities reflect real engagement with the area. These elements offer tangible indicators of how often and in what ways the public interacts with the space, helping to assess the area's multifunctionality and social reach. Mapping the location of these activities adds an essential spatial layer, enabling the identification of active or neglected zones and their evolution over time.

In the third section, the survey collects spatially explicit data on perceived environmental and comfort-related needs. By mapping the locations where specific needs (e.g., shade, quiet, clean air) are most pressing, participants communicate their spatial priorities for improvement. Rating the importance of each need complements this mapping, allowing researchers to compare the intensity of perception with geographic clustering. Over time, this enables evaluation of whether and where these needs have been addressed through nature-integrated urban features interventions.

The fourth section investigates five classes of perceived benefits: socio-cultural, environmental, relational, emotional (sentiment), and acceptability. Socio-Cultural Benefit correspond to the internationally accepted class of cultural ecosystem services (CES) such as aesthetic enjoyment, physical activity, or social cohesion are examined alongside environmental benefits, namely regulating ecosystem services (RES), like cooling, air purification, and flood mitigation. Relational values explore deeper

connections between people, place, and nature, while sentiment captures emotional responses such as calmness or conflict. Finally, acceptability evaluates whether the intervention is perceived as appropriate and beneficial, considering concerns about unintended effects, planning integration, and public endorsement. This combination enables a multidimensional, spatially grounded understanding of the perceived impact of the nature-integrated urban features.

The fifth section on demographics supports all other analytical layers by allowing data disaggregation by gender, age, income, proximity, and more. Understanding who benefits most from nature-integrated urban features—who visits, who perceives improvements, and who still experiences barriers—is critical for ensuring equitable and inclusive outcomes. Mapping the approximate location of respondents' residences further supports spatial justice analyses by linking perceived accessibility and relevance of the intervention to geographical patterns.

Physical site visits remain the most robust way to gather grounded, experiential feedback throughout all sections. However, recognizing that not all participants can access the site—due to distance, mobility, or the intervention's incomplete status—the survey includes a digital visit feature. This alternative enables informed, albeit imagined, engagement with the place through annotated images and contextual descriptions. While digital perceptions may differ from in-situ experiences, they allow the inclusion of a broader public and maintain methodological integrity through spatially referenced responses. However, to address barriers related to accessibility, time, or awareness, the survey also includes a digital visit option. This enables broader participation while still anchoring perceptions to concrete spatial references. Although less immersive than real-life experience, the digital simulation ensures that data collection remains inclusive and representative—especially during early planning stages when physical transformations may not yet be visible. Enables disaggregation of responses to explore equity in access, perception, and impact across population groups.



Methodological steps

This chapter outlines the operational process for implementing the integrated PPGIS survey. It defines key phases including spatial and thematic scoping, sampling strategy, survey execution, and data interpretation. The process is designed to ensure comparability across pre- and post-intervention timeframes and to maintain methodological rigor throughout.

a. Define the Spatial, Temporal and Thematic Scope

- **Obtain shapefiles or spatial boundaries:** Ideally, city partners should provide accurate GIS shapefiles delineating the area of intervention. Where relevant, buffer zones (e.g., 200–500 meters or a 15-minute walk) may be included by the research team to assess potential spillover effects. If a shapefile is not available, a high-resolution and clearly annotated image showing the intervention boundaries must be provided. This image should allow for accurate digitization and georeferencing within a GIS environment, ensuring that a polygon can be manually drawn with sufficient spatial accuracy.
- **Determine the temporal windows:** Data collection is to be conducted at two key moments—T0 (2–6 months before implementation) and T1 (6–12+ months after)—to align with the expected development of benefits.

b. Sampling Strategy and Recruitment

- **Stratified random sampling:** Sampling must reflect the socio-demographic structure of the city (e.g., age, gender, education, income). Where needed, post-stratification weighting should be applied to correct for underrepresentation.
- **Recruitment channels:** Depending on the local context, dissemination may be conducted via commercial panels (e.g., Netquest), local networks, or community-based outreach. The survey is administered through the Maptionnaire online platform.

c. Survey Implementation

- **Survey design:** Core questions remain consistent across T0 and T1 to enable longitudinal comparison. Additional items may be added to target specific aspects of the intervention.
- **Interactive mapping:** Participants draw points and polygons directly on a digital map to express their perceptions, experiences, and needs spatially.

- **Logic settings:** The platform enforces a logic structure—if a respondent answers "Yes" to a question about a benefit or need, mapping is required before proceeding.
- **Digital experience:** Visuals and descriptive content simulate the site visit for participants unfamiliar with the area.

d. Data Analysis

- **Spatial analysis:** Mapping data are analyzed using GIS techniques to identify clusters of perceived benefits, needs, or concerns, as well as spatial disparities or overlaps between socio-demographic groups.
- **Survey data analysis:** Responses to non-spatial questions are statistically analyzed to detect changes in life satisfaction, visit frequency, types of activities, and perceptions of acceptability and benefits. Comparative analysis across T0 and T1 phases allows for the assessment of perceptual shifts over time. Descriptive statistics, frequency distributions, and cross-tabulations by demographic characteristics are employed to evaluate trends and differences.
- **Integration of spatial and non-spatial data:** Combined analysis enables the identification of spatial patterns associated with specific population groups or behavioral dynamics, enhancing the interpretability of both qualitative and quantitative feedback.
- **Integration with other sources:** Optional triangulation may be conducted with community workshops, social media mining, or institutional reports.

e. Data Cleaning and Quality Control

- Data cleaning procedures include both manual and automated checks for completeness and accuracy. Responses are reviewed for missing geometries, duplicate entries, and incorrectly tagged attributes. Spatial validation ensures that mapped points and polygons fall within the defined intervention area and are logically consistent with the survey logic and expected behaviors.

Steps for Implementation

The table below outlines the key implementation modules, tasks, objectives, and the expected support from city partners. It is formatted to be easily copied and pasted into a Word document as a table:

Table 4 – Steps for implementation of the PPGIS Survey methodology

Module	Step	Objective	Support from City/Partners
Preparatory	Define research scope	Clarify geographic boundaries, timeline, target population	Yes (shapefiles, site info)
Survey & PPGIS Setup	Draft instruments	Standardize survey for CES, RV, sentiment, uses	No
	Configure platform	Adapt Maptionnaire for local needs and languages	Yes (translation/context input)
Data Collection (T0)	Distribute Baseline Survey	Collect ex-ante data, recruit across strata	Yes (outreach, communication)
Analysis (T0)	Analyze results	Detect patterns in perceptions and map hotspots	No
Data Collection (T1)	Distribute Follow-up Survey	Capture post-intervention satisfaction and spatial patterns	Yes (outreach, communication)
Reporting	Share results	Deliver conclusions and policy insights	Yes (dissemination support)

Data sources

To ensure the quality, reproducibility, and comparability of the survey and PPGIS outputs across different urban contexts, the following data sources are required:

- **Spatially disaggregated census data:** Enables demographic stratification and socio-spatial analysis.

- **GIS shapefiles of the intervention area:** Preferably provided by the city; if unavailable, a high-resolution and clearly bounded image must be used to create georeferenced layers.
- **Survey responses collected via Maptionnaire:** Includes both spatial and tabulated responses.
- **Visual materials for digital visit simulation:** Photos, annotated maps, and descriptive content that support respondents unfamiliar with the site.
- **Project documentation:** Descriptive and technical documentation of the nature-integrated urban features, including planning materials, design objectives, and implementation timelines.

Respondents continuity strategy

To enable meaningful comparison between the ex-ante and ex-post phases, the methodology adopts a continuity strategy focused on preserving demographic representativeness rather than tracking individual respondents over time.

- **Representational Parity:** Instead of following the same individuals longitudinally, the approach aims to maintain a similar socio-demographic distribution across both survey waves (e.g., in terms of age, gender, education, income). While this does not guarantee perfect comparability, it increases the likelihood that group-level changes in perceptions can be interpreted as reflective of shifts in experience or context, rather than sample composition. This approach relies on principles of statistical inference and assumes that maintaining similar group-level compositions across waves increases the validity of temporal comparisons, even in the absence of individual-level tracking.
- **Role of Anchoring Institutions:** Local partners—including municipalities, NGOs, and community-based organizations—play a key role in facilitating continuity. Their involvement supports consistent outreach, inclusive recruitment, and balanced representation across both rounds of data collection. These institutions are instrumental in reaching underrepresented groups and ensuring a coherent implementation across phases

Implementation risks and limitations

The implementation of this PPGIS-based survey methodology entails several important limitations and operational risks that may influence data quality, inclusivity, and the robustness of findings over time.



One key limitation is the potential for sampling bias, particularly when certain demographic groups—such as older adults, digitally excluded individuals, or marginalized communities—are underrepresented. Although the methodology incorporates stratified sampling and post-stratification weighting, the effectiveness of these measures ultimately depends on the outreach capacity of local partners and the responsiveness of target populations.

Additionally, the digital format of the survey, including the need to interact with interactive maps, may challenge users with limited digital literacy or inadequate internet access. This digital divide may lead to incomplete data or lower response rates among less tech-savvy groups. To mitigate this, the methodology recommends the use of clear instructions, simplified interfaces, and—where feasible—additional assistance through community organizations.

A further constraint lies in the temporal dynamics of the intervention itself. Certain benefits of nature-integrated urban features—such as increased biodiversity, improved microclimatic comfort, or enhanced social cohesion—require time to materialize and be perceived by users. If the post-intervention data collection (T1) occurs too soon, results may not reflect the full impact of the intervention. Moreover, seasonal and contextual variability—including weather patterns, local events, or broader socio-political conditions—may influence perceptions independently of the intervention, thus confounding temporal comparisons.

Finally, linguistic and cultural differences across diverse urban contexts present a risk to the validity of responses. Accurate translation and culturally sensitive adaptation of survey instruments are essential to avoid misinterpretation and ensure comparability across demographic segments and city contexts.

Methodology 3 – Social Media Data analysis

Description of methodology

A social media analysis will be conducted using geotagged, multi-platform data within the defined area of the planned C2G Nature-Based Solutions (NBS) intervention. The data will be segmented into two timeframes: posts made prior to the intervention (Ex-ante) and posts made following the intervention (Ex-post). Both datasets will be analysed using a mixed-methods approach that combines qualitative content analysis and quantitative metrics. The findings will be synthesized into a weighted satisfaction index, which will be compared across timeframes using statistical methods. The results will be cross-validated against data from participatory GIS (PPGIS) mapping and survey responses to ensure triangulation and reliability.

Steps for implementation

Table 5- Steps for the implementation of the SMD analysis methodology

Module	Step	Objective	Support from City/Partners
Preparatory	Define research scope and timeline	Clarify geographic boundaries, timeline, and local demographic targets for data collection	Yes (shapefiles, site info)
SMD Setup	Access to SM platform	Secure the access to data downloading of SM posts through API of platform	No
	Draft instruments	Create coding and scaling instruments on CES, RV, sentiments	No
Data collection (t0)	Data collection	Collect ex-ante relevant social media data across platforms within a specified time frame and geotagged to a specific location	No
	Data Cleaning	Filter irrelevant posts	No
Analysis (t0)	Analyse baseline data	Quantitative and qualitative analysis of key trends and spatial hotspots of perceived benefits and concerns	Yes data support with local language)
Data Collection (t1)	Data collection	Post-intervention data relevant social media data across platforms within a	No

		specified time frame and geotagged to a specific location	
	Data Cleaning	Filter irrelevant posts	No
Analys s & Integrat ion	Compare t0 & t1 Data	Perform quantitative and spatial analyses to assess changes in satisfaction and perceptions	Yes (data support with local language)
	Triangulate with PPGIS & Meetings	Enrich findings by cross-referencing results from the PPGIS (Section 6) & Community Meetings (Section 5)	No
Reporti ng	Share preliminary & final findings	Deliver updates and final conclusions for inclusive urban planning	Yes (eventually) (facilitate communication)

Data sources

Social media data acquired from platforms:

X, Facebook, Flickr

Official GIS Files:

- Shapefiles outlining NBS intervention boundaries
- Census track data

Supplemental documents:

- Detailed description of each intervention

Detailed description of the approach

This methodology leverages social media content to assess public satisfaction with NBS interventions, focusing on both perceived benefits and behavioural responses.

1. Perceived Benefits of the Intervention

Social media posts will be analysed to assess users' socio-cultural, environmental, and emotional perceptions of nature-based solutions (NBS), using automated keyword thematic analysis of textual content. The analysis will focus on the following indicators:

Cultural **Ecosystem** **Services** **(CES):**
Higher densities of relevant SM content can serve as a proxy for quantifying the flow of



experiences and recreation within urban green spaces (Tieskens et al., 2018; van Zanten et al., 2016; Yoshimura & Hiura, 2017). The proportion of cultural ecosystem services (CES)-related social media posts relative to the total number of posts will be used as an indicator of user satisfaction. In addition, the diversity of CES expressions will be evaluated across several predefined categories (Benati et al., 2024).

- *Physical Recreation* (e.g., keywords such as "run", "bike", "walk")
- *Experiential Recreation* (e.g., keywords such as "peace", "enjoy", "vacanze", "dream", "relax")
- *Aesthetic Value* (e.g., keywords such as "stunning", "beautiful", "magnific", "maravill", "landscape", "view")
- *Social Relations* (e.g., keywords such as "people", "wedding", "together", "birthday", "family", "mother", "friend", "love", "children")

A broader variety and higher proportion of CES-related post will be interpreted as an indicator of higher satisfaction with the NBS.

Relational Values (RV):

Relational values will reflect meaningful connections between people and nature, and among people through nature, encompassing identity, well-being, and a sense of care and responsibility (Chan et al., 2016). These values will be identified through coding of:

- *Explicit expressions*, such as direct mentions of care for nature (e.g., “I love this park, because I connect here with my friends” or “we should protect this park”), and
- *Implicit expressions*, such as captions showing engagement without directly naming values (e.g., “I walk in this park every morning”).

The number and balance of explicit vs. implicit RV expressions will be used as a proxy for user satisfaction of NBs interventions.

Sentiment Analysis:

Sentiment analysis will be applied to social media captions to assess the overall emotional tone of the posts. Sentiments will be automatically categorized into positive, neutral, or negative.

- *Example of positive sentiment*: “Absolutely love this park after the rain—so peaceful and refreshing!”
- *Example of neutral sentiment*: “Went for a walk in the neighborhood today.”
- *Example of negative sentiment*: “It’s allergy season again, the worst time of the year to be in the park!”



A higher proportion of positive sentiments will indicate greater satisfaction with the NBS intervention.

2. Behavioural Responses to the Intervention

This component will assess tangible user engagement and usage patterns of NBS areas, offering insights into how people interact with and value these spaces.

Visit Frequency: The number of geotagged social media posts within or near NBS areas will be used as a proxy for actual public use and relevance. A higher volume of posts suggests greater engagement and potentially higher satisfaction with the intervention (Calcagni et al., 2022; Hamstead et al., 2018).

Accessibility: The ease of reaching NBS sites will be evaluated through the presence of public transport routes and stops, walkable distances, and availability of bicycle lanes. These factors may influence visitation rates and equitable access.

Demographic Characteristics of Surrounding Neighbourhoods: Socioeconomic and demographic data (e.g., from census tracts) surrounding NBS areas will be used to explore patterns of use across different population groups. This can help identify whether interventions are equitably accessed and whether certain groups are under- or overrepresented in usage patterns.

Data continuity

One key advantage of the chosen social media platform(s) is the unrestricted temporal accessibility of historical data. This allows for the construction of a continuous dataset, which enables more nuanced tracking of post accumulation over time. Such continuity facilitates the analysis of temporal dynamics, helping to identify changes in user engagement, sentiment, and thematic categories both before and after the NBS intervention. This temporal resolution not only strengthens the reliability of Ex-ante/Ex-post comparisons but also allows for the detection of emerging trends and longer-term impacts of the intervention.

Implementation risks and limitations

- **Representativeness:** Social media users may not reflect all demographic groups (e.g., older adults, less tech-savvy populations).
- **Data Access Issues:** Limited access to certain platforms due to restrictions imposed by the company on providing data for research purposes
- **Positivity bias,** users tend to share positive aspects of their experiences while omitting negative or neutral ones. This could skew the results, making the intervention appear more favorable than it actually is)

- **Scale of Intervention** – The intervention may be too small in scale to observe a significant difference, especially if the density of data collection points (e.g., posts) is low. This could limit the ability to detect meaningful patterns or impacts.
- **Time for Data Accumulation** – Social media posts take time to accumulate, and there is a risk that by the end of the project, there may not be enough data to conduct a meaningful analysis. This could hinder the ability to draw reliable conclusions about the intervention's impact.
- **Categorization Limitations** – The coding categories used to analyze the data may not fully capture the complexity of social and environmental responses to the intervention, potentially oversimplifying the findings.

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ILOUSI, Kyriaki (1 de 2)
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Metrics and indicators

A comprehensive set of indicators has already been developed to ensure consistent pre-post comparison of satisfaction with NBS interventions. While each method contributes unique insights, the indicators were carefully designed to allow for comparability and integration across methods and contexts. Using a consistent indicator framework across different European cities or neighborhoods facilitates both spatial comparison among contexts and temporal tracking of satisfaction before and after interventions.

6 Common Indicators (used across multiple methods):

- **Frequency of positive or negative sentiments**
- **Perception of Cultural Ecosystem Services (CES)** (e.g., recreational, aesthetic, educational values)
- **Perception of Relational Values (RV)** (e.g., stewardship, connectedness to nature)
- **Quantitative satisfaction ratings** with the intervention area before and after implementation (e.g., 1–10 Likert scales, aggregated from surveys and community feedback)

7 Method-Specific Indicators:

Table 6- Correspondence between Criteria and Method-specific Indicators and

Criteria [unit of measurement]	SMD Analysis	PPGIS + Survey	Community Meeting
A. Cultural Ecosystem Services (CES) [number; variety]	Semantic analysis through intercoder agreement across themes: physical/experiential recreation, aesthetics, social bonding. Keywords: "run", "bike", "relax", "view", "together"	Spatial mapping of areas associated with: aesthetics, social interaction, physical activity, environmental learning, symbolic meaning, cultural heritage, and creativity, as selected via survey and	Likert scales (1–5) measuring perceived social interactions, physical activity, environmental learning, symbolic meaning, cultural heritage, and creative inspiration

		mapped with polygon tools	
B. Relational Values (RV) [qualitative/quantitative indices]	Coding of explicit/implicit expressions of place attachment and care	Spatial points indicating connection to nature, identity/belonging, care, and inspiration; reasons tagged through predefined categories and open comments	Likert scales (1–5) assessing connection to nature, sense of identity or belonging, and environmental inspiration
C. Sentiment [-1;1 index or emotion categories]	Automated sentiment polarity classification and emotion tagging (positive, neutral, negative)	Spatial points tagged with feelings of: safety, unsafety, calmness, anxiety/disturbance, and conflict. Emotions selected from a dropdown menu	Likert scales (1–5) assessing feelings of safety, unsafety, calmness, anxiety/disturbance, perceived conflicts, inclusivity, and representation
D. Visit Frequency [# of visits/posts]	Geotagged post volume as proxy for site usage over time (pre/post)	Self-reported frequency: Daily, several times/week, weekly, monthly, rarely/never. Option to map both past and intended frequency with polygons	Frequency categories (daily, weekly, monthly, rarely/never) and qualitative exploration in discussions
E. Variety of Uses [number of activities]	Textual categorization of	Checklist of activities (running,	Checklist and qualitative listing

	activity types based on post content	walking, cycling, relaxing, sports, socializing, gardening, commuting, playing) selected for each mapped location	of activities (running, walking, cycling, relaxing, sports, socializing, gardening, commuting, playing) discussed and prioritized by stakeholders
F. Socio-demographic User Profile [categorical variables]	Inferred from neighborhood census data	Self-reported data: age, gender, education, income bracket, country of origin, work status, residential zone, transport mode, outdoor leisure frequency	Stakeholder mapping and demographic profiling: age, gender, income, housing tenure, migration status, disability status, ethnicity/language , and site usage frequency
G. Acceptability of NBS [multi-dimensional construct]	Discourse indicators of support/critique; mentions of effectiveness, integration, and trade-offs. Change over time assessed by comparing pre/post posts	Direct yes/no responses on overall acceptability, barriers (e.g., cost, access), and spatial areas of concern. Optional justification of answers and mapping of barriers	Participatory prioritization exercises (pebble method) and facilitated group discussions on effectiveness, fairness, distribution, and unintended effects

This harmonized indicator set ensures that qualitative and quantitative dimensions of satisfaction are captured consistently across the three methods—**Community Meetings**, **PPGIS + Survey**, and **Social Media Data Analysis**—enabling robust ex-ante and ex-post evaluation in diverse urban contexts.

Expected Outcomes

1. **Comprehensive perception analysis**

An integrated view of how citizens' perceptions of NBS interventions evolve over time and across different scales.

2. **Methodological**

recommendations

Evidence-based guidance on selecting ex-ante and ex-post assessment tools suited to different spatial scales and contexts.

3. **Insights into socio-demographic differences**

An understanding of how perceptions may vary by demographic and cultural factors, informing more inclusive and equitable NBS planning and policy-making.

Ethical and Privacy Considerations

For the PPGIS survey and community meeting components, participants will be fully informed about the objectives of the study, their rights as participants, and the nature of the data being collected. They will be required to provide informed consent before participating. This consent will explicitly address:

- Voluntary participation
- The right to withdraw at any time
- Data anonymization procedures
- Use of aggregated findings for research and policy purposes

Survey and mapping responses will be stored securely, anonymized upon collection, and never linked to individual identities.

In the social media data analysis, only publicly available and geotagged content will be used. No personally identifiable information (PII) will be collected or analyzed. Posts will be analyzed in aggregate and anonymized before processing to ensure compliance with GDPR and platform-specific terms of service. Content used will be limited to textual data and associated metadata (e.g., timestamp, geolocation) and will exclude private profiles or content behind privacy settings.

All data collected will be stored on secure servers with restricted access. Data will be retained only for the duration necessary for analysis and reporting, after which it will be safely deleted or archived in line with institutional data policies. Each partner institution

ILLOU, Kyraki (1 de 2)
Tècnica superior arquitecte infraestructures 4
Data signatura :22/10/2025 13:02:13
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FERNANDEZ RODRIGUEZ, Jesús (2 de 2)
Cap de Servei Infraestructura verda
Data signatura :22/10/2025 14:40:36
HASH:D9F5B150C24EAC1B40DE4F19B7D356F648B0A461



involved in the Commit2Green project is responsible for ensuring ethical clearance through their respective review boards when applicable.



Bibliography

- Anderson, C. C., & Renaud, F. G. (2021). A review of public acceptance of nature-based solutions: The 'why', 'when', and 'how' of success for disaster risk reduction measures. *Ambio*, 50(8), 1552–1573. <https://doi.org/10.1007/S13280-021-01502-4>
- Ansell, C., & Gash, A. (2008). Collaborative Governance in Theory and Practice. *Journal of Public Administration Research and Theory*, 18(4), 543–571. <https://doi.org/10.1093/JOPART/MUM032>
- Benati, G., Calcagni, F., Matellozzo, F., Ghermandi, A., & Langemeyer, J. (2024). Unequal access to cultural ecosystem services of green spaces within the city of Rome – A spatial social media-based analysis. *Ecosystem Services*, 66, 101594. <https://doi.org/10.1016/j.ecoser.2023.101594>
- Brown, G., & Kyttä, M. (2014). Key issues and research priorities for public participation GIS (PPGIS): A synthesis based on empirical research. *Applied Geography*, 46, 122–136.
- Brown, G., & Raymond, C. M. (2014). Methods for identifying land use conflict potential using participatory mapping. *Landscape and Urban Planning*, 122, 196–208.
- Bush, J., & Doyon, A. (2019). Building urban resilience with nature-based solutions: How can urban planning contribute? *Cities*, 95, 102483. <https://doi.org/10.1016/J.CITIES.2019.102483>
- Calcagni, F., Nogué Batallé, J., Baró, F., & Langemeyer, J. (2022). A tag is worth a thousand pictures: A framework for an empirically grounded typology of relational values through social media. *Ecosystem Services*, 58, 101495. <https://doi.org/10.1016/j.ecoser.2022.101495>
- Chaffin, B. C., Garmestani, A. S., Gunderson, L. H., Benson, M. H., Angeler, D. G., Tony, C. A., Cosens, B., Craig, R. K., Ruhl, J. B., & Allen, C. R. (2016). Transformative Environmental Governance. *Annual Review of Environment and Resources*, 41(Volume 41, 2016), 399–423. <https://doi.org/10.1146/ANNUREV-ENVIRON-110615-085817/CITE/REFWORKS>
- Chan, K. M. A. (2016). Opinion: Why protect nature? Rethinking values and the environment. *Proceedings of the National Academy of Sciences*, 113(6), 1462–1465.
- Cochran, W. G. (1977). *Sampling Techniques* (3rd ed.). John Wiley & Sons.
- Few, R., Brown, K., & Tompkins, E. L. (2007). Public participation and climate change adaptation: Avoiding the illusion of inclusion. *Climate Policy*, 7(1), 46–59.
- Frantzeskaki, N., & Kabisch, N. (2016). Designing a knowledge co-production approach for

urban environmental governance: The example of Rotterdam, The Netherlands. *Environmental Science & Policy*, 62, 90-98.

Frantzeskaki, N. (2019). Seven lessons for planning nature-based solutions in cities. *Environmental Science & Policy*, 93, 101–111.

Fung, A. (2006). Varieties of Participation in Complex Governance. *Public Administration Review*, 66(SUPPL. 1), 66–75. <https://doi.org/10.1111/J.1540-6210.2006.00667.X>

Hamstead, Z. A., Fisher, D., Ilieva, R. T., Wood, S. A., McPhearson, T., & Kremer, P. (2018). Geolocated social media as a rapid indicator of park visitation and equitable park access. *Computers, Environment and Urban Systems*, 72, 38-50.

Haines-Young, R., & Potschin, M. (2018). Common International Classification of Ecosystem Services (CICES) V5.1 Guidance on the Application of the Revised Structure. www.cices.eu

Han, S., & Kuhlicke, C. (2021). Barriers and Drivers for Mainstreaming Nature-Based Solutions for Flood Risks: The Case of South Korea. *International Journal of Disaster Risk Science*, 12(5), 661–672. <https://doi.org/10.1007/S13753-021-00372-4>

Hölscher, K., Wittmayer, J. M., & Loorbach, D. (2018). Transition versus transformation: What's the difference? *Environmental Innovation and Societal Transitions*, 27, 1–3. <https://doi.org/10.1016/J.EIST.2017.10.007>

IUCN. (2020). IUCN Global Standard for Nature-based Solutions (First). IUCN, Gland, Switzerland. <https://doi.org/10.2305/IUCN.CH.2020.09.en>

Kabisch, N., & Haase, D. (2014). Green justice or just green? Provision of urban green spaces in Berlin, Germany. *Landscape and Urban Planning*, 122, 129-139.

Kabisch, N., Frantzeskaki, N., Pauleit, S., Naumann, S., Davis, M., Artmann, M., & Zaunberger, K. (2016). Nature-based solutions to climate change mitigation and adaptation in urban areas: Perspectives on indicators, knowledge gaps, barriers, and opportunities for action. *Ecology and Society*, 21(2), 39.

Kahila-Tani, M., Broberg, A., Kyttä, M., & Tyger, T. (2019). Let the citizens map—Public participation GIS as a planning support system in the Helsinki master plan process. *Planning Practice & Research*, 34(5), 1–20.

Kauark-Fontes, B., Marchetti, L., & Salbitano, F. (2023). Integration of nature-based solutions (NBS) in local policy and planning toward transformative change. Evidence from Barcelona, Lisbon, and Turin. *Ecology and Society*, Published Online: 2023-06-01 | Doi:10.5751/ES-14182-280225, 28(2). <https://doi.org/10.5751/ES-14182-280225>



Kenter, J. O., Reed, M. S., Irvine, K. N., O'Brien, L., Molloy, C., & Collins, T. (2016). The deliberative value formation model. *Ecosystem Services*, 21, 194–207.

Langemeyer, J., & Connolly, J. J. T. (2020). Weaving notions of justice into urban ecosystem services research and practice. *Environmental Science & Policy*, 109, 1–14. <https://doi.org/10.1016/J.ENVSCI.2020.03.021>

Langemeyer, J., Maestre Andrés, S., Melo Vásquez, I., & Salmon, N. (2024). Planning, Designing, and Monitoring of Nature-based Solutions: Guidelines to Urban Transformations. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Interlace. ISBN (print): 978-628-7721-30-2; ISBN (digital): 978-628-7721-34-0

Liu, R., & Xiao, J. (2020). Factors Affecting Users' Satisfaction with Urban Parks through Online Comments Data: Evidence from Shenzhen, China. *International Journal of Environmental Research and Public Health* 2021, Vol. 18, Page 253, 18(1), 253. <https://doi.org/10.3390/IJERPH18010253>

López-Maciel, M., Roebeling, P., Llewellyn, R., Figueiredo, E., Matos, F. A., Mendonça, R., Bastos, M. I., Mendes, R., Postmes, L., & Dinter, M. Van. (2023). Adoption and Diffusion of Nature-Based Solutions by Property Owners in Urban Areas: The Case of Green Roofs in Eindhoven, The Netherlands. *Resources* 2023, Vol. 12, Page 133, 12(11), 133. <https://doi.org/10.3390/RESOURCES12110133>

Maestre-Andrés, S., Drews, S., Savin, I., & van den Bergh, J. (2021). Carbon tax acceptability with information provision and mixed revenue uses. *Nature Communications* 2021 12:1, 12(1), 1–10. <https://doi.org/10.1038/s41467-021-27380-8>

Pretty, J., & Ward, H. (2001). Social Capital and the Environment. *World Development*, 29(2), 209–227. [https://doi.org/10.1016/S0305-750X\(00\)00098-X](https://doi.org/10.1016/S0305-750X(00)00098-X)

Rall, E. L., Kabisch, N., & Haase, D. (2017). The added value of public participation GIS (PPGIS) for urban green infrastructure planning. *Urban Forestry & Urban Greening*, 22, 120–131.

Raymond, C. M., Frantzeskaki, N., Kabisch, N., Berry, P., Breil, M., Nita, M., Geneletti, D., & Calfapietra, C. (2017). A framework for assessing and implementing the co-benefits of nature-based solutions in urban areas. *Environmental Science & Policy*, 77, 15–24.

Raymond, C. M., Kenter, J. O., Plieninger, T., Turner, N. J., & Alexander, K. A. (2014). Comparing instrumental and deliberative paradigms underpinning the assessment of social values for cultural ecosystem services. *Ecological Economics*, 107, 145–156.

Reed, M. S. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141(10), 2417–2431. <https://doi.org/10.1016/J.BIOCON.2008.07.014>

Soga, M., & Gaston, K. J. (2020). The ecology of human–nature interactions. *People and Nature*, 2(2), 247–261.

Song, X. P., Richards, D. R., He, P., & Tan, P. Y. (2020). Does geo-located social media reflect the visit frequency of urban parks? A city-wide analysis using the count and content of photographs. *Landscape and Urban Planning*, 203, 103908. <https://doi.org/10.1016/J.LANDURBPLAN.2020.103908>

Tian, T., Yu, T., Qian, Y., Deng, L., & Che, Y. (2024). Assessing public perceptions of the cultural ecosystem services waterfront spaces provide along the Huangpu River in Shanghai, China, in support of urban waterfront planning and design. *Socio-Ecological Practice Research*, 6(2), 141–154. <https://doi.org/10.1007/S42532-024-00181-1>

Yang, L., Marmolejo Duarte, C., & Martí Ciriquián, P. (2022). Quantifying the relationship between public sentiment and urban environment in Barcelona. *Cities*, 130, 103977. <https://doi.org/10.1016/J.CITIES.2022.103977>

Appendix A – Community Meeting's questionnaire

- Section 1: Satisfaction with the Intervention Area (overall, frequency of visits and variety of uses)

- A. Are you satisfied with the condition of the intervention area today?
☐ Yes ☐ No ☐ Don't know
- B. How often do you visit this place?
☐ Daily ☐ A few times a week ☐ Weekly ☐ Monthly ☐ Rarely/Never ☐ Don't know
- C. What activities do you engage in here? (select all that apply)
☐ Running ☐ Walking ☐ Cycling ☐ Relaxing ☐ Other sports ☐ Socializing
☐ Gardening ☐ Commuting ☐ Playing (with children/pets) ☐ Other

If other please specify which one:

- Section 2: Personal needs

- D. How important is it to add more natural green elements at this location? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- E. How important is it to improve heat protection in the area? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- F. How important is it to manage rainwater and reduce flooding in this location? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- G. How important is it to reduce noise or create a quieter environment here? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- H. How important is it to provide shelter from strong winds in this location? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- I. How important is it to improve air quality in this location? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

- Section 3: Perceived Benefits of Nature-Based Intervention

- 4.1: Socio-Cultural Benefits



- J. To what extent does this area promote social interactions and community engagement for you? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- K. How important is this place for your physical activity (e.g., walking, exercising)? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- L. To what extent do you think this place helps you or others learn about nature or the environment? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- M. How much personal or symbolic meaning does this place hold for you (e.g., memories, rituals, personal milestones)? (1 = None, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- N. To what extent does this place reflect local identity, history, or cultural heritage? (1 = Not at all, 5 = To a great extent)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- O. How much has this place inspired you creatively (e.g., photography, writing, art)? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

○ 4.2: Socio-Cultural Benefits

- P. To what extent do you think this place helps reduce urban heat during hot days? (1 = Not at all, 5 = To a great extent)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- Q. How much do you think this place helps manage rainwater or flood risk? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- R. To what extent do you believe this place helps improve air quality in the implementation area? (1 = Not at all, 5 = To a great extent)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- S. How much do you feel this place buffers you from urban noise? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- T. To what extent do you believe this place helps capture and store carbon (CO₂)? (1 = Not at all, 5 = To a great extent)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
- U. How much does this area provide shelter from strong winds? (1 = Not at all, 5 = Very much)
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

○ 4.3 Relational Values



V. How strongly do you feel a connection with nature in this area? (1 = Not at all, 5 = Very strongly)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

W. To what extent does this place contribute to your sense of identity or belonging? (1 = Not at all, 5 = To a great extent)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

X. How much does this place inspire you to care for the environment? (1 = Not at all, 5 = A lot)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

○ 4.4 Sentiment

Y. How safe do you feel in this place? (1 = Not at all safe, 5 = Very safe)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Z. How unsafe do you feel in this place? (1 = Not at all unsafe, 5 = Very unsafe)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

AA. How calm or tranquil do you feel in this place? (1 = Not at all calm, 5 = Very calm)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

BB. How anxious or disturbed do you feel in this place? (1 = Not at all, 5 = Very much)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

CC. To what extent do you perceive any conflict or tension in this area (between users, uses, or interests)? (1 = None, 5 = A lot)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

DD. If you were not born in this country, how welcoming and inclusive do you find this area for people of your background? (1 = Not at all welcoming, 5 = Very welcoming)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

EE. How much do you feel that everyone is equally welcomed and represented in this area, regardless of background, ethnicity, or nationality? (1 = Not at all, 5 = Very much)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5



Appendix B – PPGIS Survey

Local details, such as intervention description and demographic categories, are provided as illustrative examples and are drawn from the pilot case study conducted in The Hague.

1st slide – Introduction: Encouraging meaningful participation

Thank you for taking the time to participate in this survey.

Your contribution is important to help us understand how nature-based interventions in your city affect people's quality of life and perception of public spaces.

Your feedback will directly support urban administrations and researchers in designing more inclusive, effective, and citizen-centred urban planning policies.

2nd slide- Brief explanation of the survey

This survey is part of a two-phase study. We are collecting responses before and after the implementation of the Waterfrontpark project to evaluate how people's experiences and perceptions change over time. This survey will take approximately 15 minutes

In this phase, we are interested in your current impressions and expectations of the area, before the intervention takes place.

To better illustrate the intervention area within the city, the map on the right shows The Hague District, with the exact location of the Waterfrontpark intervention highlighted in orange.

If you have visited the area physically, please answer based on your personal experience of the space as it is now.

If you haven't been to the area in person, your perspective still matters! We have prepared a brief "digital visit" using images and descriptions to help you visualize the site. In that case, please respond based on how you think you would feel or behave in the area — for example:

- Would you feel safe there?
- Could you imagine relaxing or socializing in that space?
- Which areas might you find appealing, and why?



There are no right or wrong answers: we are interested in your honest impressions.

3rd slide- The Waterfrontpark project

The Waterfrontpark project is part of the transformation of Binckhorst, a former industrial area in The Hague now undergoing rapid urban redevelopment. As new housing increases the population, there is a need for more green spaces to improve quality of life.

The Waterfrontpark aims to become a nature-inclusive public space along the Trekvliet canal. This transformation will address challenges like heat stress and biodiversity loss while promoting social interaction and climate adaptation. Your input will help shape how the community perceives and accepts this space.

4th slide- Description of the area

Our intention in this section is to provide participants who are not familiar with the area an overview of the intervention site. To support this, a selection of images has been placed on the map, giving a sense of what the location currently looks like. These visuals help contextualize the space and allow all participants to better understand the site's present condition, regardless of whether they have visited it in person.

These points on the map correspond to the locations where the following pictures were taken, providing a visual overview of the current situation of the intervention area.



Photo

1. Meteorstraat: 52.07011945218547, 4.334254910864364



Photo

2. Toegangshek Kasteel Binckhorst: Coordinates 52.06732047502946,
4.338273310840689





Photo

3- Oever van de Trekvljet in Molenwijk: Coordinates 52.06549977456021,
4.335655440297845



Photo 4. Voetpad langs bouwweg Callsotweg: Coordinates 52.06602367281163,
4.3375636270689215





Photo

5. Afvalkathedraal vanaf de Poolsterstraat: Coordinates 52.071027227457144,
4.330215724156943



5th slide – Informed consent

Please read this consent form carefully before deciding whether to take part in this study.

The purpose of this research is to assess citizens experience and satisfaction in the Waterfrontpark area, both before (ex-ante) and after (ex-post) the planned intervention, in order to evaluate its social and environmental impacts over time.

First of all, we will ask you for some information related to your overall life satisfaction and your experience with the intervention area. We will also ask you to draw polygons on a map to indicate where your needs are being addressed in the area. Then, you will answer questions about your perception of the benefits provided by the area and mark where these benefits are located. Finally, we will ask you some basic demographic information (e.g., gender, age, income, etc.).

The survey takes around 15 minutes. Your participation involves no risks of any kind. If you decide to take part, **your identity will remain confidential** and only members of the research team will have access to the project data. When the project is over and all data have been analysed, the whole database will be anonymised and made available to other interested researchers.

Participation in this study is completely voluntary. There is no penalty for opting not to take part. You can withdraw from the study at any time without giving explanations and with no negative consequences: just by letting us know through any communication channel. You can exercise your rights under the European General Data Protection Regulation by making a request to our team at the contact details below, enclosing a photocopy of your ID document.

Request forms for this purpose are available here: <https://www.uab.cat/web/coneix-la-uab/itineraris/proteccio-de-dades/drets-de-les-persones-interessades-1345764799916.html>. You may also file a claim before the Catalan Data Protection Authority (<https://apdcat.gencat.cat/ca/contacte>), or contact the **UAB data protection officer** (proteccio.dades@uab.cat).

If you have any queries, you can contact the following: Giulia Benati, senior researcher of the research project: Giulia.Benati@uab.cat Johannes Langemeyer, PI of the research project: johannes.langemeyer@uab.cat

6th slide: Section 1 – Life Satisfaction

- **Overall, how satisfied are you with your life currently? (0 = completely dissatisfied, 10 = completely satisfied)**

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

7th slide: Section 2– Satisfaction with the Intervention Area

Please answer the following questions (YES or NO)

Are you satisfied with the condition of the area today?

☐ Yes ☐ No

- **How often do you visit this place?**

☐ Daily ☐ A few times a week ☐ Weekly ☐ Monthly ☐ Rarely/Never

If you answered 'Rarely/Never', you can skip mapping activities

- **What activities do you engage in here? (select all that apply)**

☐ Running ☐ Walking ☐ Cycling ☐ Relaxing ☐ Other sports ☐ Socializing

☐ Gardening ☐ Commuting ☐ Playing (with children/pets)

- **Map each activity location**

8th slide: Section 3 – Needs

In the following two slides, first map then rate importance, we want to understand where in the intervention area you believe specific improvements are most needed, and how important you think each one is. This section is structured around six criteria (A, B, C, D, E, F) commonly related to environmental and well-being needs.

For each criterion below:

3.1 – Draw a polygon showing where this need is most relevant within the intervention area.

3.2 – Then rate how important it is to address this need in the location you mapped. (1 = *Not important at all*, 5 = *Very important*)

9th slide: 3.1 Mapping Needs

A. Need for more nature spaces.



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UAB
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Draw a polygon where this area most needs more trees or natural vegetation.

B. Need for better protection from heat during hot days.

Draw a polygon where better protection from heat is needed the most.

C. Need for improved rainwater management or flood protection.

Draw a polygon where drainage or flood protection is most needed.

D. Need for better buffering from urban noise.

Draw a polygon where a quieter area is needed.

E. Need for a shelter from strong winds.

Draw a polygon where wind protection is needed.

F. Need for better air quality.

Draw a polygon where the area has an air quality improvement.

10th slide: 3.2 Rating Importance

A. How important is it to add more natural green elements in this location?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

B. How important is it to improve heat protection in the area?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

C. How important is it to manage rainwater and reduce flooding in this location?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

D. How important is it to reduce noise or create a quieter environment here?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

E. How important is it to provide shelter from strong winds in this location?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

F. How important is it to improve air quality in this location?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

11th slide: Section 4 – Perceived Benefits of Nature-Based Intervention

Your perception of benefits is important for us, and where you perceive them. When you draw polygons or mark points, be aware that you can draw only within the green area, which represents the intervention area.



Remember: if you have been there, respond accordingly, if not, respond based on what you would imagine you would feel, based your digital experience of the place.

12th slide: 4.1 Socio-Cultural Benefits

- **Do you find any parts of this area aesthetically pleasing?**
☐ Yes ☐ No
 Draw polygon(s) showing where this applies
- **Does this area promote social interactions and community engagement for you?**
☐ Yes ☐ No
 Draw polygon(s) showing where this applies
- **Is this place important for your physical activity (e.g., walking, exercising)?**
☐ Yes ☐ No
 Draw polygon(s) showing where this applies
- **Do you think this place helps you or others learn about nature or the environment?**
☐ Yes ☐ No
 Draw polygon(s) on the map where you experience this benefit
- **Does this place hold personal or symbolic meaning to you (e.g., memories, rituals, personal milestones)?**
☐ Yes ☐ No
 Draw polygon(s) of the area(s) that carry this meaning for you
- **Does this place reflect local identity, history, or cultural heritage?**
☐ Yes ☐ No
 Draw polygon(s) of the area(s) where this is most evident
- **Has this place ever inspired you creatively (e.g., photography, writing, art)?**
☐ Yes ☐ No
 Draw polygon(s) of the areas where you feel this inspiration

13th slide: 4.2 Environmental Benefits

- **Do you think this place helps reduce urban heat during hot days?**
☐ Yes ☐ No
 Draw polygon(s) showing where this applies
- **Do you think this place helps manage rainwater or flood risk?**
☐ Yes ☐ No
 Draw polygon(s) showing where this applies

- **Do you think this place helps improve air quality?**
☐ Yes ☐ No
 Draw polygon(s) of the area(s) where you believe this occurs
- **Do you feel this place buffers you from urban noise?**
☐ Yes ☐ No
 Draw polygon(s) of the quieter area(s) on the map
- **Do you believe this place helps capture and store carbon (CO₂)?**
☐ Yes ☐ No
 Draw polygon(s) where this benefit may be occurring
- **Does this area provide shelter from strong winds?**
☐ Yes ☐ No
 Draw polygon(s) showing where this applies

14th slide: 4.3 Relational Values

- **Do you feel a strong connection with nature in this area?**
☐ Yes ☐ No
 Mark point(s) on the map where this feeling is strongest
- **Does this place contribute to your sense of identity or belonging?**
☐ Yes ☐ No
 Mark point(s) on the map where this applies
- **Does this place inspire you to care for the environment?**
☐ Yes ☐ No
 Mark point(s) on the map where this happens

15th slide: 4.4 Sentiment

- **Do you feel safe in this place?**
☐ Yes ☐ No
 Mark point(s) on the map where you feel safe
- **Do you feel unsafe in this place?**
☐ Yes ☐ No
 Mark point(s) on the map where you feel unsafe
- **Do you feel calm or tranquil in this place?**
☐ Yes ☐ No
 Mark point(s) on the map where you feel calm

- **Do you feel anxious or disturbed in this place?**

☐ Yes ☐ No

Mark point(s) on the map where this happens

- **Do you perceive any conflict or tension in this area (between users, uses, or interests)?**

☐ Yes ☐ No

Mark specific point(s) on the map where this happens

16th slide: 4.5.1 Acceptability

What is the Waterfrontpark?

The Hague Waterfrontpark will be a new green space in the Binckhorst area. The new intervention is expected to serve around 35000 new homes planned as part of ongoing housing densification. It aims to fill this gap by creating an urban nature hub along the Trekvllet canal, with water as the central design feature.

The Waterfront Park will help close this green gap by providing:

- A park structured around the Trekvllet canal, developed on both sides of the water, forming a continuous green corridor
- Native planting, floating greenery, and naturalised banks that support local biodiversity
- New routes and connections: shaded, accessible paths for pedestrians and cyclists that combine urban dynamism with rural tranquillity and beauty

17th slide: 4.5.2 Acceptability

What will the park offer?

The planned intervention will provide spaces for the public to enjoy nature and community integration without forgetting the important climate and sustainability aspects. The spaces and activities are listed below:

Multi-use spaces for:

- Cultural events
- Sports & recreation
- Relaxation and nature experience



- Natural play areas

Integration with Urban Life:

- Includes pavilions and active ground-floor uses
- Built with durable, vandalism-resistant materials
- Designed for social safety and visibility

Climate adaptation features

- Built for rainwater retention
- Helps reduce heat stress in a dense urban area
- Uses resilient vegetation and green infrastructure

The intervention goal is to implement a district park with city-wide impact in the Binckhorst area, with a green artery linking homes, heritage, and ecosystems.

18th slide: 4.5.3 Acceptability

The Waterfrontpark will change how this part of the city looks, feels, and is used. In this sense, we would like to hear your thoughts on these planned changes and how they may affect your experience of the area.

- **Do you accept the planned changes in this area (or, if ex-post, the changes already implemented)?**
☐ Yes ☐ No
- **Do you believe the intervention is appropriate for this specific area and its needs?**
☐ Yes ☐ No
- **Do you think the intervention helps increase the use of green infrastructure and citizen participation in engagement activities intended for this area?**
☐ Yes ☐ No
 Mark location(s) where you believe this effect occurs
- **Are you concerned about any unintended effects of the new features in the area?**
☐ No
☐ Yes, noise
☐ Yes, overuse
☐ Yes, lack of maintenance
 If yes, mark where you foresee these issues



- **Are there one or more of these factors that make it difficult for you to use this space?**
 - ☐ Cost
 - ☐ Distance
 - ☐ Accessibility
 - ☐ Safety

19th slide: Section 5 – Demographic Information

We're almost done!

We'd now like to ask a few questions about you. Please note that all responses are anonymous and will be treated in full compliance with European data protection regulations (GDPR – EU General Data Protection Regulation 2016/679). Your data will be used only for research purposes and will not be linked to any personal identifiers.

- **How old are you?**

- ☐ 20–24 ☐ 25–29 ☐ 30–34 ☐ 35–39 ☐ 40–44 ☐ 45–49 ☐ 50–54 ☐ 55–59 ☐ 60–64
☐ 65 or above

- **What is your gender?**

- ☐ Male ☐ Female ☐ Non-binary, gender-fluid, agender, other

- **What is your country of origin?**

- **What is your highest level of education?**

- ☐ None ☐ Primary ☐ Secondary ☐ High School ☐ Vocational Training ☐ University Degree ☐ Master's ☐ PhD

- **What is your current employment status?**

- ☐ Full-time ☐ Part-time ☐ Student ☐ Unemployed ☐ Retired

- **What is your net annual household income?**

- ☐ €0–18.120 ☐ €18.120–25.000 ☐ €25.000–35.000 ☐ €35.000–40.000 ☐ €40.000–120.000 ☐ More than €120.000

- **Most used modes of transport (select all that apply):**

- ☐ Walking ☐ Bicycle ☐ Scooter ☐ Car/Motorbike ☐ Public transport

- **Frequency of outdoor leisure activities in the intervention area:**



☐ Daily ☐ 4–5 days/week ☐ 2–3 days/week ☐ Once a week ☐ Every 2 weeks ☐
Once a month ☐ Every 6 months ☐ Never

- **Where is your residence located?**
- Pin your place of residence: Please drop a pin on the map to show the location of your residence as precise as possible

20th Final slide: Thank you for your valuable feedback!

- **Thank you for participating in this survey! Please include any additional comments you may have below:**