



Nature's integration in cities'
hydrologies, ecologies and societies

MS4.1 Pilot integrated assessment framework

31/06/2023

Lead partner: **ICTA-UAB**

Author/s: **Johannes Langemeyer**

Table of Contents

Table of Contents	2
1 Preface	3
2 Summary	3
3 List of abbreviations	Error! Bookmark not defined.
4 Development.....	3
5 Pilot assessment framework	4

1 Preface

In the evolving landscape of urban vulnerabilities and their associated risks, the NICHES project emerges as a beacon of innovation. Within the realm of the NICHES project (<https://niches-project.eu/>), this milestone corresponds to the Task 4.1 Integrated assessment framework (M12-30). Task 4.1, steered by UAB with notable contributions from USFD and NIOO, aims at constructing a robust and adaptable Integrated Assessment Framework. Task 4.1 will - building on T1.2 and in collaboration with T2.1 - develop a multi-criteria decision analysis framework (D4.1) to evaluate different NBS scenarios under the consideration of conflicting social preferences and needs, integrating results from T2.2-2.4 and WP3. This milestone marks the initial stage of this endeavor in form of a Pilot Integrated Assessment Framework. This pilot, which stands as the precursor to a comprehensive final product, seeks to set the foundational stones upon which subsequent phases of the project will build, and provides a suggestion of the integration of knowledge streams across the projects. While universal in its character, the assessment framework will be tailored and tested within the co-design arenas (T5.1) to gather insights for developing transition pathways (T4.3).

2 Summary

The pilot framework for Task 4.1, guided by the conceptual underpinnings of WP1, seeks to holistically understand urban vulnerabilities from a social-ecological-technological perspective. Through the integration of spatially explicit NBS scenarios and ecosystem service modeling, the framework will assess the potential of nature-based solutions in mitigating flood and overflow vulnerabilities, considering the broader implications of climate change. The final aim of the framework is to translate this understanding into actionable transition pathways, ensuring the alignment of these pathways with local needs and global sustainability criteria.

3 Development

The capstone event was the annual project meeting where the pilot assessment framework, pioneered by ICTA-UAB, was unveiled to all partners. In this collaborative spirit, the team employed a Miro-board, an innovative approach ensuring that the framework's utility is not just theoretical. Its practicality was cemented by adapting the framework to meet the distinct challenges and capacities posed by case studies in the project cities: Barcelona, Berlin, Boston, Rotterdam, and Sheffield. The pilot assessment not only signifies the birth of a versatile tool in the form of the Integrated Assessment Framework but also stands testament to the collaborative and interdisciplinary spirit, ingenuity, and foresight of the NICHES project team. Moving forward, this framework promises to play a pivotal role in shaping sustainable urban transition pathways.

4 Pilot assessment framework

Our team, basing their foundation on insights from T1.2 and synergizing with T2.1, has crafted a multi-criteria decision analysis framework (D4.1). This framework is designed to judiciously evaluate varied Nature-Based Solution (NBS) scenarios, weighing them against the complex matrix of social preferences and needs. Not only does this ensure a comprehensive integration of findings from T2.2-2.4 and WP3, but it also encapsulates critical considerations like:

- The spatial manifestations of social vulnerabilities.
- The unequal sharing of environmental risks across regions.
- The optimal provisioning of Ecosystem Services (ES) and multifunctional benefits, be it at the actual site of impact or the area where NBS measures are implemented.

Despite its universal application potential, the assessment framework's beauty lies in its adaptability. Recognizing the unique socio-environmental characteristics of diverse locations, the framework can be tailored to cater to specific requirements. It is currently tested and fine-tuned for co-design arenas as per T5.1, shedding light on the roadmap for developing sustainable transition pathways (T4.3).

The pilot framework, embedded in the rich insights of WP1, harnesses a social-ecological-technological systems perspective to navigate the intricacies of urban vulnerabilities to flooding and stormwater overflow. Recognizing the escalating pressures of global climate change, the framework underscores the imperative to decipher vulnerabilities in a spatially explicit manner. At its core, it champions the potential of nature-based solutions (NBS) as instruments to mitigate these vulnerabilities. This is achieved through a structured evaluation of spatially explicit NBS scenarios, which may also be understood as land-use change scenarios. These scenarios become the cornerstone for modeling ecosystem services, particularly emphasizing the mitigation potential of stormwater runoff, consequently reducing flood and sewer overflow vulnerabilities. Ecosystem services are proposed to be modelled both at the NBS-site, but also at the receiving water bodies, where decreased overflow will enhance the ecosystem's quality. In addition, the evaluation of ecosystem services values or preferences will provide insights regarding the specific NBS most suitable in a local context beyond its modelled effectiveness; the preference assessment will provide spatially explicit information of local priorities for ecosystem service provisions. A co-creation process as part of the integrated assessment, will support the incorporation of the integrated knowledge provided through all the previous steps described and facilitates the co-creation of transition pathways for the mitigation of water-related vulnerabilities through NBS.

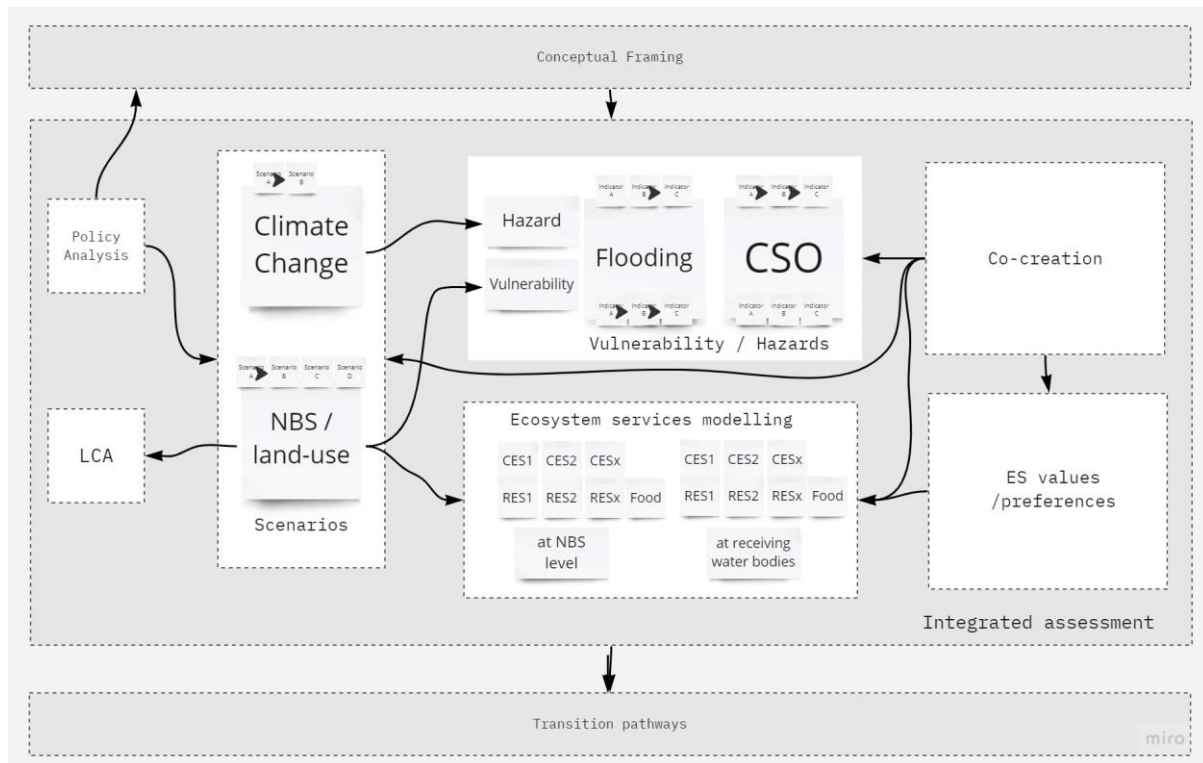


Figure 1: Pilot assessment framework.

In terms of operationalizing the conceptual understanding, the pilot framework proposes the application of detailed modeling techniques (Fig. 1). For mapping social-ecological-technological vulnerabilities, it is assumed essential to concurrently consider the sensitivity and adaptive capacity of urban communities in relation to projected increases in precipitation, pluvial flooding, and combined sewer overflows, alongside hazard and exposure factors. Ecosystem services emerge as focal points, not just at the NBS implementation sites but also at receiving water bodies. By doing so, the framework acknowledges the ripple effect of decreased overflow, resulting in enhanced ecosystem quality. Transitioning this knowledge into pragmatic policy implications involves the creation of NBS scenarios rooted in social-ecological-technological feasibility criteria. Existing policies and planning paradigms are scrutinized through meticulous policy analysis and interviews. Furthermore, ecosystem services preferences and values are evaluated to discern the most locally suitable NBS, transcending mere modeled effectiveness. An innovative participatory mapping approach aids in this evaluation, capturing spatially explicit local priorities for ecosystem service provisions. This layered knowledge assimilation finds its culmination in a co-creation process. Here, stakeholders collaboratively forge transition pathways, ultimately addressing water-related vulnerabilities through nature-based solutions.

MS4.1 Pilot assessment framework

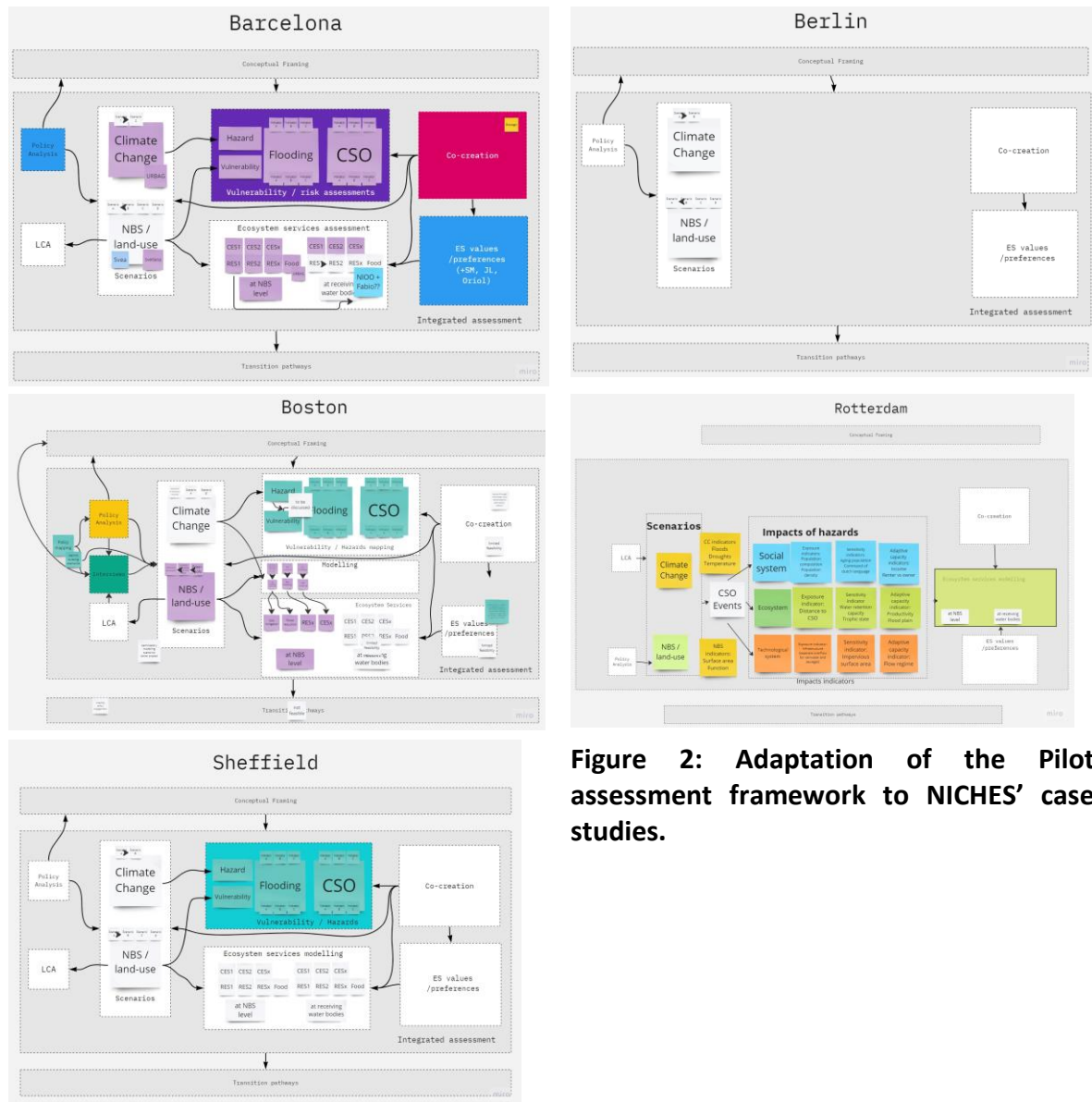


Figure 2: Adaptation of the Pilot assessment framework to NICHES' case studies.

The initial pilot framework has been adapted to the specific needs and capabilities in the case study cities (Fig. 2). With the pilot Integrated Assessment Framework being applied in different case studies, the NICHES project is poised to redefine our understanding and mitigation strategies for urban vulnerabilities more general, melding scientific rigor with localized insights and global imperatives.



<http://niches-project.eu/>

Project partners



NICHES is made possible with the support of:

