Catchment scale NbS framework and implementation guidelines

1 Description:

The NbS Framework is a practical decision-support tool designed to help stakeholders identify, evaluate, and prioritize the most appropriate Nature-Based Solutions (NbS) for their environmental, social, and land management contexts. It offers a structured, evidence-based method to guide users through the selection of NbS interventions, incorporating local ecological conditions, stakeholder preferences, climate adaptation goals, and regulatory requirements.

Designed for planners, public authorities, land managers, and environmental professionals, the NbS Framework enables informed and transparent decision-making. The tool helps align landscape restoration and climate adaptation efforts with EU and national policies, such as the Green Deal, Biodiversity Strategy, and CAP. It also promotes co-benefit analysis, including water regulation, carbon sequestration, and biodiversity enhancement. The framework can be implemented as a standalone methodology, integrated into digital platforms, or used during participatory planning and policy design processes.

2 Photo:

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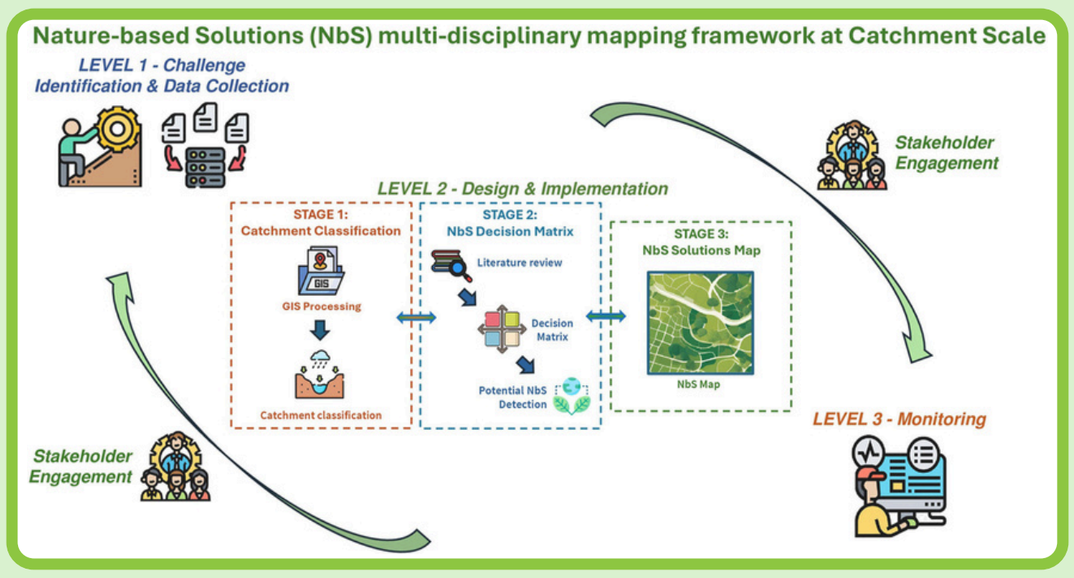

3 Competitive advantages:

- Designed for usability across different sectors and levels of expertise, avoiding technical jargon and overly complex evaluation models.
- Adaptable to multiple contexts, from urban to rural, and scalable from small local projects to regional programs.
- Integrates socio-ecological criteria and policy alignment, ensuring compatibility with the EU Biodiversity Strategy, Green Deal, and Nature Restoration Law.
- Facilitates participatory planning, allowing inclusion of local knowledge, stakeholder values, and governance concerns.
- Supports multi-criteria analysis, providing a transparent and replicable method for comparing NbS options.
- Field-tested in demonstration sites across various EU projects (e.g., OurMED), reinforcing its robustness and relevance in diverse contexts.
- Complements digital planning and GIS tools, with potential for integration into smart city and regional planning platforms.

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4 Target Users:

1. Municipalities and regional planners seeking structured tools to assess NbS options under limited budgets and regulatory pressures.
2. Consultancies and engineers designing infrastructure with green alternatives (e.g., green roofs, wetland buffers, bioswales).
3. Civil society organizations working on biodiversity and ecosystem services that require transparent, science-based guidance.
4. Policymakers and funding agencies that need a consistent, adaptable framework to support evaluation, monitoring, and reporting of NbS interventions.
5. Academic institutions and research groups integrating NbS planning frameworks in transdisciplinary projects or field assessments.

5 Quote from a local stakeholder:

The GIS-based NbS Framework was a critical tool for our Authority. It provided the first spatially-explicit methodology to move beyond general water management goals and prioritize where to deploy specific NbS within our Catchment. This critical insight, derived from the framework's detailed ecological and geomorphological classification, will help us target initiatives to strengthen our flood resilience, improve water quality, and ensure robust, co-beneficial climate adaptation efforts across our region.

6 Uptake of the Service:

The findings and structured methodology of the NbS Framework are designed to inform regional and national policy, particularly concerning water security and climate adaptation. The framework is currently being integrated to inform the next iteration of the Regional Water Management Plans in OurMED demosites by providing spatially-explicit priority maps for NbS deployment across the catchments. Furthermore, the GIS-based Catchment Classification and Decision Matrix will be used to populate the Bode Regional Water Platform, a centralized digital platform under development for sustainable water management. This integration will enable planners and stakeholders to dynamically assess potential NbS interventions based on localized data (ecosystem, climate, geomorphology), thereby ensuring that landscape restoration and climate adaptation efforts are fully aligned with the EU Green Deal and national Biodiversity Strategy goals.

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7 Next Steps:

This study establishes the NbS Framework as a robust model for scaling up spatially-explicit, evidence-based decision-making for environmental management at the catchment scale. To realize the full potential of this methodology, the next steps focus on expanding both its technical capacity and user base. This includes developing an interactive digital tool (e.g., the "Catchment Solutions Tool") that automates the GIS-based classification and integrates the Decision Matrix, allowing stakeholders to easily generate NbS Solutions Maps. We recognize the continued need for cross-sectoral stakeholder engagement and capacity building, specifically targeted workshops to train planners and land managers on how to interpret and use the classification outputs and prioritize co-benefits. Future research will also be essential, focusing on the integration of economic and financial performance indicators to quantify the long-term value and insurance benefits of the prioritized NbS interventions.

8 OurMED Demosite Application & Results:

The framework's core methodology was applied and validated in the Bode River catchment in Germany.
This catchment is one of the most monitored river basin systems in Central Europe, featuring its largest drinking water reservoir, which provided a rich, multi-year dataset necessary for the GIS-based classification stage of the framework.

Key Outcomes & Results
The application in the Bode River catchment and its subsequent integration into broader Mediterranean initiatives yielded the following key outcomes:

- Reliable NbS Prioritization: The framework demonstrated reliable results in detecting the potential areas for NbS implementation. By classifying the catchment based on ecosystem type, climate class, and geomorphological characteristics, it successfully provided a method to spatially prioritize solutions (e.g., placing buffer strips or constructed wetlands) for effective water management.

- Enhanced Water Management Planning: The framework supported the development of baseline NbS maps to identify priority areas, which is a crucial step for local water authorities (like the one overseeing the Bode River) to guide future investments and align management with long-term regional goals.

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- Replicability and Scalability: A key outcome was confirming the framework's ease of application and tailorable structure, proving its replicability to multiple contexts even across diverse policy and governance structures. This is particularly relevant for the wider OurMED project, which focuses on sustainable water storage and distribution in eight local and one regional demo sites across the Mediterranean (representing arid to temperate climates and various water challenges).
- Integration with Digital Tools: The methodology is designed to be integrated into advanced digital platforms, such as the proposed River Basin Digital Twins (RBDTs) under the OurMED project. This integration will allow for real-time data recording, prediction, and risk alerts (e.g., flood risk, low-flow risk), significantly improving the decision-making capabilities of water managers and making the system more resilient against climatic uncertainty.

9 Technology Readiness Level (TRL):

The NbS Framework has been tested and applied in an operational environment (the Bode River catchment in Germany). A more accessible digital tool is under process to automate the methodology and integrate it with platforms like River Basin Digital Twins. The service requires more financial support to be fully developed, qualified, and made widely ready to use by public authorities and land managers.

Technology Readiness Level (TRL): 7

Owner:
University of Naples Federico II

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