



Natural and Nature-Based Features Planning Framework

Jonathan Simm



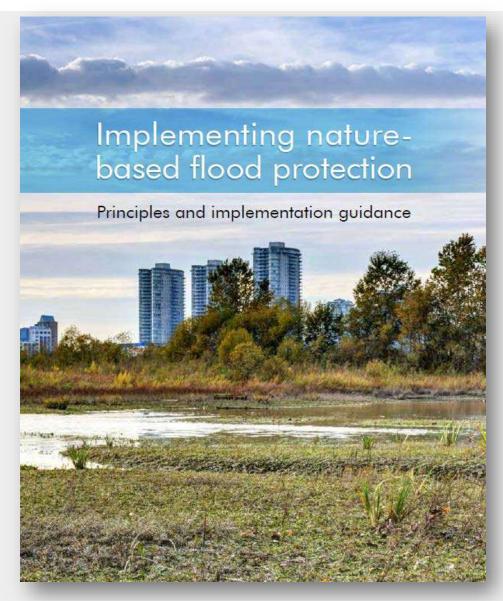
International NNBF Guidelines



World Bank Principles and Implementation Guidance



https://www.gfdrr.org/sites/default/files/document s/Brochure%20Implementing%20naturebased%20flood%20protection_voor%20web.pdf







Focus on Principles and Performance of NNBF

World Bank Principles:

- WB1. System-scale perspective
- WB2 Risk and benefit assessment for a full range of solutions
- WB3. Standardised performance evaluation
- WB4. Integration with ecosystem conservation and restoration
- WB5. Adaptive management

Additional NNBF guidelines team thinking.

- 1. Innovative and creative solutions using diverse partners and teams
- 2. Risk and uncertainty embraced when considering NNBF options [WB2]
- 3. Scope for values and benefits greater with NNBF solutions [WB2]
- 4. Portfolio solutions involving both NNBF and traditional infrastructure [WB2 and WB5].



International NNBF Guidelines

Principles - Overview

In summary ...

- Think systems and, therefore, adaptive management
- All options on the table: NNBF, traditional and combination,
- Innovative and creative teams
- Multiple values and benefits identifiable flood risk management and ecosystem services
- Clear and limited number of (common) performance metrics needed, with common definitions and approaches.

November 1st, 2018 © HR Wallingford 2018



Performance Metrics

Resilience to water:

- Resistance to erosion / Instability
 - Fragility relationships
- Time (and cost) for recovery
 - Regrowth (natural components) and replanting
 - Maintenance (artificial components)

Influence on water:

- Geometry:
 - height, width, shape,
 - storage
 - surge attenuation
- Roughness/rugosity
 - Wave attenuation
 - Slowing flow/ reducing shear stress
- Absorption
 - Infiltration
 - Evapotranspiration

Ecosystems

- Geometry:
 - height, width, shape,
 - area
- Roughness/rugosity
 - Species density
 - Species diversity
 - Habitat for fauna
- Absorption
 - Infiltration
 - Evapotranspiration

Social values also link to above

November 1st, 2018 © HR Wallingford 2018



International NNBF Guidelines

Outcomes

• Communication processes established with all stakeholders and publics Problem identified and stakeholders committed to action 02 • Funding streams identified and delivered. 03 • Impact on natural and risk systems identified and accepted 04 Approvals and authorities in place 05 Overall solution delivered with natural and nature-based elements optimised 06 Monitoring and adaptive management processes established 07



International NNBF Guidelines



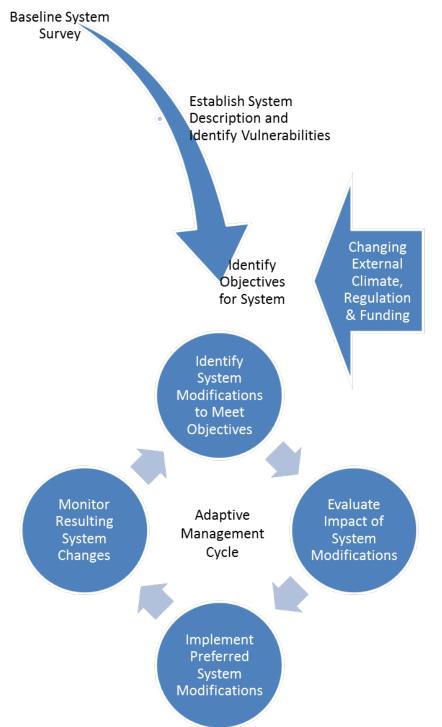
World Bank Process

Ecosystem Outputs aspects STEP 5 STEP 6 STEP 8 STEP 3 STEP 4 STEP 7 STEP 1 STEP 2 Conduct Develop Estimate Select and Implement and Monitor and Define Problem. Develop Design the Ecosystem, Naturethe Costs, Construct Inform Future Project Scope, **Financing** based Risk Benefits, and Intervention **Practices** Hazard, and Objectives Strategy and Risk Effectiveness Management Assessments Strategy Monitoring Ecosystem Effectiveness Green and Conservation. Scale of natural Local Ecosystem hybrid option system suitable presence, potential, of ecosystem restoration, ecosystem investment in health, and and/or performance, for problem option measure design interventions. establishment functioning identification resilience, solving green and stability of ecosystem financing elements Hazard and Design of Monitoring List of Cost-benefit Intervention Stakeholder Budget lifetime estimate risk maps measures analysis measures reports needs • Ecosystem Impact Regulatory Maps of area Overview of Strategy map Monitorina plan Actions if and land- Maintenance frameworks needed of interest resources assessment Share lessons · Risk assess- Implemented Project use maps plan objectives Flood zone ment with measures learned inverventions maps

Project implementation timeline

Feedback activities





Framework cycle

November 1st, 2018 © HR Wallingford 2018

Strategic

Scope (Qualitative phase)

- **1. Initial planning and problem definition**: identify, organize, and assemble stakeholders and partners; define problems and opportunities; set objectives and develop metrics; define the system
- **2. Funding strategy**: identify funding mechanisms and opportunities; prepare preliminary cost estimates



Plan (Quantitative phase)

- **3. Risk and vulnerability assessment**: develop an understanding of the system; compile or collect existing data; conduct hazard, vulnerability, and risk analyses
- **4. NNBF alternative formulation**: identify conventional, NNBF, and hybrid options to meet objectives; develop conceptual designs
- 5. Evaluation of alternatives: analyze economic, social, and ecological costs and benefits



Decide (Decision phase)

6. Preliminary selection: work with decision-makers to select an option, engage with interested parties



Implement (Action phase)

- **7. Refinement of the selected alternative**: design alternative and develop construction plan; develop monitoring and adaptive management plan; revise cost estimates and finance strategy; submit permit applications
- **8. Finalization of design and authorization**: finalize designs, plans, and specifications; obtain permits; award construction contract
- **9. Construction**: construct alternative; communicate with interested parties; supervise and monitor activities; complete punch list; verify construction (as-built); notification of completion to funding source and regulators



Manage (Operational phase)

- **10. Adaptive management**: monitor and report performance and outcomes; adaptively manage; develop and execute long-term asset management strategy
- 11. Asset management: develop and execute long-term strategy for system management

Tactical

Possible form of cycle

Iterative process to identify practical preferred alternatives

Operational





Natural and Nature-Based Features Planning Framework

j.simm@hrwallingford.com