Italy's National Biodiversity Future Center (NBFC): A Vision for Biodiversity Science and Innovation
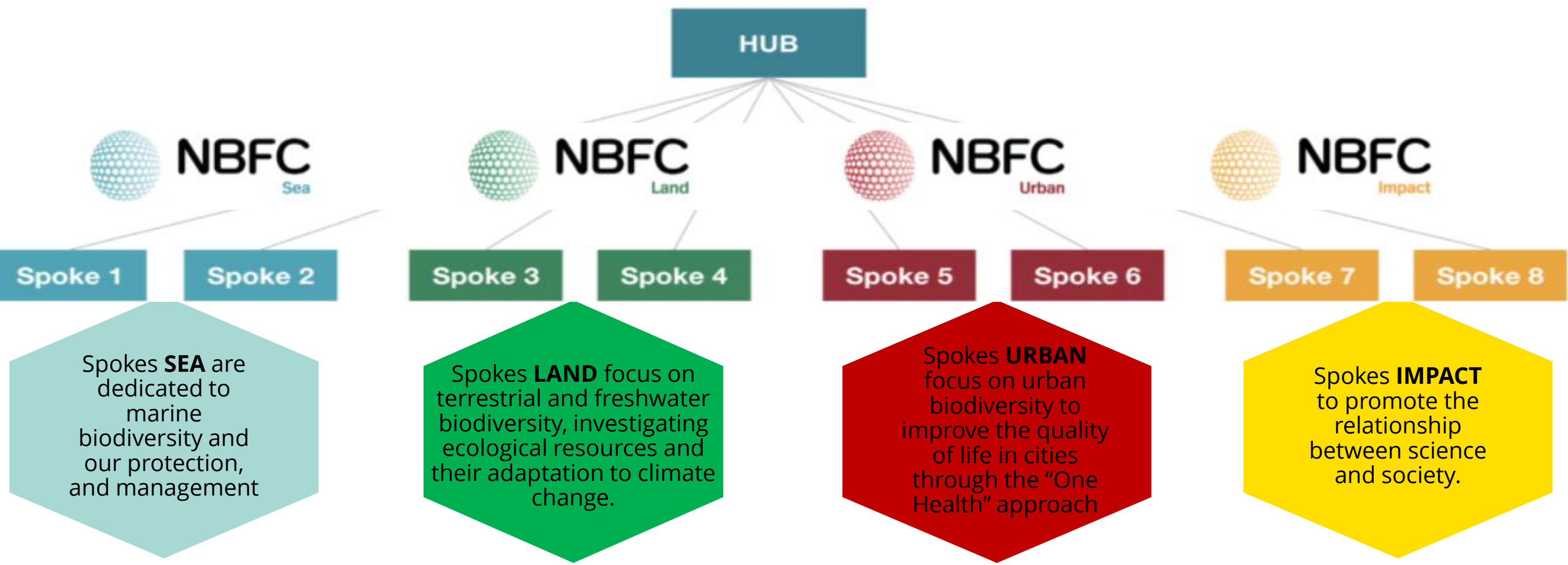
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Introduction

⚑NBFC is the National Research and Innovation Center focused on biodiversity, providing an innovative framework for research centers, universities, and companies dedicated to monitoring, conserving, restoring, and enhancing biodiversity across marine, terrestrial, and urban environments.

Hub & Spoke Structure

HUB

NBFC Sea — Spoke 1 | Spoke 2 — Spokes **SEA** are dedicated to marine biodiversity and our protection, and management

NBFC Land — Spoke 3 | Spoke 4 — Spokes **LAND** focus on terrestrial and freshwater biodiversity, investigating ecological resources and their adaptation to climate change.

NBFC Urban — Spoke 5 | Spoke 6 — Spokes **URBAN** focus on urban biodiversity to improve the quality of life in cities through the "One Health" approach

NBFC Impact — Spoke 7 | Spoke 8 — Spokes **IMPACT** to promote the relationship between science and society.

⚑Below, Figures show (**1**) an abridged map of the **national Biodiversity and Ecosystem Functions network**, which consists of 12 large-area sites and that includes 180 forest plots (both monospecific and mixed forest areas), selected along a national pedoclimatic gradient, (**2**) the main component of the **strategy** applied for Biodiversity in the **marine environment**, and (**3**) in **urban areas**, and (**4**) a scheme of the **Cata-Tool** to supports the design of Nature-Based Solutions (**NbS**) through real case studies and theoretical examples for land and sea environments.

NBFC Activities and Goals

www.nbfc.it

Enhancement of **biodiversity** through innovation to **produce economic, environmental, and social value.**

Development of **'Restoration Ecology'** strategies and **NbS** aiming to achieve the goals of **the Nature Restoration Law**

Strengthening an effective network of the already existing **Protected Areas** with the support of **key enabling technologies**

Mitigate the negative impact of **Invasive Alien Species** on Biodiversity and Ecosystem Functions

Establishing a **national network for monitoring Biodiversity and Ecosystem Functions**

Identifying **process innovations** and studying **innovative biotechnological solutions**

Area-based conservation of terrestrial, marine and urban Biodiversity

Digital tools such as the **NBFC-Platform for Biodiversity, Climate Change, and Environmental Studies**

Scientific approach

⚑ Spatial Data Infrastructure for biodiversity in marine, terrestrial, and urban environments.

⚑Dedicated monitoring networks and tools, including environmental DNA (eDNA), remote sensing, modeling, artificial intelligence (AI), cross-taxa studies, and citizen science initiatives.

⚑Engage with citizens through a dedicated virtual and physical Science Gateway.

⚑ The NBFC Digital Platform supports biodiversity research and modeling through a specialized architecture with high-performance computing (HPC) resources, focusing on four key thematic areas.

1

Nord-Tirreno, Nord-Est, Tirso, Ficuzza-Madonie, Italia Centrale

Altitude (m asl)
Mean Annual Temperature (°C)

2

Knowledge Catalogue — Policy analysis

Case Studies

Climate refugia, Fisheries in Southern Tyrrhenian Sea — Structuring knowledge-based multi-level Governance MSP

Protected Areas in Sardinia Seas, eDNA and Underwater Imaging for MSP, Marine mammals in Northern Tyrrhenian Sea — Integrating the environmental, social and economic dimensions

3

Streets, Urban forest

Urban nanoparticles, Metals, organics, Particle Bound - Reactive Oxygen Species, Oxidative Potential, Black carbon — PROXY of EXPOSURE to Oxidant atmosphere — PM₁ PM₂.₅

BIOMARKERS of oxidative stress — EXPOSURE-RESPONSE RELATIONS IN HUMANS AND PLANTS

4

NbS CataTool

Marine ecosystems areas