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## Co-design of multidimensional mainstreaming of the WEFE Nexus: preliminary results from the four Mediterranean Nexus-Ness living labs

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Mediterranean regions are impacted by critical water scarcity, climatic and demographic change, with national institutions and authorities that are called to take prompt and important decisions to support fair allocation of resources, mitigate conflicts and sustain social cohesion. Understanding the interlinkages of the Water-Energy-Food-Ecosystem (WEFE) Nexus components is of fundamental importance for safe and sustainable management of urban, agricultural, and natural ecosystems. Nevertheless, WEFE Nexus knowledge and technology transfer is still falling behind with major technical and non-technical barriers that avoid the transition towards WEFE Nexus approaches. Multi-Sector, Multi-Disciplinary and Multi-Actor cross-cooperation and mutual trust are still lacking, with stakeholders and citizens that are not adequately informed and involved. The NEXUS Nature Ecosystem Society Solution or NEXUS-NESS project - funded by the PRIMA Programme under the 2020 Nexus Innovation Action - seeks to co-demonstrate with stakeholders a science-driven solution to mainstream WEFE Nexus in Mediterranean regions. NEXUS-NESS aims to co-produce and co-test with stakeholders WEFE Nexus management plans for fair and sustainable allocation of resources. NEXUS-NESS will produce trans-disciplinary datasets and scenarios integrating large scale WATNEEDS and river basin scale FREEWAT eco-hydrological models for building an operational NEXUS-NESS Service (NNS) transferring science-driven WEFE Nexus knowledge to address real case issues. NEXUS-NESS will operationalize the adoption of a WEFE Nexus bottom-up approach in four different case studies employing Living Lab and Responsible Research and Innovation (RRI) principles and change management by applying the RRI Roadmap. Four Nexus Ecosystem Labs (NELs) in Italy, Spain, Egypt and Tunisia were set up as preliminary important step to support NEXUS-NESS mission and goals. In the four NELs all stakeholders will be effectively engaged for creating long-lasting Innovation Ecosystems that are based on collaboration among academia, industry, different levels of the public sector and citizens. This contribution illustrates the preliminary insights, observed during the NELs start up, sharing the issues and opportunities that were co-assessed in the four labs of Val di Cornia in coastal Tuscany (Italy), the Duero basin (Spain), the Wadi Naghamish (Egypt) and the Wadi Jir basin (Tunisia).

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