

11-12 FEBRUARY 2025

RABAT, MOROCCO

Institut Agronomique et Vétérinaire Hassan II



WEFE NEXUS INTERNATIONAL CONFERENCE

**EXPLORING AND BRIDGING NEXUS FOR
A SUSTAINABLE FUTURE**



These projects are part of the
PRIMA programme supported
by the European Union.

WEFE NEXUS INTERNATIONAL CONFERENCE

Day 2 – 12th February 2024

INNOVATIVE SOLUTIONS FEATURING INNOVATIVE, DISRUPTIVE TECHNOLOGIES, NATURE-BASED SOLUTIONS (NBS), ANCESTRAL PRACTICES, AND MORE.....



Intergrating nature-based and bioeconomy solutions through a participatory multi-criteria assessment: a WEFE Nexus approach for sustainable development in the Mediterranean

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Integrating nature-based and bioeconomy solutions through a participatory multi-criteria assessment: a WEF E Nexus approach for sustainable development in the Mediterranean

Andriani Galani, Alexandra Tsatsou, Josué González-Camejo, Isabella Georgiou, Virginia Grace Barros, Anna Laura Eusebi, Tadej Stepišnik Perdih, Simos Malamis, Francesco Fatone, Constantinos Noutsopoulos



**SEL
NTUA**
Sanitary Engineering
Laboratory

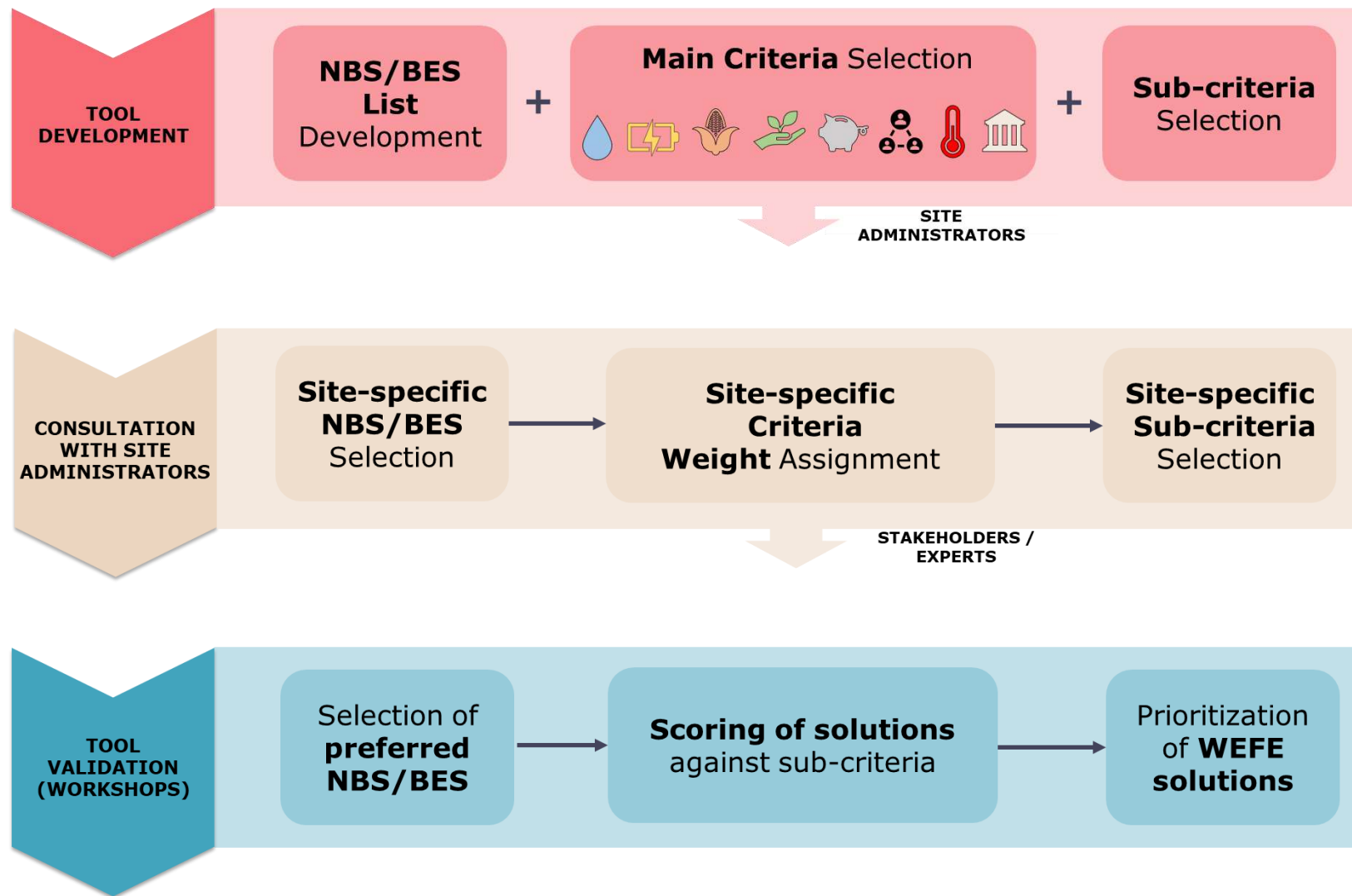


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NBS/BES selection tool objectives



NBS/BES Tool Methodological Process



Pool of 39 NBS and customization on each Demo

SolutionShort description			SURE NEXUS DEMO SITES						WEFE NEXUS				
			DS 1 Vineyard & Winery	DS 2 Ecologde		DS 3 Digital Citrus	DS 4 Agrovoltaic crop field	RS 1 Sentina Natural Park	RS 2 Tunisia	Water	Energy	Food	Ecosystems
			All pilots	Pilot 2A Agios Fokas	Pilot 2B Potamia	Kenitra	Emek HaMaayanot	San Benedetto del Tronto	Underground irrigation using renewable energy				
NATURE-BASED SOLUTIONS													
1	Aerated constructed wetlands	Aerated treatment wetlands (AETs) are an advanced type of treatment wetlands (TWs), which allow more efficient removal of contaminants from wastewater owing to the higher availability of oxygen. This subsurface flow system is aerated mechanically from below, with an appropriate distribution system of air. This system is ideal for treating wastewater with high organic matter loads and for minimizing the land footprint of the TW.	X					X		X		X	
2	Vertical flow constructed wetlands	In vertical flow (VF) wetlands, primary treated wastewater is loaded on the surface of the	X		X			X		X		X	
3	Horizontal Subsurface Flow Treatment System	Horizontal subsurface flow (HSF) wetlands typically employ a gravel bed planted with						X		X		X	
4	Electroconductive constructed wetlands	Constructed wetland were the classic biofilter material has been replaced by	X					X		X	X	X	
5	Constructed wetland with recycled material (cork)	Constructed wetlands are used for the treatment of wastewater utilising a variety of	X					X		X		X	
6	Floating wetlands	Floating wetlands consist of a suspended matrix planted with wetland plants. This						X		X		X	
7	Living walls treating wastewater	Living walls are self-sustaining vertical gardens, with significant potential to manage	X							X		X	
8	Green wall with innovative materials (cork) with insulating	A vertical built structure covered by vegetation. As growth medium, cork has been used. It								X		X	
9	Water storage	Reservoirs that store water for household consumption and drinking purposes. They may			X					X		X	
10	Water harvesting (Khadins)	Long earthen embankment that is built across the hill slopes of gravelly uplands that				X		X		X	X	X	
11	Water harvesting (Zabo)	System that combines water conservation with forestry, agriculture and animal care.						X		X		X	
12	Water harvesting (Jhalaras)	Rainwater that falls on forested hilltops is collected by channels that denoist the run-off.						X		X		X	
13	Water harvesting (Fog catcher tower)	Typically rectangular-shaped stepwells that have tiered steps on three or four sides. These								X		X	
14	Residential rainwater harvesting	Water harvesting system that allows for fog, humidity, and precipitation to collect on	X	X		X		X	X	X		X	
15	Surface rainwater harvesting (Johads)	Rainwater harvesting is collecting the run-off from a structure or other impervious	X	X	X	X		X		X		X	
16	Surface rainwater harvesting (Rainwater small islands)	Small earthen check dams that capture and store rainwater that may infiltrate to recharge						X	X	X		X	
17	Subsurface rainwater harvesting	Collecting and preserving water from a combination of terraces and cisterns. Rainwater							X			X	
18	Fog catcher tower	Collection of rainwater by draining	X	X		X		X	X	X		X	
19	Solar-driven vapour condensation units	Water harvesting system that allows for fog, humidity, and precipitation to collect on	X	X		X		X	X	X		X	
20	Solar driven desalination system	Recovery of drinking water from water vapour	X	X		X		X	X	X	X	X	
21	Aquifer recharge	Principles: evaporation and condensation			X					X		X	
22	Riparian buffers	Processes that replenish groundwater stored in aquifer for beneficial purposes. Methods:						X	X	X		X	
23	Coastal Sand dunes	Riparian buffers are linear bands of permanent vegetation adjacent to an aquatic	X			X		X	X	X	X	X	
24	Mangrove forests	Protection against sea level rise and coastal erosion.						X		X		X	
25	Bioswale	Ecosystems consisting of shrubs and/or trees that grow in coastal saline or brackish			X			X		X	X	X	
26	Millpond	Bioswales are vegetated, shallow, landscaped chanelns designed to capture, treat, and	X	X		X		X	X	X		X	
27	Bioretention ponds	A millpond is a pond constructed to store storm water through a storm event. The stored	X					X	X	X		X	
28	Rain garden	Bioretention ponds are landscaped depressions or shallow basins used to slow and treat	X			X		X	X	X		X	
29	Permeable pavements	A rain garden is a depressed area in the landscape that collects rain water from a roof,	X	X		X				X		X	
30	Irrigation systems (Ahar Pynes)	Permeable pavement is a porous urban surface which catches precipitation and surface						X		X		X	
31	Irrigation systems (Aflaj)	Artificial rivulets or diversion channels led off from rivers, conveying water to reservoirs						X	X	X		X	
32	Irrigation systems (Stone weirs)	Hydrologically, the Aflaj are integrated systems which collect water (groundwater, natural						X	X	X		X	
33	Agroforestry	Small stone structures along the riverbeds of ephemeral and seasonal streams to address						X	X	X		X	
34	Aquaponics	Agroforestry is the interaction of agriculture and trees, including the agricultural use of	X	X	X	X		X	X		X	X	
35	Conservation Agriculture	Aquaponics is a combination of aquaculture (the growing of fish and other aquatic						X				X	
36	Vegetable gardens	The practice of minimum soil disturbance, diversified crop rotations, and maintenance of	X	X	X	X		X	X		X	X	
37	Tree pit	Vegetable gardens can contribute to climate mitigation and adaptation through a range of			X							X	
38	Terraces and slopes	In their simplest form, tree pits may direct runoff to a single tree planted in native soil.				X		X	X			X	
39	Green roofs	Landscape terraces used to stabilize slopes and protect urbanized areas with steep slopes			X					X	X	X	
		A green roof, or rooftop garden, is a vegetative layer grown on a rooftop. Green roofs			X					X	X	X	

Pool of 32 BES and customization on each Demo

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1	Biosorption using cork	Cork by-product granulates are used to treat wastewater as a filter medium	X						X		X	X		X
2	Microalgae-cork technology for groundwater treatment	A bioreactor and a cork filter can be used for the treatment of water from polluted wells	X						X	X	X	X		X
3	exfoliant base production from cork	Use of granulated cork for the production of cosmetics and pharmaceuticals	X								X	X	X	X
4	Compost toilets	Use of dry compost toilets (by workers) for safe resource recovery from fecal matter to	X		X				X	X	X	X	X	X
5	In-vessel composting	In in-vessel composting, organic wastes are collected in a drum or vessel to be manually	X	X					X		X	X	X	X
6	Bokashi composting (fermented organic matter)	The method involves layering organic wastes with a Bokashi inoculant in a special bucket.									X	X	X	X
7	Decentralised composting	Decentralised composting of community + agricultural wastes in a compact decentralised	X	X	X				X		X	X	X	X
8	Vermicomposting	Vermicomposting consists of the use of worms and microorganisms for stabilization of	X	X					X	X	X	X	X	X
9	Compost-biochar composite	Addition of biochar to the organic wastes during the composting process to reduce GH	X	X					X		X	X	X	X
10	Agitated bay composting with biofilter	In an enclosed building, the material to be composted is placed in uncovered bays. Forced	X						X		X	X	X	X
11	Bio-drying	Bio-drying is a compost-like process. However, its goal is the use of the metabolic heat to	X						X		X	X	X	X
12	Hydrogen production from organic and non-organic waste	Hydrogen is produced through anaerobic digestion and dark fermentation using organic	X						X		X	X	X	X
13	BioGas production from shrublands	The production of biomass from shrub species in the area for biogas production	X						X		X			
14	Biomass production from citrus peels	Biomass derived from waste citrus peels that can be used for water decontamination							X		X	X	X	X
15	Macroalgae/seaweed biorefinery	valorisation of macroalgal residual biomass to obtain new low-cost dietary proteins for							X		X	X	X	X
16	Microalgae biorefinery for ww treatment and biomass	A biorefinery using microalgae has great potential of using biomass for fertiliser and/or	X						X		X	X	X	X
17	Biorefinery using winery waste	Biorefinery using different types of winery waste, such as grape pomace, grape stalks or	X								X	X	X	X
18	Anaerobic Fermentation for MCFA production	Treatment of organic waste through AD for the production of Medium-chain fatty acids,	X						X		X	X	X	X
19	Biochar application for soil amendment and water	Biochar is the product of the thermal transformation of waste biomass which is rich in	X	X					X	X	X	X	X	X
20	Trickling filters for wastewater treatment	Trickling filters are a type of biological aerobic treatment, where microorganisms							X	X		X		
21	SCEPPHAR: PHA-enriched biomass for bio-plastics	PHA-enriched biomass is recovered from the sludge line of the WWTP by using VFA-rich	X						X		X	X	X	X
22	Crytalyzer: Struvite recovery for fertilizer	Struvite is recovered from the anaerobic digestion rejected liquor in the sludge line of the	X		X				X		X	X	X	X
23	Freeze concentration	Freeze Concentration (FC) is the concentration of materials using freezing of water rather							X		X	X		X
25	Hydrochar for ww treatment	Hydrochar obtained from organic wastes to remove micropollutants from ww	X						X		X	X		X
26	Zeolites for ww treatment	Zeolites modified by metal oxide nanoparticles (MON) and metal-organic framework	X						X		X	X		X
27	Zeolites for biodiesel production	Zeolites modified by metal oxide nanoparticles (MON) and metal-organic framework									X	X		X
28	AnMBR for wastewater and/or organic waste treatment	anaerobic digestion coupled to membrane filtration for treating ww and/or organic	X						X		X	X		X
29	Microalgae for brine treatment	Microalgae PBR to reduce nutrient content of brackish and brines. This option is useful									X	X		X
30	Biomass combustion for co-generation.	Co-generation engine to produce heat and electricity. Heat can be used for thermal							X			X		X
31	UASB for ww and/or organic waste treatment	Upflow Anaerobic sludge blanket system to treat ww and/or organic wastes and produce	X						X		X	X		X
32	Mycelium-based material for soil regeneration	Reuse of organic wastes to grow fungi and form mycelium-based material, biodegradable, to be used in agricultural applications		X										

WEFE subcriteria and customization on each Demo

Criteria	DS 1 Vineyard & Winery	DS 2 Ecolodge		DS 3 Digital Citrus	DS 4 Agrovoltaic crop field	RS 1 Sentina Natural Park	RS 2 Tunisia
	<i>All pilots</i>	<i>Pilot 2A Agios Fokas</i>	<i>Pilot 2B Potamia</i>	<i>Kenitra</i>	<i>Emek HaMaayanot</i>	<i>San Benedetto del Tronto</i>	
WATER							
Water storage	YES	NO	YES	YES	NO		
Water savings	YES	YES	YES	YES	YES		
Water reuse	YES	NO	YES	NO	NO		
Wastewater/Greywater treatment	YES	NO	YES	NO	NO		
Seawater desalination	YES	YES	NO	NO	NO		
ENERGY							
Energy production	YES	NO	YES	NO	YES		
Energy savings	NO	NO	YES	YES	YES		
Energy efficiency	YES	YES	YES	YES	YES		
Diversification of energy sources	YES	NO	YES	YES	YES		
Energy autonomy	YES	YES	YES	YES	NO		
FOOD							
Improved crop production	YES	NO	YES	YES	YES		
Improved crop resilience	YES	YES	NO	YES	NO		
Reuse of organic waste	YES	YES	YES	YES	NO		
Revival of traditional cultivation techniques / crops	YES	NO	YES	YES	NO		
ECOSYSTEMS							
Runoff reduction (diffuse pollution)	YES	NO	NO	NO	NO		
Reduction of water pollution and groundwater contamination	YES	NO	YES	YES	YES		
Restoration of ecosystems	YES	YES	NO	YES	NO		
Preservation of habitats	NO	NO	NO	YES	NO		
Increased soil quality / fertility	YES	NO	YES	YES	YES		
Increase of biodiversity	YES	NO	YES	YES	YES		

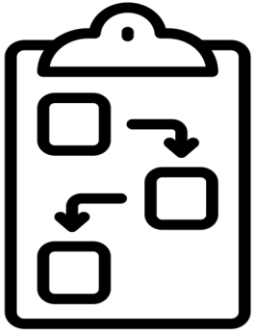
WEFE subcriteria and customization on each Demo

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SOCIAL							
Increased food security	YES	YES	YES	YES	YES		
Social awareness for responsible use of resources	YES	NO	YES	YES	YES		
Social acceptance of water/wastewater and by-products reuse	YES	NO	YES	YES	NO		
Improved living environment conditions and human health	YES	NO	YES	NO	NO		
Opportunities for collective activities, new skills and knowledge	YES	YES	YES	YES	NO		
ECONOMIC							
New revenue opportunities (e.g. from by-products)	NO	NO	YES	YES	YES		
Reduction of maintenance expenditure	YES	YES	YES	YES	YES		
Reduction of construction expenditure	YES	YES	YES	YES	YES		
Reduction of losses (through circular economy approaches)	YES	YES	YES	YES	NO		
Increased products' value	YES	YES	YES	YES	YES		
CLIMATE CHANGE							
Availability of water during droughts	YES	YES	YES	YES	YES		
Reduction of flood risk	YES	NO	YES	NO	NO		
Reduction of fire risk	YES	NO	YES	NO	NO		
Reduction of GHG emissions	YES	NO	YES	YES	YES		
Regulation of microclimate	NO	YES	YES	YES	YES		
INSTITUTIONAL / GOVERNANCE							
Opportunities for participatory governance	NO	NO	NO	YES	NO		
Opportunities for cross-sectoral interaction of organizations and network	YES	YES	YES	YES	YES		
Highlighting the need to mainstream climate change in local and regional	YES	NO	YES	YES	YES		
Highlighting the need for BES/NBS inclusion in local plans, with evidence	YES	YES	YES	YES	NO		
Increased data availability from real applications	YES	NO	YES	YES	YES		

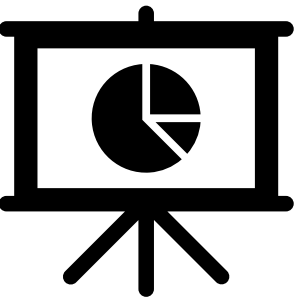
Criteria weights and customization on each Demo

		DS1	DS2 (Agios Fokas)	DS2 (Potamia)	DS3	DS4
WATER		25	31,25	12,5	18,75	12,5
ENERGY		12.5	12,5	6,25	12,5	25
FOOD		12.5	12,5	12,5	12,5	12,5
ECOSYSTEMS		12.5	18,75	18,75	12,5	12,5
SOCIAL		6.25	6,25	25	6,25	6,25
ECONOMIC		12.5	6,25	6,25	12,5	6,25
CLIMATE CHANGE		12.5	6,25	12,5	18,75	18,75
INSTITUTIONAL		6.25	6,25	6,25	6,25	6,25

A full day workshop to ensure the best quality of results

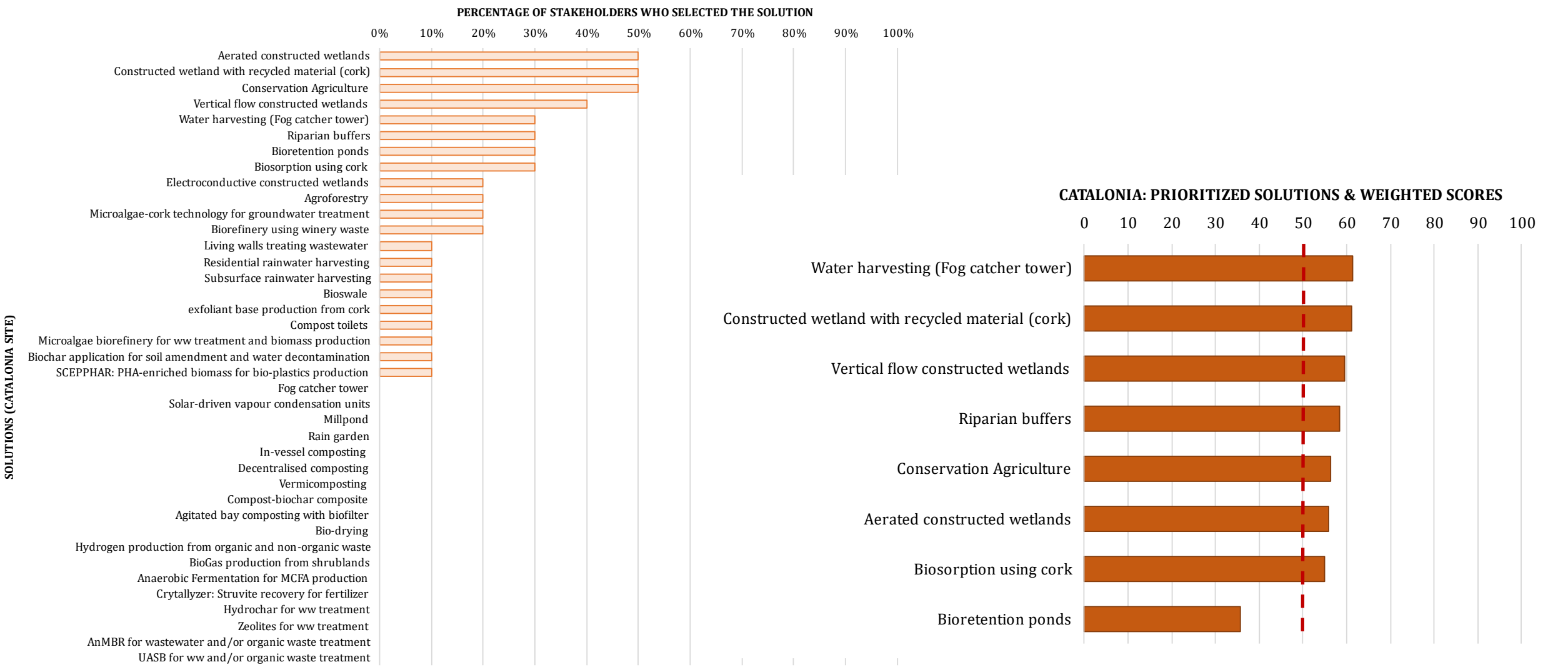


1. Selecting & inviting the right participants / stakeholders
2. Presentation of SureNexus project and the WEFE concept
3. Individual exercise, groupwork and plenary discussion about the local context: SWOT, barriers and enabling factors for sustainability and climate resilience
4. Presentation of / tour around the Demonstrator
5. Introduction to the NBS/BES tool
6. Presentation of the pool of solutions and criteria and open discussion
7. Individual exercise: selection and scoring of solutions (MCA tool)
8. Presentation of compiled results and group discussion
9. *...Coffee and lunch breaks!*



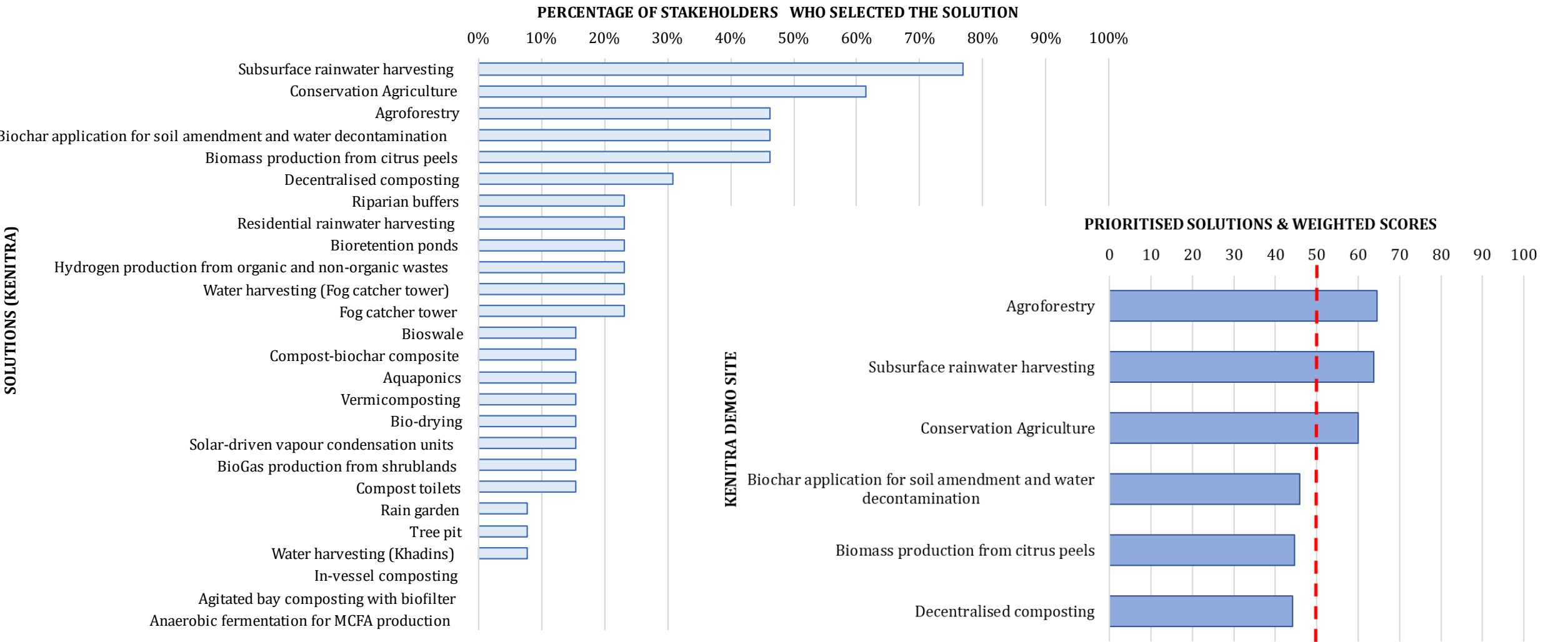
1. The selected solutions were ranked based on their final score.
2. Weighted scores were used to provide a quantitative reflection of participants' collective preferences.
3. Solutions with less than 30% support from participants were excluded from further consideration.
4. Remaining solutions were subjected to a final threshold criterion, requiring at least a 50% score for eligibility.
5. Each selected solution also received a score based on how it addressed each criterion, without considering the assigned weights.

Workshop results as input for further analysis: Catalonia (Spain)

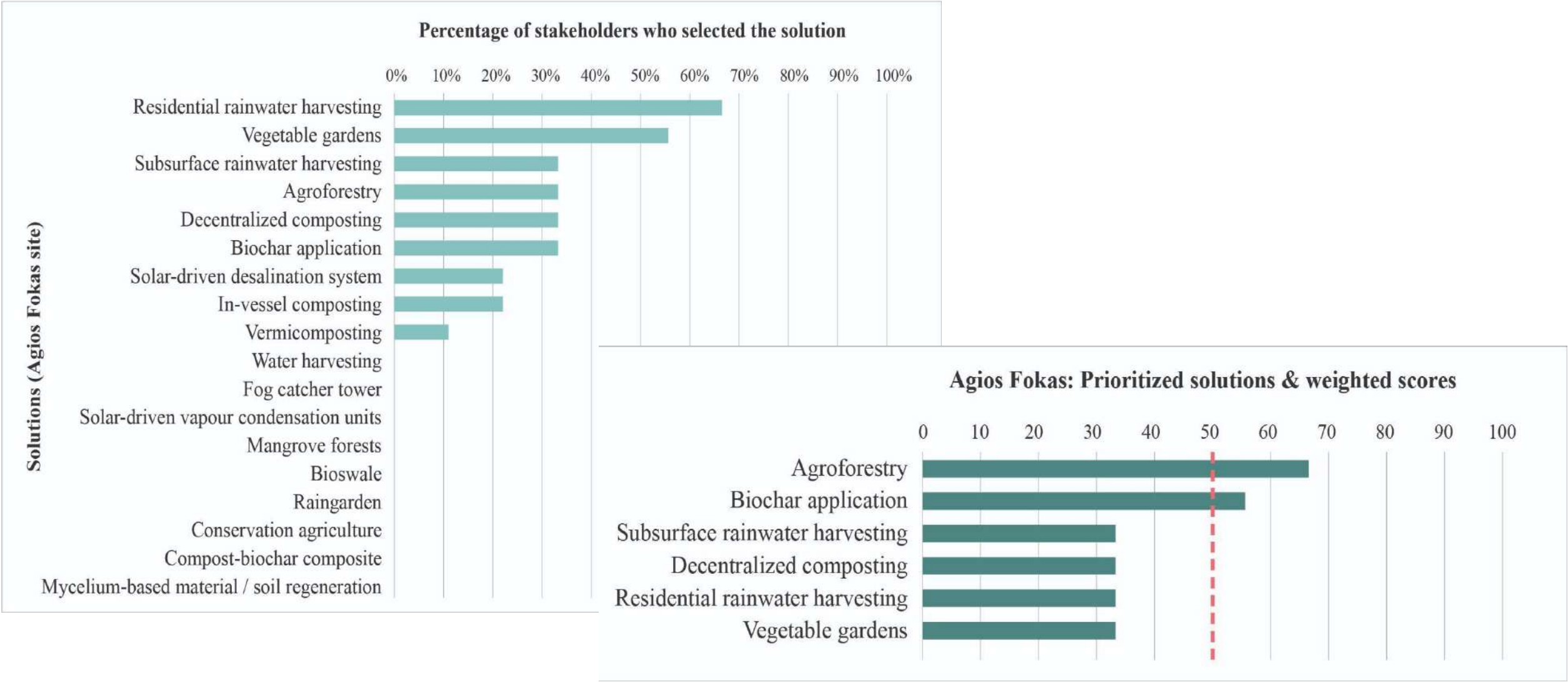


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Workshop results as input for further analysis: Morocco (Kenitra)

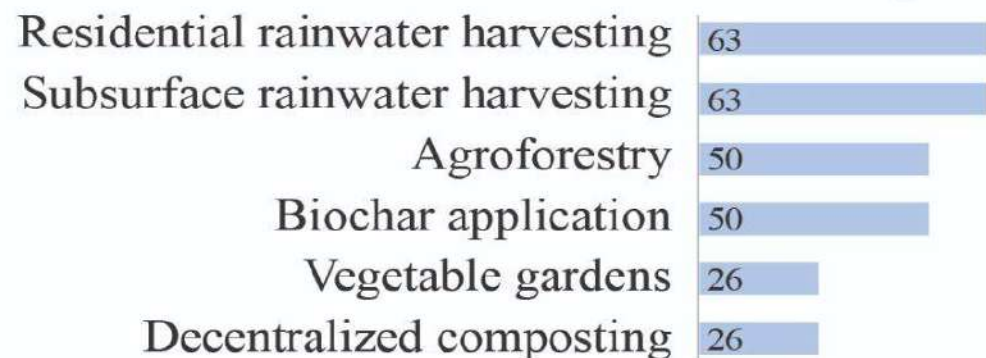


Workshop results as input for further analysis: Greece (Agios Fokas)

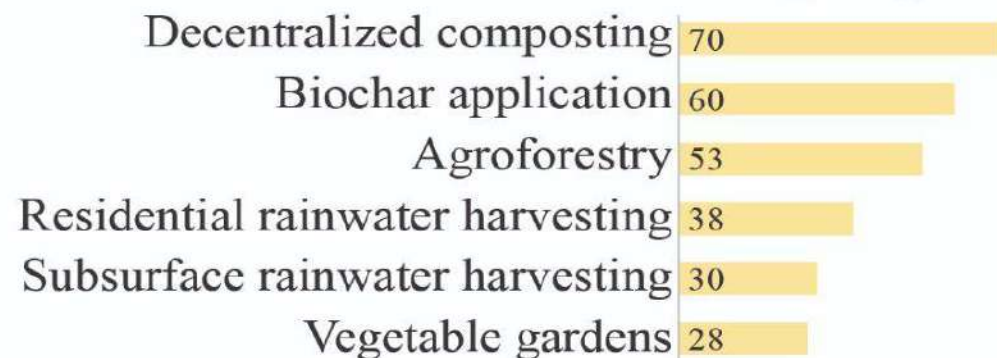


Workshop results as input for further analysis: Greece (Agios Fokas)

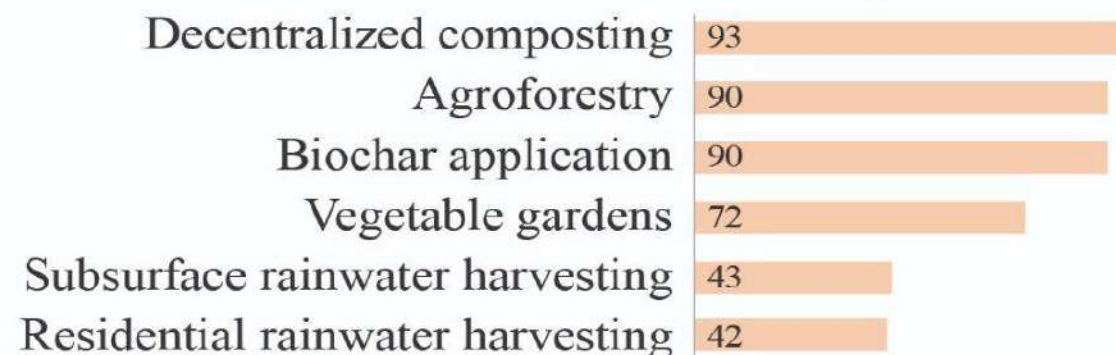
Water impact



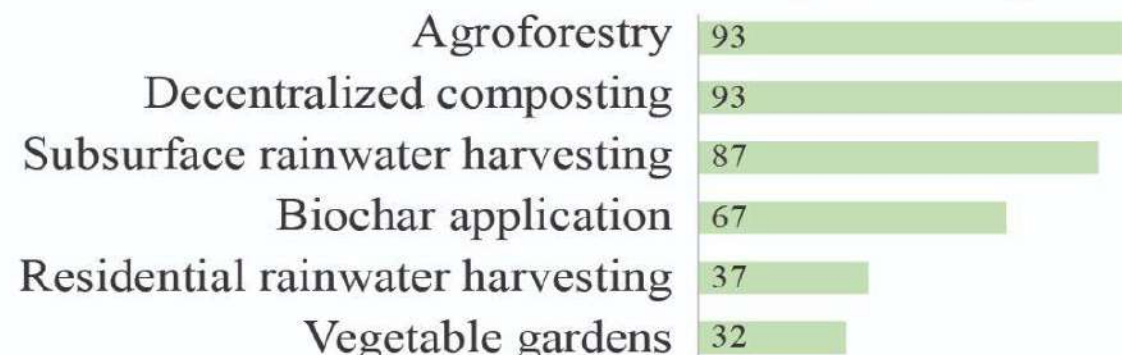
Energy impact



Food impact

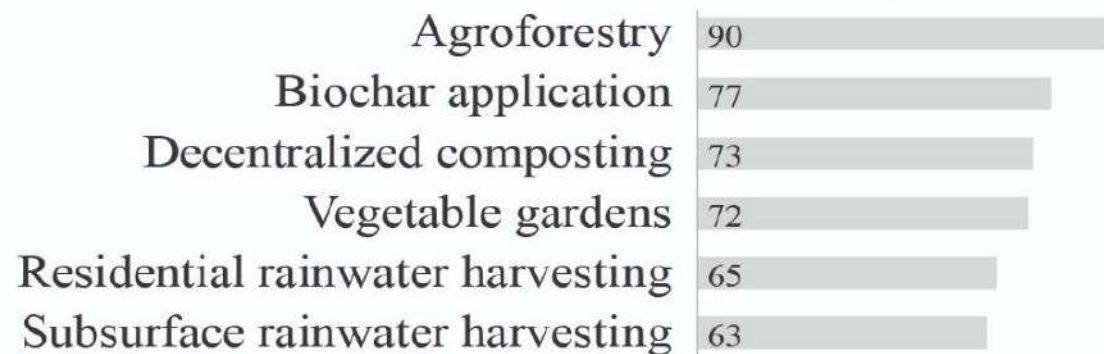


Ecosystems impact

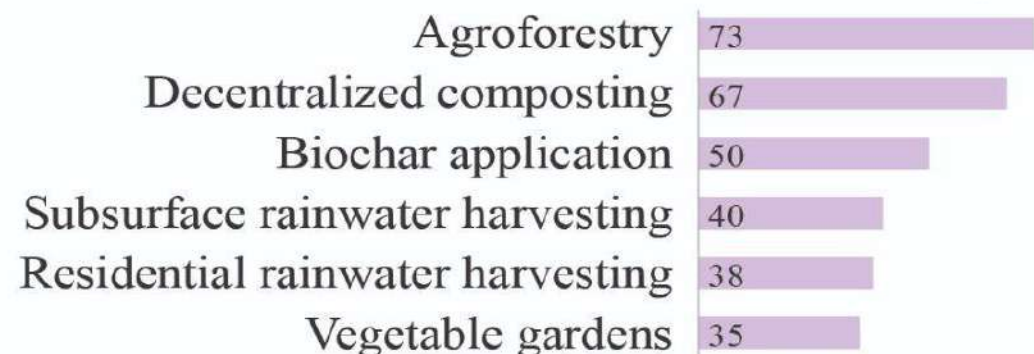


Workshop results as input for further analysis: Greece (Agios Fokas)

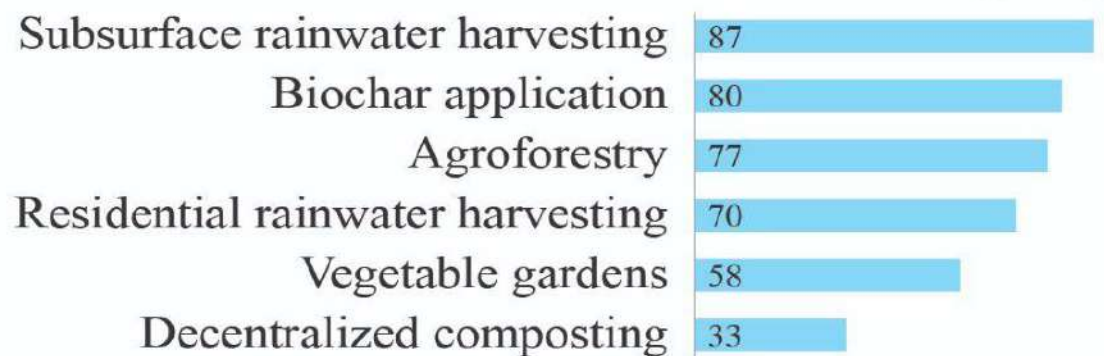
Social impact



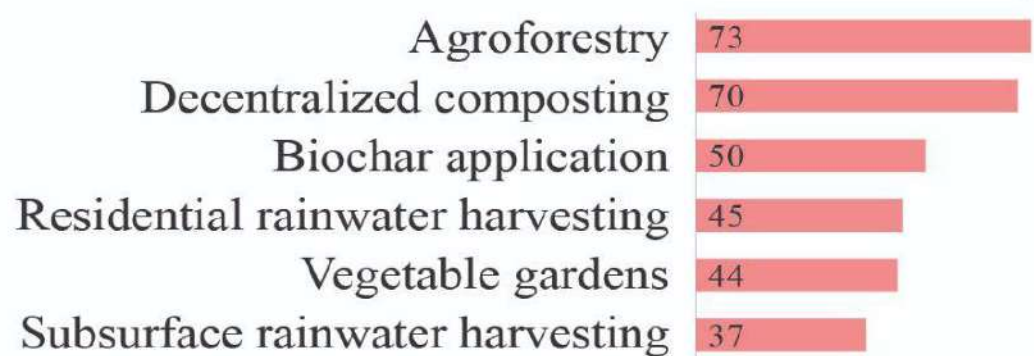
Economic impact



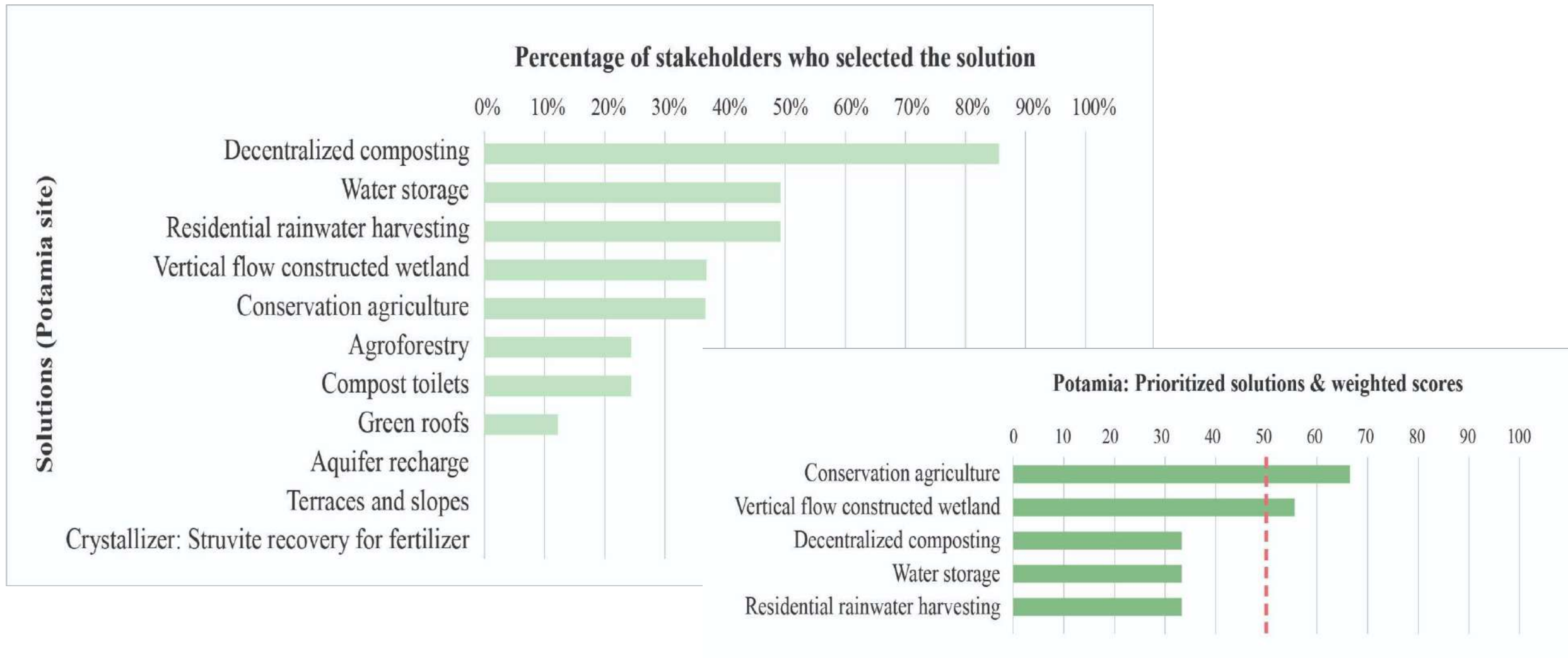
Climate change impact



Institutional impact

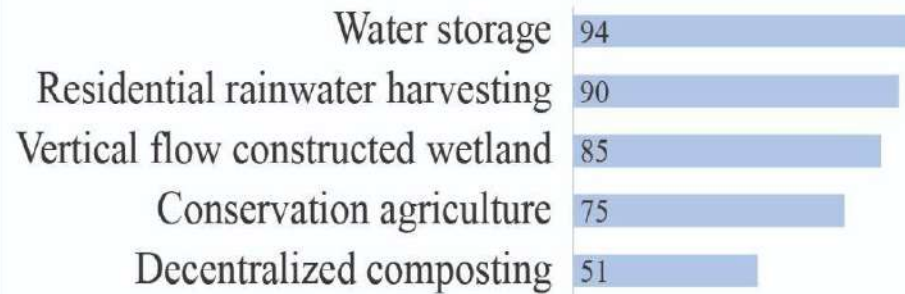


Workshop results as input for further analysis: Greece (Potamia)

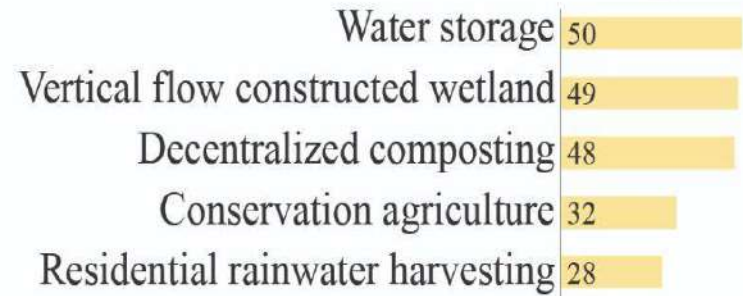


Workshop results as input for further analysis: Greece (Potamia)

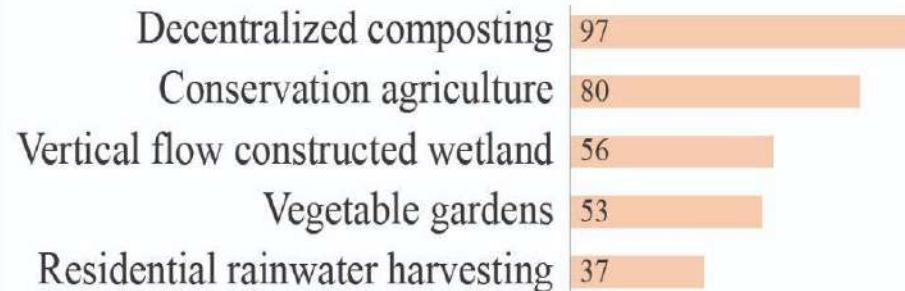
Water impact



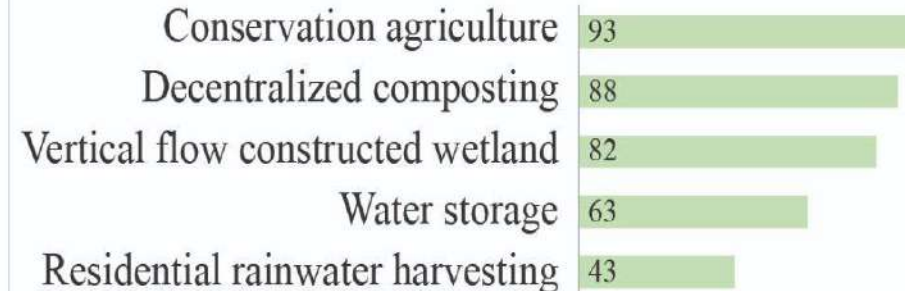
Energy impact



Food impact

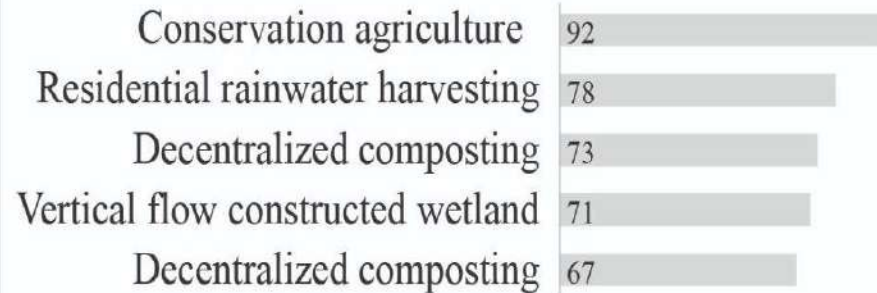


Ecosystems impact

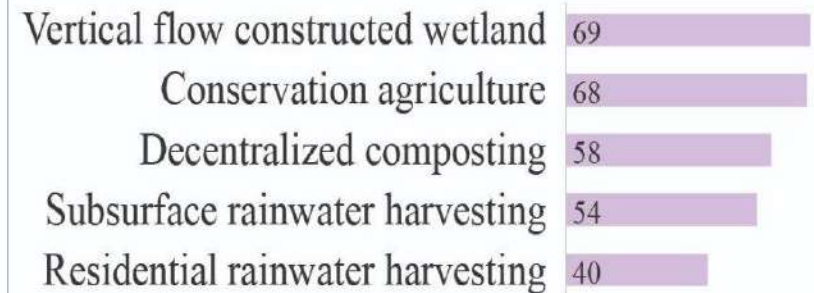


Workshop results as input for further analysis: Greece (Potamia)

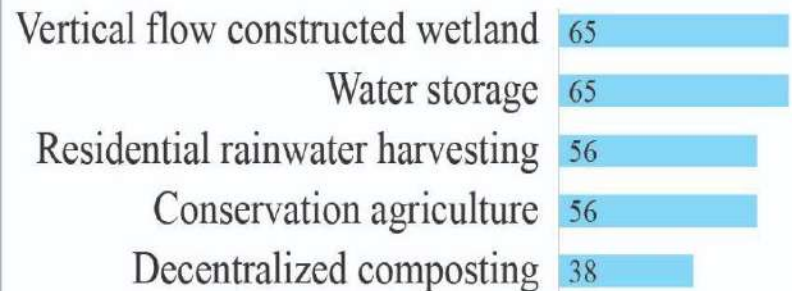
Social impact



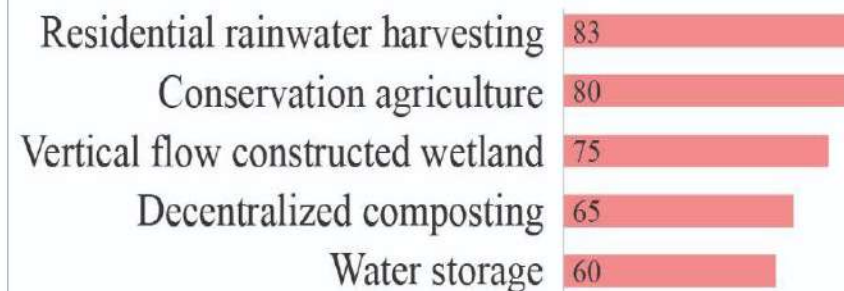
Economic impact



Climate change impact



Institutional impact





**SURE
NEXUS**



PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION
IN THE MEDITERRANEAN AREA



These projects are part of the
PRIMA programme supported
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