DELIVERABLE 1.9

List of stakeholders preferred no-regret NbS measures – Front - Running Regions

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Abbreviations

CRA	Climate Risk Assessment
D	Deliverable
EU	European Union
FRR	Front-Running Region
LAND4CLIMATE	Utilization of private land for mainstreaming nature-based solution in the systemic transformation towards a climate-resilient Europe
NbS	Nature-Based Solution
WP	Work Package

Executive Summary

This deliverable presents the identified preferred no-regret Nature-based Solutions (NbS) aimed at reducing climate risks at the hotspots identified in the Climate Risk Assessment (CRA). Through the implementation of these NbS the climate resilience of the Front-Running Regions (FRR) shall be increased. The measures were developed by the FRR and their academic partners during a workshop held at the third consortium meeting in Timisoara, Romania in September 2024.

Keywords

climate resilience, no-regret Nature-based Solutions, FRR workshops

1. Introduction

Climate change is expected to lead to an increase in frequency and intensity of hydrometeorological hazards such as heat, droughts, floods and heavy rain events in the future. These hazards pose significant challenges to regions all over Europe. To address these challenges climate adaption measures are necessary, including Nature-based Solutions (NbS). However, climate adaption measures require land — often exceeding the public land available. Therefore, the EU-funded LAND4CLIMATE project aims to implement NbS on private land in six Front-Running Regions (FRR) in Germany, Austria, Italy, Czech Republic, Slovakia and Romania. The objective is to help mitigate the impacts of climate change and increase climate resilience in these regions.

As part of the project activity "Evidence-base for climate-resilient NbS" (WP1), preferred no-regret NbS are to be collaboratively developed among the FRR and their tandem academic partners. These no-regret NbS are planned to be implemented in the regions to help mitigate the impacts of climate change at hotspots identified by the means of the CRA (see D1.3 – Climate risk analysis – front-running regions).

First, this deliverable (DEL) provides an overview of the general concept of the performed workshop, followed by a detailed description of the process used to identify stakeholder preferred no-regret NbS. Lists of potential no-regret NbS prepared by the FRR and their tandem academic partners will be presented. These measures should have positive effects on the climate adaptation of the region regardless of changing climate or other developments. Lastly, the FRR preferred no-regret NbS, that were selected based on the implementability of the no-regret NbS will be presented. These measures are supposed to be implemented within the LAND4CLIMATE project.

2. Concept of the preferred no-regret NbS Workshop

The identification of no-regret NbS was part of the project's workshop on cause-effect relations and potential system effects. This workshop was held on September 17th as part of the third LAND4CLIMATE consortium meeting in Timisoara, Romania. A total of 35 people participated. The workshop was divided into three sections.

The objective of the first part was for the FRR and their academic tandem partners to familiarize themselves with the results of the CRA, validate these results and identify areas that exhibit particularly high climate risks.

The second part of the workshop aimed to develop ideas of NbS that could help mitigate the effects of climate change at the hotspots identified within the first part of the workshop. The participants were asked to think of strengths and weaknesses of those NbS ideas specific to their region and the identified climate risk hotspot. This part of the workshop was also dedicated to finding stakeholders preferred no-regret NbS for the FRR.

The third part of the workshop was dedicated to sharing the results across the consortium, which enhanced cross-regional learning and collaboration. For a more detailed description of the workshop concept, the identified hotspots within the FRR and cause-effect relations and systemic effects of NbS, see D1.7 – Report on stakeholder workshops on cause-effect relations and potential systemic effects – front-running regions.

The following section will provide a more detailed description of the process used in the second part of the workshop dedicated to identifying stakeholders preferred no-regret NbS for the FRR. There is no general used definition of no-regret NbS, therefore a project intern definition was created. In the context of the LAND4CLIMATE project no-regret NbS means, that the NbS will have more positive than negative effects on the livelihoods and ecosystems within the FRR regardless of the changing climate and other developments in the region. Based on the benefits and possible drawbacks or concerns connected to the collaboratively developed ideas of NbS that could mitigate the impacts of climate risks at the identified hotspots (see D1.7), no-regret NbS could be identified. Finally, the FRR were able to select the measures most likely to be implemented in their region from the list of no-regret measures compiled, referred to as the preferred no-regret NbS.

The following topics/questions were addressed to guide the discussion on the identification of prefered no-regret NbS:

1. Based on the positive aspects and the concerns create a list of "no regret" NbS measures, that can address the climate risks at the chosen hotspots in the FRR. "No-regret" in this context means that the NbS will always have more positive than negative effects on the livelihoods and ecosystems within the FRR, regardless of the changing climate and other developments in the region.

2. What potential obstacles could still hinder the implementation of the "no-regret" measures within the FRR?

3. Rank the "no-regret" NbS based on their suitability for your FRR. How feasible do you think it is to implement these measures in your region?

The following figure shows the results sheet that was provided as additional material to document and discuss the identified no-regret NbS. For future use of the result sheet, it should be noted that

"suitability" should be replaced by "implementability" so it is clear that the question refers to the probability that the measure will be implemented in a region.

Table 1:   Empty result sheet for discussing the selected no-regret NbS

FRR:			
No-regret NbS	Potential obstacles that could still hinder the implementation	Ranking of the suitability of the NbS measure	Comments

3. List of no-regret NbS

The following section presents the identified no-regret NbS, including their potential implementation obstacles and implementation probability of the individual FRR.

3.1 Germany

Table 2 shows the resulting no-regret NbS that were discussed within the workshop of the German FRR region, the county of Euskirchen.

Table 2:   Identified no-regret NbS for the German FRR

FRR: GERMANY			
No-regret NbS	**Potential obstacles that could still hinder the implementation**	**Ranking of the suitability of the NbS measure**	**Comments**
Miscanthus	• Planting period • Economic concerns	😀 🙂 😐 🙁 ☹️	
Agroforestry	• Planting period • Harvest time (duration)	😀 🙂 😐 🙁 ☹️	
Tiny forest	• Land use	😀 🙂 😐 🙁 ☹️	
Climate park / Pocket park	• Maintenance of parks	😀 🙂 😐 🙁 ☹️	
Green roofs / walls	• Maintenance of greening • Investment budget	😀 🙂 😐 🙁 ☹️	• Not feasible, because of the liability period during the implementation process
Unsealing of surfaces	• Costs of unsealing	😀 🙂 😐 🙁 ☹️	
Raingardens	• Landowner concerns	😀 🙂 😐 🙁 ☹️	
Bioswales	• Landowner concerns	😀 🙂 😐 🙁 ☹️	

3.2 Austria

The Table 3 shows the result sheet for the Austrian FRR, the Lafnitz catchment.

Table 3: Identified no-regret NbS for the Austrian FRR

FRR: AUSTRIA			
No-regret NbS	**Potential obstacles that could still hinder the implementation**	**Ranking of the suitability of the NbS measure**	**Comments**
Desealing	• Very expensive • Time intensive	(ranking: 4th face – sad/red circled)	
Hedges	• Willingness of the landowner to implement is unclear	(ranking: 2nd face – light green circled)	
Protection stripes	• Willingness of the landowner to implement is unclear	(ranking: 2nd face – light green circled)	
Green drainage paths	• Several landowners necessary	(ranking: 3rd face – yellow neutral circled)	
Overall management adjustment	• Willingness of the landowner to implement is unclear	(ranking: 3rd face – yellow neutral circled)	
Agroforest		(ranking: 2nd face – light green circled)	

3.3 Slovakia

In Table 4 the identified no-regret NbS for the Slovakian FRR, the Rovana River Basin, are presented. The FRR selected no-regret NbS for every hotspot identified within the first workshop part (see the coloured dots in the map for the Slovakian FRR in D1.7). The FRR compiled potential obstacles that could hinder the implementation of the no-regret NbS in one list for all measures.

Table 4:   Identified no-regret NbS for the Slovakian FRR

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FRR: SLOVAKIA				
Location	**No-regret NbS**	**Potential obstacles that could still hinder the implementation**	**Ranking of the suitability of the NbS measure**	**Comments**

Slivnik Farm	Check dams	• Design process can be long (procurement)
		• Not sure about what permissions are needed
		  ○ Building permits
		  ○ Municipality
		• Contracts with landowners
		• Will they sign for maintenance?
		• Co-financing possible?
		• Mapping co-benefits for landowner
			😃(selected) 🙂 😐 🙁 😞	

	Contour trenches on slopes		😃(selected) 🙂 😐 🙁 😞	
	Wetlands		😃(selected) 🙂 😐 🙁 😞	
	Surface cross drains		😃(selected) 🙂 😐 🙁 😞	
Cerhov Orchard	Check dams		😃 🙂 😐(selected) 🙁 😞	• State water company might be too conservative
	Remeandering of the river		😃 🙂 😐(selected) 🙁 😞	
	Small water retention		😃 🙂 😐(selected) 🙁 😞	
Matsiik Weinery	Water retention pits		😃(selected) 🙂 😐 🙁 😞	
Klasa Forest	Check dams		😃 🙂(selected) 😐 🙁 😞	
	Surface drains		😃 🙂(selected) 😐 🙁 😞	
Ranche Dante Bysta	Check dams		😃(selected) 🙂 😐 🙁 😞	
	Contour trenches		😃(selected) 🙂 😐 🙁 😞	
	Wetland system		😃(selected) 🙂 😐 🙁 😞	

3.4 Czechia

The following table (Table 5) shows the no-regret NbS for the Czech FRR Krasna Lipa and the Bohemian Switzerland National Park.

Table 5:   Identified no-regret NbS for the Czech FRR

FRR: CZECHIA			
No-regret NbS	**Potential obstacles that could still hinder the implementation**	**Ranking of the suitability of the NbS measure**	**Comments**
Small size retention ponds	• Effects depend on location and size	🙂 🙂 😐(circled) 🙁 🙁	Might be regret solution depending on the realization
Closing drainage ditches		😃(circled) 🙂 😐 🙁 🙁	
Bioswales		🙂 🙂(circled) 😐 🙁 🙁	On municipal properties – than easy to implement
Unsealing surfaces		😃(circled) 🙂 😐 🙁 🙁	

3.5 Italy

In Table 6, the workshop results of the Italian FRR are presented. For the Italian FRR the probability of an implementation of the identified no-regret NbS was not performed.

Table 6:   Identified no-regret NbS for the Italian FRR

No-regret NbS	Potential obstacles that could still hinder the implementation	Ranking of the suitability of the NbS measure	Comments
FRR: ITALY			
Dune	• Availability of land • Authorization process	😀🙂😐☹️😦	
Salicornia	• Knowledge of owners • Availability of land	😀🙂😐☹️😦	
Planting of deep-rooting plants to strengthen the river embankment	• Selecting plants that can withstand salt and freshwater	😀🙂😐☹️😦	

3.6 Romania

Table 7 shows the results of the Romanian FRR, the upper Timis river. The Romanian FRR also listed no-regret NbS for each of the hotspots identified during the first part of the workshop (see D1.7).

Table 7: Identified no-regret NbS for the Romanian FRR

FRR: ROMANIA				
Location	**No-regret NbS**	**Potential obstacles that could still hinder the implementation**	**Ranking of the suitability of the NbS measure**	**Comments**
Lugoj	Riparian Buffer Zone	• Requires public and private land	😀 🙂 😐 🙁 ☹️	
	Retention Ponds	• Land property rights (private land)	😀 🙂 😐 🙁 ☹️	
	Re-connection of floodplains	• Land property rights (private land) • Financial	😀 🙂 😐 🙁 ☹️	
Daicoviciu	Re-connection of floodplains	• Willingness of the landowner to implement on their private property	😀 🙂 😐 🙁 ☹️	
	Restoration of natural river courses		😀 🙂 😐 🙁 ☹️	
	Creation of retention areas	• Willingness of the landowner to implement on their private property	😀 🙂 😐 🙁 ☹️	
	Riparian buffer zone	• Willingness of the landowner to implement on their private property	😀 🙂 😐 🙁 ☹️	
Caransebej	Slope vegetation	• Private land	😀 🙂 😐 🙁 ☹️	
	Green Roofs	• Just for new buildings	😀 🙂 😐 🙁 ☹️	Low probability of implementation
	Reforestation	• Private land	😀 🙂 😐 🙁 ☹️	

4. Stakeholder preferred no-regret NbS

Based on the discussed implementation obstacles and the probability of implementation, the FRR and their tandem academic partner decided on no-regret NbS that are preferred to be implemented in their region within the LAND4CLIMATE project. In the following tables, all identified preferred no-regret NbS for the FRR are listed, starting with the German FRR. The resulting stakeholder preferred no-regret NbS are presented in the same order as the results of the list of no-regret NbS. The Table 8 also contains the climate risks that the measure is intended to address within the FRR, the expected benefits as well as the sector in which the NbS will be implemented.

4.1 Germany

In the following table, the preferred no-regret NbS for the German FRR are presented. The region determined five NbS that they want to implement in their region. With the selected no-regret NbS they want to address the effects of droughts, heat, heavy rain and flooding at the identified hotspots. Their focus within the project lies on the sectors build environment and agriculture.

Table 8:   Preferred no-regret NbS for the German FRR

FRR: GERMANY			
NbS	**Climate Hazard**	**Sector**	**Expected Benefits**
Tiny Forest	• Heat • Heavy Rain • Flood	Build Environment	• Absorb and filter rainwater • Reduce the risk of urban flooding • Provide shade and evaporate cooling • Mitigate the urban heat island
Climate Park	• Heat • Heavy Rain	Build Environment	• Absorb and filter rainwater • Reduce the risk of urban flooding • Provide shade and evaporate cooling • Mitigate the urban heat island
Miscanthus	• Drought • Heavy Rain	Agriculture	• Water retention and infiltration • Biodiversity • Soil erosion • Less transpiration
Bioswales	• Heat • Heavy Rain	Build Environment	• Water runoff • Infiltration • Temperature reduction • Mitigate urban heat islands
Rain gardens	• Heat • Heavy Rain	Build Environment	• Water runoff • Infiltration • Temperature reduction • Mitigate urban heat islands

4.2 Austria

Table 9 shows the preferred no-regret NbS of the Austrian FRR. Within the LAND4CLIMATE project the Austrian project partners want to concentrate on addressing the effects of heavy rain, drought, soil erosion on the agricultural sector with the selected no-regret NbS.

Table 9:   Preferred no-regret NbS for the Austrian FRR

FRR: AUSTRIA			
NbS	**Climate Hazard**	**Sector**	**Expected Benefits**
Hedges	• Heavy Rain • Drought • Soil Erosion	Agriculture	• Protection against wind erosion • Increased biodiversity • Better micro climate
Vegetated buffer stripes	• Heavy Rain • Drought • Soil Erosion	Agriculture	• Filters nutrient run-off from farm land • Increased biodiversity
Agroforestry	• Heavy Rain • Drought • Soil Erosion	Agriculture	• Protection against soil erosion • Increased infiltration • Better micro climate • can be economically beneficial, if forest is used for the wood

4.3 Slovakia

In the table below (Table 10) the resulting preferred no-regret NbS of the Slovakian FRR are presented. The Slovakian project partners intend to implement NbS at five locations within the FRR. With their preferred no-regret NbS they intend to address the impacts of various climate risks on the agricultural and forestry sector and rivers.

Table 10: Preferred no-regret NbS for the Slovakian FRR

FRR: SLOVAKIA			
NbS	**Climate Hazard**	**Sector**	**Expected Benefits**
Water retention pits	• Heavy Rain • Flood • Erosion	Agriculture	• Water resource • Increased crop yield • Reduction of sensible heat and heat • Carbon Sequestration
Check dams	• Drought • Erosion • Flood	Forest / Agriculture	• Water retention and resource • Decrease of temperature • Provide water in droughts • Improved growth of planted trees and increased fruit production
Surface drains	• Flood • Heavy Rain • Erosion	Forest / Agriculture	• Water storage and resource • Increased vapor • Increased crop yields • Sensible and summer heat reduction • Carbon sequestration • Fertilizing soil
Contour trenches	• Drought • Soil erosion • Heavy Rain	Agriculture	• Reduction of temperatures and increased steam • Carbon sequestration • Crop increase • Water retention • Biodiversity support • Creation of water resources and increasing flows • Fertilizing soil
Wetlands	• Drought • Soil erosion	Forest / Agriculture	• Biodiversity • Support of carbon sequestration • Increased evaporation and thermoregulation • Water retention • Drought prevention • Fertilizing soil
River remeandering	• Flood • Heavy Rain • Erosion	River	• Water retention • Increased vapor

4.4 Czechia

Table 11 shows the preferred no-regret NbS of the FRR in Czechia. The focus of the selected NbS lies in addressing the effects of heat, drought, heavy rain and floods within the build environment and the forestry sector.

Table 11: Preferred no-regret NbS for the Czech FRR

FRR: CZECHIA			
NbS	**Climate Hazard**	**Sector**	**Expected Benefits**
Small retention ponds	• Heavy Rain • Heat	Build Environment	• Slows down runoff • Decreases temperature • Increases biodiversity
Closing drainage ditches	• Drought • Heavy Rain	Forest	• Water retention • Groundwater refill • Slow-down outflow
Bioswales	• Heavy Rain • Floods	Build Environment	• Slows down runoff • Infiltration
Unsealing of surfaces	• Heavy Rain • Floods	Build Environment	• Water infiltration

4.5 Italy

The following table (Table 12) shows the preferred no-regret NbS for the FRR in Italy, the only FRR located at the coast. With their three identified preferred no-regret NbS the Italian FRR intends to mitigate the effects of storm surges, avulsions as well as salt intrusion and flooding at the coast, river and within the agricultural sector.

Table 12: Preferred no-regret NbS for the Italian FRR

FRR: ITALY			
NbS	**Climate Hazard**	**Sector**	**Expected Benefits**
Dune	• Storm Surge • Avulsion	Coast	• Prevent inundation • Increases biodiversity
Salicornia	• Saltwater intrusion (rising in case of droughts)	Agriculture	• Irrigation with groundwater remains possible • Maintain agricultural practice • Salicornia can be sold on the market
Deep-rooted plants	• Flooding	River	• Strengthening of the river embankment • Serving river and coastal floods

4.6 Romania

The resulting preferred no-regret NbS selected by the Romanian FRR are presented in Table 13. With the chosen NbS the Romanian FRR wants to address the effects of the climate hazards heat, drought, heavy rain and flooding within their region on the build environment and rivers.

Table 13: Preferred no-regret NbS for the Romanian FRR

FRR: ROMANIA			
NbS	**Climate Hazard**	**Sector**	**Expected Benefits**
Riparian Buffer Zone	• Heat • Heavy Rain • Flood • Hydrological Drought	River	• Reduces flooding risk • Supports drought/heatwaves mitigation • Improves water policy • Increases biodiversity • Increases water quality
Retention Ponds	• Heat • Heavy Rain • Flood	Build Environment	
Re-connection of floodplains	• Heavy Rain • Flood	River	• Reduces flood risk • Promotes filtration of pollutants
Creation of retention areas	• Heat • Heavy Rain • Flood	River	• Reduces Heat waves • Reduces flooding • Improves biodiversity • Improves air quality
Green Roofs	• Heat	Build Environment	• Mitigates heat waves • Improves air quality
Reforestation	• Heat	Build Environment	• Reduces heat waves

Conclusions

The deliverable described the workshop concept used to collaboratively develop ideas for stakeholder preferred no-regret NbS that can have positive effects on the livelihoods and ecosystems of a region, regardless of the changing climate or other developments in a region. During the workshop, which took place at the third consortium meeting in Timisoara (Romania), a list of no-regret NbS that could mitigate the effects of hydrometeorological climate hazards such as heat, drought, floods and heavy rainfall at previously identified hotspots was created for each FRR. Based on the list of no-regret NbS, all regions could select preferred no-regret NbS to be implemented in the FRR as part of the LAND4CLIMATE project.

The CRA and the identified hotspots provide a valuable foundation for identifying no-regret NbS. However, it is important to note that the CRA alone would be inadequate to reach this goal. The workshop participants need in-depth knowledge of the region to identify strengths and weaknesses as well as potential implementation obstacles. A transfer of the no-regret NbS identification process to another regions for upscaling is feasible under the conditions mentioned. The results of this deliverable serve as a basis for the "Effectiveness and efficiency assessment of NBS" activity of the project (WP2), in which the effectiveness and efficiency of the selected measures will be examined at the location where the measure is to be implemented.

References

Holtkötter, S.; Tholen, A.; Freyer, J.; Gargiulo, F.; Ruggieri, P. (2024): Climate risk analysis – front-runner regions (LAND4CLIMATE Deliverable 1.3)

Freyer, J.; Bonduelle, G.; Klopries, E.; Holtkötter, S.; Tholen, A. (2024): Report stakeholder work-shops on cause-effect relations and potential systemic effects – FRR (LAND4CLIMATE Deliverale 1.7)

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