ITEA Project 22014 -Natural Disaster and Risk Assessment Platform

D1.1 Pilot Project Identification (location, use case and key stakeholders)

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VERSION HISTORY

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

1 Introduction

As a part of NADIR project, there are 3 pilot projects and each one has an identified use case around the natural disasters and the associated risks namely Wildfires, Landslides and Algae Bloom. The participants for each Pilot Project have identified the specific area where they would focus on primarily for the projects. Each of them would mainly have their local authority/municipality as their stakeholders. The stakeholders also include the funding agencies that will participate in the pilot site demonstrations and provide funding support for the stakeholders involved in the pilot projects (if/as required) and could provide sustainable funding for the longer-term NADIR related operations if the pilot demonstrations are successful.

2 Work Package Context

This work package relates to identifying the specific sites, use cases and requirements for the pilot demonstration projects and foster a strong collaborative multi-actor community to support this activity that are the stakeholders for the disaster management operations and services in the pilot site locations. The stakeholders also include the funding agencies. There are 3 pilot demonstration projects planned in the following locations: Portugal, Romania and Korea. Each will have their own specific focus on specific information products to support improved disaster preparations and improved management of disaster events that help to minimize the impacts of the disaster.

3 Pilot Project Details

3.1 Pilot Project 1: Wildfire Risk assessment

3.1.1 Overview

Lead: DragonPraxis (with OPT and ISEP participating)
Location: Sever do Vouga, Portugal (further engagement of two contiguous municipalities, Oliveira de Frades and Vouzela).
Use Case: Wildfire risk assessment and classification, wildfire detection and first response and collaborative training
Key Stakeholders: Municipality of Sever do Vouga, Agency for the Integrated Management of Rural Fire (AGIF)

3.1.2 Details

Pilot Project 1 for Wildfire Risk assessment is led by DragonPraxis, with the participation of OPT and ISEP, and focuses on the development and validation of advanced capabilities for wildfire risk assessment, detection, and response within the broader scope of the NADIR platform.
The pilot will be implemented in the municipality of Sever do Vouga, Portugal, with the potential extension of activities to neighbouring municipalities, namely Oliveira de Frades and Vouzela. This geographic area has been selected due to its high exposure to wildfire risk and its representativeness of complex rural and forested environments typical of Southern Europe.
The primary use case addressed in this pilot concerns wildfire risk assessment and classification, early detection of wildfire events, and support to first response operations, including collaborative training scenarios involving relevant stakeholders. A central objective of this use case is the development and validation of wildfire detection capabilities using Unmanned Aerial Vehicles (UAVs), integrated with satellite

data and ground-based information. The use of UAVs is expected to enhance detection speed, increase spatial resolution of observations, and enable flexible and targeted monitoring of high-risk areas, thereby improving situational awareness and supporting faster and more effective response actions.

A comprehensive study of the area of operations was conducted to support the selection and validation of the pilot location. This assessment combined geospatial analysis using QGIS and open data sources with on-site reconnaissance activities. Field visits were carried out to evaluate accessibility conditions, assess vegetation characteristics, and collect qualitative insights from local stakeholders. Panoramic photographic records were also produced to support the evaluation of potential aerial operation routes, particularly in the context of UAV-based missions.

The analysis considered a wide range of environmental and operational factors, including administrative boundaries, topography and terrain morphology, land use and land cover, vegetation density and typology, soil characteristics, prevailing wind patterns and potential orographic effects, road infrastructure, high-voltage power lines, and meteorological conditions such as temperature, precipitation and drought patterns. This multi-criteria approach ensured a robust and comprehensive characterization of the operational context, particularly with regard to the feasibility and safety of UAV operations.

Results of the assessment indicate that the municipality of Sever do Vouga presents a spatial configuration characterized by dispersed settlements embedded within extensive and continuous forest areas. The northern part of the territory is structured along a north–south orientation, transitioning to an east–west configuration in the southern sector. The overall area is classified as having high wildfire susceptibility, making it particularly suitable for the implementation of this pilot project.

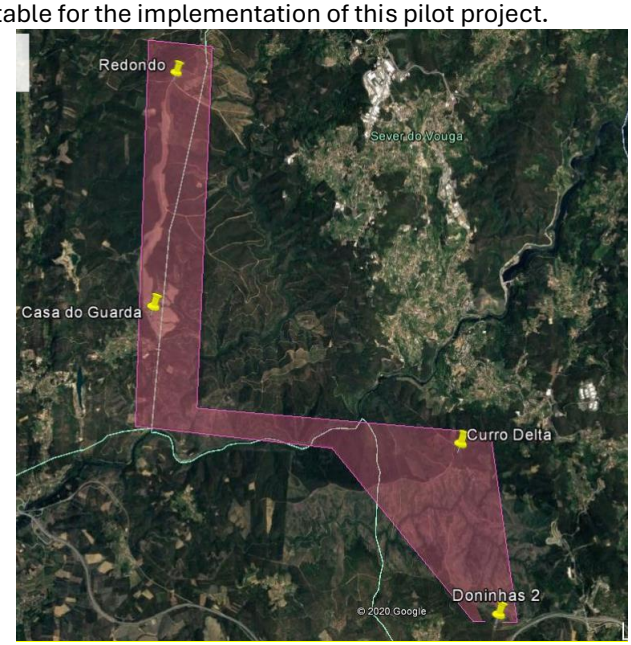

Figure 1. L-shaped corridor

A relevant feature identified during the analysis is an L-shaped corridor of low vegetation extending across the Redondo–CasadoGuarda–Curro alignment (Figure 1). This natural corridor provides favourable conditions for defining low-risk aerial routes for UAV operations, allowing safe overflight of forested areas while enabling correlation with satellite data. The use of this corridor also reduces exposure to potentially adverse wind conditions associated with orographic effects. Only one major road with significant traffic, the N16 national road, is expected to require crossing, which can be managed through appropriate operational planning.

Additionally, several areas of low shrub vegetation and natural clearings were identified, which may serve as contingency or emergency landing zones for UAVs. The southwestern sector of the municipality was identified as the most suitable area for flight operations, due to its lower population density, smoother terrain, extensive forest coverage, and more stable wind conditions.

Figure 2. Initial flight zone

Based on these findings, an initial flight zone (Figure 2) has been defined, with the possibility of expanding the operational area as the pilot progresses. To ensure safe and effective implementation, several recommendations have been identified. These include the need to involve neighbouring municipalities, particularly Albergaria-a-Velha and Águeda, in order to ensure coordinated planning and operational alignment. Furthermore, the installation of at least three meteorological stations within the municipality of Sever do Vouga is recommended to enable real-time monitoring of wind conditions, which are critical for UAV flight operations.

3.2 Pilot Project 2: Landslides Early Warning System

3.2.1 Overview

Lead: BEIA (with ABB Participating)
Location: Romania (Danube River watershed)
Use Case: Landslides
Key Stakeholders: to be established during the project

3.2.2 Details

BEIA is the lead on this Pilot Project for Landslides. They will contribute with experience in disaster early warning for landslides using its time critical cloud telemetry platform and innovative acoustic sensors.

3.2.2.1 *Landslides: Factors and Triggering Conditions*

Table 1 Landslides: Factors and Triggering Conditions

	Factor	Critical Condition
Core Factors	Intense/Prolonged Rainfall.	Heavy rain infiltrates the soil, reducing suction (water cohesion), increasing pore water pressure, and causing saturation, which allows the slope to lose stability
	Earthquakes:	Strong shaking destabilizes slopes directly; triggers soil liquefaction and creates new cracks. Earthquake-induced landslides happen on steep slopes, with risk persisting after the event due to weakened material
	Rapid Snowmelt:	Fast melting of snow (combined with rain) adds significant, volumes of water to the soil.
	Volcanic Activity:	Eruptions deposit loose ash on steep slopes, which can be transported as debris flows (lahars) during rainfall, along with the seismic activity triggering slope failures.
Geological & Topographical	Slope Steepness:	Steeper slopes (typically 15°–45°) are more vulnerable to gravitational failure.
	Weak Lithology:	Certain rock types, fractured metamorphic rocks (schist, phyllite) or poorly cemented sedimentary rocks, are more prone to failure, particularly if bedding planes align with the slope.
	Erosion:	Natural undercutting of slopes by rivers or ocean waves destroys the stability of the slope toe.
	Weathering:	Chemical and physical weathering (e.g., freeze-thaw cycles) break down rock strength, turning rock into loose debris.
Human	Deforestation/Vegetation Removal	Trees and deep-rooted vegetation stabilize soil; their removal reduces binding force and increases soil moisture.
	Slope Excavation/Modification:	Cutting into the toe of a slope for roads or building construction removes necessary support.
	Overloading:	Adding heavy structures (buildings, waste piles) or material on top of a slope increases the shear stress.
	Mining & Quarrying:	Create artificial vibrations and instability.
	Artificial Irrigation & Leaking Utilities:	They can unexpectedly saturate ground

	Factor	Critical Condition
Environmental & Climate Conditions	Wildfires:	They destroy vegetation, removing root reinforcement, and can create hydrophobic (water-repellent) soil, reducing infiltration and promoting high surface runoff, leading to debris flows.
	Climate Change:	Increased frequency of extreme weather events, including heavy precipitation and rapid warming (causing snowmelt and permafrost degradation), is increasing landslide frequency and intensity.

3.2.2.2 Types of sensors proposed for monitoring

Table 2 Types of sensors proposed for monitoring

ID	Sensor Name	Use
1	Air temperature	Measures the outside air temperature
2	Air humidity	Measures the outside air humidity
3	Level of precipitation	Monitoring and prediction of level precipitation
4	Wind speed and direction	
5	Barometric air pressure	Measures the air pressure
6	GPS (optional)	Detect the location
7	Accelerometer	Measures the acceleration concerning soil movement
8	Sensor for the acoustic level	Measures the pressure of the sound, furnishes the graphic representation of the sound wave
9	Optical range sensor	Measuring the distance to an uncooperative target, the information being available as a measurement value
10	Geophone	Acoustic detection of ground or snow vibrations due to generated movements

3.3 Pilot Project 3: Algae Bloom Detection

3.3.1 Overview

Lead: NaraSpace
Location: Busan, South Korea
Use Case: Monitor wildfire, floods and algae bloom status
Key Stakeholders: Yeongdo-Gu, Busan Development Institute

3.3.2 Details

Naraspace is self-funded and so far, have worked on finalizing the test site locations. Please find below the criteria for the selection of the locations and the possible locations from which 3 would be finalized for the project.

3.3.2.1 Selection Strategy for Pilot Testing

Three sites in particular will be selected from among the 50 candidate stations listed above to perform the pilot tests. To provide the best data quality and model accuracy, the following three environmental and technological criteria will be dynamically assessed during the selection process:

Cloud Coverage: To provide clean optical imaging, areas with minimum cloud interference will be prioritized during the satellite's flyover.

River/Lake width: The Selection will prefer sites with enough water surface width to optimize the efficiency of optical satellites' spatial resolution while avoiding land-masking interference.

Algae Bloom Status: To validate the NDCI and SABI index sensitivities, sites will be chosen where active algal blooms are discovered or occur regularly (e.g., river exits with weirs).

3.3.2.2 Potential Pilot Test Sites

The following table identifies 50 national algal bloom monitoring stations in South Korea that serve as candidate sites for the NADIR pilot demonstrations. These stations provide critical ground-truth data for calibrating the satellite-based algae bloom detection algorithms, which might be used to inform major stakeholders such as public entities, climate finance institutions, and so on.

Table 3 Potential Pilot Test Sites

No.	Monitoring Station	Location (District, Province)	Managing Agency
1	Nakdong River (Haepyeong)	Seokjeok-eup, Chilgok, Gyeongbuk	Nakdong River Water Environment Center
2	Nakdong River (Chilseo)	Chilbuk-myeon, Haman, Gyeongnam	Nakdong River Water Environment Center
3	Uiam Lake (Sinyeongyo)	Seo-myeon, Chuncheon, Gangwon	Han River Integrated Water Environment Center
4	Han River (Icheon)	Danhyeon-dong, Yeoju, Gyeonggi	Han River Integrated Water Environment Center
5	Daecheong Lake (Muni)	Muni-myeon, Cheongju, Chungbuk	Geum River Water Environment Center
6	Daecheong Lake (Hoenam)	Hoenam-myeon, Boeun, Chungbuk	Geum River Water Environment Center
7	Chungju Lake (In front of Dam)	Jongmin-dong, Chungju, Chungbuk	Wonju Regional Environmental Office
8	Chungju Lake (Hwanggangnaru)	Hansu-myeon, Jecheon, Chungbuk	Wonju Regional Environmental Office
9	Juam Lake (Sinpyeongyo)	Songgwang-myeon, Suncheon, Jeonnam	Yeongsan River Water Environment Center
10	Unmun Lake (In front of Dam)	Unmun-myeon, Cheongdo, Gyeongbuk	Daegu Regional Environmental Office
11	Unmun Lake (Intake Tower 2)	Unmun-myeon, Cheongdo, Gyeongbuk	Daegu Regional Environmental Office
12	Yongdam Lake (In front of Dam)	Ancheon-myeon, Jinan, Jeonbuk	Jeonbuk Regional Environmental Office

No.	Monitoring Station	Location (District, Province)	Managing Agency
13	Yongdam Lake (Intake Tower)	Jeongcheon-myeon, Jinan, Jeonbuk	Jeonbuk Regional Environmental Office
14	Dongbok Lake (Intake Tower)	Dongbok-myeon, Hwasun, Jeonnam	Gwangju Waterworks Headquarters
15	Yeongcheon Lake (Intake Tower)	Jayang-myeon, Yeongcheon, Gyeongbuk	Daegu Regional Environmental Office
16	Jinyang Lake (Naedong)	Gonmyeong-myeon, Sacheon, Gyeongnam	Nakdong River Basin Environmental Office
17	Angye Lake (Intake Tower)	Gangdong-myeon, Gyeongju, Gyeongbuk	Daegu Regional Environmental Office
18	Gongsan Reservoir (Central)	Jimyo-dong, Dong-gu, Daegu	Daegu Waterworks Headquarters
19	Gongsan Reservoir (Intake Tower)	Jimyo-dong, Dong-gu, Daegu	Daegu Waterworks Headquarters
20	Gwanggyo Reservoir (Intake Tower)	Jowon-dong, Suwon, Gyeonggi	Gyeonggi Institute of Health and Environment
21	Chuncheon Lake (Chunseong Bridge)	Sabuk-myeon, Chuncheon, Gangwon	Chuncheon City
22	Okjeong Lake (Chilbo Intake)	Gangjin-myeon, Imsil, Jeonbuk	Jeonbuk Regional Environmental Office
23	Jinjeon Reservoir (Upstream)	Yeonil-eup, Pohang, Gyeongbuk	Gyeongbuk Institute of Health and Environment
24	Jinjeon Reservoir (Downstream)	Yeonil-eup, Pohang, Gyeongbuk	Gyeongbuk Institute of Health and Environment
25	Han River (Gangdong Bridge)	Amsa-dong, Seoul	Seoul Water Institute
26	Han River (Guui)	Guui-dong, Seoul	Seoul Water Institute
27	Han River (Jamsil Railroad Bridge)	Jayang-dong, Seoul	Seoul Water Institute
28	Han River (Gwangjin Bridge)	Pungnap-dong, Seoul	Seoul Water Institute
29	Sayeon Lake (Intake Tower)	Beomseo-eup, Ulju, Ulsan	Nakdong River Basin Environmental Office
30	Sayeon Lake (Banyeon-ri)	Eonyang-eup, Ulju, Ulsan	Nakdong River Basin Environmental Office
31	Hoeya Lake (Intake Tower)	Cheongnyang-eup, Ulju, Ulsan	Ulsan Waterworks Headquarters
32	Hoeya Lake (Spillway)	Cheongnyang-eup, Ulju, Ulsan	Ulsan Waterworks Headquarters
33	Deokdong Lake (In front of Dam)	Deokdong, Gyeongju, Gyeongbuk	Nakdong River Water Environment Center
34	Tamjin Lake (Yuchicheon Confluence)	Jangheung-eup, Jangheung, Jeonnam	Yeongsan River Water Environment Center

No.	Monitoring Station	Location (District, Province)	Managing Agency
35	Boryeong Lake (Intake Tower)	Ungcheon-eup, Boryeong, Chungnam	Geum River Water Environment Center
36	Hoengseong Lake (Intake Tower)	Gapcheon-myeon, Hoengseong, Gangwon	Wonju Regional Environmental Office
37	Paldang Lake (In front of Dam)	Joan-myeon, Namyangju, Gyeonggi	Han River Integrated Water Environment Center
38	Paldang Lake (Buyongsa)	Yangseo-myeon, Yangpyeong, Gyeonggi	Han River Integrated Water Environment Center
39	Paldang Lake (Sambong)	Joan-myeon, Namyangju, Gyeonggi	Han River Integrated Water Environment Center
40	Daecheong Lake (Chudong)	Chu-dong, Dong-gu, Daejeon	Geum River Water Environment Center
41	Nakdong River (Mulgeum/Maeri)	Sangdong-myeon, Gimhae, Gyeongnam	Nakdong River Water Environment Center
42	Chungju Lake (Cheongpung Bridge)	Cheongpung-myeon, Jecheon, Chungbuk	Wonju Regional Environmental Office
43	Dongbok Lake (Midstream)	Iseo-myeon, Hwasun, Jeonnam	Gwangju Waterworks Headquarters
44	Chuncheon Lake (Yongsan Intake)	Seo-myeon, Chuncheon, Gangwon	Chuncheon City
45	Tamjin Lake (In front of Dam)	Busan-myeon, Jangheung, Jeonnam	Yeongsan River Water Environment Center
46	Juam Lake (In front of Dam)	Juam-myeon, Suncheon, Jeonnam	Yeongsan River Water Environment Center
47	Jinyang Lake (Panmun)	Panmun-dong, Jinju, Gyeongnam	Nakdong River Basin Environmental Office
48	Han River (Misa Bridge)	Wabu-eup, Namyangju, Gyeonggi	Seoul Water Institute
49	Nakdong River (Gangjeong/Goryeong)	Dasa-eup, Dalseong, Daegu	Nakdong River Water Environment Center
50	Okjeong Lake (Chilbo Discharge)	Sannae-myeon, Jeongeup, Jeonbuk	Jeonbuk Regional Environmental Office
40	Daecheong Lake (Chudong)	Chu-dong, Dong-gu, Daejeon	Geum River Water Environment Center
41	Nakdong River (Mulgeum/Maeri)	Sangdong-myeon, Gimhae, Gyeongnam	Nakdong River Water Environment Center
42	Chungju Lake (Cheongpung Bridge)	Cheongpung-myeon, Jecheon, Chungbuk	Wonju Regional Environmental Office
43	Dongbok Lake (Midstream)	Iseo-myeon, Hwasun, Jeonnam	Gwangju Waterworks Headquarters
44	Chuncheon Lake (Yongsan Intake)	Seo-myeon, Chuncheon, Gangwon	Chuncheon City
45	Tamjin Lake (In front of Dam)	Busan-myeon, Jangheung, Jeonnam	Yeongsan River Water Environment Center

No.	Monitoring Station	Location (District, Province)	Managing Agency
46	Juam Lake (In front of Dam)	Juam-myeon, Suncheon, Jeonnam	Yeongsan River Water Environment Center
47	Jinyang Lake (Panmun)	Panmun-dong, Jinju, Gyeongnam	Nakdong River Basin Environmental Office
48	Han River (Misa Bridge)	Wabu-eup, Namyangju, Gyeonggi	Seoul Water Institute
49	Nakdong River (Gangjeong/Goryeong)	Dasa-eup, Dalseong, Daegu	Nakdong River Water Environment Center
50	Okjeong Lake (Chilbo Discharge)	Sannae-myeon, Jeongeup, Jeonbuk	Jeonbuk Regional Environmental Office