

# The Role of PP7 MECOnet in ARCA

*IoT Equipment, Sensors, Cameras & Drones for Forest Hazard Monitoring in Montenegro's National Parks*

Organisation name: *MECOnet DOO*

Presenter name: *Prof. dr. Radovan Stojanovic  
Jovan Djurkovic*

**Interreg**



Co-funded by  
the European Union

**ARCA**

**IPA** ADRION

ARCA - ARTificial intelligence platform to prevent Climate change natural hazArds

Agreement No: IPA-ADRION00107 - ARCA

# Agenda

01

## **ARCA Project at a Glance**

*Objectives, consortium and the role of PP7 MECOnet*

02

## **WP1 Progress: Reporting Periods 1-4**

*From procurement strategy to completed equipment procurement*

03

## **Equipment & Procurement Focus**

*IoT sensors, wildfire-detection cameras and LiDAR drone*

04

## **National Park Lovcen: the Pilot Site**

*Forest ecosystem, fire history and sensor siting*

05

## **Institutional Cooperation**

*MoU with National Parks of Montenegro*

06

## **Dissemination & Scientific Output**

*Workshops, conferences and publications*

07

## **Outlook**

*Delivery, installation and next reporting period*

# ARCA at a Glance

*ARTificial intelligence platform to prevent Climate change natural hazArds*

Forest monitoring is vital for planetary health. ARCA develops AI-based services, piloted in wooded areas, to face natural hazards intensified by climate change such as windstorms, wildfires and droughts.

The platform combines wireless sensor networks, video cameras, drones and LiDAR remote sensing to model forest ecosystems and support protected areas such as National Parks and Natura 2000 sites.

- AI & machine learning algorithms to monitor forests and forecast climate adaptation scenarios
- A Decision Support System (DSS) for hazard prevention, resilience and air-quality monitoring
- **Two mobile apps:** real-time tree/forest health monitoring and fleet management
- Cross-border cooperation and knowledge sharing among researchers and stakeholders
- Joint training and dissemination for young people on ecosystem protection

**EUR 1,763,970**

Total project budget

**36 months**

Project duration

**9 partners**

5 countries: Italy, Croatia, Greece,  
North Macedonia, Montenegro,  
Albania, Serbia

**Funded by the INTERREG IPA ADRION Programme**

*PP7 MECOnet leads the Montenegrin pilot, deploying IoT infrastructure in and around Podgorica and Lovcen National Park.*

# The ARCA Consortium

9 partners across the Adriatic-Ionian region

**LP** Italy

## CMCC

Euro-Mediterranean Center on  
Climate Change Foundation

**PP2** Italy

## DHITECH

High-Tech Technological  
District Scarl

**PP3** Croatia

## UNIDU

University of Dubrovnik

**PP4** Croatia

## IRENA

Istrian Regional  
Energy Agency

**PP5** Greece

## Anatoliki S.A.

Organization for  
Local Development

**PP6** North Macedonia

## MKDS

PE National Forests

**PP7** Montenegro

## MECOnet

Mediterranean Excellence in  
Computing and Ontology

**PP8** Albania

## UBT-Albania

Center for Modelling and  
Simulations, UBT Tirana

**PP9** Serbia

## CAD Solutions

CAD Solutions

# PP7 MECOnet: Role in ARCA

*Leading the Montenegrin pilot under Work Package 1 (IoT Infrastructure)*

MECOnet (PP7) is responsible for deploying and validating ARCA's field IoT infrastructure in Montenegro: wireless sensors, video cameras and drones feeding the project's AI platform.

**A1.1**

## **Wireless sensor network design & deployment**

*TreeTalker-type sensors, LoRa/WiFi/GSM connectivity, site planning*

**A1.2**

## **Drones and video cameras**

*LiDAR-equipped drones and outdoor cameras for canopy, hazard and fire detection*

**A1.3**

## **Computing and mobile devices**

*Field and backend devices for data pre-processing and on-site operations*

**A1.4**

## **Test & validation of deployed infrastructure**

*Connectivity, accuracy and environmental-resilience testing protocols*

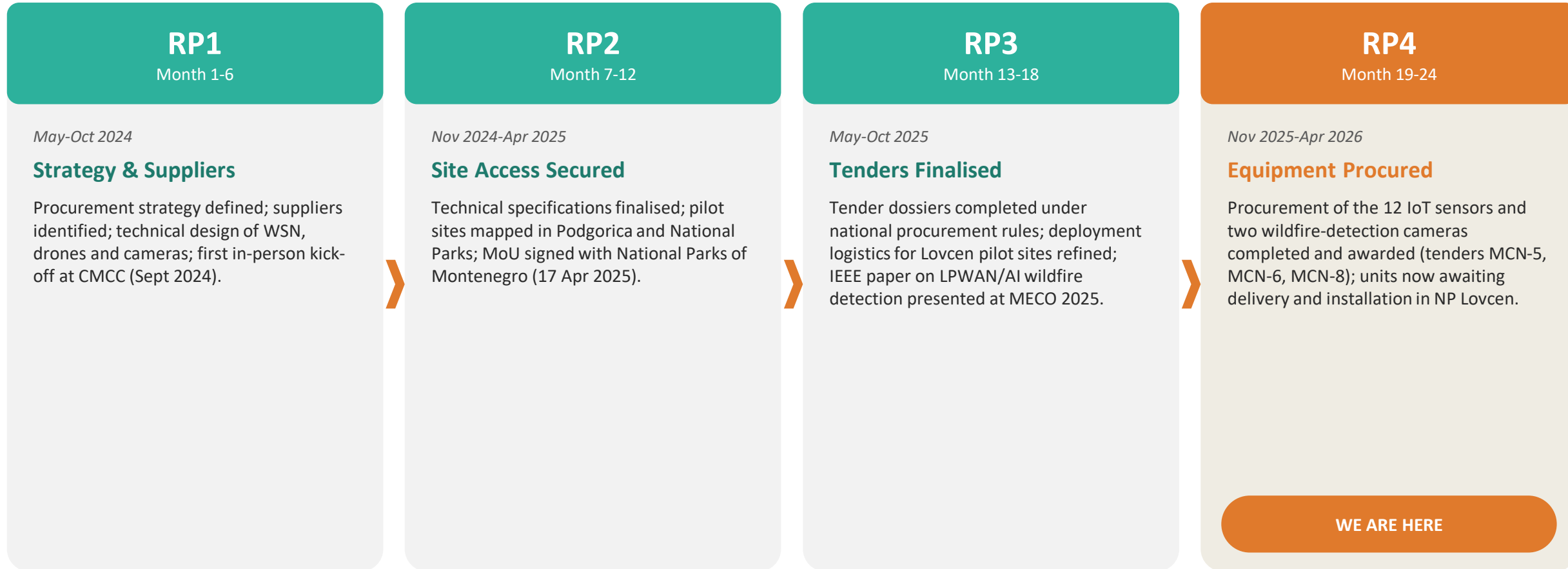
**A1.5**

## **WP1 communication activity**

*Stakeholder engagement, MoU, workshops and dissemination*

# From Planning to Procurement

WP1 progress across Reporting Periods 1-4 (May 2024 - Apr 2026)



*Status at time of this presentation (RP4): procurement of sensors and both wildfire-detection cameras is complete — the project now awaits delivery and on-site installation in NP Lovcen.*

# Equipment & Procurement

PP7's tender campaign for the Montenegrin IoT pilot infrastructure

Between April and May 2026, MECOnet ran a series of public tenders (Ref. IPA-ADRION00107-ARCA / MCN-3 to MCN-8) to equip the Lovcen National Park pilot with sensors and cameras. Three tenders were successful: 12 IoT sensors (MCN-6) and two cameras (MCN-5, MCN-8) are now procured and awaiting installation.

*Note: tender codes MCN-3...MCN-8 are internal contract numbers and are independent of MECOnet's partner number PP7 in the ARCA consortium.*

## MCN-3

12x IoT forest fire  
monitoring sensors

Unsuccessful

## MCN-4

12x IoT forest fire  
monitoring sensors

Unsuccessful

## MCN-5

Outdoor camera  
(Dahua thermal hybrid)

Procured

## MCN-6

12x IoT forest fire  
monitoring sensors

Procured

## MCN-7

LiDAR drone  
recording services

Re-tendering

## MCN-8

Wildfire detection  
system (Hikvision PTZ)

Procured

# IoT Forest Fire Monitoring Sensors

12 TreeTalker units procured, to be installed across 3 sites (4 sensors each)

Tender MCN-6 (procurement complete, RP4) supplied 12 combined IoT forest fire monitoring units, each pairing a TreeTalker Cyber and a TreeTalker Fire device. Powered by LiPo batteries for long-term outdoor deployment, the units mount directly on trees and transmit data to the central platform at least hourly.

1

## TreeTalker Cyber

*Eco-physiological & microclimate monitoring*

- Sap-flow measurement (water transport inside the plant)
- Tree growth and stability parameters
- Air temperature and relative humidity
- Estimated stem moisture content
- CO2 and particulate matter (PM1, PM2.5, PM10)
- VOC and Air Quality Index

2

## TreeTalker Fire

*Fire risk & early detection*

- Infrared thermal array
- Camera for flame and smoke detection
- Foliage temperature
- Feeds early-warning alerts into the AI platform

12

units procured (RP4)

3 sites

selected in NP Lovcen

4 each

sensors per site

# Wildfire Detection Cameras

Two camera systems procured: thermal hybrid bullet camera (MCN-5) and PTZ camera (MCN-8)



## Dahua TPC-BF1241-B7F8-DW-S8

Thermal Network Hybrid Bullet Camera  
Tender MCN-5 — Procured

- **Dual sensor:** thermal (256x192, 7 mm lens) + 4MP visible (8 mm lens)
- Detects people up to ~292 m and vehicles up to ~897 m
- Built-in fire/smoke and excessive-temperature detection with audible/visual alerts
- IP67-rated, PoE powered — suited to unattended outdoor forest deployment
- **Status:** procurement complete (RP4); pending delivery and installation at the selected Lovcen site



## Hikvision DS-2DE5425IWG-K/4G

25x PTZ Network Camera with 4G connectivity  
Tender MCN-8 — Procured

- 4 MP sensor, 25x optical / 16x digital zoom, 4.8-120 mm motorised lens
- IR range up to 150 m for night-time visual confirmation of fire/smoke
- 4G connectivity — supports off-grid deployment without fixed network infrastructure
- 360° pan, smart event detection (line crossing, intrusion, region entry/exit)
- **Status:** procurement complete (RP4); pending delivery and installation at the selected Lovcen site

# National Park Lovcen: Forest Ecosystem

The pilot site for ARCA's Montenegrin IoT deployment

Forests cover 67% of Lovcen National Park (4,189 ha), dominated by beech (*Fagetum montenegrinum montanum*). Endemic Bosnian pine (*Pinus heldreichii*) grows on the highest peaks, Stirovnik and Jezerski vrh.

Beech covers 95% of forest area and 98.6% of total timber volume — but is increasingly degraded and limited in its capacity to withstand climate stress, raising fire and drought risk.

**67%**

of park area is forest  
(4,189 ha)

**72.4%**

of forest area  
is beech

**60%+**

of park area is  
privately owned

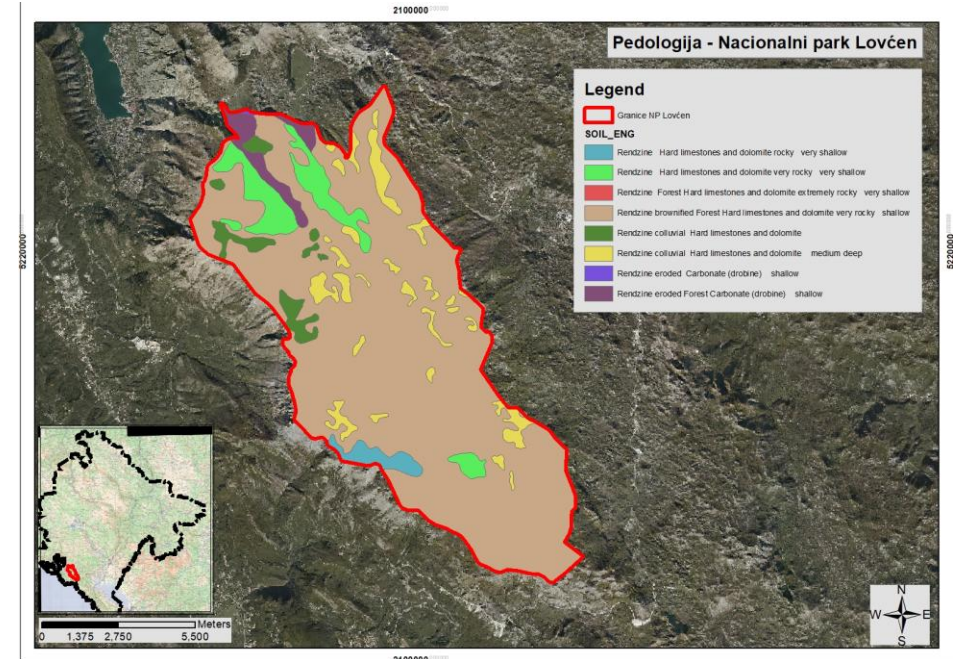
## Land cover breakdown

Forest: 3,225 ha (51.8%)

Forest land: 1,000 ha (16.1%)

Non-forest land: 1,995 ha (32.1%)

**Total park area: 6,220 ha**



Soil map of NP Lovcen — predominantly shallow rendzina on limestone/dolomite, increasing erosion risk after fire

# Fire History Around NP Lovcen (2008–2025)

EFFIS burned-area records confirm the need for early-warning IoT infrastructure

**8,802 ha**

burned in 44 fire events, 2008-2025

**879 ha**

largest single fire (Cetinje, Aug 2011)

**2,952 ha**

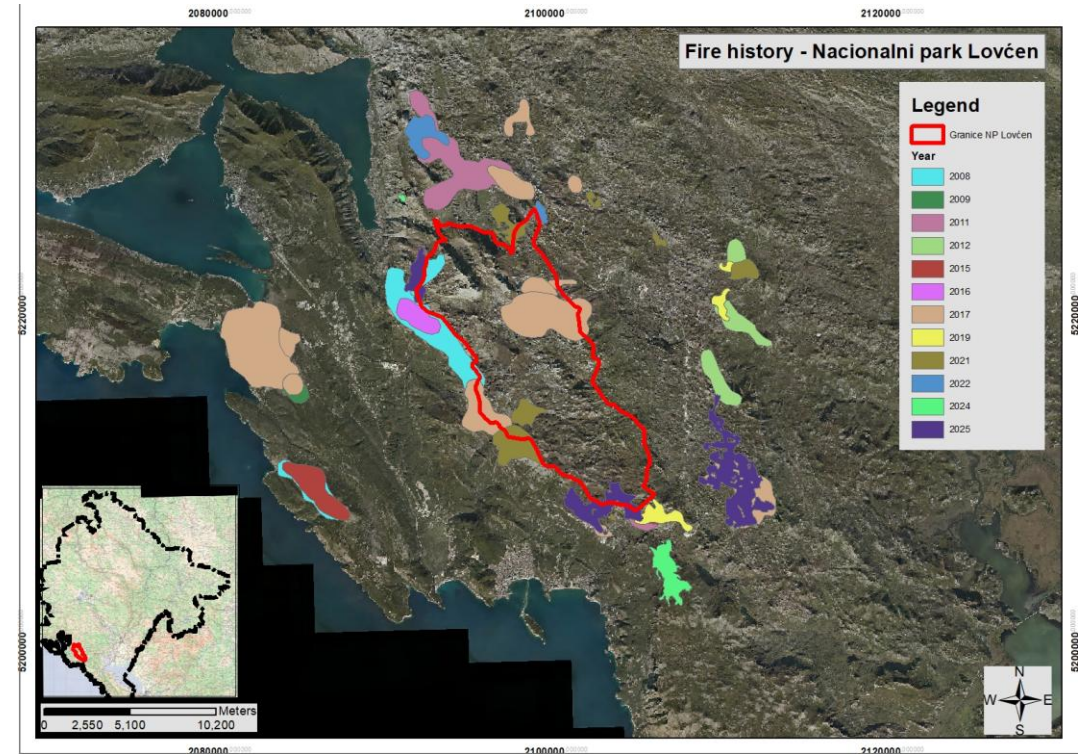
burned in 2017 alone — the worst fire year

## Burned area by municipality

Cetinje: 4,549 ha • Kotor: 1,802 ha

Budva: 1,514 ha • Tivat: 937 ha

~95% of fires are linked to human activity (negligence or deliberate ignition); over 40% have no identified cause — Sanacioni plan, NPCG 2018.



# Siting the Sensor Network in NP Lovcen

Candidate sensor locations mapped jointly with the National Park and University faculty team

Field assessment identified 15 candidate sites along Lovcen's most fire-exposed ridgelines. The 12 procured sensors will be installed across 3 of these clusters, split into 3 categories of 4 units each, matched to terrain and risk profile.

Cat. 1

## Eco-physiological (4)

North-west ridge, near Ivanova Korita — dense beech stands

Cat. 2

## Microclimate (4)

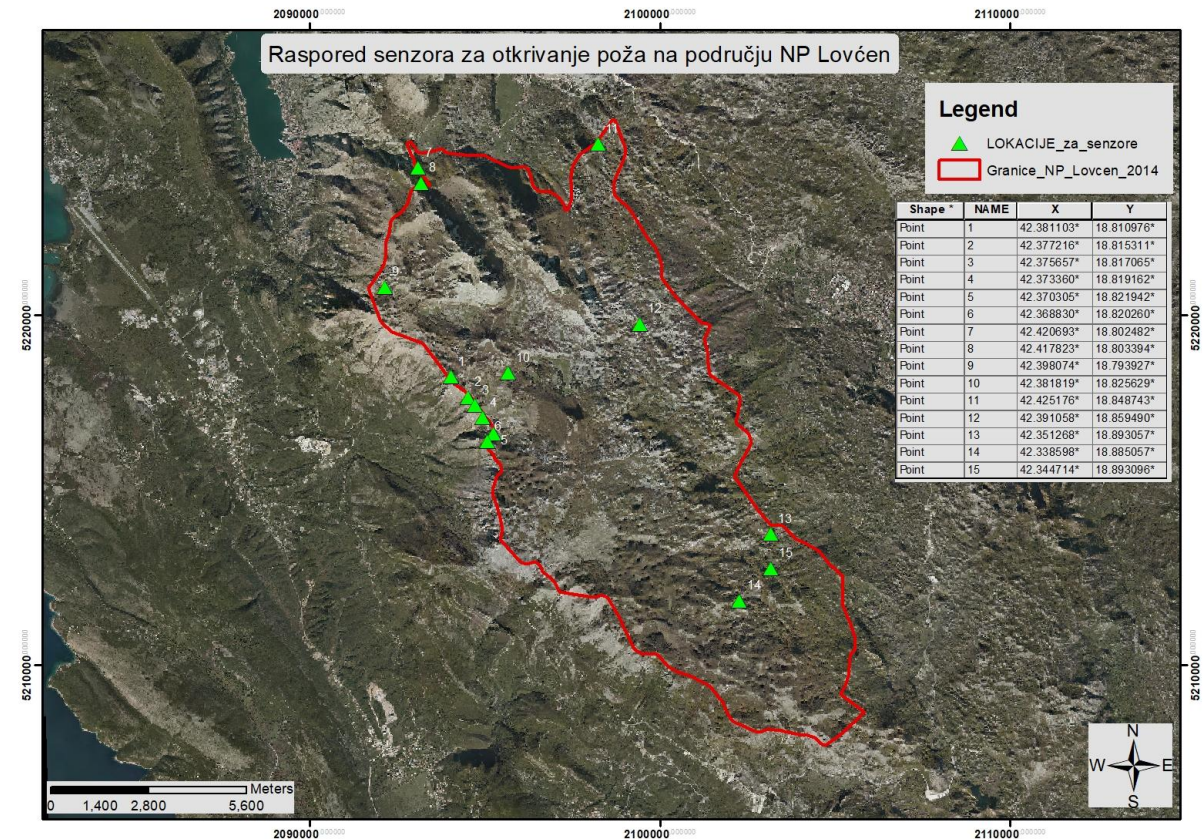
Central plateau, around Jezerski vrh — open exposure to wind/heat

Cat. 3

## Smoke / fire-risk (4)

South-east slopes — closest to historical fire perimeters

Exact coordinates for all 15 candidate points were captured by drone/field survey; final placement of each of the 12 units will be confirmed once LiDAR mapping (tender MCN-7) is complete.



# Institutional Cooperation

*Memorandum of Understanding with the National Parks of Montenegro*

**17 April 2025**

## MoU signed

Signed by prof. dr Radovan Stojanovic (MECOnet) and Marinela Djuretic, Director of National Parks of Montenegro.

### The agreement secures:

- Authorisation to install IoT sensors, cameras and drones at specific National Park locations
- Joint commitment to digital technologies for environmental preservation and disaster prevention
- Cooperation on education and training in innovative monitoring technologies
- Institutional support securing the Lovcen pilot site through the deployment phase

## Why it matters for WP1

Without site access in a protected area, none of the procured equipment — sensors, camera or LiDAR drone — could be legally installed in Lovcen National Park.

### The MoU directly unblocked:

- Site selection for the 15 candidate sensor locations
- Field assessments for terrain & accessibility
- Long-term data-sharing for the ARCA AI platform
- Follow-up meeting in Cetinje (12 Mar 2026) confirming drone use & sensor installation in Lovcen

# Dissemination & Scientific Output

PP7 MECOnet's visibility actions across the ARCA project

Jun 2025

## 1st ARCA Workshop on AI & Climate Change Hazards

*Held at MECO 2025 Conference, Budva*

Jun 2025

## IEEE Xplore publication

*"Integration of Relay-Based LPWAN Network and AI for Wildfires Detection and Prevention" — Stojanovic, Petrovic, Mirto, Aloisio*

Oct 2025

## 11th Balkan Conference in Informatics, Tirana

*"Low-cost edge-enabled sensor system for small farms and households" presented, promoting ARCA*

Jan 2026

## "AIoT-based Drone Systems" lecture

*Joint session with University of Donja Gorica, MoDrone and Burch University on AI-powered drones for forest monitoring*

Feb 2026

## Monitoring visit by Ministry of European Affairs

*Held at MECOnet office, Podgorica*

Mar 2026

## ARCA project meeting, Cetinje Municipality

*Agreement on drone use & sensor installation in Lovcen National Park*

Maz 2026

## Commercial sensors gateway disseminated

*Developed commercial sensors gateway to ARCA system*

Jun 2026

## 2nd ARCA Workshop on AI & Climate Change Hazards

*Research paper: "IoT Gateway for Commercial Smoke Detectors" — Stojanovic, Djurkovic, Mirto, Aloisio*

# Reporting & Financial Progress

PP7 partner reports R1-R3, plus RP4 status (May 2024 - Apr 2026)

	R1 (M1-6)	R2 (M7-12)	R3 (M13-18)	RP4 (M19-24)
<b>Reported so far (EUR)</b>	6,109	23,402	39,981	in progress*
<b>% of total budget</b>	4.2%	16.1%	27.4%	in progress*
<b>Equipment spent</b>	EUR 0	EUR 0	EUR 0	Sensors + cameras procured
<b>Key milestone</b>	Procurement strategy set	MoU signed (17 Apr 2025)	Tenders finalised	Equipment procurement complete

**Budget re-allocation (approved, within 20% flexibility rule):** Equipment budget reduced from EUR 50,000 to EUR 30,000; the difference shifted to Staff Costs and External Expertise to support technical deployment, data-pipeline setup and field testing.

\* RP4 financial figures are pending certification in the next partner report; equipment procurement (sensors and both wildfire-detection cameras) is confirmed complete.

# Outlook: Towards Full Deployment

*What comes next for PP7 MECOnet under WP1*

1

## **Delivery & installation**

*Procurement of the 12 IoT sensors and both wildfire-detection cameras is complete; receive and install all units at the confirmed Lovcen sites*

2

## **LiDAR mapping flights**

*Re-tender and complete 5 LiDAR data-acquisition flights to precisely geo-locate all 12 sensors and model forest structure*

3

## **Connectivity & data pipeline**

*Activate LoRa/WiFi/GSM transmission from Lovcen to the CMCC Data Center in Lecce, Italy*

4

## **Test & validation (A1.4)**

*Run field validation scenarios: wildfire risk, drought stress and connectivity stability*

5

## **Feed WP2 / WP3**

*Hand off live sensor, camera and LiDAR data streams into AI hazard modelling and the Decision Support System*

# Thank you!

**Radovan Stojanovic**

**Jovan Djurković**

MECOnet DOO — [meconet.me@gmail.com](mailto:meconet.me@gmail.com)

*Kralja Nikole 306, Zabjelo, Podgorica, Montenegro*

ARCA — IPA ADRION Interreg Programme | Agreement No: IPA-ADRION00107