

DIONE



DIONE: an integrated EO-based toolbox for modernizing CAP area-based compliance checks and assessing respective environmental impact



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.870378.

Content

- DIONE overview, objectives and concept
- Earth Observation (EO) based area monitoring system
- Geotagged photos and soil property maps
- Environmental performance tool
- DIONE pilots



DIONE FACTS & FIGURES

Implementing an integrated EO-based toolbox for modernising CAP area-based compliance checks and assessing respective environmental impact

8 partners from 5 countries

- Institute of Communication and Computer Systems (Project Coordinator)
- 2 Paying agencies (NPA (Lithuania), CAPO (Cyprus))
- 4 SMEs (SINERGISE, GILAB, CORE, INOSENS) with orientation to EO, ICT fields & agriculture domain
- 2 Research institutes (ICCS, i-BEC)

Duration: 30 months (01/2020 - 06/2022)

EU funding: 1,999,837€



DIONE OBJECTIVES

**BUILDING EO-BASED SYSTEM FOR THE
AUTOMATED MONITORING OF GREEN
DIRECT PAYMENTS**

**DEVELOP AND DEMONSTRATE A -
COMPLEMENTARY TO THE EO DATA-
SYSTEM OF GROUND-BASED GEO-TAGGED
PHOTOS**

**IMPLEMENT A LOW-COST SYSTEM BASED
ON SPECTRAL SENSORS**

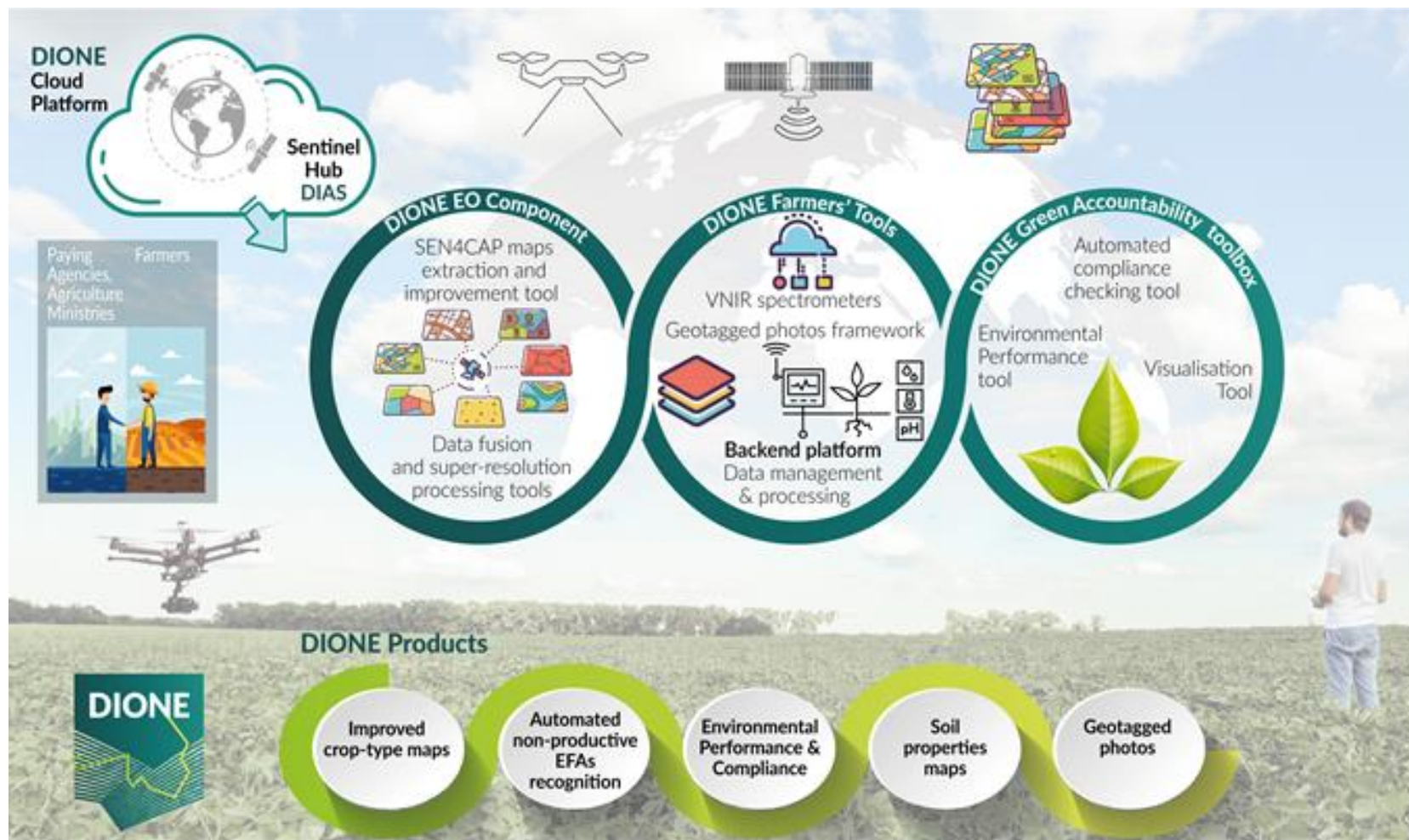


**IMPROVE RESOLUTION OF FREE AND
OPEN SENTINEL DATA**

**INTEGRATE THE RESULTS INTO DIONE
COMPLIANCE MONITORING TOOL**

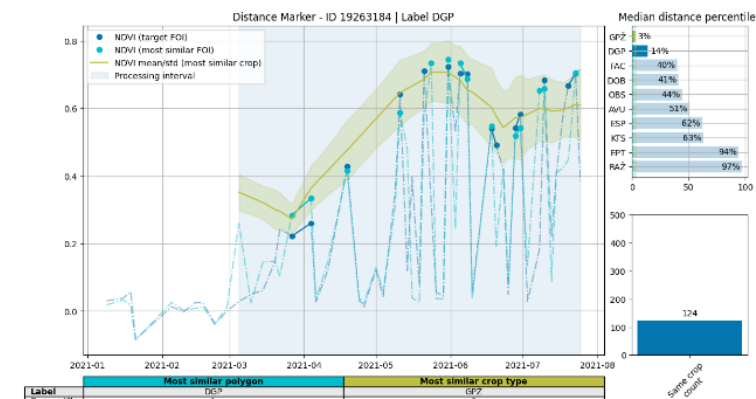
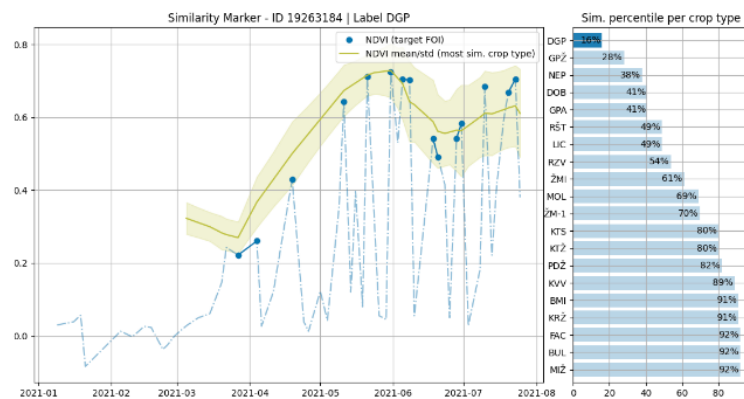
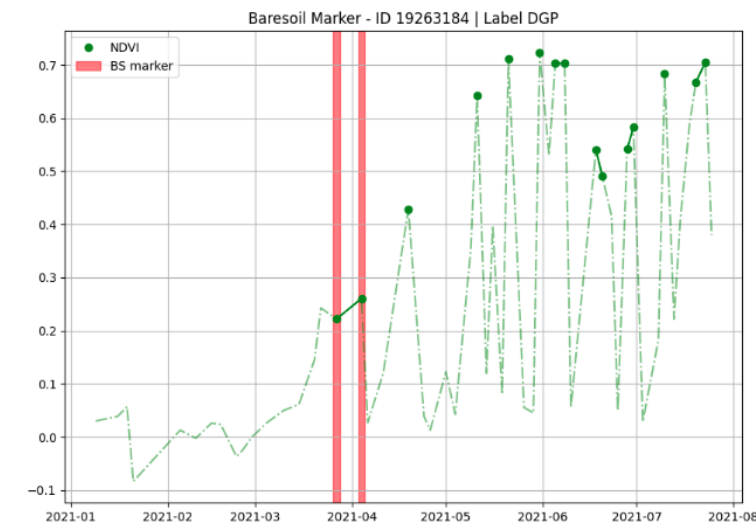
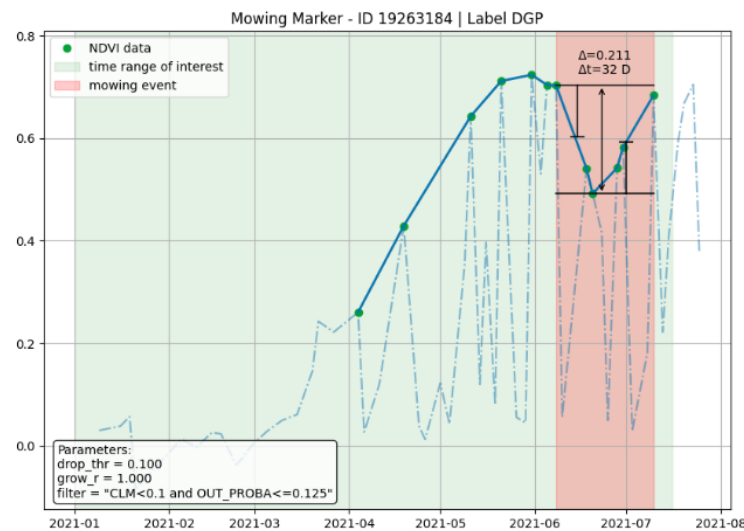
**DESIGN AND IMPLEMENT AN
ENVIRONMENTAL PERFORMANCE TOOL**

DIONE CONCEPT



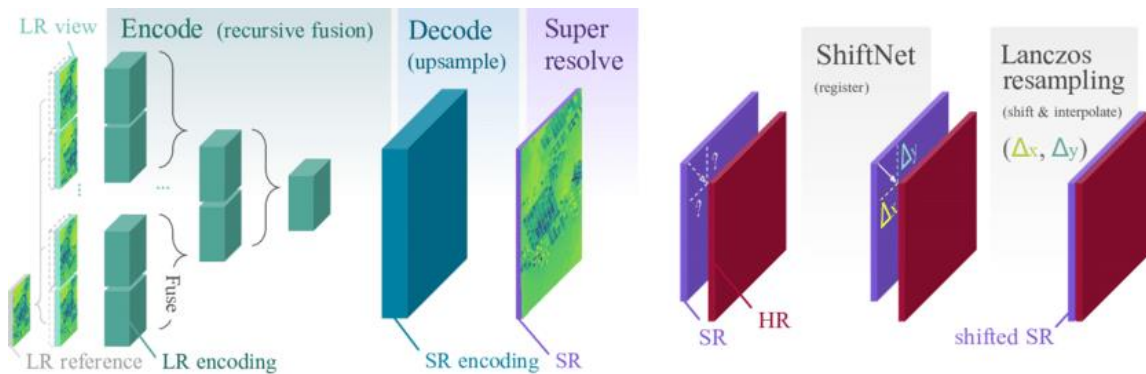
EO BASED AREA MONITORING SYSTEM

- Area monitoring markers
- ✓ Homogeneity marker
 - ✓ Similarity and distance scores
 - ✓ Bare soil marker
 - ✓ Mowing marker
 - ✓ Crop marker
 - ✓ Land marker
 - ✓ Mean NDVI marker



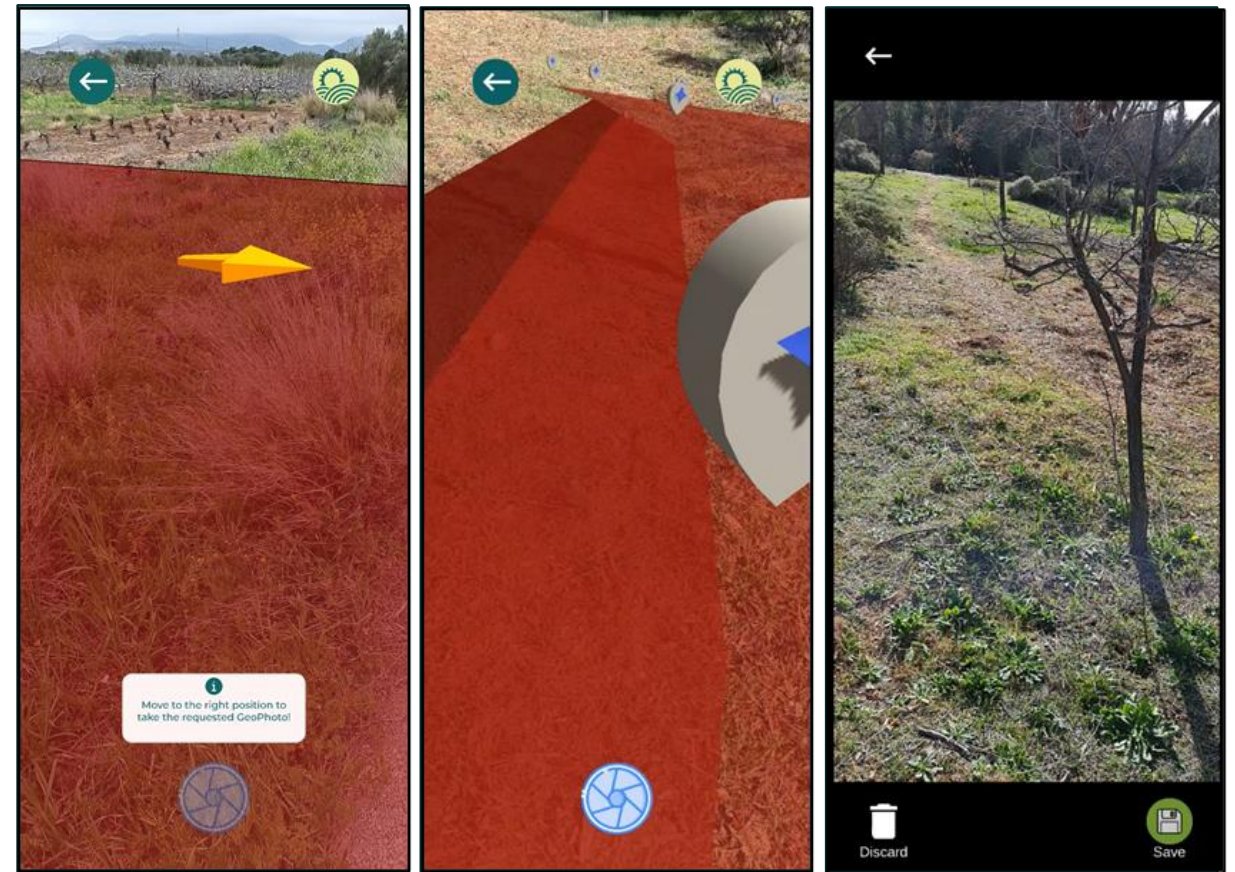
EO BASED AREA MONITORING SYSTEM

- ✓ Deep learning network architectures that enable the augmentation of the coarser resolution bands of Sentinel 2 bands (20, 60m) to the resolution of the finer bands (10m);
- ✓ Combine free and open Sentinel data with high resolution drone and commercial data, using data fusion and super-resolution technologies so that EFA types of increased environmental impact are considered.

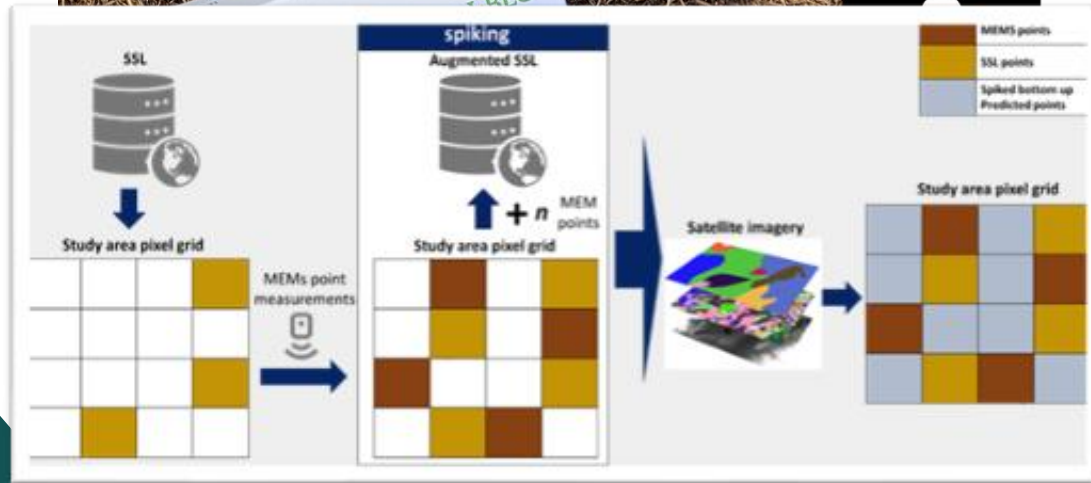


GEOTAGGED PHOTOS FRAMEWORK

- ✓ Navigation to parcel and defined spots
- ✓ Augmented Reality based user guidance
- ✓ Improved location accuracy (i.e. multiple location differentiators, EGNOS Data Access Service)
- ✓ Direct communication with PAs via push notifications - Supporting offline operations
- ✓ Lightweight digital signature scheme, image forensics (i.e. steganography, etc)
- ✓ Time and location integrity (EGNSS clock, OSNMA)
- ✓ Anonymisation of private data in the photos



PORTABLE SOIL SCANNING SYSTEM



- ✓ Low-cost & portable spectral sensor (1750 to 2150 nm)
- ✓ Preprocessing of collected spectra including spectral standardization and outlier and novelty detection
- ✓ Machine learning tools which will transform the raw data collected through the in-situ soil scanning system to appropriate soil properties: SOC, clay, pH and CaCO₃
- ✓ Combination of point measurements with EO imagery towards the delivery of spatially explicit maps (spiked bottom-up approach)

COMPLIANCE MONITORING TOOL

- ✓ Visualisation of parcel boundaries, geotagged photos, biophysical indices (i.e. NDVI, CHL) and markers;
- ✓ Generation of reports on compliance monitoring

- ✓ Showing parcel information in tabular form; request geotagged photos through dedicated forms

- ✓ Layer management, displaying charts for selected location/parcel on the map regarding area monitoring markers

Compliance status

Download report

CROP DIVERSIFICATION ✓

- Less than 10 ha of TAL. ✓
- Declared arable land has eco-certification. If part of declared arable land has no eco-certification and is more than 10 ha, this part of arable land must be compliant with crop-diversification requirements. ✗
- Temporary grassland and/or black or green fallow and/or protein crops covers more than 75%. ✗
- Declared grassland (temporary and permanent) is more than 75% of all declared eligible area. ✗
- In all area declared just perennial plantations. ✗
- More than 50% declared this year of TAL were declared last year, and all declared area last year was growing different crop than this year. ✗
- KTZ, DAK, DAK cover more than 25% of all declared TAL when beneficiary declares less than or equal to 30 ha. And more than 5% of all declared TAL when beneficiary declares more than 30 ha. ✗

ECOLOGICAL FOCUS AREAS ✗

You are exempt from Ecological Focus Area requirements.

- Arable land greater than 15ha? ✗
- More than 75% of the arable land in temporary grass, herbaceous forage, fallow or leguminous crops? ✓
- More than 75% of total land in temporary grass or permanent grass or herbaceous forage? ✓

REQUEST ACTION

Inspecting: Ith_test4 with markers

Inspecting: Ith_inspector

PARCEL VEGETATION PHOTOS MARKERS

Similarity: 100

MOST SIMILAR CROP TO DECLARED ONE - GP2 57%

MV	DAI	AVU	ZM5	KRV	RA2	BUL	BM	BAR	POJ	KTS	ZM1	NEP	RST	TPN	GP2
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MAP

Map settings

Base: [Satellite] [Street View]

Layer: NDVI, CHL, RGB

Photos: [Toggle]

Opacity: [Slider]

October 2020

Su	Mo	Tu	We	Th	Fr	Sa
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

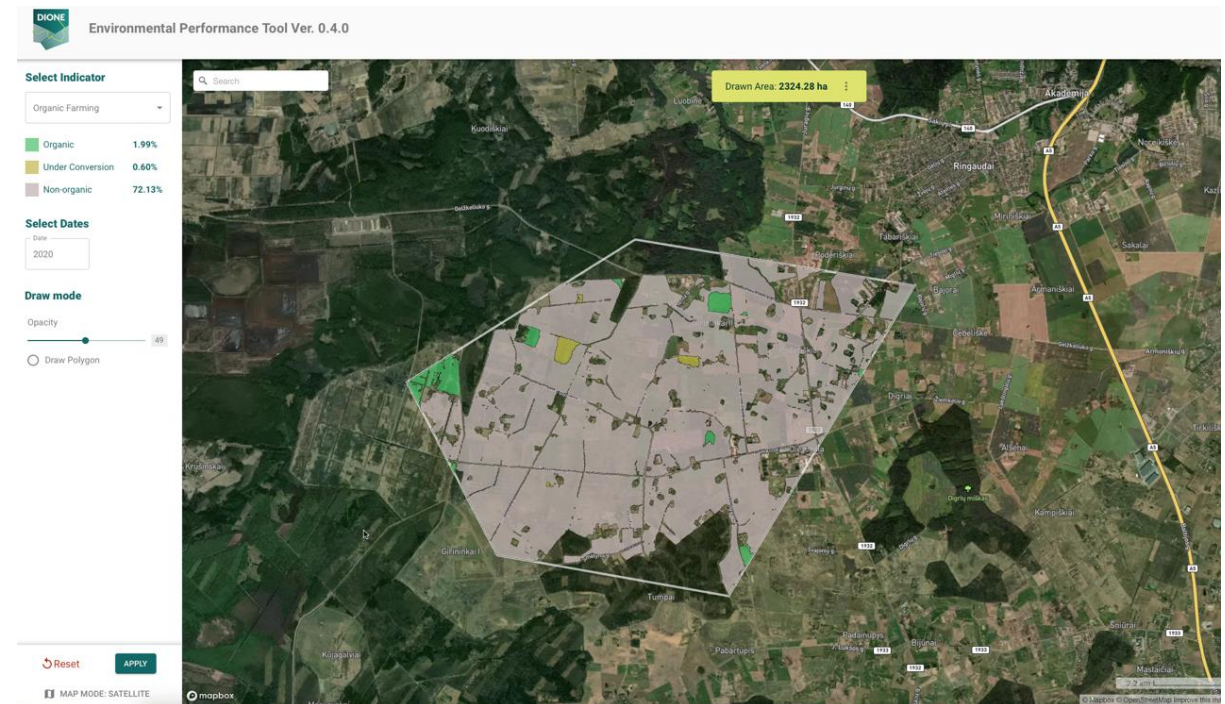
- Capture photos to verify crop diversification. ACTIVE. 18-Dec-2020 17:53
- Capture photos to verify ecological focus areas. ACTIVE. 18-Dec-2020 17:53
- Capture photos to verify ecological focus areas. ACTIVE. 18-Dec-2020 17:50
- Capture photos to verify crop diversification. ACTIVE. 18-Dec-2020 17:19
- Test 3105 Testing task endpoints. RESOLVED. 21-May-2021 10:34
- Demo 2 This is a comment. RESOLVED. 17-Jun-2021 14:47

PARCEL VEGETATION PHOTOS MARKERS

PHOTO ACCEPTED

ENVIRONMENTAL PERFORMANCE TOOL

Environmental priorities	Agri-environmental indicators	Short definition (unit)
Land and soil	Land cover change	Changes in land cover classified by type and size (%)
	Soil erosion	Estimated mean soil erosion rate in ($t\ ha^{-1}\ yr^{-1}$)
	Soil organic matter	Mean organic matter concentration in arable land (g/kg)
Water	Organic farming	Area under organic farming as a ratio of the total utilized agricultural area (UAA)
	Water quality	Chl- α , TSM, Temperature ($^{\circ}C$)
Air quality and climate change	Land irrigation	Irrigated land (ha)
	Greenhouse gases emissions	methane (CH_4), nitrous oxide (N_2O) and carbon dioxide (CO_2)
Protected/vulnerable	HNV farmland	Agricultural areas (ha) under HNV areas
	Natura 2000 areas	Agricultural areas (ha) under Natura 2000 areas



The selected indicators can be used to show progress towards fulfilling the EU standards on good agricultural and environmental condition of land (Good Agricultural and Environmental Conditions)

DIONE PILOTS

LITHUANIA – NPA | CYPRUS - CAPO



DIONE



 DIONE Project

 DIONE Project

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THANK YOU!

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