LIFE Platform meeting
Building Climate-Resilient Agroecosystems in Mediterranean Areas: Lessons from LIFE DESERT-ADAPT

Prof. Simona Castaldi

Università degli Studi della Campania *Luigi Vanvitelli*
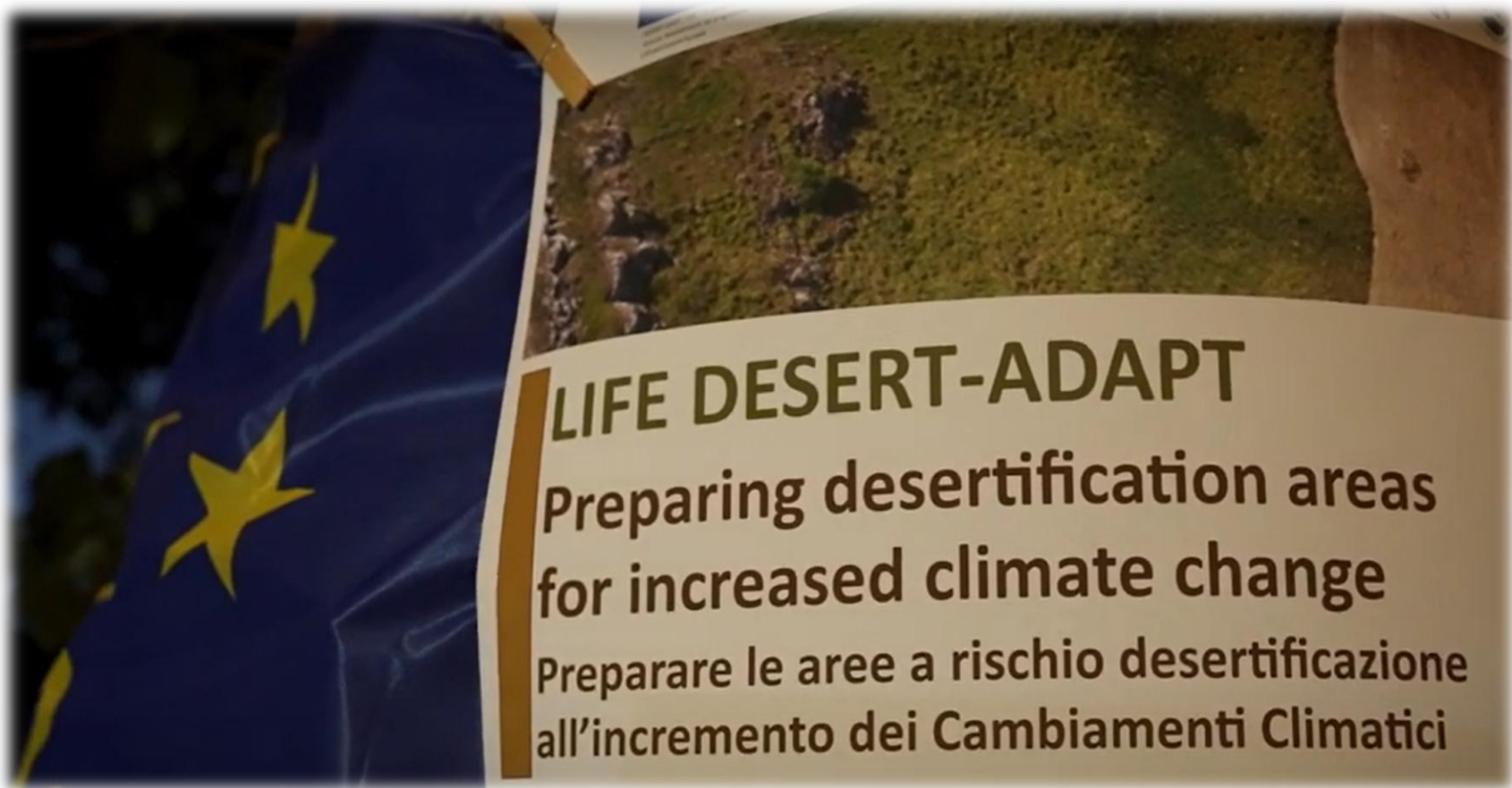
3-4 December 2025

Brussels

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LIFE16 CCA/IT/000011

Italy, Spain, Portugal
01/09/2017 - 01/09/2023
Partners: 19 (9 technical, 10 landowners)
Climate Change Mitigation and Adaptation sub-programme

European Commission

IMAGE

LIFE DESERT-ADAPT
Preparing desertification areas for increased climate change
Preparare le aree a rischio desertificazione all'incremento dei Cambiamenti Climatici
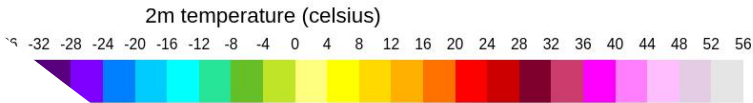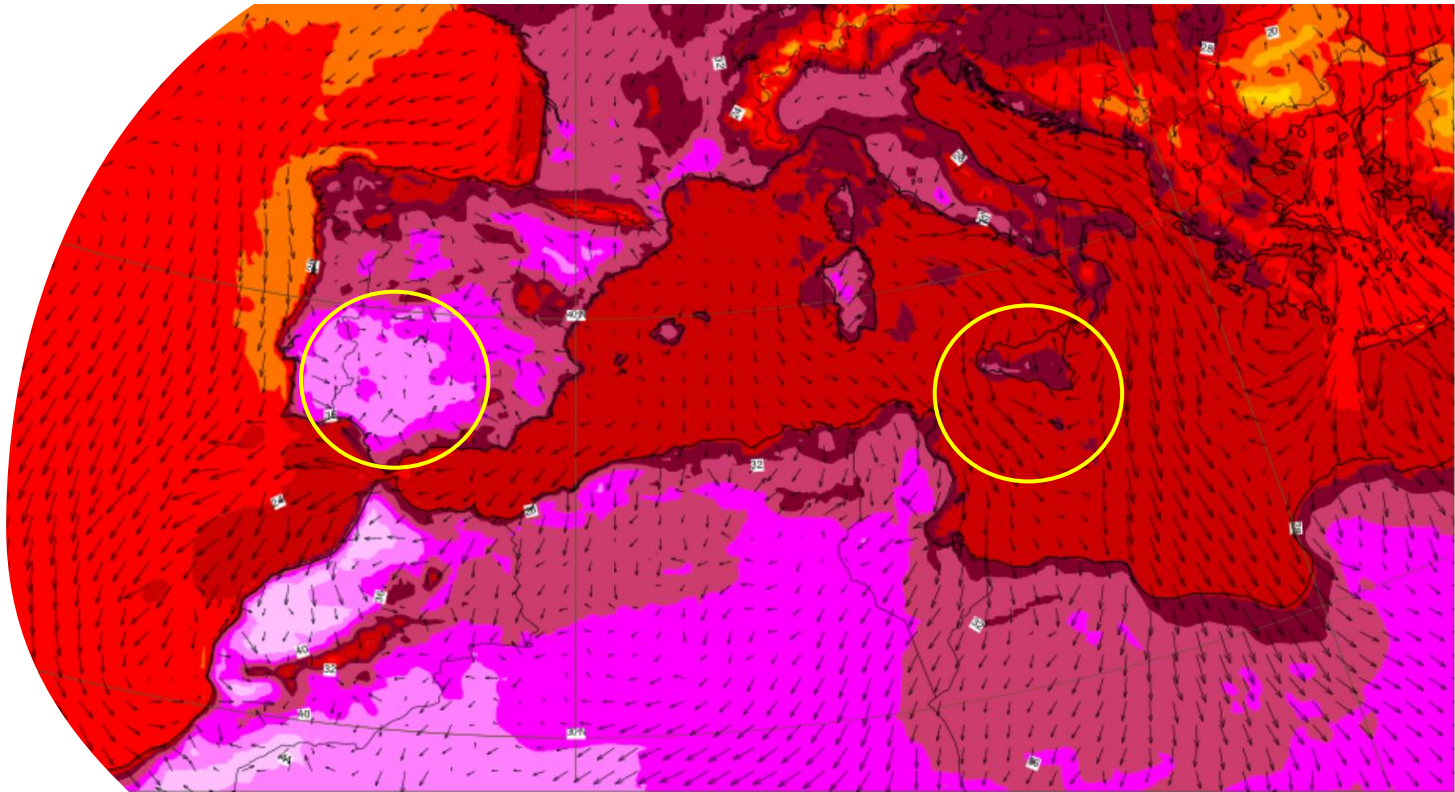
Desert-Adapt
Restore Nature, Change to Adapt

9 sites in IT, SP and PT **1016,18 ha**
10000+ ha adaptation plans

Climatic risk

Land degradation risk

Desertification risk

2m temperature (celsius)

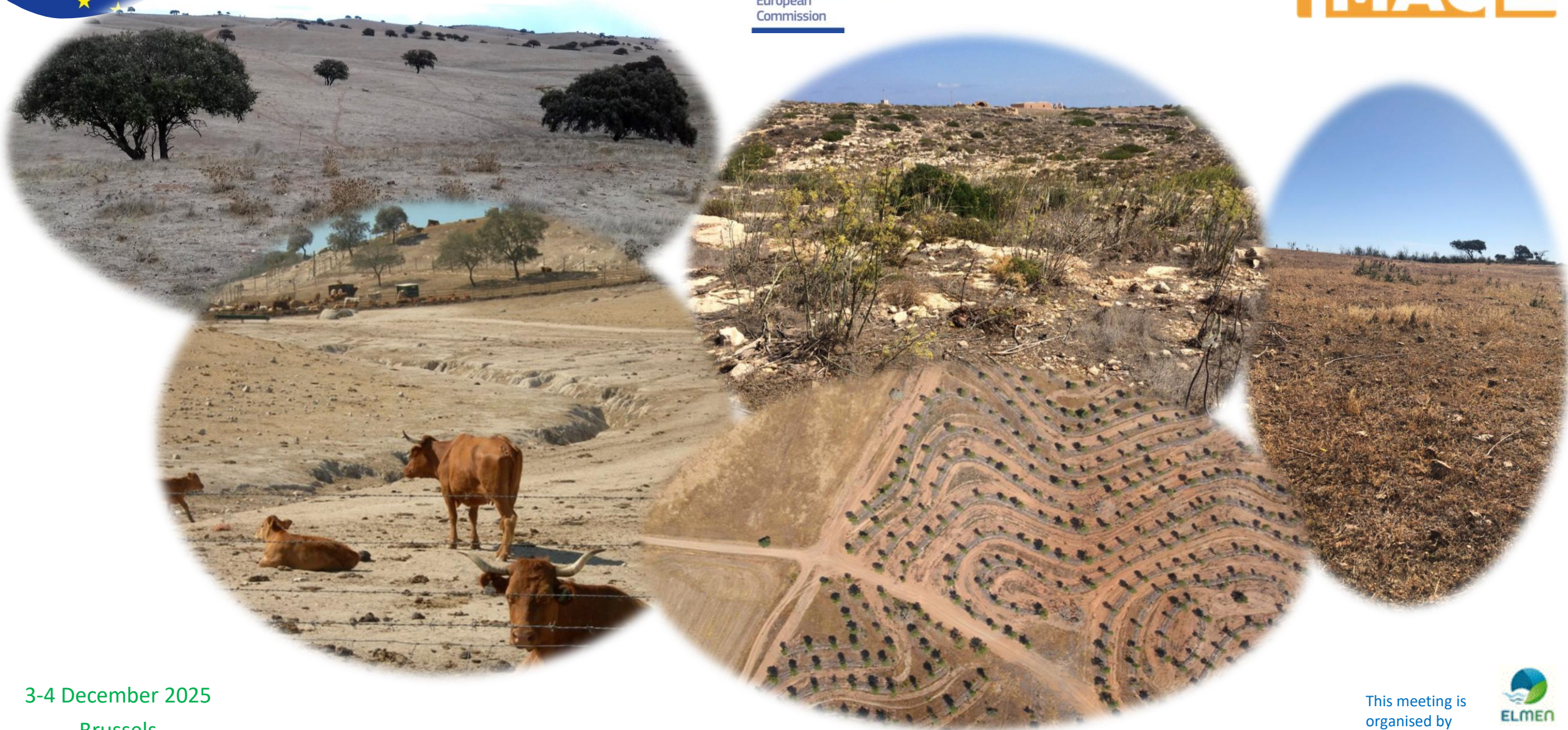-32 -28 -24 -20 -16 -12 -8 -4 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56

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What future?

LOW **SOIL CARBON CONTENT**

LOW **ECOSYSTEM CARBON DENSITY**

LOW **SOIL QUALITY**

LOW **BIODIVERSITY**

LOW **WATER AND NUTRIENT RETENTION**

HIGH **EROSION RISK**

LOW **NATURAL CAPITAL VALUE**

LOW **RESILIENCE**

HIGH **CLIMATIC RISK**

LOW **PRODUCTIVITY**

LOW **ECONOMIC VALUE**

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Middle/long term scenario

Only one way possible

Biodiversity
Crop yield
Hydrology
Plant health
Soil quality
Climate resilience
C savings

ENVIRONMENT

Income
Profitability
Marketing
Production differentiation
Savings

ECONOMY

Job creation
Stakeholder involvement
Knowledge transfer
Replication

SOCIETY

Desertification
Adaptation Model
(Dam)
BENEFITS TO

Core elements of Resilience

Landscape MOSAIC OF functionalities

- o **ECONOMIC**
- o **ENVIRONMENTAL**
- o **SOCIAL**

- ✓ **ADAPTED SPECIES**

- ✓ **ADAPTATION MEASURES**

- ✓ **NATURE-BASED SOLUTIONS**

- ✓ **COST/BENEFIT BALANCE OF FUNCTIONS**

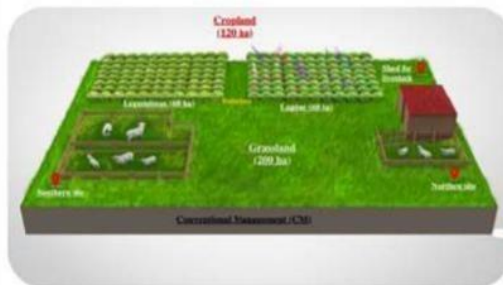This meeting is
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Conflict of interest?

Natural Capital

Economic return

Impacts of shifting from Conventional management (CM) to Multifunctional land use management (MFU)

↓ 75% Soil erosion

↓ 50% Water runoff

↑ 118% Soil organic carbon

↑ 24% Soil water storage

↑ 19% Provisioning services gains

↓ 37% Mitigation costs

↑ 116% Total Economic Value

Desert-Adapt
Restore Nature, Change to Adapt

Cropland (120 ha)

Biodiversity Island (1.43 ha)

Test Area (1.16 ha)

Lupins (25 ha)

Fruit (1.84 ha) Nuts (3.90 ha)

Cereals (25 ha)

Seeded hay (60 ha)

Fodder & Bedding (0.79 ha)

Aromatics (1.41 ha)

Pond for Livestock (2.44 ha)

Grassland (200 ha)

Southern site

Northen site

Shed for livestock

Multifunctional Land Use Management (MFU)

Ishaq et al. 2025 Total Env. Advances 16, https://doi.org/10.1016/j.teadva.2025.200138

European Commission

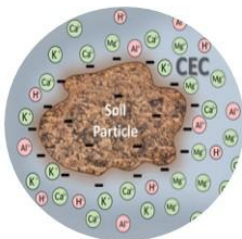This meeting is organised by ELMEN

Soil stewardship and adaptive land management

Ecosystem Services Progresses in 5 years
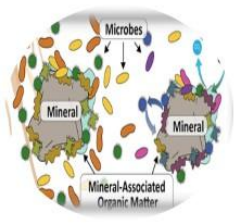
SOIL CARBON
+ 5-10 C tons/ha

CEC
+24-53%

WATER RETENTION
+11-30% WHC

SOIL NITROGEN
+ 44 -120%

FUNGAL BIOMASS
+ 84%

STABLE SOIL C
+ 37-63% MAOM

GRASS PRODUCTIVITY
+3 months of forage

COST SAVING
Reduced external inputs

WIN-WIN options

LCA

36 kg CO_2euq/kg boneless lamb meat

7 kg CO_2euq/kg boneless lamb meat

Soil C offset

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Desert-Adapt in number
LAND AND ENVIRONMENT

Improved land	1016,18 ha covered by DAMs Planted 93.391 trees, shrubs and plants in 132 species	
C sink	C sequestered in the vegetation: 2,1 Tons CO_2/ha/yr	
GHG Reduction	Around and 180 Ton CO_2 sequestered in total on average per year with newly planted trees	
Desertification risk	Reduction of 1 ESA class (Environmentally Sensitive Area to desertification) over areas of intervention	
Soil water resource	2-3% increase of soil water retention capacity 34-66% avoided soil run-off by improved land use 3 folds reduction of plant mortality rates by use of plant growing aids	
Soil quality	52-67% increase of soil C, 53-77% of soil N under adaptation measures 49-59 % increase of aggregate stability under adaptation measures 36-47% increase of nutrient retention (CEC) under adaptation measures	
Biodiversity Taxa Species Indicators Functions	6-18% increase (frequency - intensity) of mychorrizal root colonization Indicator species: +30% more bird species; +29% soil fauna taxa; + 15% QBS, no variations of butterfly Shannon index and 2% variation for Bees shannon index, while no increase in taxa. >30% in soil microbial biodiversity, biomass and functionality	

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In blistering
drought, California
farmers rip up
precious almond
trees

Naturality increases
Resilience

LIFE is the project of people for the people

SENSE OF IDENTITY

COMMON GOAL

BELONGING TO A
PROJECT for «LIFE»

EUROPE IS NOT REMOTE, ABSTRACT, OSTILE

insieme nella sostenibilità con partner

We are Europe

4:13 / 4:43

Scorri per i dettagli

THANKS

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