PRO-GRACE
PROMOTING A PLANT GENETIC RESOURCE COMMUNITY FOR EUROPE

In Situ CWR Management Planning and Implementation

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PRO-GRACE Pillar 2 *In Situ*

Genetic reserve

- Area designated for the active management of the genetic diversity of one or more CWR populations in their natural habitat.
- Basic management unit for *in situ* CWR conservation

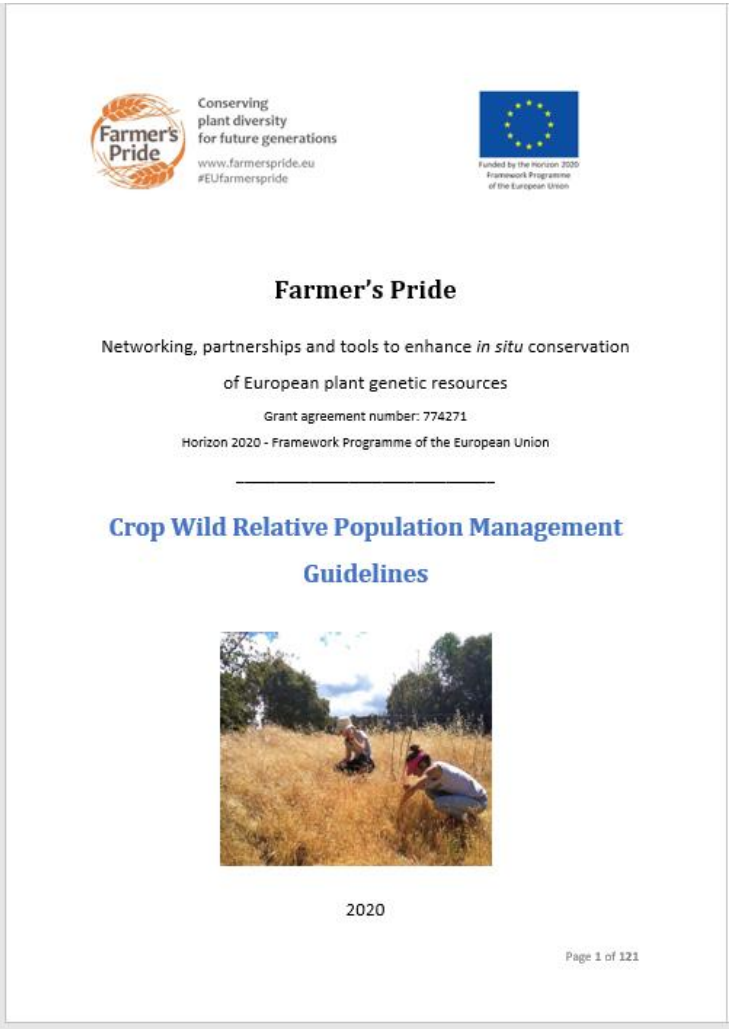
Genetic reserve management plan

- Management plan: planning tool that contains a set of prescriptions and actions to achieve the conservation goals

Elements of a genetic reserve management plan

a. Site description
b. Target taxa population description
c. Habitat characterization
d. Objectives
e. Prescription
f. Monitoring and evaluation
g. Workplan and resources

CWR population management guidelines



Conserving plant diversity for future generations
www.farmerspride.eu
#EUfarmerspride

Funded by the Horizon 2020 Framework Programme of the European Union

Farmer's Pride

Networking, partnerships and tools to enhance *in situ* conservation of European plant genetic resources

Grant agreement number: 774271

Horizon 2020 - Framework Programme of the European Union

Crop Wild Relative Population Management Guidelines

2020

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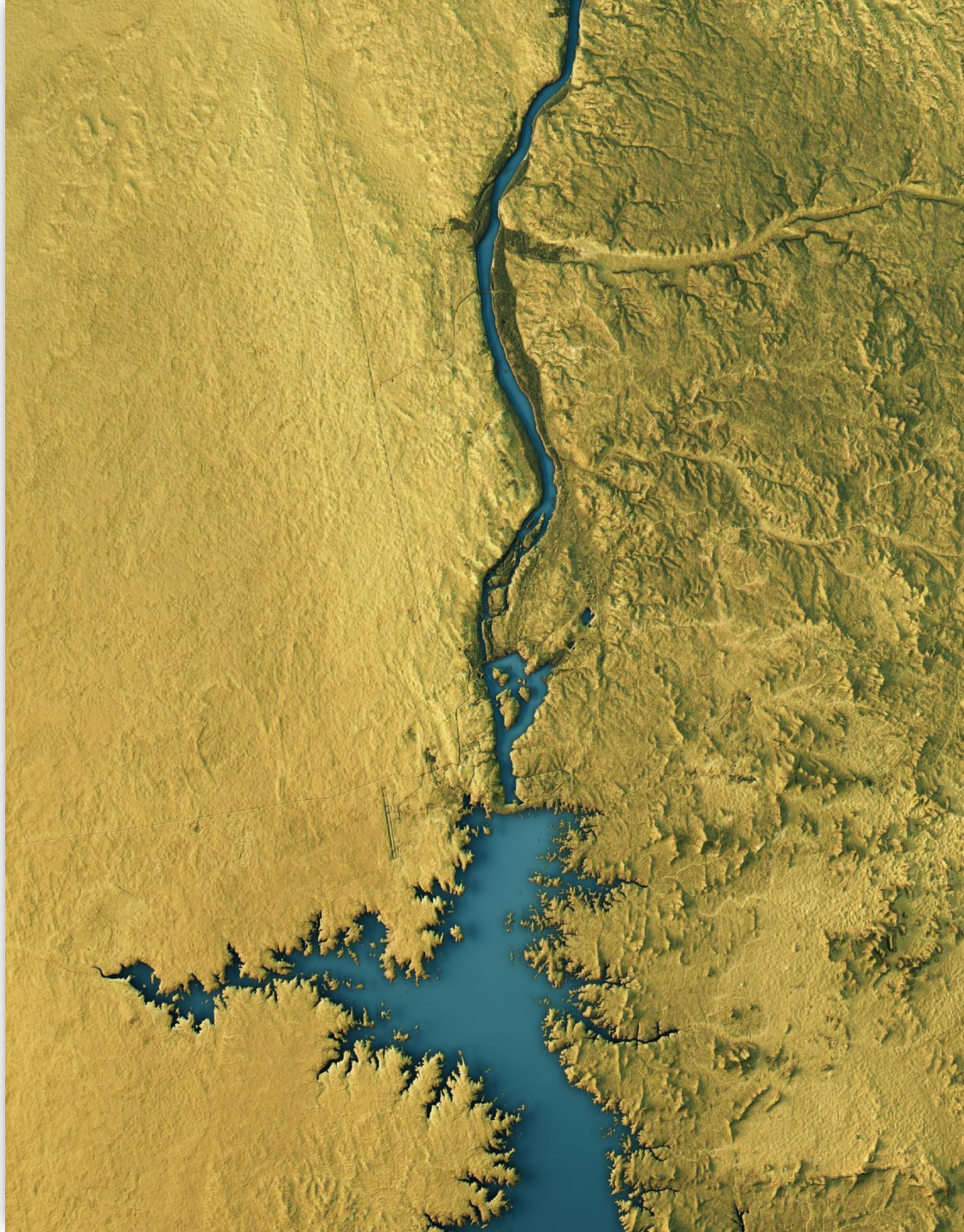
- Iriondo, J.M., Magos Brehm, J., Dulloo, M.E., Maxted, N. (eds.) (2021) Crop Wild Relative Population Management Guidelines. Technical Report. Farmer's Pride project.
- www.farmerspride.eu
- Web tool: https://cwrpopulation-toolkit.cropwildrelatives.org/

a. Site description

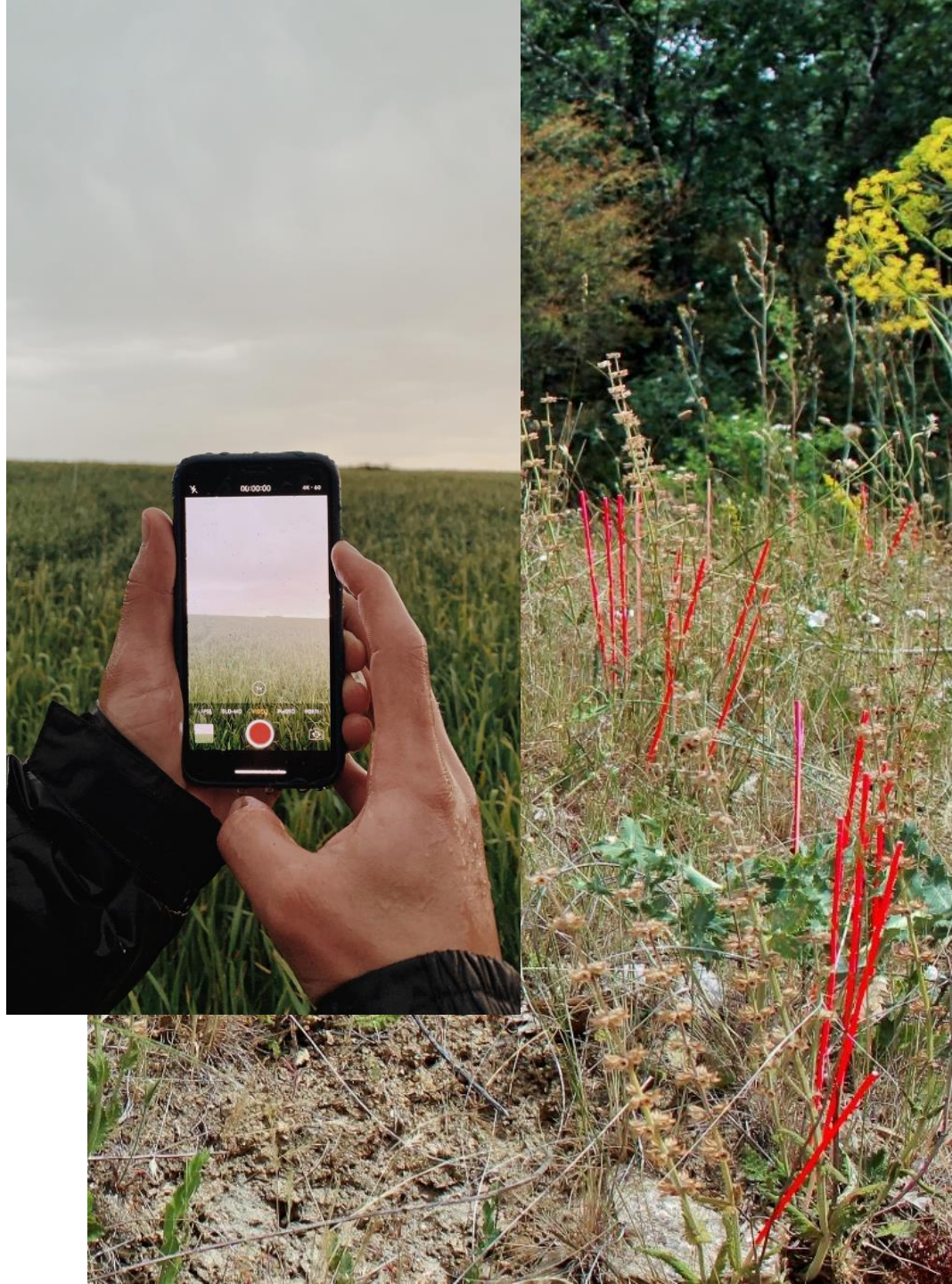
- geographic location, size
- legislation and policy measures
- land use and land tenure
    - public land: protected areas
    - private land: farms



b. Target population description: geolocation and population size

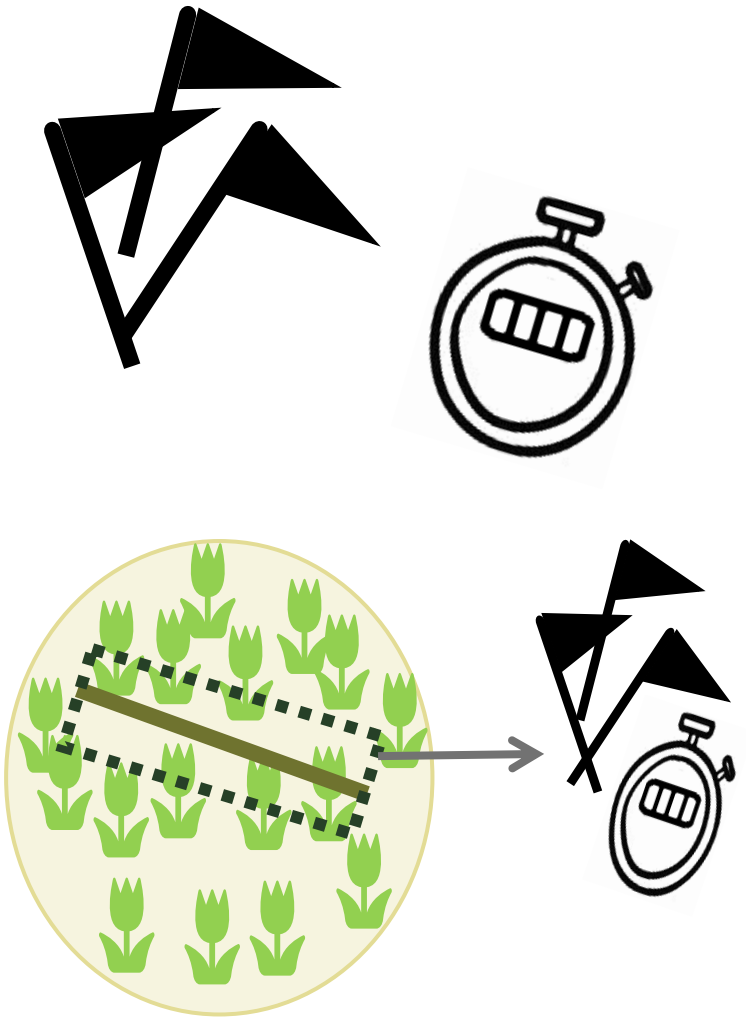
- Georeferencing and delimitation of target CWR populations

- Population size: estimation of the number of reproductive individuals
  - Flowering time
  - Small populations: complete census
  - Large populations: estimation through sampling



b. Target population description: geolocation and population size

- Population trends:
  - Balance between resource investment and data quality.
  - Reasonable time investment per population: 2 hours
  - Simplified approach able to detect relevant demographic trends through time.



b. Target population description: genomic characterization

- Goal: baseline characterization
  - Conservation
    - Genetic diversity and inbreeding
    - Population structure and gene flow
    - Signatures of selection
    - Introgression
  - Use (Pre-breeding):
    - Identify genetically complementary populations for crossing
    - Genome-wide association studies (GWAS) for target traits
    - Genomic prediction
    - Trait introgression tracking
    - Marker-assisted selection

b. Target population description: genomic characterization

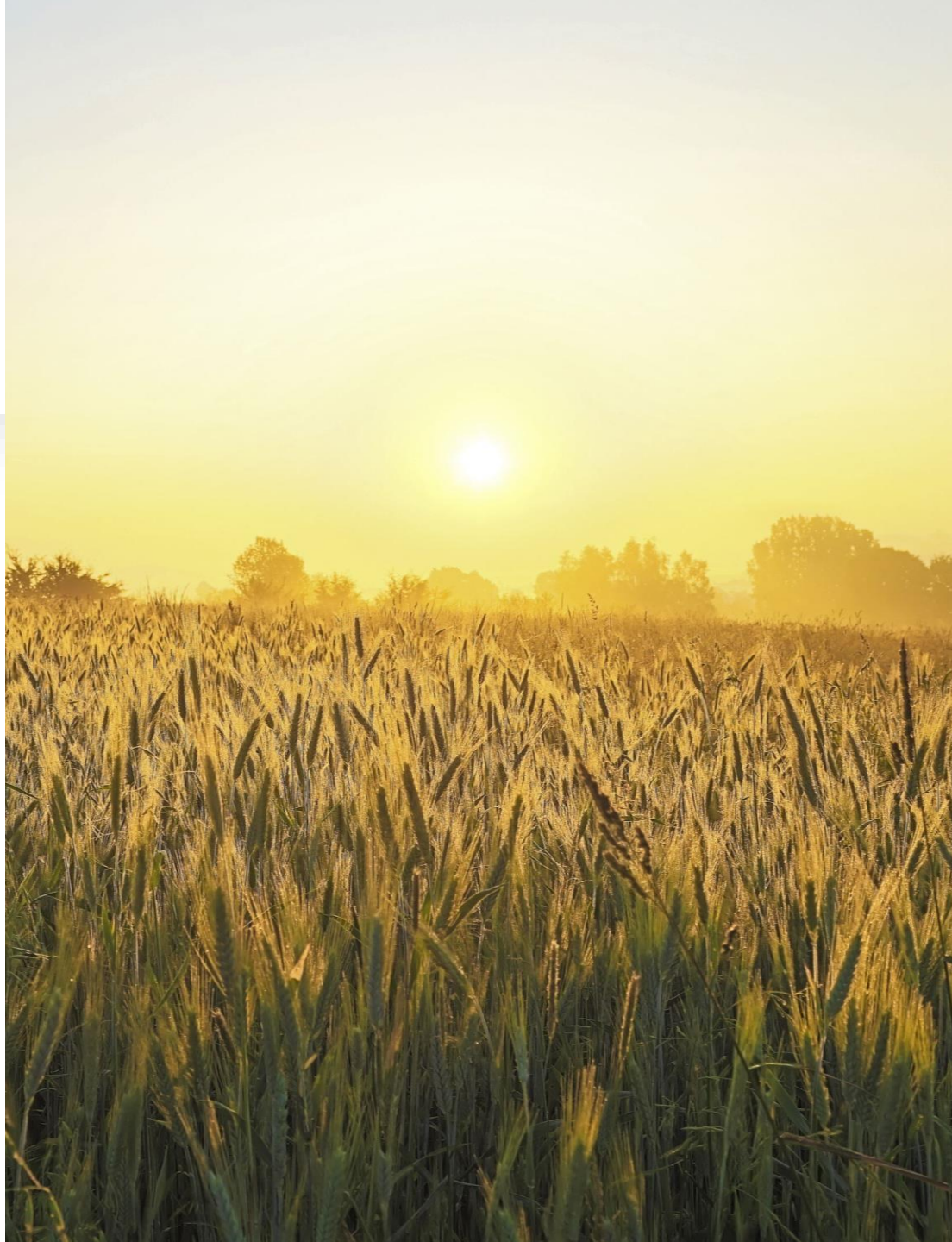
- Whole genome resequencing (WGS)
  - Assuming availability of reference genome of related crop species
  - 3-5 x coverage
  - Random sample of 30 individuals/population
  - 1500 € per population

b. Target population description: genomic characterization

- Goal: monitoring genetic diversity trends
  - Research on ‘Genetic diversity’ barcode
    - Genetic diversity estimators based on chloroplastic markers (e.g. 500 bp) optimized for each genus
    - 120 € per population (30 individual sample)

b. Target population description: phenotypic characterization

- Difficult to implement as a standardized practice in genetic reserves
- Only traits of interest by plant breeders
- Adapted standard descriptors of related crop
- Pilot studies to test usefulness and feasibility



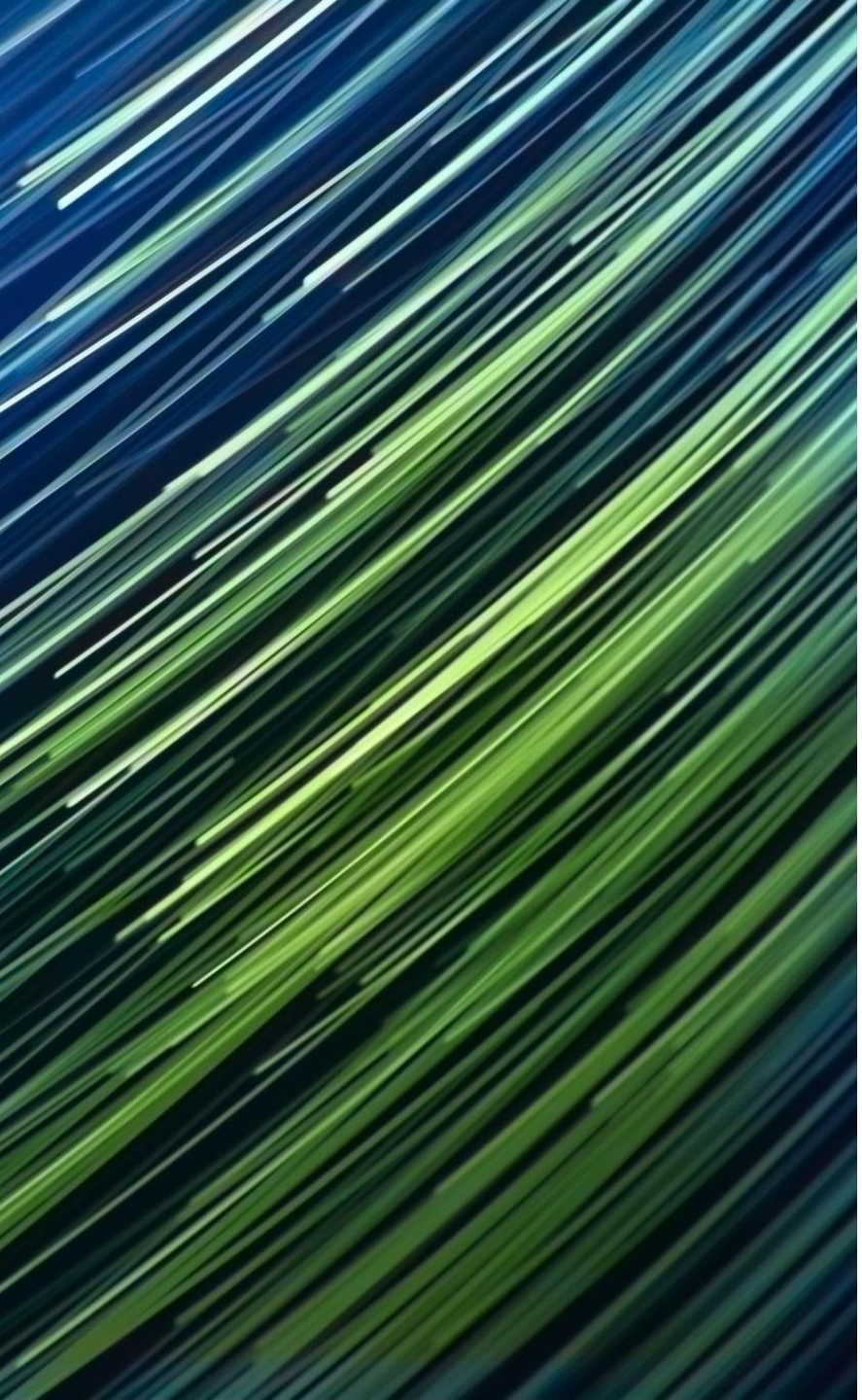
b. Target taxa description: threat assessment

THREAT ASSESSMENT			
Genetic reserve:			
Target CWR:			
Threat type	Timing	Scope	Severity
1 Residential and commercial development			
1.1 Housing and urban areas			
1.2 Commercial and industrial areas			
1.3 Tourism and recreation areas			
2 Agriculture and aquaculture			
2.1 Annual and perennial non-timber crops			
2.1.1 Shifting agriculture			
2.1.2 Small-holder farming			
2.1.3 Agro-industry farming			
2.1.4 Scale Unknown/Unrecorded			
2.2 Wood and pulp plantations			
2.2.1 Small-holder plantations			
2.2.2 Agro-industry plantations			

- Risks that could potentially threaten the genetic diversity and evolutionary potential of the population
- IUCN Threats Classification Scheme (version 3.2): https://www.iucnredlist.org/resources/threat-classification-scheme

c. Habitat characterization

- Physical characterization (soil, geology, climate, hydrology)
- Biotic characterization (competitors, parasites, herbivores, pollinators, seed dispersers)



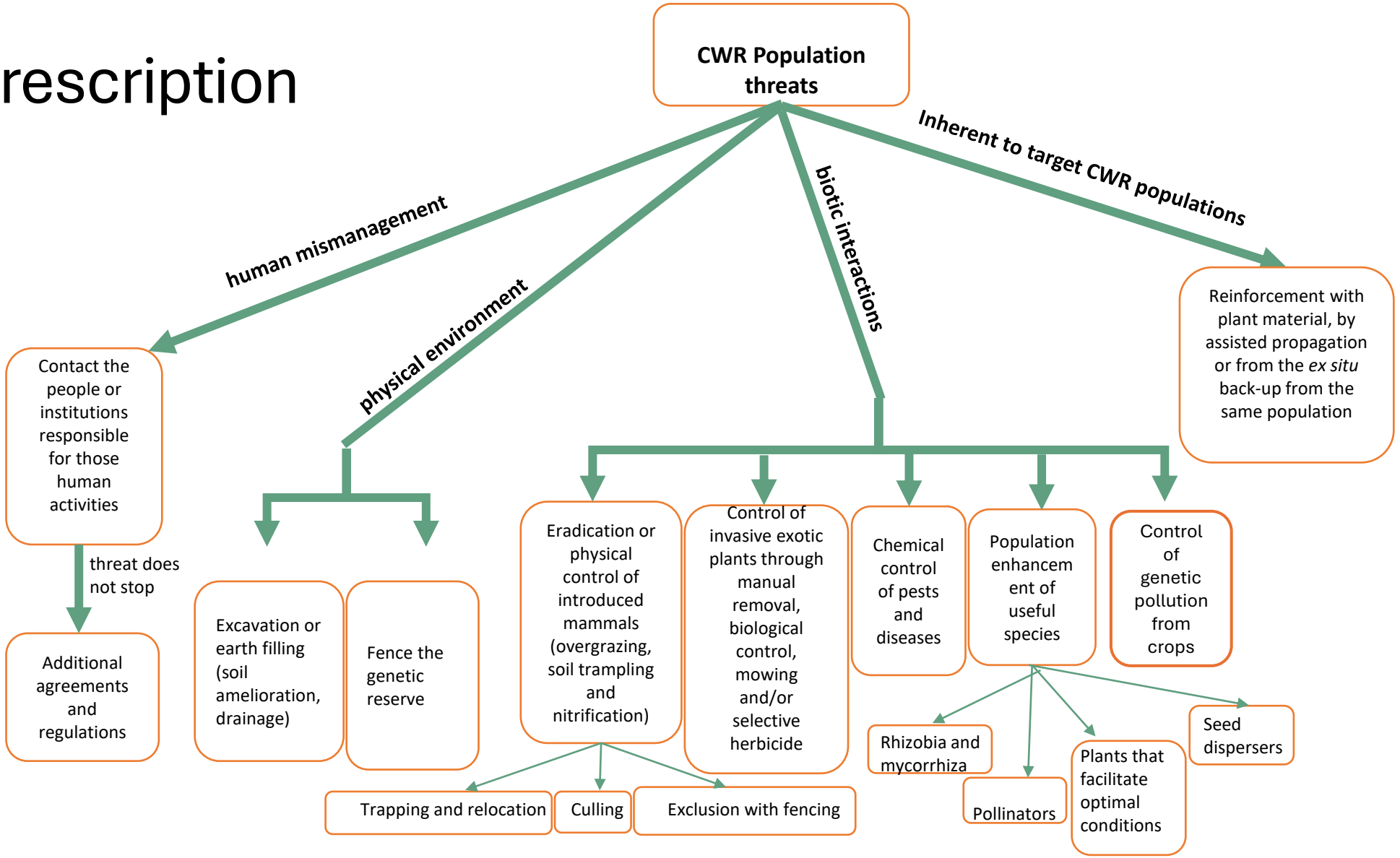
d. Management objectives

Overall objective: to maintain the viability and genetic diversity of the target CWR population(s)

Specific goals:

- Minimize risk of genetic pollution from nearby crops
- Support actions that promote genetic diversity
- Ensure access to populations for research, phenotyping, *ex-situ* backup for use in breeding, exploitation by local communities

e. Prescription



f. Monitoring and evaluation

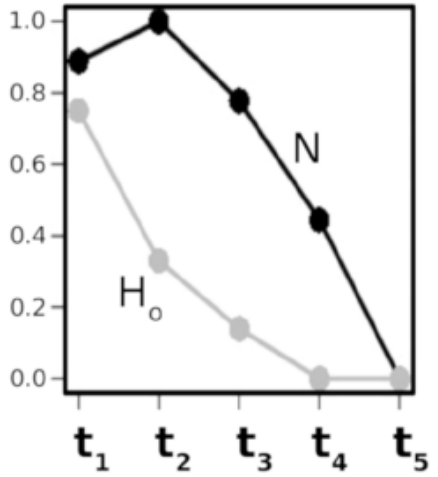
- Aims:
  - to detect changes in population size
  - to assess trends in population genetic diversity
  - to detect changes in the physical and biotic components of the habitat
  - to determine the outcomes of management actions and to guide management decisions

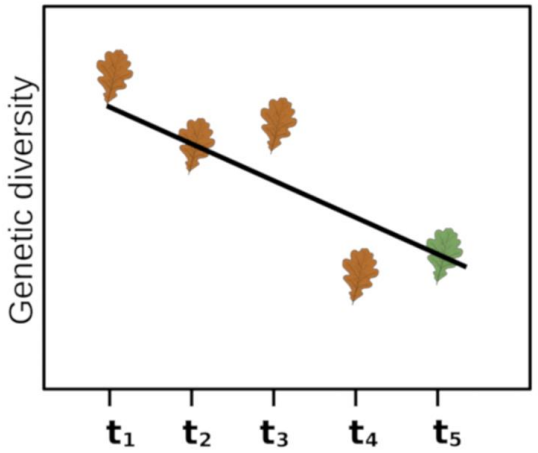
f. Monitoring and evaluation

- Qualitative check-ups throughout the year by protected area personel / farmers, managers
  - Alert about any significant perturbation
- Periodic monitoring and evaluation (e.g., every 5 years)
  - Demographic trends
  - Genetic diversity
  - Population threat assessment
  - Review of management plan

f. Monitoring and evaluation

- Identify demographic and genetic thresholds
- Life history traits (e.g. annuals vs. perennials)
- Trends through several time intervals

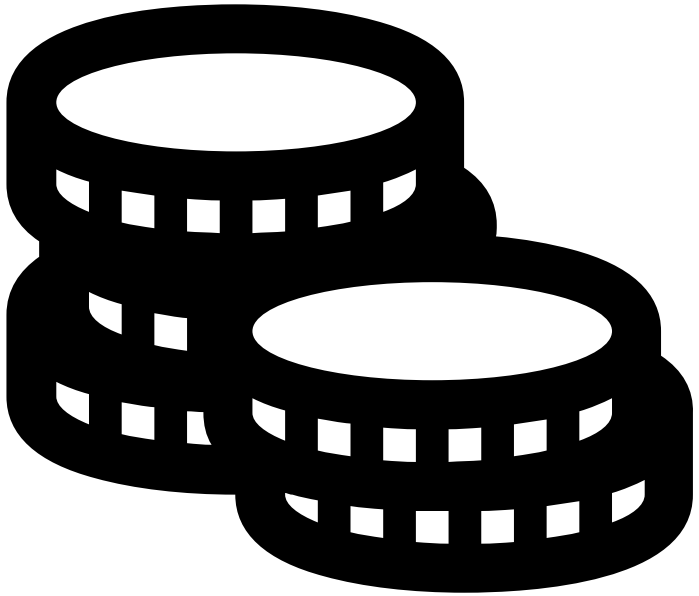




Viveiros-Moniz (2025) Perspectives in Plant Ecology, Evolution and Systematics 67

g. Workplan and resources

- Workplan by designated managers
- Management and monitoring resources:
  - Public sector:
    - **Agriculture** (CAP)
    - Environment (e.g., photovoltaic plants compensation measures)
  - Private sector:
    - Companies in the sector
    - Corporate responsibility



Integration of population information in the national *in situ* CWR database

- Simplify the work of genetic reserve managers
- Collect a variety of standardized data on:
  - Geolocation
  - Area of occupation
  - Demographic census
  - Phenotypic characterization
  - Population threat assessment
  - Habitat characterization
- Data gathering and delivery to cloud database

KoboToolbox

Ad-hoc app

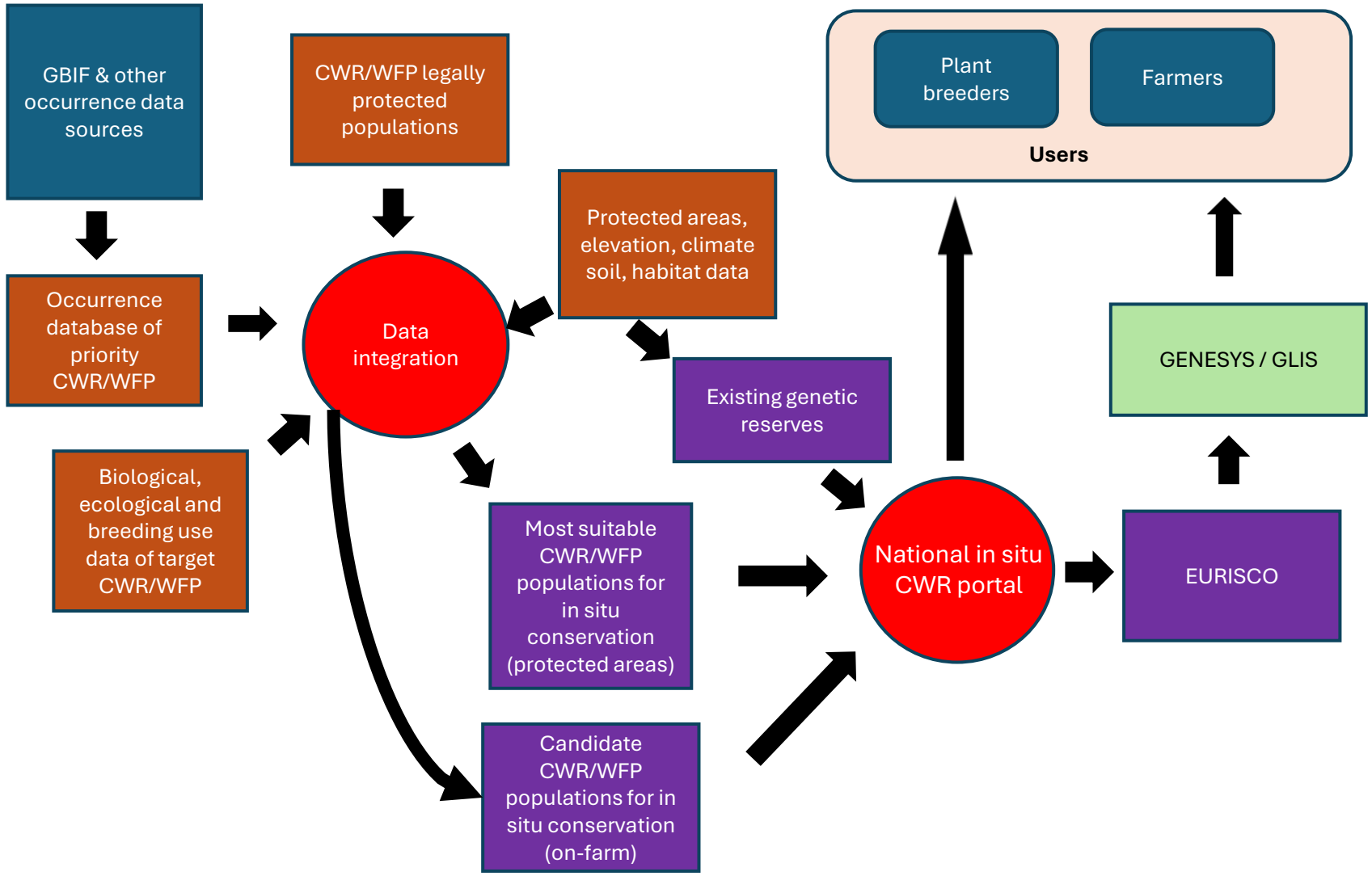
Integration of population information in the national *in situ* CWR database

RESUMEN FORMULARIO **DATOS** CONFIGURACIÓN

ocultar campos

1 - 3 3 resultados	Validación	start	end	Genetic reserve polygon	Name of the species	Area of occupancy of the population	Polygon of the core	123 Population size	Soil	Habitat
	Mostrar todo	Buscar	Buscar		Mostrar todo			Buscar	Mostrar todo	Mostrar todo
	-	6 de oct. de 2...	6 de oct. de 2...	40.4983628114811...	Lupinus angustifolius	40.4897339097139...	40.4936954943745...	680	Siliceous	Grasslands
	-	6 de oct. de 2...	6 de oct. de 2...	40.5604427067905...	Lupinus angustifolius	40.5715682917017...	40.4953637418539...	369	Siliceous	Grasslands
	-	6 de oct. de 2...	6 de oct. de 2...	40.5517293201436...	Lupinus angustifolius	40.5259350663139...	40.4974220313083...	450	Siliceous	Grasslands

National Inventory of in situ conservation of CWR



Stakeholder involvement in CWR conservation