UNIVERSITY OF BIRMINGHAM

European Cooperative Programme for Plant Genetic Resources
ECP/GR

Coherent, Comprehensive and Centralised Documentation of *In Situ* CWR and WFP Conservation

Nigel Maxted and ECPGR CWR WG Members

ECPGR Doc. & Info. WG Meeting

Tallinn, Estonia. 18-19th September 2024

Talk coverage

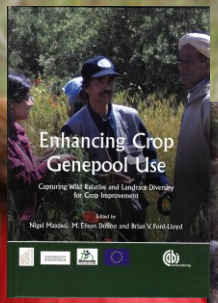
- Objectives of ECPGR CWR WG
- Stage 1: schematic description of CWR / WFP *in situ* conservation
  - Where does doc. and info. enter into the CWR / WFP context?
- Stage 2: *in situ* ontologies and descriptor 'gap analysis'
  - Integrated CWR / WFP descriptor list
  - CWR / WFP together or rather the same?

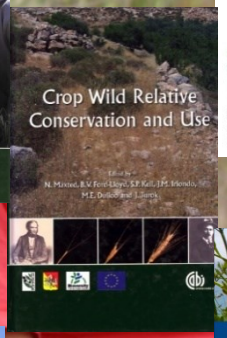
ECPGR Wild Species Conservation WG & ECPGR Crop Wild Relative WG

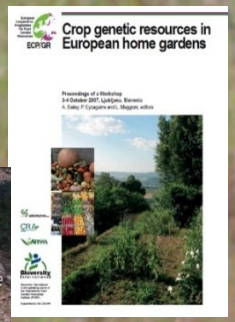
1st Network and two Task Forces meet in Isola Polvese, Italy, May 2000

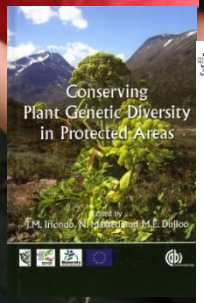
Major achievements since 2000:

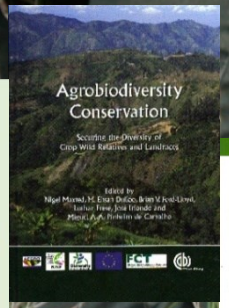
- Raising professional and public awareness
- Specific projects
  - PGR Forum
  - AEGRO
  - PGR Secure
  - Dynaversity
  - Farmer's Pride
- Publication of methodologies and tools
- *ECPGR Concept for in situ conservation of crop wild relatives in Europe (2015)*
- New current projects
  - PRO GRACE – D1.3 (description of in situ process) / D2.3 (in Situ descriptors
  - Horizon Europe: COUSIN, FRUITDIV, PRO-WILD – sustainable long-term impact?
- Establishment of a community of *in situ* / on-farm experts











ECPGR Support

ECPGR Commissioned *In Situ* Concept:

- Maxted, N., Avagyan, A. Frese, L., Iriondo, J.M., Magos Brehm, J., Singer, A. and Kell, S.P., (2015). *Preserving diversity: a concept for* in situ *conservation of crop wild relatives in Europe. Ver. 2.* Rome, Italy: ECPGR, Rome, Italy.

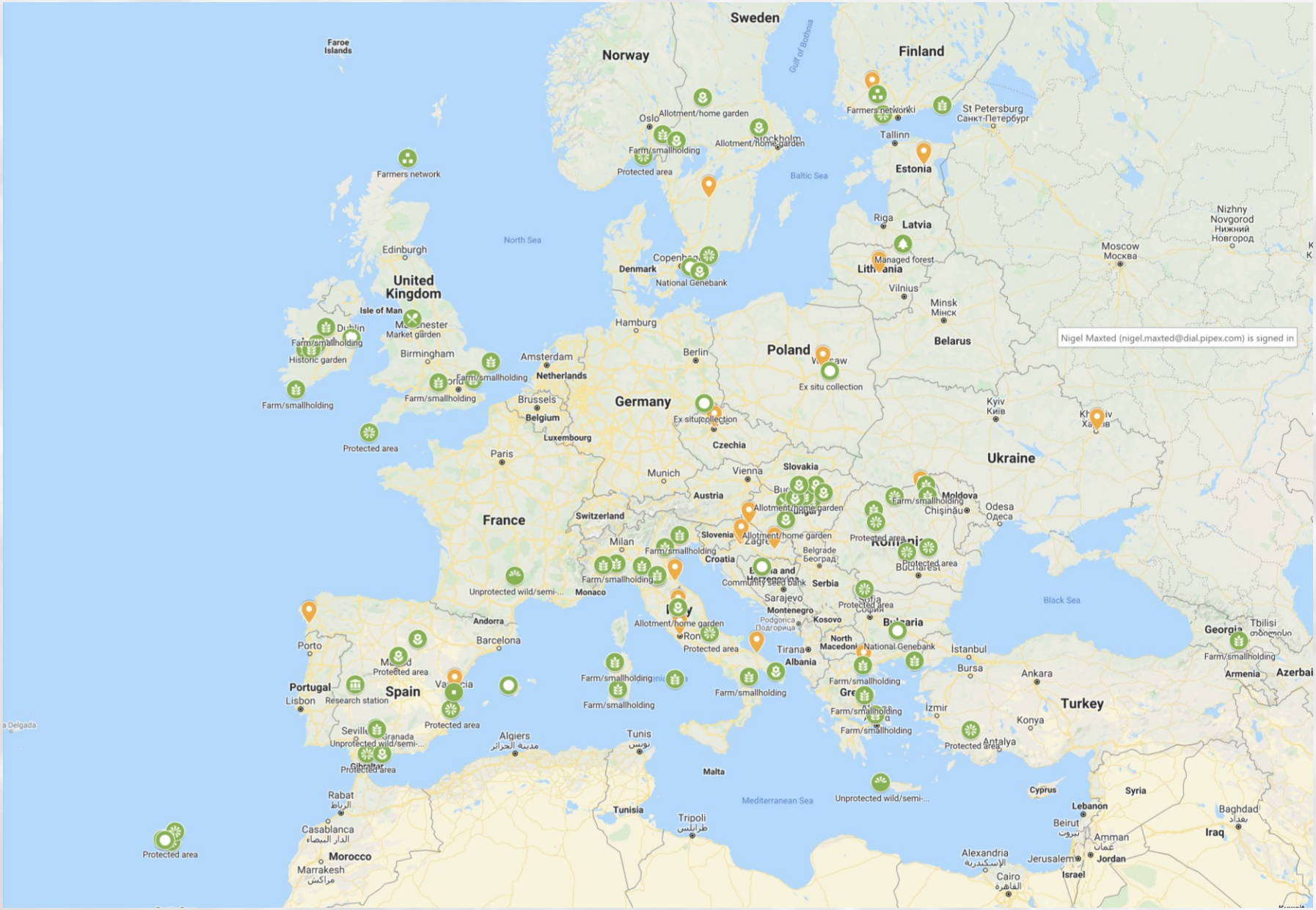
- Significant steps made by EC funded Farmer's Pride
  - CAPFITOGEN tools for crop wild relative and landrace conservation planning
  - Extension of EURISCO for in situ crop wild relative and on-farm landrace data
  - *In situ* crop wild relative population look-up tool
  - Crop wild relative in situ population management guidelines: online toolkit
  - Descriptors for crop wild relative diversity management

  - Crop wild relative population management guidelines
  - Crop wild relative in situ conservation case studies
  - White paper on establishing a CWR network

  https://more.bham.ac.uk/farmerspride/

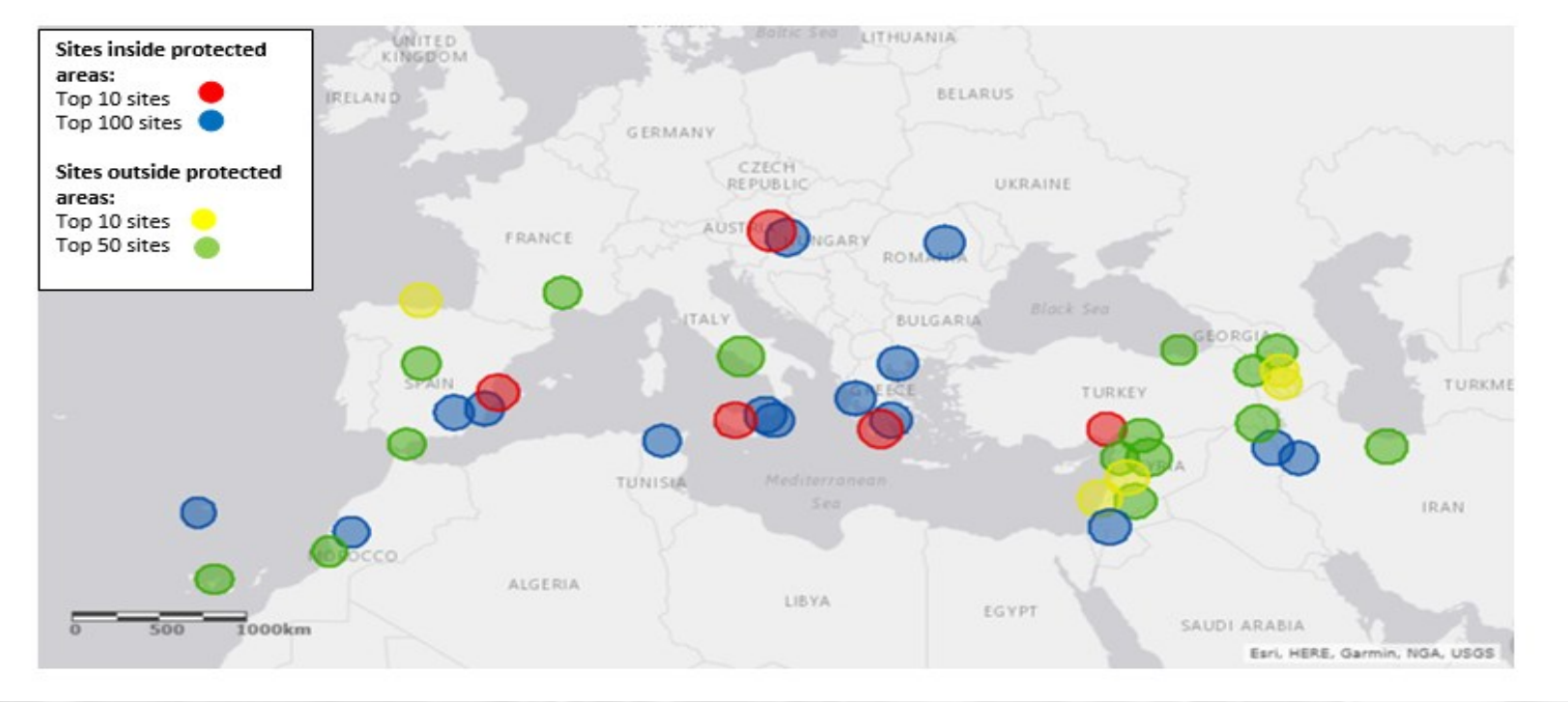
Farmer's Pride

Stakeholder survey of potential site commitment to European *In Situ* CWR/LR Conservation Network



Objectives of ECPGR CWR WG

To effectively and sustainably conserve the breadth of wild PGRFA (CWR & WFP) *in situ* (in nature or on-farm), with complementary *ex situ* activities, and to provide and increase access to the conserved resource for crop improvement, research and other uses.



Top 45 out of 150 global *in situ* CWR conservation sites are found in Europe (Vincent *et al.,* 2018).

The Principle of PGR Conservation / Use Congruence

Three fundamental components of the principle:

a. to maximise the long-term, sustainable maintenance of plant genetic diversity,

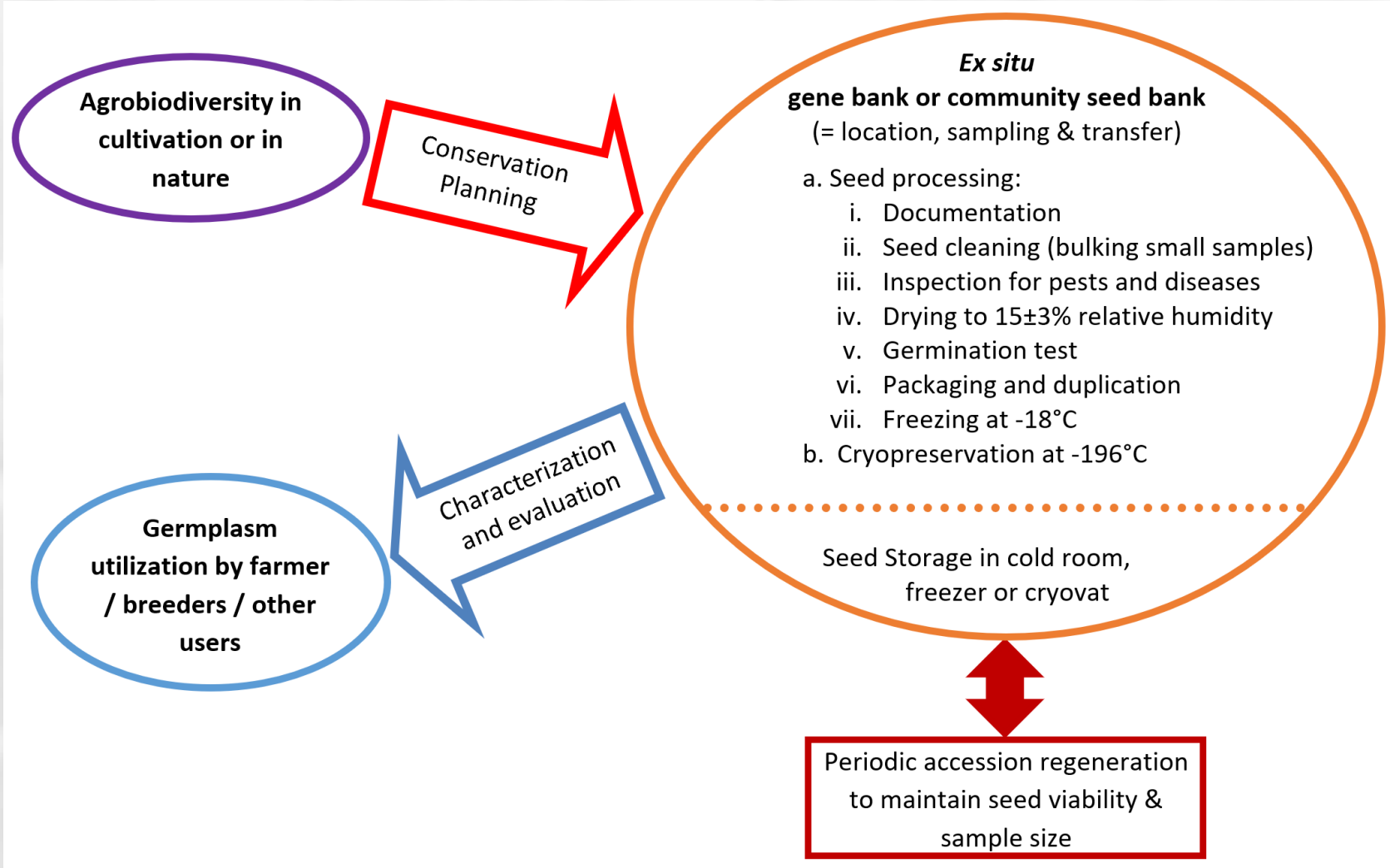
b. to actively conserve resource diversity using complementary conservation techniques, and

c. to ensure the conserved resource is freely available for utilisation.

….. must hold true for whatever means of conservation is enacted or the resource is not conserved.

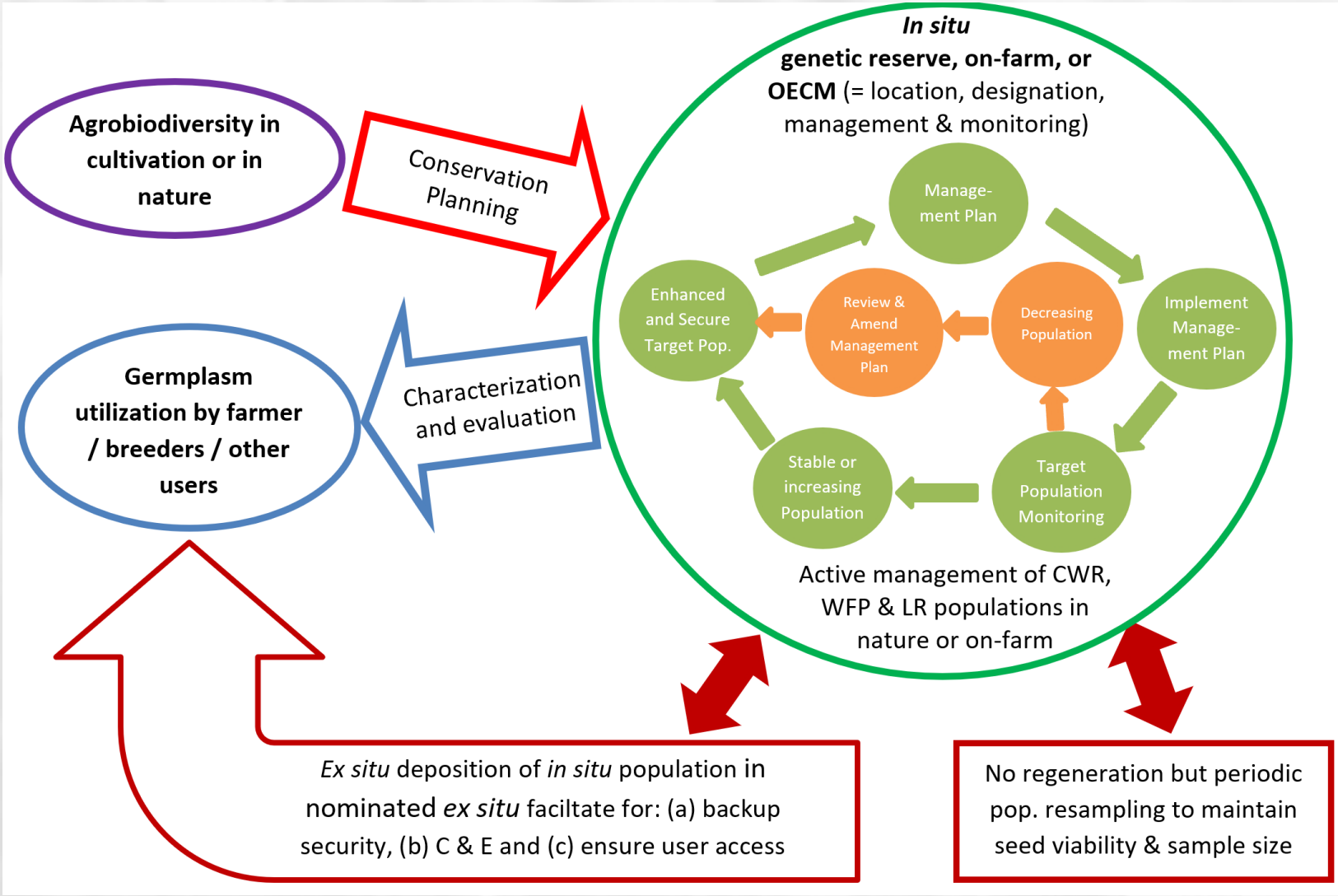
Already exists for *ex situ*, therefore must in future be the test of *in situ* applications.

Schematic description of CWR / WFP *in situ* conservation – *ex situ* seed conservation



(Maxted *et al.*, 2020)

Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation



(Maxted *et al.*, 2024)

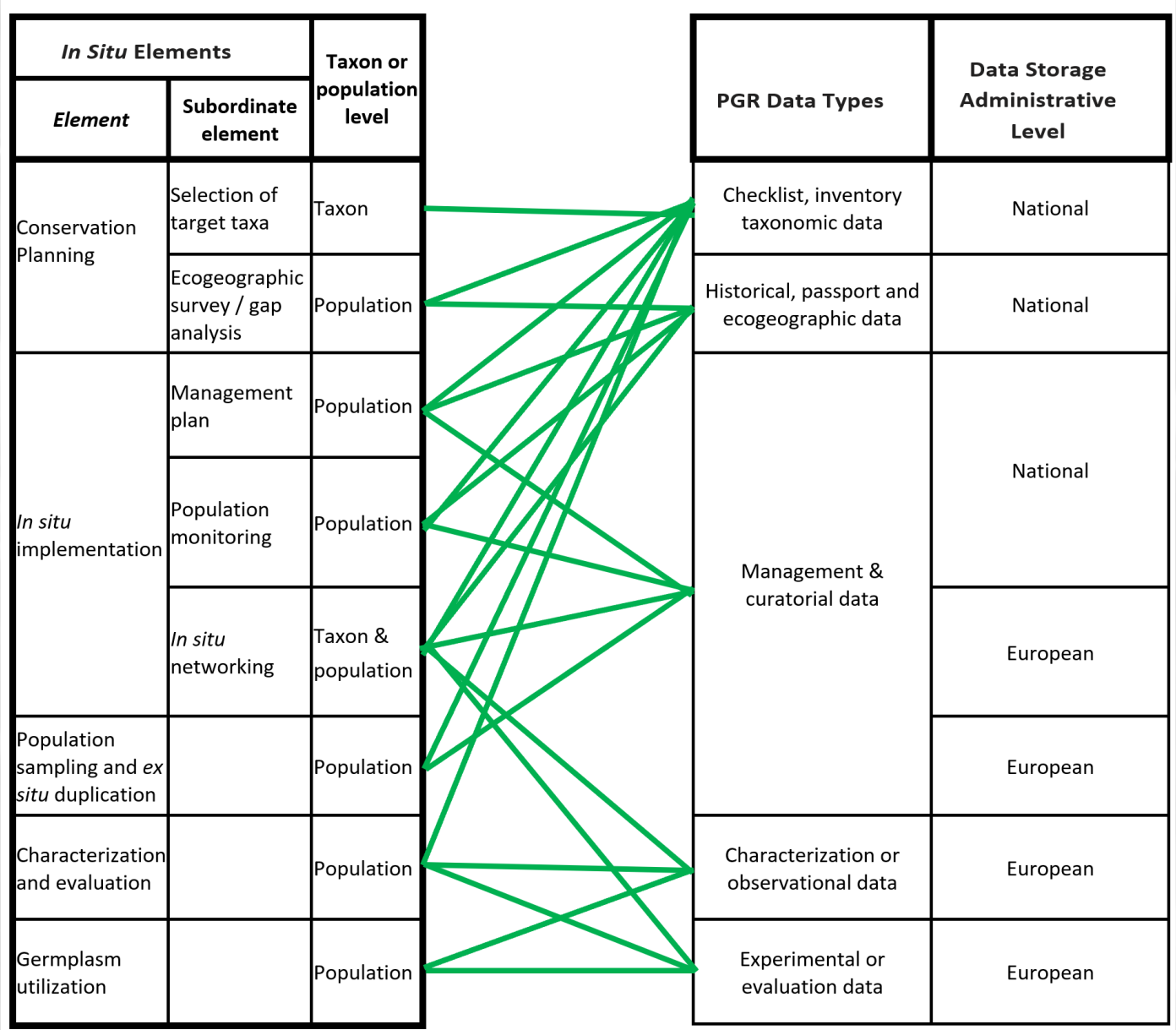
Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation + data

- *Conservation Planning*
  - *Selection of target conservation units* (CWR / WFP wild taxon or Crop landrace) Checklist – Prioritisation (crop value, extinction or erosion threat, [crop relatedness] data) – Inventory
  - Ecogeographic and gap analysis (ecogeographic data [existing or novel], current conservation data, predicted climate change mitigation or resilience data)
- *Conservation technique implementation*: (CWR, WHS or LR resource is actively managed either in nature or cultivated on-farm or in-garden)
  - *Reserve design* (Population demography, but also environmental policy, local communities, economic, sociological, and cultural data)
  - *Formulation of the management plan*
    - general site descriptive data;
    - target taxon/taxa representative population descriptive data;
    - site characterisation, physical habitat, co-occurrent species, existing and potential threats (and for LR farming system, cultivation regime, product enhancement data;
    - management objective data;
    - management prescription data (for CWR or WHS these may include level / timing of grazing control, burning, erosion control, invasive species control, nutrient control, disturbance, assisted propagation / breeding; or for LR subsidies, development of niche markets, adding value);
    - human interactions data links to local communities, physical environment, biotic interactions and target populations;
    - work plan data, specific tasks and timeframe, required resources, assumptions, outcomes, roles, personnel and budget, and
    - monitoring and evaluation planning data to detect changes in physical and biotic habitat and target populations.

Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation + data

- *Conservation technique implementation*: Continued
  - *Initiation of the management plan*
  - *Resource monitoring* data recording for target populations and other key species in a time series to aid identification of diversity trends
  - *Conserved resource partnership* data related to PA manager / farmer / land manager, nominated *ex situ* back-up and utilisation promotion
- *Conserved resource description*
  - *Characterization and Evaluation*
    - *Phenotypic* data
    - *Genomic* data
    - *Predictive* data
- *Utilization*
  - *Promoting utilization* data

Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation + data



Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation

Proposed *In situ* population management collaboration

CWR, WHS or LR *in situ* population conservation		
National GRC staff's role (data)		**PGR population maintainer's role (data)**
International, national and local policy development.		Preparation, implementation and periodic revision of site management plan.
National conservation planning.		Management of target populations.
Target population national network management.		Monitoring of target populations.
Target population characterization and evaluation.		Periodic collection of target populations to make representative *ex situ* backup samples, for backup, c & e and user access.
Ensuring user access to *in situ* conserved resources (via the *ex situ* backup sample).		Promotion of PGR integration into the broader biodiversity community.
Lead and participate in *PGR* In Situ *Population Management Committee*.		Participation in *PGR* In Situ *Management Committee*.

Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation

Advantages of coordinating *in situ* actions via NETWORK structure:

- Facilitate systematic coordination and reporting (e.g. FAO Global Plan of Action on PGRFA).
- Foster stronger partnerships and mutual support.
- Integrate global, regional and national actions.
- Link local communities of practice with common goals.
- Facilitate ABS for protected areas and farmers / farming communities.
- Enable truly integrated, long-term complementary *in situ–ex situ* conservation.
- Promote access to PGR held in protected areas and farmers / farming communities via Genetic Resource Centres, thus doubling resources available.
- Safeguard evolving *in situ* PGR populations for perpetuity.

- Data associated with networking

Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation

Assuming a NETWORK structure is adopted:

- The CWR population is native at that location, or if introduced, has existed at that location for at least fifteen generations, in which time it has evolved potential unique alleles.

- The CWR population contains distinct or complementary genetic diversity, ecogeographic diversity as a proxy for genetic diversity or specific traits of interest, for example, the high importance to the CWR user community that is beet necrotic yellow vein virus (BNYVV) resistance in *Beta vulgaris* subsp. *maritima* populations from the Kalundborg Fjord area, Denmark (Capistrano *et al.*, 2014). This high utilization value of such traits would enhance the overall value of the *in situ* network.

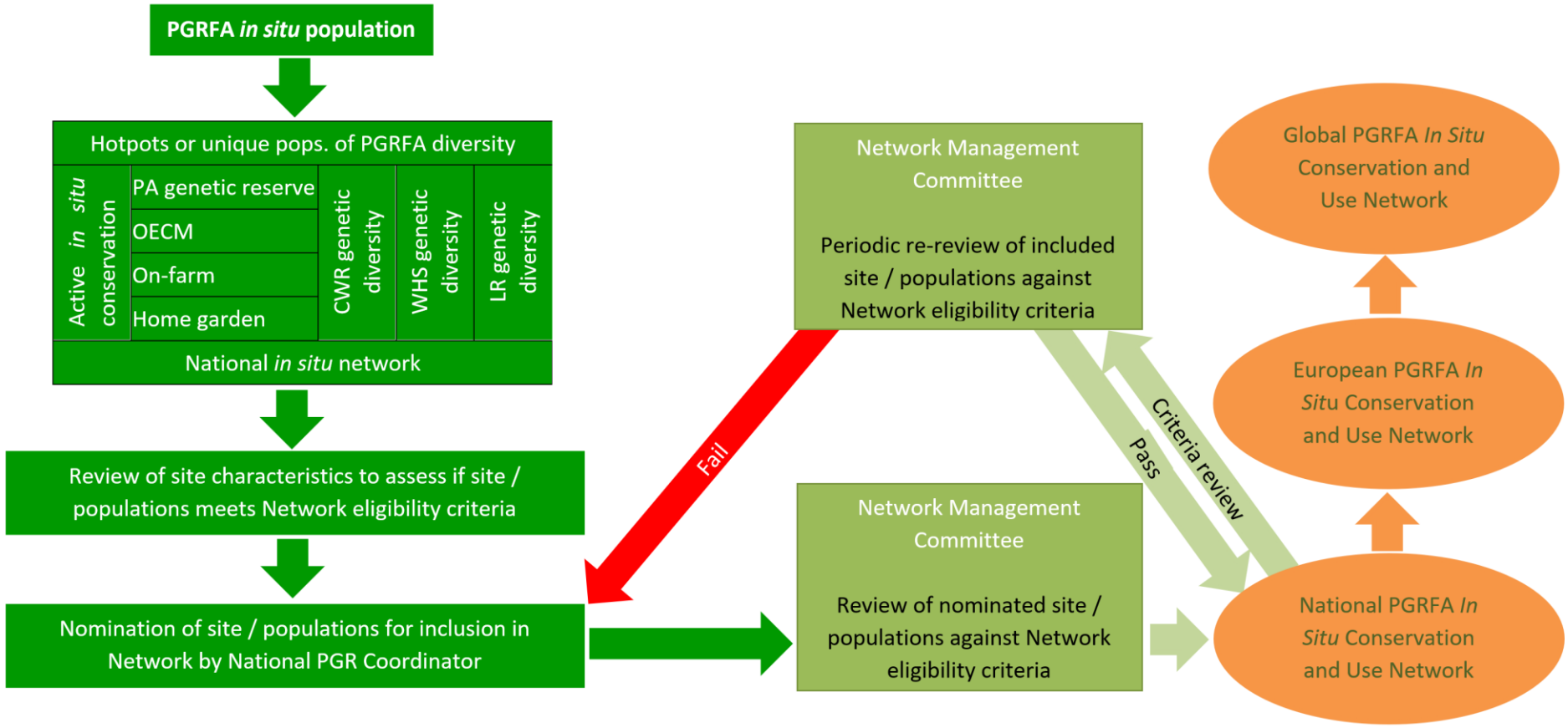
- The CWR population should not be threatened, so there is a likelihood of long-term survival (conventionally thought to mean having a >95% probability of persistence for over 100 years - Traill *et al.*, 2007) and site / population threats such as development or climate change will need to have been assessed / modelled and found negligible. If target PGR populations are threatened, as might be the case with rare taxa, and no ‚healthy' populations are available, then *ex situ* conservation will need to be implemented as a priority and associated assisted propogation programmes link to reintroduction should be initiated.

- The CWR population is actively and sustainably managed as a long-term *in situ* conservation resource according to the minimum quality standards for genetic reserve conservation (Iriondo *et al.*, 2012).

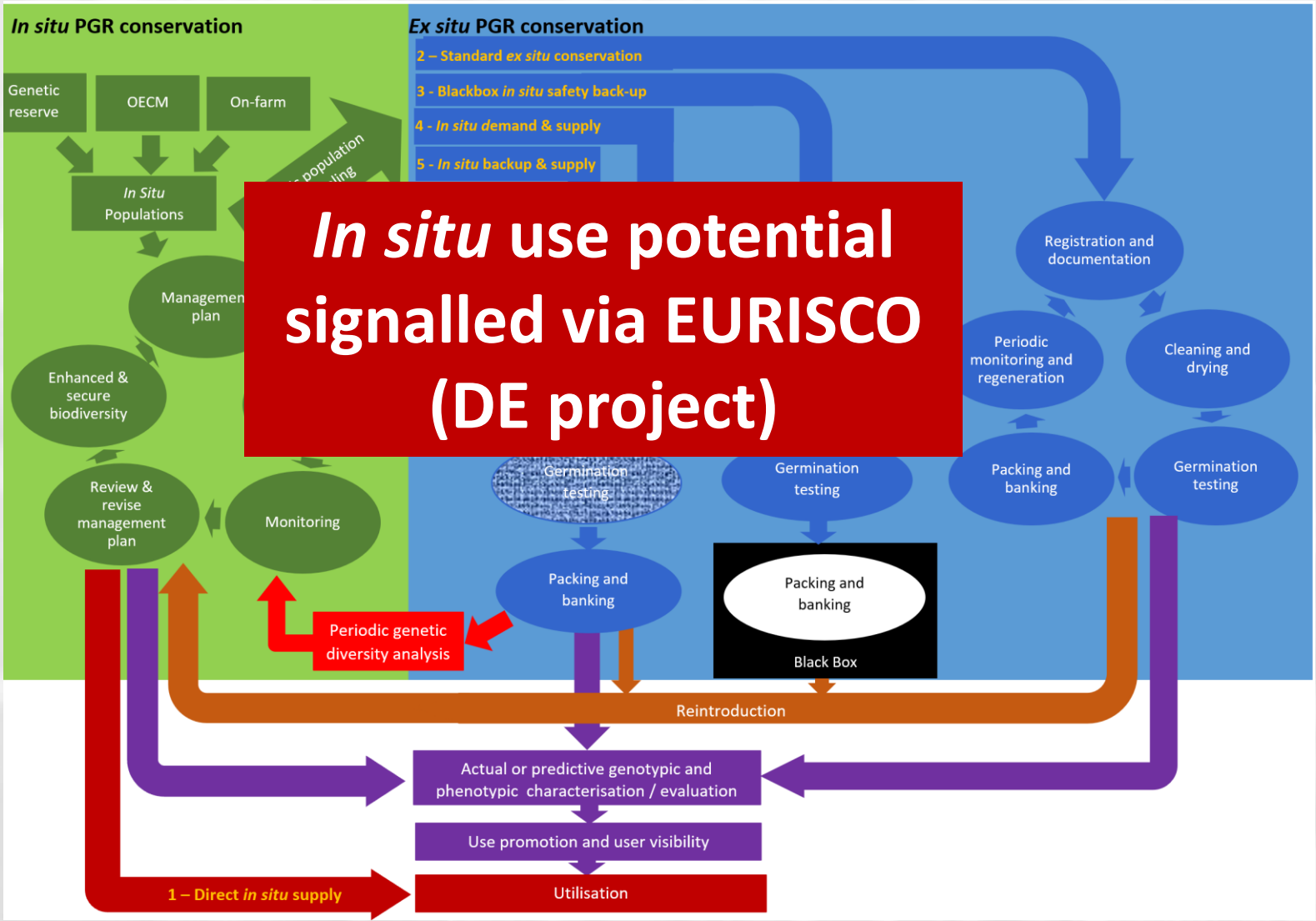
- *Continued ....*

Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation

Assuming a NETWORK structure is adopted, it will involve data collation and analysis:



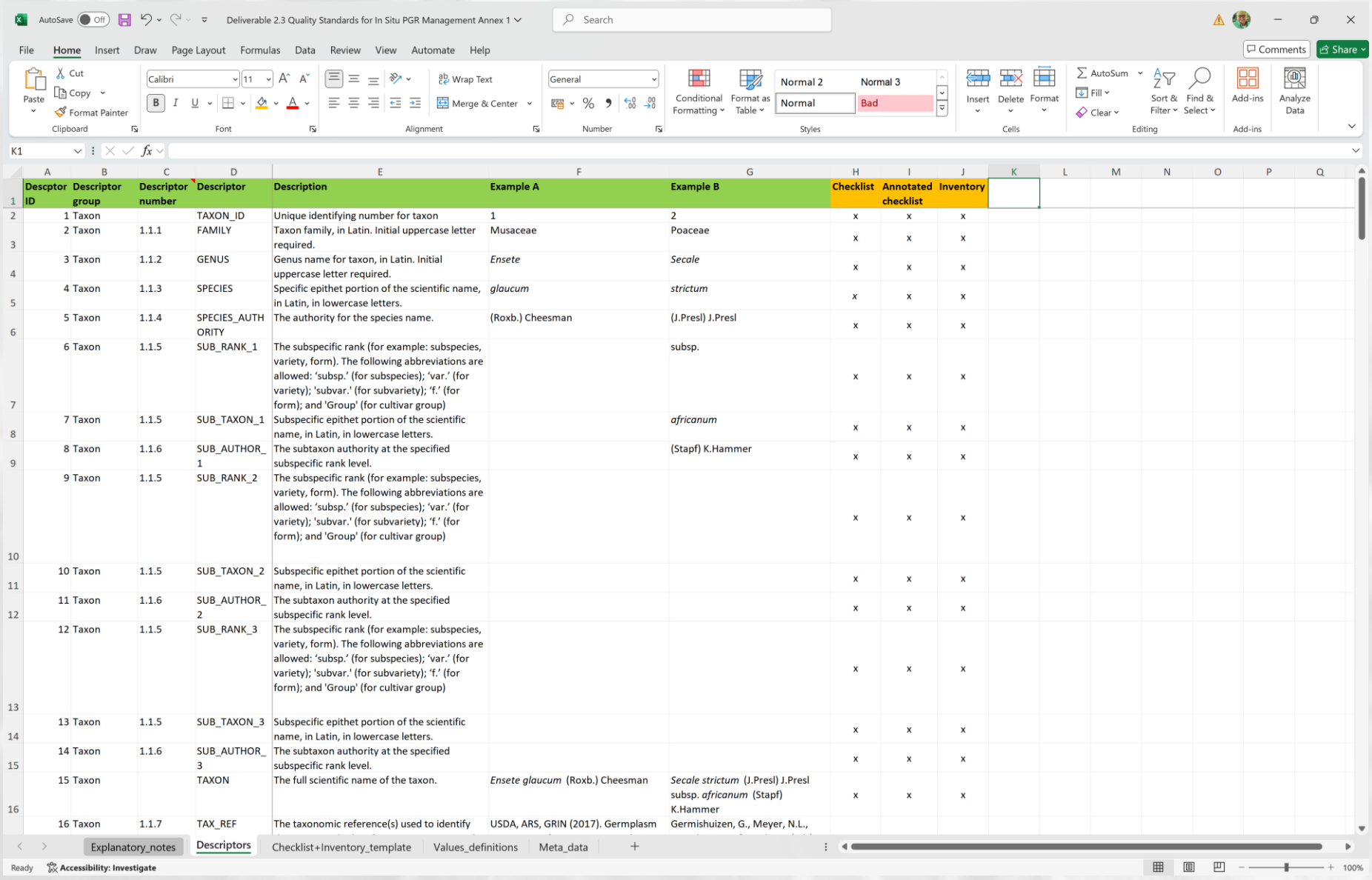
Schematic description of CWR / WFP *in situ* conservation – *in situ* population conservation



PRO GRACE D2.3: *In situ* ontologies and descriptor 'gap analysis'

- 'Gap analysis' in the traditional sense, locating what is missing
- Understand the PGR *in situ* process
- Where are published *in situ* related ontologies / descriptors needed to facilitate the *in situ* process
- Where are the gaps
- Fill the gaps and produce an integrated guide to PGR *in situ* data management

D2.3 - Integrated CWR / WFP descriptor list



Deliverable 2.3 Quality Standards for In Situ PGR Management Annex 1

Descptor ID	Descriptor group	Descriptor number	Descriptor	Description	Example A	Example B	Checklist	Annotated checklist	Inventory
1	Taxon		TAXON_ID	Unique identifying number for taxon	1	2	x	x	x
2	Taxon	1.1.1	FAMILY	Taxon family, in Latin. Initial uppercase letter required.	Musaceae	Poaceae	x	x	x
3	Taxon	1.1.2	GENUS	Genus name for taxon, in Latin. Initial uppercase letter required.	*Ensete*	*Secale*	x	x	x
4	Taxon	1.1.3	SPECIES	Specific epithet portion of the scientific name, in Latin, in lowercase letters.	*glaucum*	*strictum*	x	x	x
5	Taxon	1.1.4	SPECIES_AUTHORITY	The authority for the species name.	(Roxb.) Cheesman	(J.Presl) J.Presl	x	x	x
6	Taxon	1.1.5	SUB_RANK_1	The subspecific rank (for example: subspecies, variety, form). The following abbreviations are allowed: 'subsp.' (for subspecies); 'var.' (for variety); 'subvar.' (for subvariety); 'f.' (for form); and 'Group' (for cultivar group)		subsp.	x	x	x
7	Taxon	1.1.5	SUB_TAXON_1	Subspecific epithet portion of the scientific name, in Latin, in lowercase letters.		*africanum*	x	x	x
8	Taxon	1.1.6	SUB_AUTHOR_1	The subtaxon authority at the specified subspecific rank level.		(Stapf) K.Hammer	x	x	x
9	Taxon	1.1.5	SUB_RANK_2	The subspecific rank (for example: subspecies, variety, form). The following abbreviations are allowed: 'subsp.' (for subspecies); 'var.' (for variety); 'subvar.' (for subvariety); 'f.' (for form); and 'Group' (for cultivar group)			x	x	x
10	Taxon	1.1.5	SUB_TAXON_2	Subspecific epithet portion of the scientific name, in Latin, in lowercase letters.			x	x	x
11	Taxon	1.1.6	SUB_AUTHOR_2	The subtaxon authority at the specified subspecific rank level.			x	x	x
12	Taxon	1.1.5	SUB_RANK_3	The subspecific rank (for example: subspecies, variety, form). The following abbreviations are allowed: 'subsp.' (for subspecies); 'var.' (for variety); 'subvar.' (for subvariety); 'f.' (for form); and 'Group' (for cultivar group)			x	x	x
13	Taxon	1.1.5	SUB_TAXON_3	Subspecific epithet portion of the scientific name, in Latin, in lowercase letters.			x	x	x
14	Taxon	1.1.6	SUB_AUTHOR_3	The subtaxon authority at the specified subspecific rank level.			x	x	x
15	Taxon		TAXON	The full scientific name of the taxon.	*Ensete glaucum* (Roxb.) Cheesman	*Secale strictum* (J.Presl) J.Presl subsp. *africanum* (Stapf) K.Hammer	x	x	x
16	Taxon	1.1.7	TAX_REF	The taxonomic reference(s) used to identify	USDA, ARS, GRIN (2017). Germplasm	Germishuizen, G., Meyer, N.L.,			

Explanatory_notes | Descriptors | Checklist+Inventory_template | Values_definitions | Meta_data

CWR / WFP together or rather the same?

- FAO has started to promote CWR alongside WFP it is logical, but indirect and direct usage
- Both CWR and WFP are just wild plants species and there is no logical reason for different conservation techniques, assumption they are the same
- Now requires experimental application to test the assumption

Child selling Wild Food Plant (*Origanum marjoram*) on the roadside in the West Ban