

In situ conservation and use of crop wild relatives in three ACP countries of the SADC Region



ROLE OF PREDICTIVE CHARACTERIZATION AND PRE-BREEDING ACTIVITIES IN THE DEVELOPMENT OF NATIONAL STRATEGIC ACTION PLANS

Joana Magos Brehm, Shelagh Kell, Nigel Maxted, Chikelu Mba, Mauricio Parra-Quijano, Imke Thormann, Ehsan Dulloo

Regional training workshop

Predictive characterization and pre-breeding of crop wild relatives
13-16 April 2015, Pretoria, South Africa

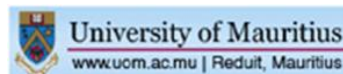
UNIVERSITY OF
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REPUBLIC OF SOUTH AFRICA



Researching Soils, Crops and
Water in Zambia



- National strategic action plans (NSAP) for the conservation and use of CWR
 - » Aims and brief introduction
 - » Specific objectives
 - » How to produce a NSAP?
 - » Examples
- Conservation linked to use
- Predictive characterization and pre-breeding in NSAP
- Structure of a NSAP
- Summary

NATIONAL STRATEGIC ACTION PLANS FOR THE CONSERVATION AND USE OF CWR



- To ensure **appropriate conservation** and **sustainable use of CWR**
 - » to prevent the loss of diversity
 - » to maximize their availability (e.g. for crop improvement)
- CWR diversity conservation requires an **integrated *in situ* / *ex situ* approach**, best implemented via a National Strategic Action Plan (NSAP)
- Governments are committed to ensure that conservation and sustainable use of PGR are a key element in the global efforts to **alleviate poverty** and **increase food security and nutrition** (CBD, ITPGRFA, Second GPA for PGRFA)

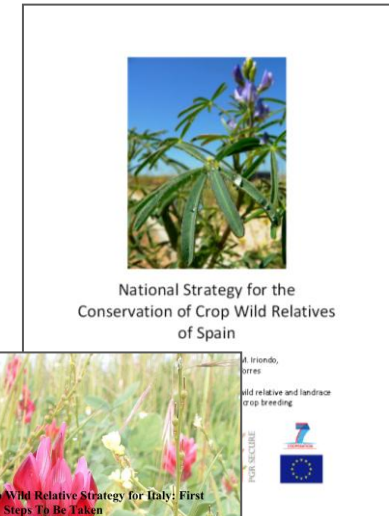


NATIONAL STRATEGIC ACTION PLANS FOR THE CONSERVATION AND USE OF CWR



- No single method of generation
- Depends on:
 - » national context
 - availability of baseline data
 - existing policy framework
 - remit of the agencies that are responsible for formulating and implementing the NSAP
 - » financial and human resources for implementation
- Follows a similar pattern in all countries:
 - » develops from an effective consultation process
 - » establishes a knowledge base
 - » analyzes conservation gaps
 - » identifies priorities
 - » plans and implements specific conservation actions

(GCRFA-15/15/Inf.24)



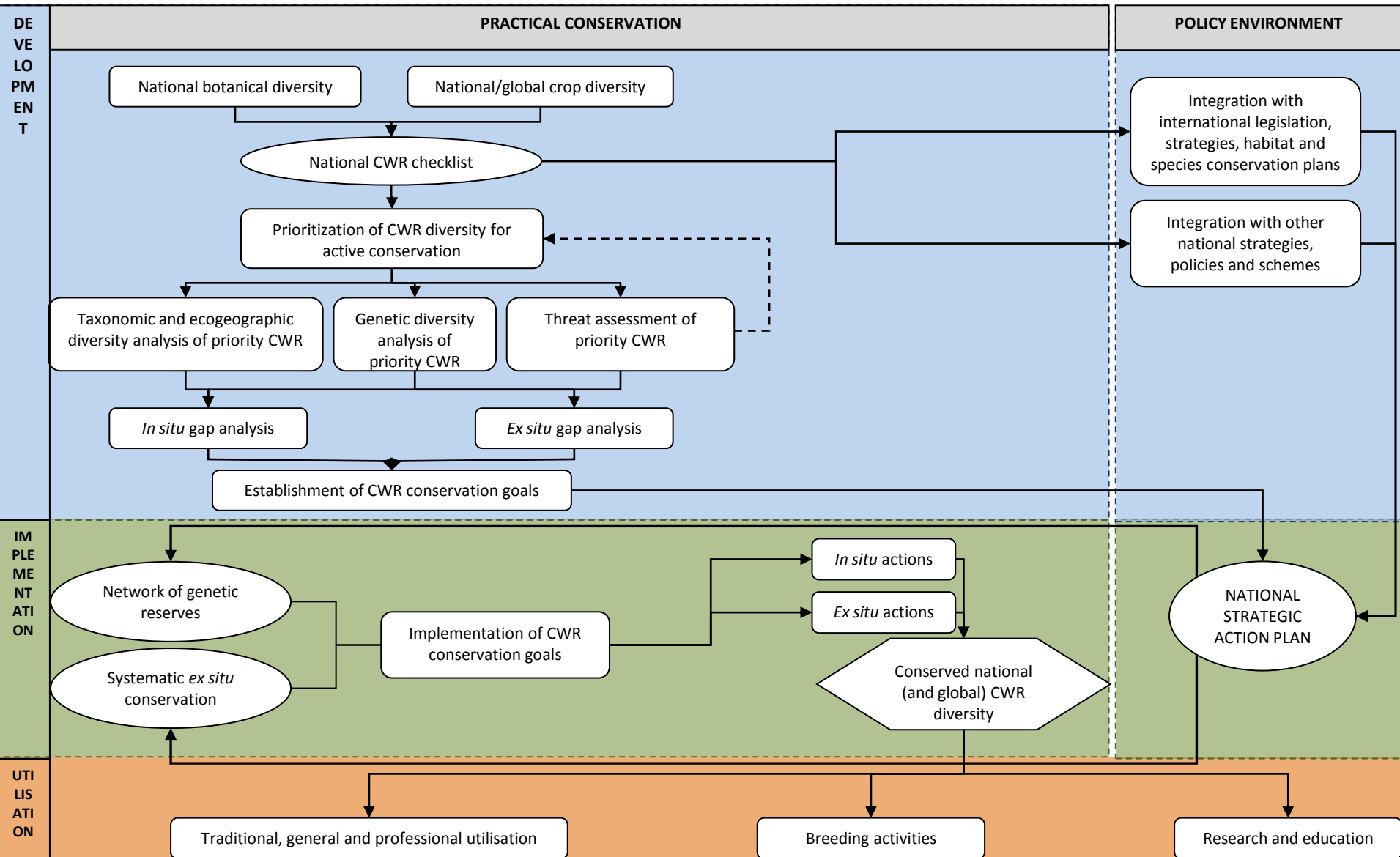
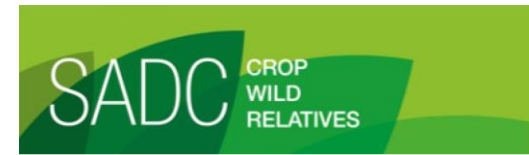
SPECIFIC OBJECTIVES OF THE NSAP



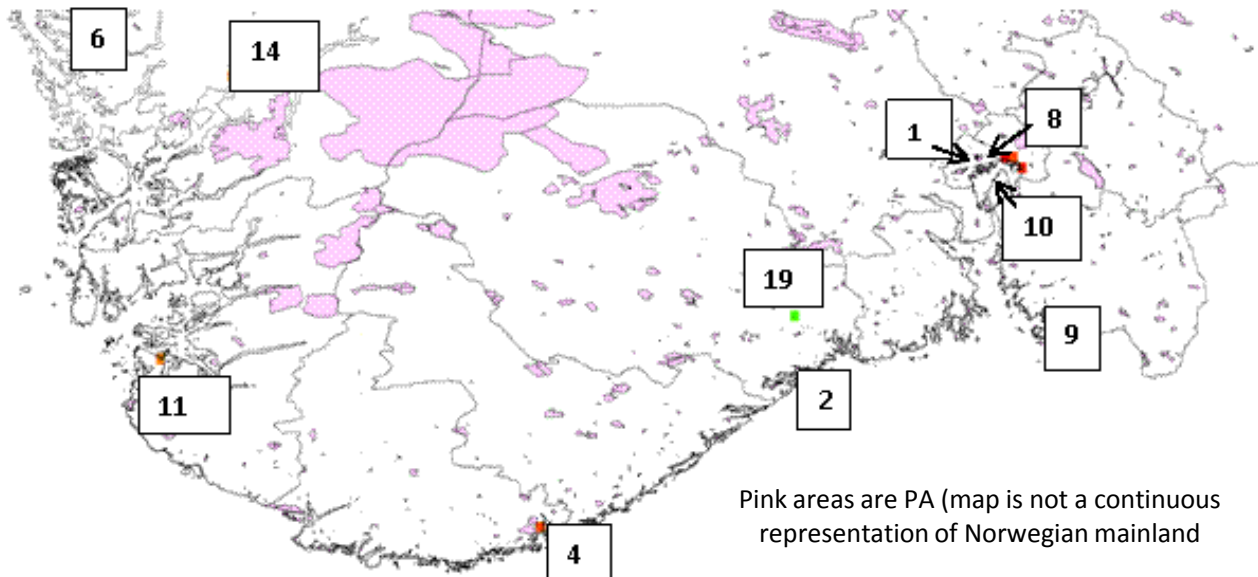
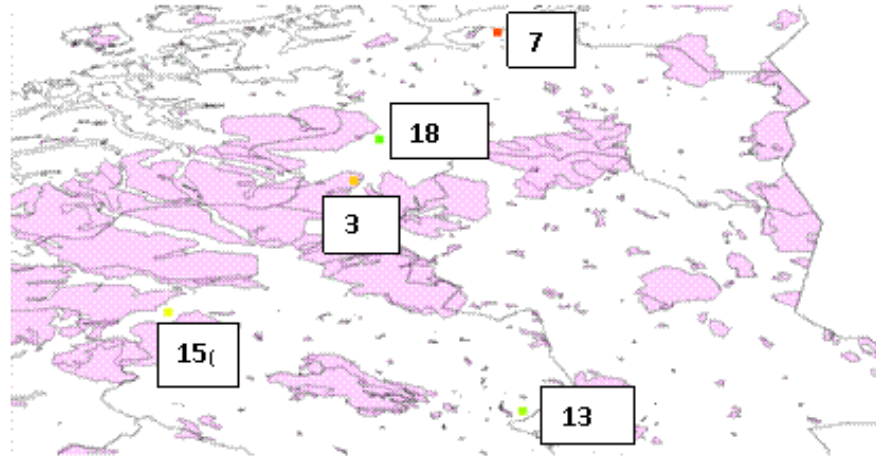
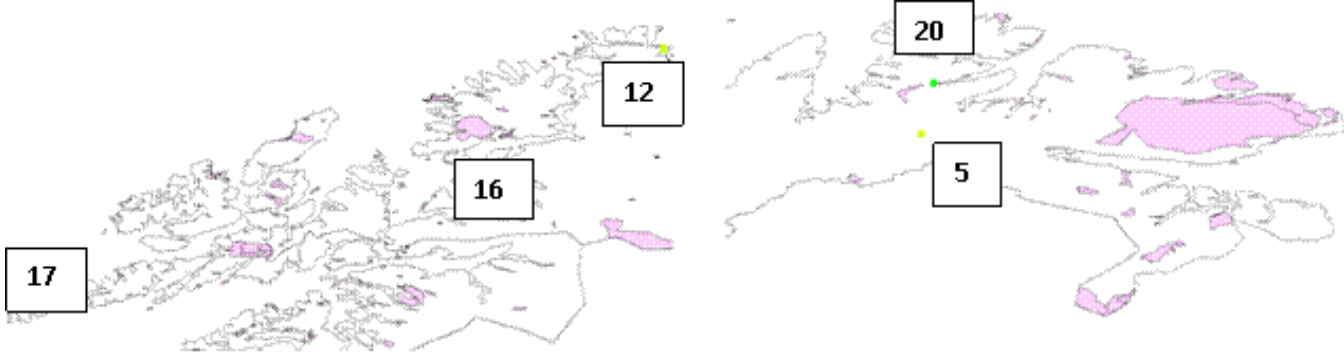
- To establish *ex situ* conservation priorities (which taxa to collect and where?)
- To recommend a network of conservation areas (*in situ*) that conserves CWR diversity
- To guide the monitoring of CWR diversity through time
- To promote the use of conserved diversity



NATIONAL STRATEGIC ACTION PLANS FOR THE CONSERVATION AND USE OF CWR



CWR DIVERSITY IN NORWAY



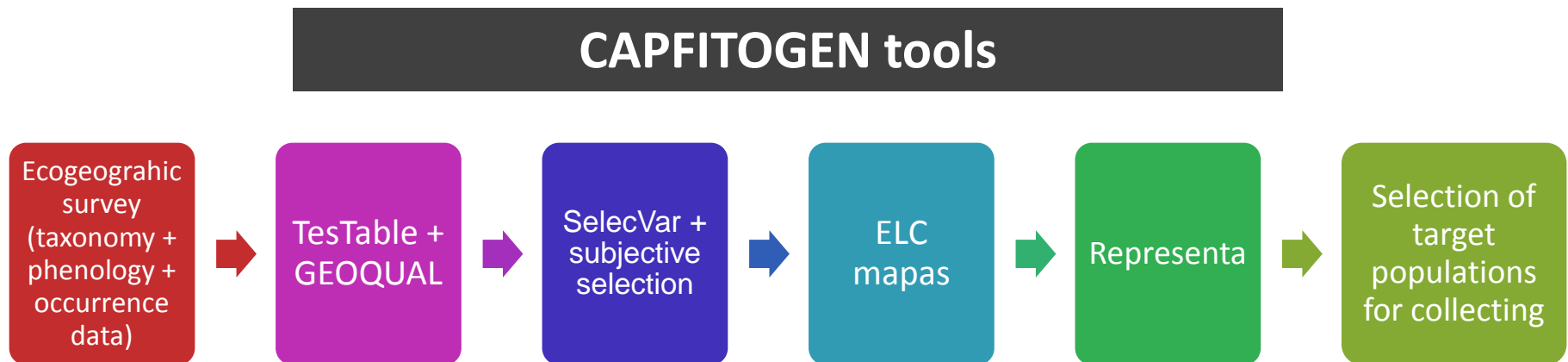
Pink areas are PA (map is not a continuous representation of Norwegian mainland)

20 COMPLEMENTARY
SITES to cover 201
priority CWR

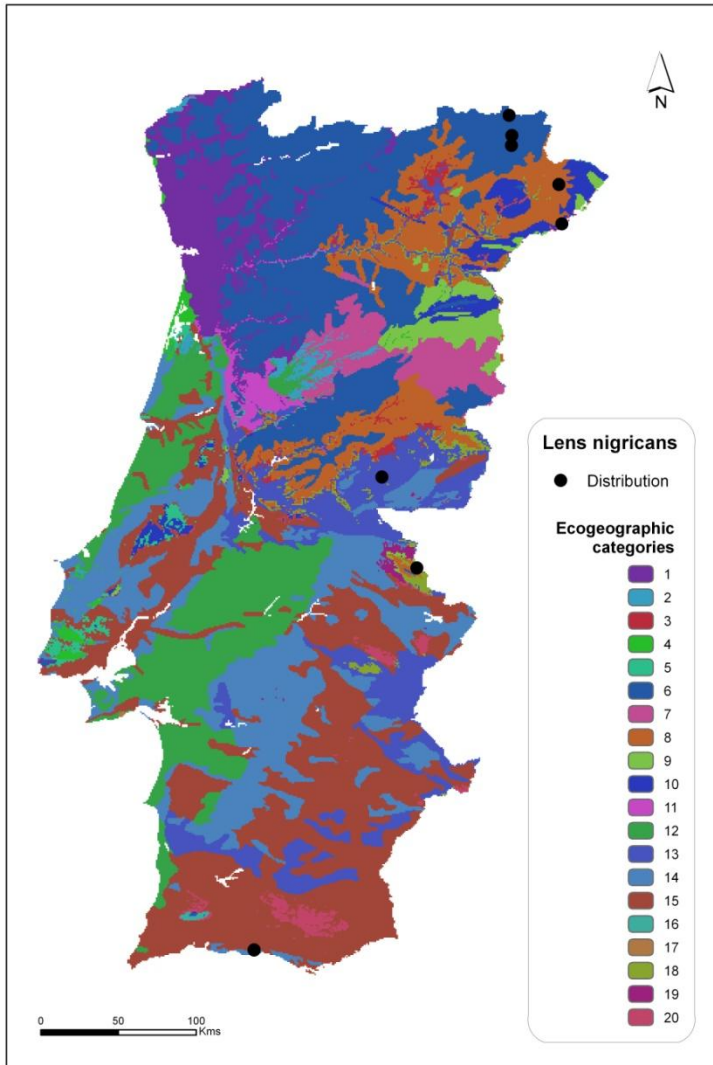
COLLECTION OF CWR FOR *EX SITU* CONSERVATION IN PORTUGAL



- Target taxa (16):
Avena spp., *Daucus* spp., *Lathyrus* spp., *Lens nigricans*, *Malus sylvestris*, *Medicago* spp., *Pisum sativum* subsp. *elatius*, *Vicia* spp.
- Collect 5 *ex situ* accessions representing different ecogeographic conditions



COLLECTION OF CWR FOR *EX SITU* CONSERVATION IN PORTUGAL



| EC | # populations | % freq | Need to collect |
|----|---------------|--------|-----------------|
| 6 | 3 | 37.5 | yes |
| 8 | 2 | 25 | yes |
| 10 | 1 | 12.5 | yes |
| 13 | 1 | 12.5 | yes |
| 14 | 1 | 12.5 | yes |

GLOBAL CWR CONSERVATION – ADAPTING AGRICULTURE TO CLIMATE CHANGE: COLLECTING, PROTECTING AND PREPARING CWR

Global Crop Diversity Trust + Millennium Seed Bank project with Norwegian Gov. funding (USD 50 milion)

1. 81 crop gene pools selected (1187 CWR)
2. Ecogeographic data collection (> 5.4 million records)
3. Gap analysis using Maxted *et al.* (2008), Ramírez-Villegas *et al.* (2010) methodology



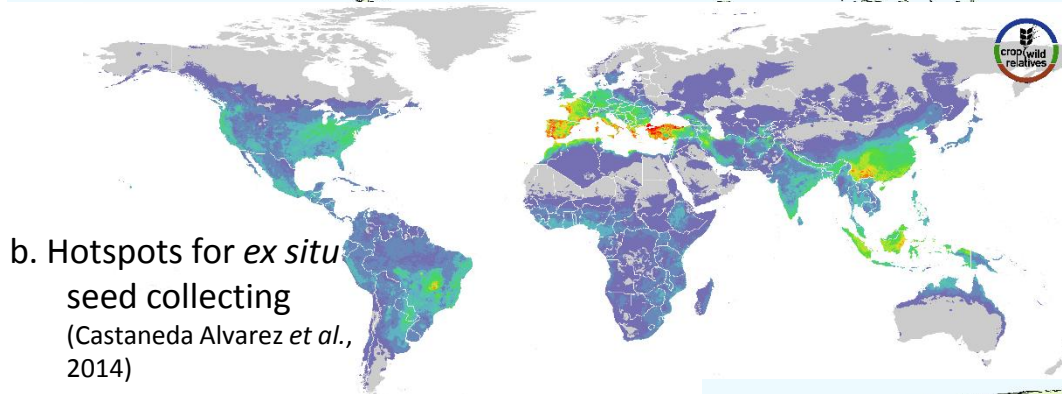
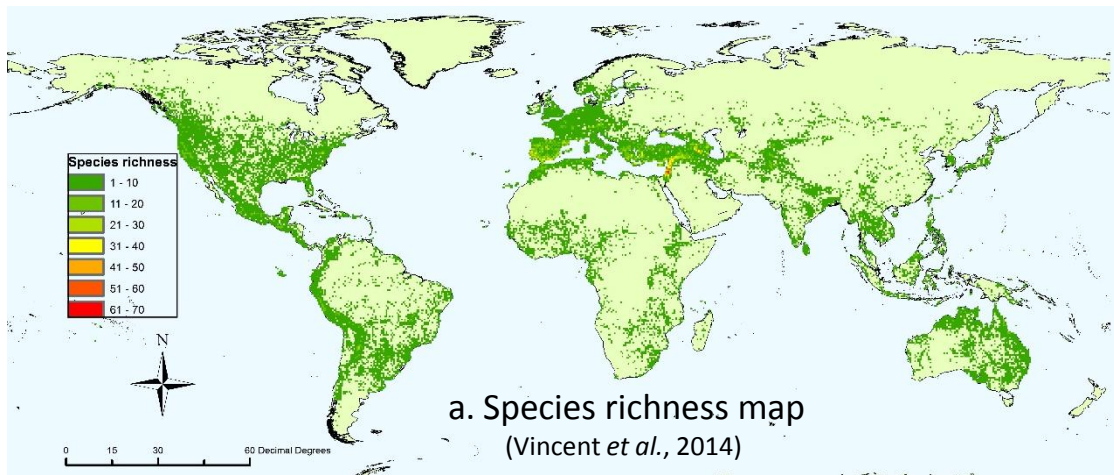
GLOBAL CWR CONSERVATION – ADAPTING AGRICULTURE TO CLIMATE CHANGE: COLLECTING, PROTECTING AND PREPARING CWR

4. Field collection (countries)
5. *Ex situ* storage (national genebanks, MSB, Svalbard)
6. Pre-breeding: prepare CWR for use in breeding crops for new climates
7. Evaluate them for useful traits
8. Make the resulting information widely available



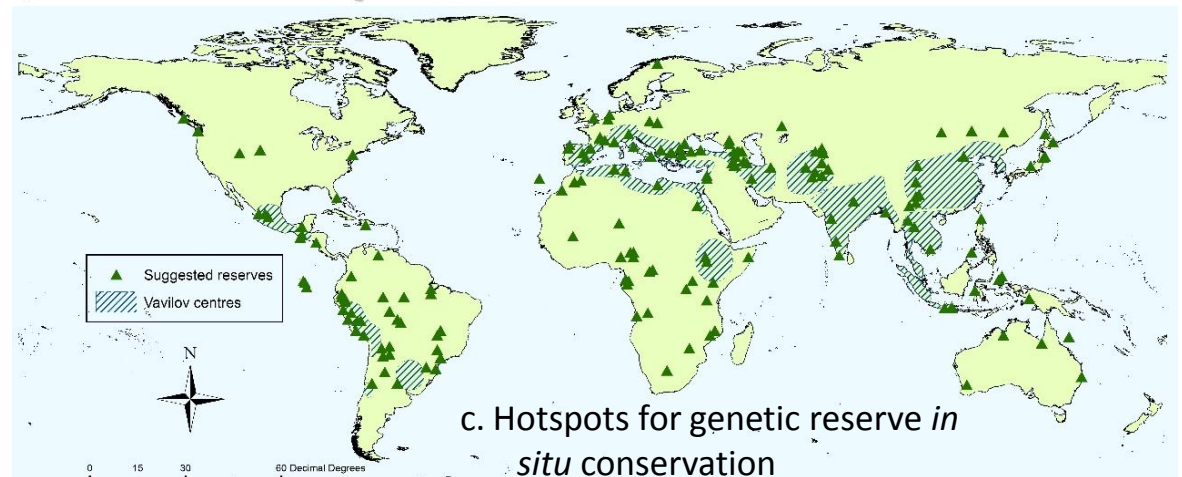
WHERE TO CONSERVE PRIORITY CWR DIVERSITY?

71% of all taxa are in **urgent need of collection** and conservation in genebanks



Collecting hotspots for high priority species from all crop genepools combined

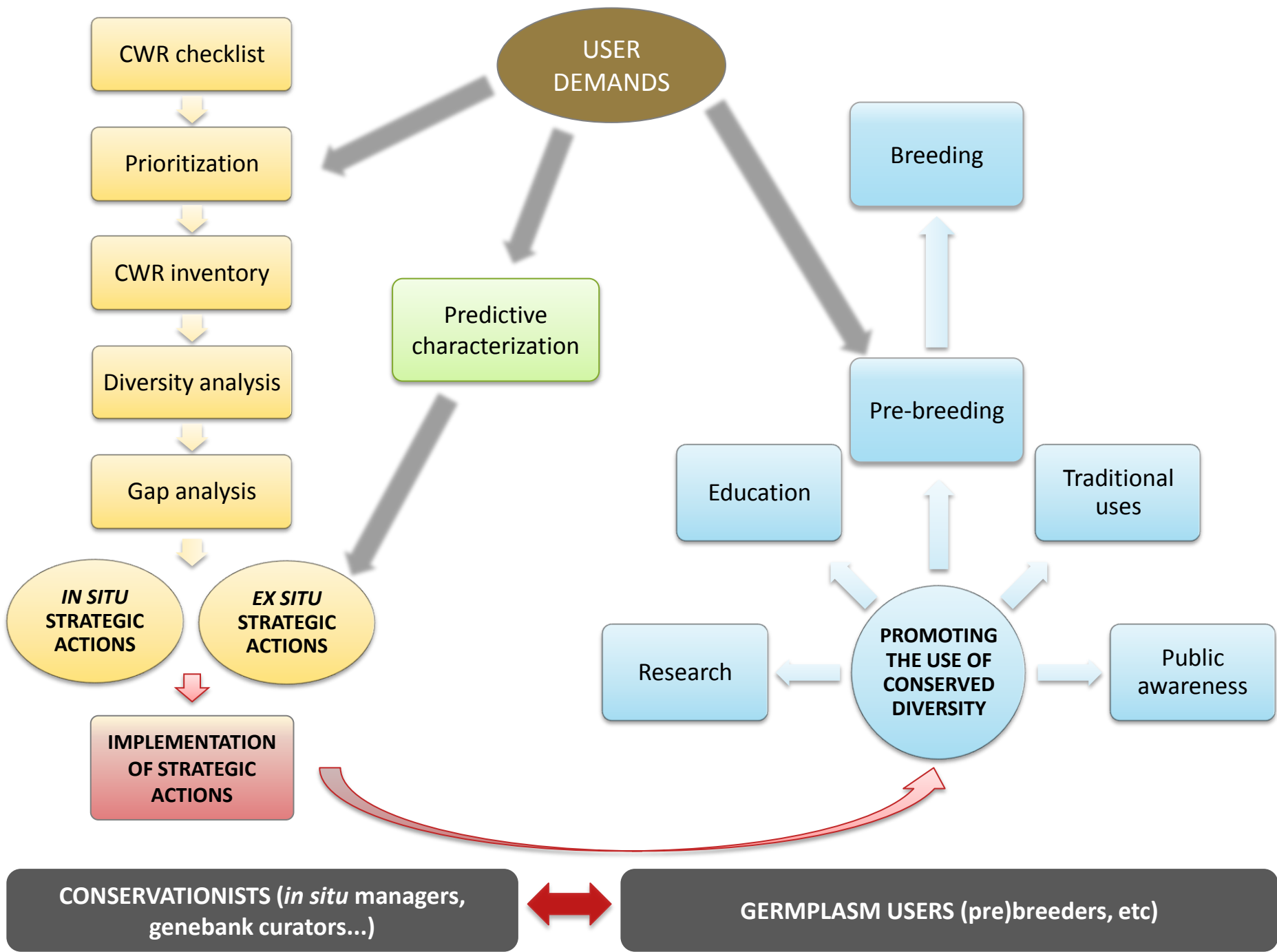
Project: Adapting Agriculture to Climate Change: collecting, protecting and preparing crop wild relatives
International Center for Tropical Agriculture (CIAT), Global Crop Trust Diversity (GCDT),
Millennium Seed Bank Partnership Kew, University of Birmingham



CONSERVATION LINKED TO USE



- CWR defined by their intrinsic potential to contribute novel traits for crop improvement
- **Conservation not the end goal!**
- SoW1 (FAO 1998): 35% of countries reported lack of C&E data which is a major constraint for germplasm use
- SoW2 (FAO 2010): 'country reports were virtually unanimous in suggesting most significant obstacle for greater use of PGRFA is the lack of C&E data'
- Conventional C&E has failed to meet the demand



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STRUCTURE OF THE NSAP

PART 1: INTRODUCTION

- Leadership, stakeholders and endorsement
- Aims and specific objectives of the NSAP
- General methodology used



PART 2: UNDERSTANDING THE COUNTRY CONTEXT

- Constitutional, legal and institutional framework
- State of CWR conservation and use (threats, Red List, current status of *in situ* and *ex situ* conservation, current status of use...)



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STRUCTURE OF THE NSAP

PART 3: CWR DIVERSITY ASSESSMENT AND PRIORITIZING FOR CONSERVATION

- CWR checklist
- Prioritizing for conservation
- CWR inventory
- Conservation assessment of prioritized CWR (diversity, gap and climate change analyses)

PART 4: POTENTIAL UTILIZATION OF CWR

- Current user demands
- **Predictive characterization**

PART 5: ACTION FOR THE FUTURE

- *In situ* and *ex situ* strategic actions
- Promoting the use of conserved diversity (**pre-breeding**, public awareness...)
- Implementation of the strategic actions (timeline, management responsibilities, financial and human resources)

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STRUCTURE OF THE NSAP

PART 5: MONITORING AND INFORMATION MANAGEMENT

- Monitoring CWR diversity
- Information system

PART 6: DISCUSSION

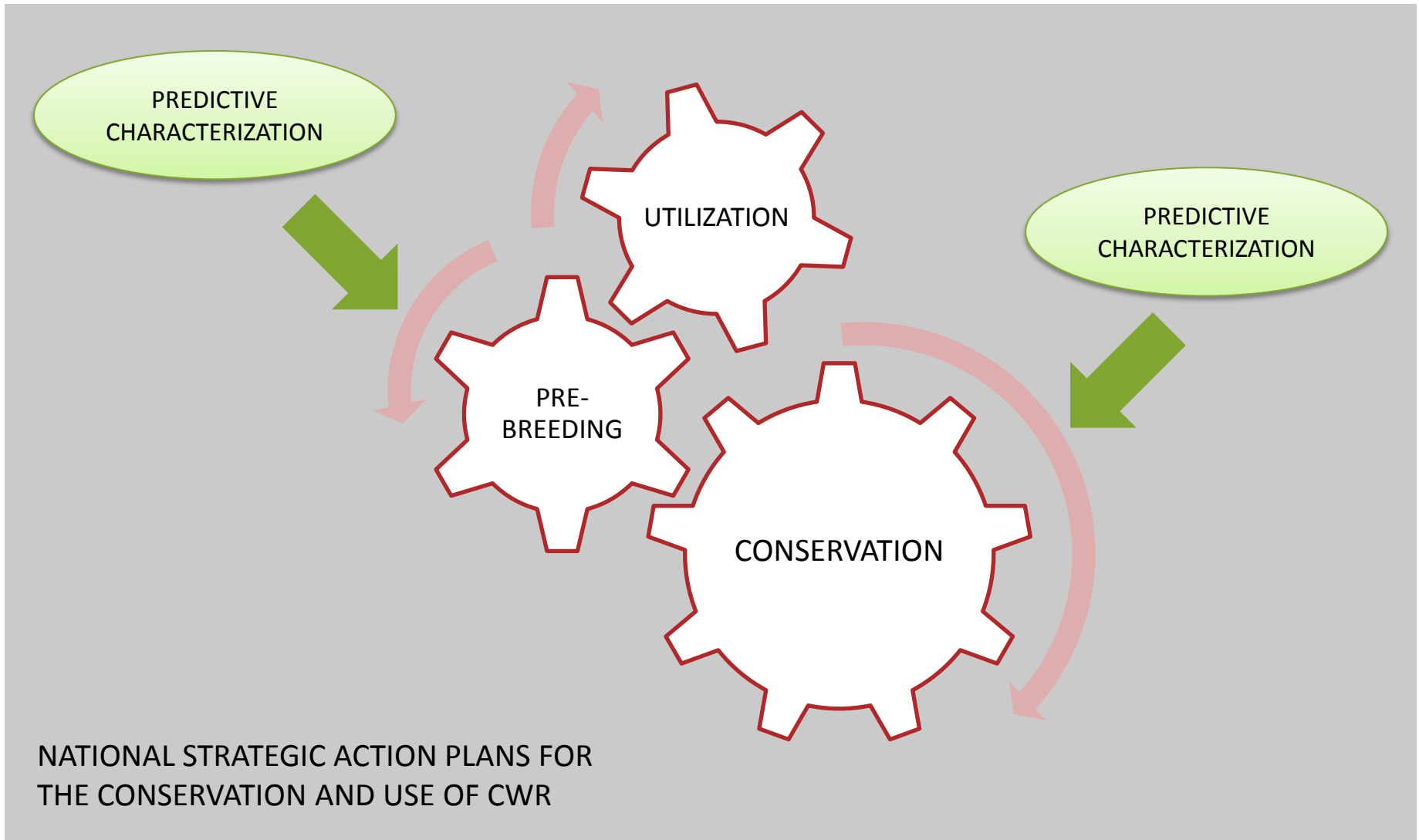
- Methodology applied and strategy limitations
- Future research recommendations
- Towards regional integration and international collaboration
- Next NSAP iteration

SUMMARY



- NSAP are fundamental tools to effective conservation and sustainable use of CWR diversity
- No single method of producing NSAP but have common elements
- Predictive characterization helps prioritizing populations for (*ex situ*) conservation
- Pre-breeding uses conserved diversity by looking for desirable characteristics and preparing pre-breeding populations
- User demands help to determine priority species for conservation, predictive characterization and pre-breeding activities

SUMMARY



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