



Contribution of protected areas to food security through in situ conservation

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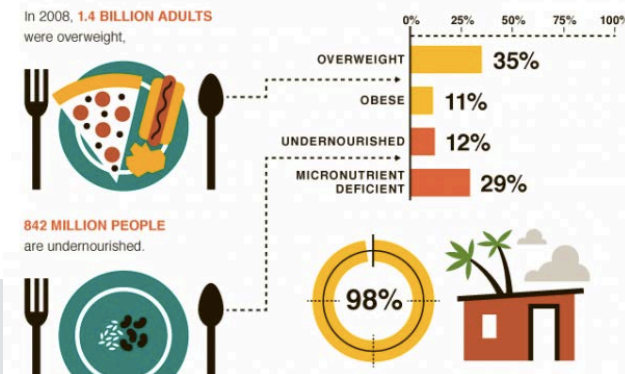
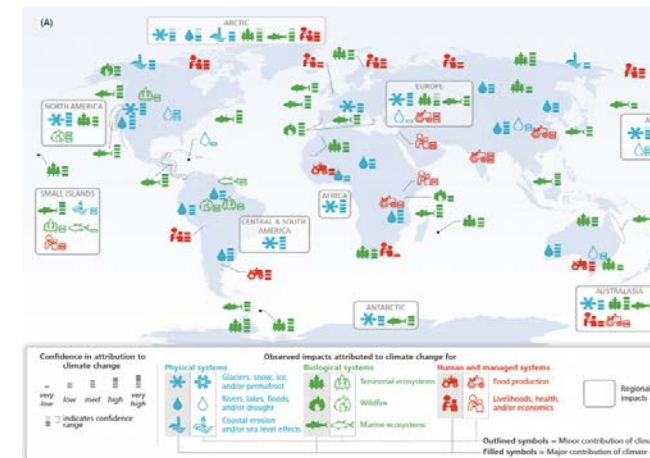
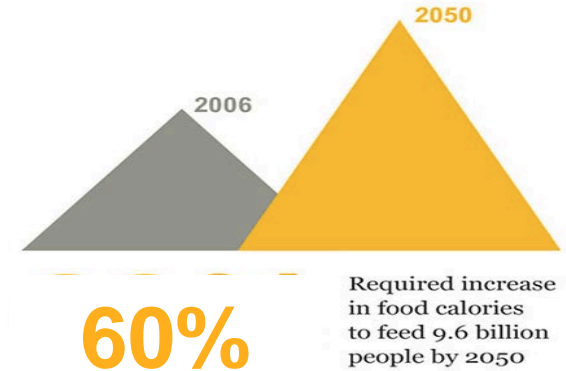
Overview

- Key challenges facing food and nutritional security and conserving biodiversity
- What contributions that protected areas brings to Food and nutrition Security?
- Effectiveness of protected areas in conserving crop genetic diversity
- Global network for in situ conservation of crop wild relatives
- Conclusions – questions?



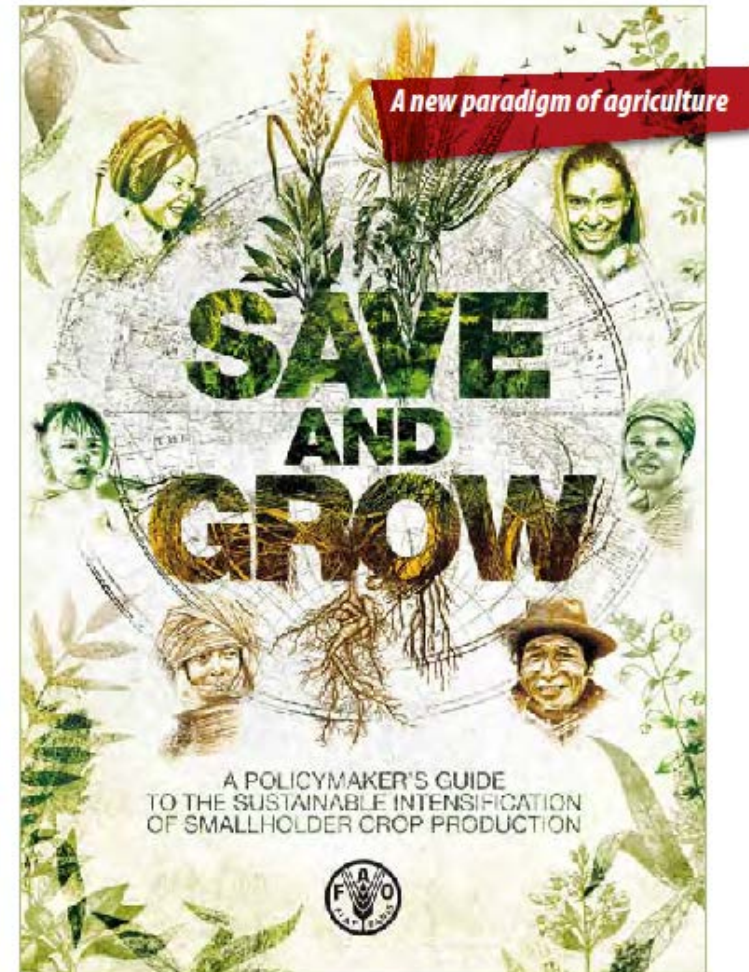
The 21st Century Challenge


- To feed 9-10 billion people by 2050, food supplies need to increase by 60% globally, and 100% in developing countries. How to do this in sustainable way?
- Climate change may reduce agricultural production 2% each decade while demand increases 14%.
- Double-Burden Malnutrition - overweight and obesity are on the rise in low and middle-income countries. At the same time, 1 billion people suffer from "hidden hunger."



Demands for food v/s Biodiversity loss

- How can we meet the increasing demands while at same time conserve the full array of biodiversity?
- How can we produce more with less land?
- Sustainable intensification of crop production; Save and Grow:
 - Ecosystem approach
 - Crop, animal and microbial diversity
 - Farming system -Sustainable water management, soil health, plant protection(natural enemies)
 - Enabling agricultural policies and institution





What is the link
between Protected
areas and Food
security?

Protected Areas and Food security

- Generally protected areas contains wild species, some of which may be important for food security; Two types:
 - Species that can provide food for human consumption - Wild Harvested Species
 - Species that can help improved crops – Crop Wild Relatives?



Walnut (*Juglans regia*)
Uzbekistan



Wild relatives of wheat, Armenia



What are Crop Wild Relatives?

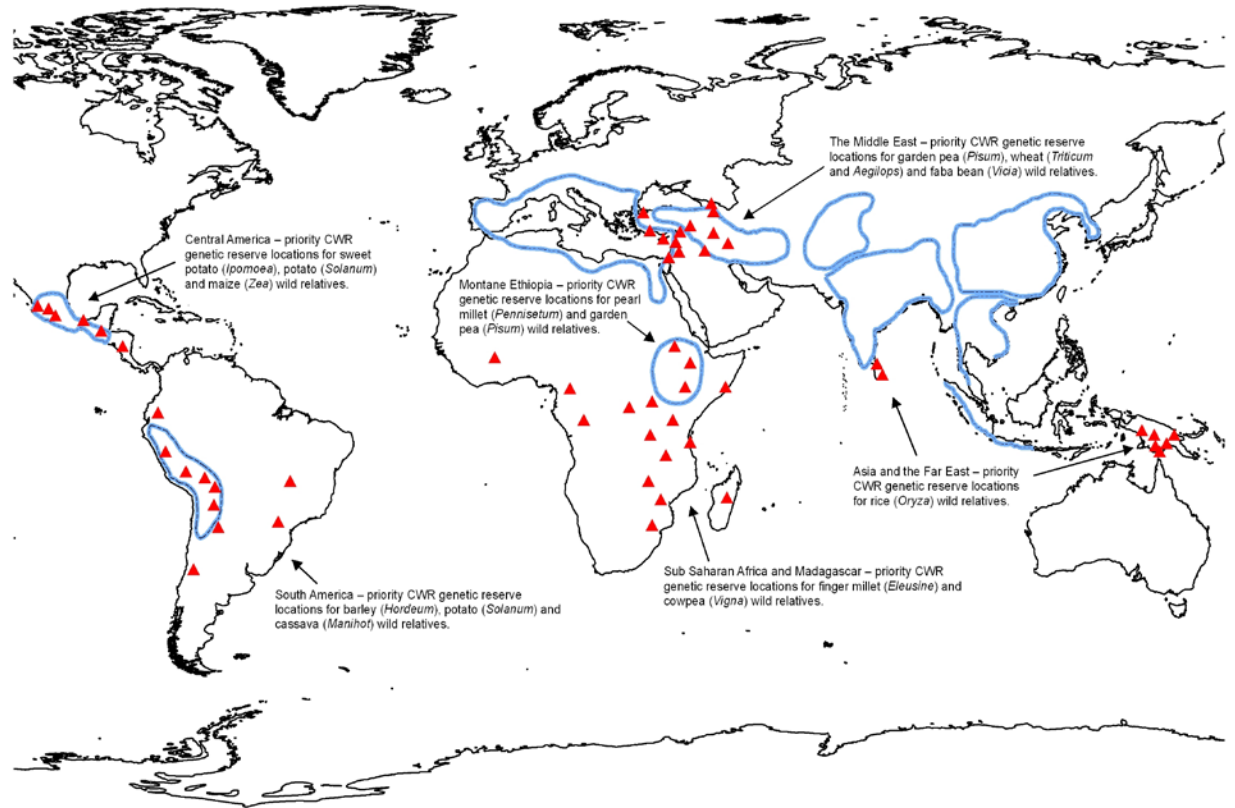
- CWR are wild species closely related to crops; possess traits of interest for crop improvement (resistance to pest and diseases, drought, salinity etc.);
- Exploited by local communities as they directly contribute to food security through provision of fruits, leaves, seeds and/or tubers (e.g. Yams in Madagascar- *Dioscorea maciba*)
- Maintained in situ and their conservation status is however often still largely unknown
- Threatened with extinction globally: 16-22% extinct by 2055;
- Most will lose 50% of their range according climate change predictions (Jarvis *et al.*, 2008)




Global priority genetic reserves for CWR

High Priority locations for CWRs identified

- finger millet (Burundi, DRC, Ethiopia, Kenya, Rwanda and Uganda),
- pearl millet (Sudan),
- garden peas (Ethiopia) cowpea in several countries
- Potatoes in Andean region
- Wheat, faba beans and garden peas in fertile crescent



Global priority genetic reserve locations for wild relatives of 12 food crops

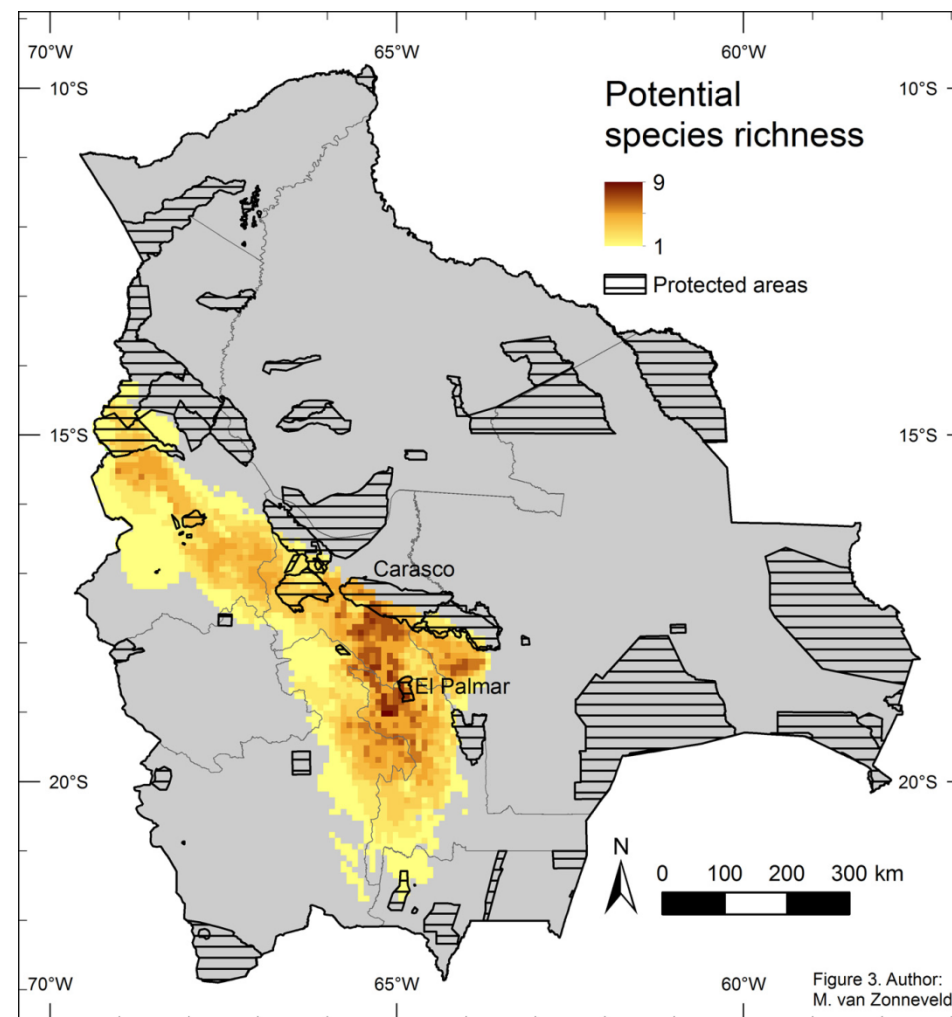
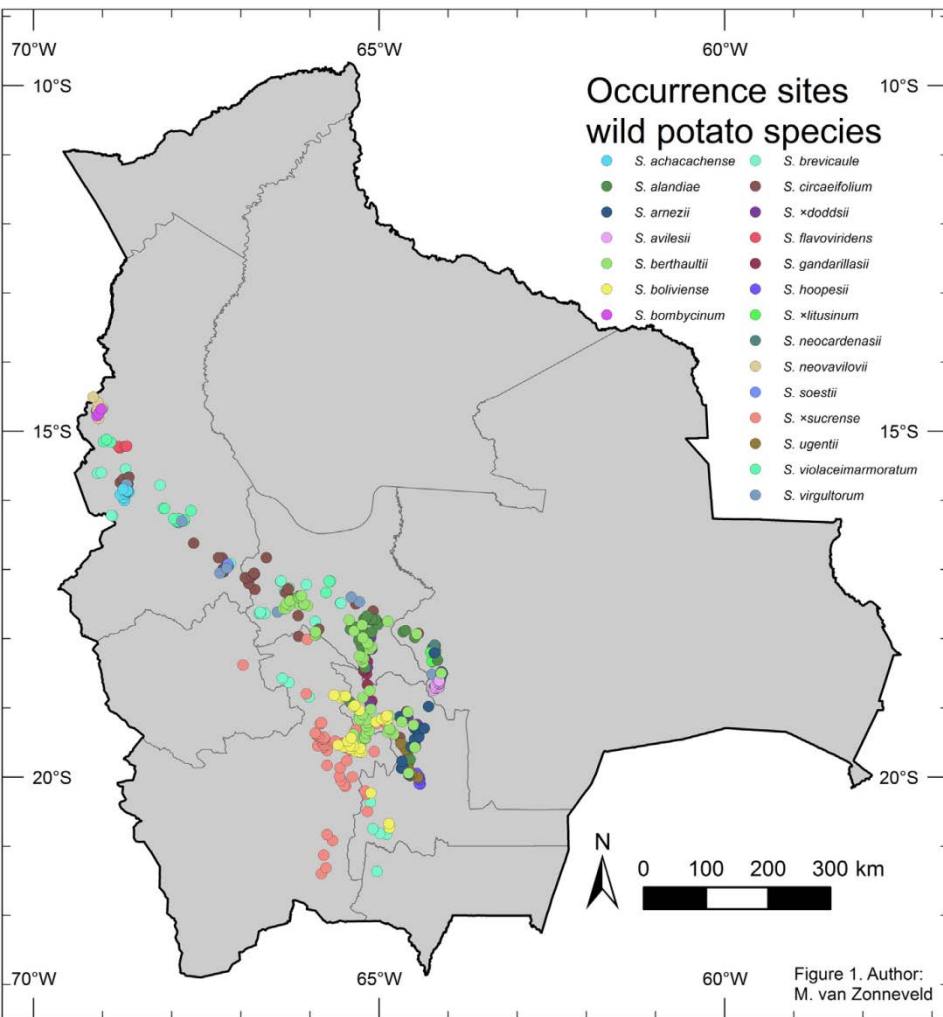
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- Protected areas are the principal system for in situ conservation at national level.
 - What is their effectiveness in conserving crop genetic diversity?

Case study of wild potatoes in Bolivia



- Potato is the fourth most important crop in the world,
- In Bolivia, over 1000 native potato cultivars being cultivated by over 200,000 families;
- Study by Cadima et al to evaluate the in situ and ex situ conservation status of endemic wild potato relatives in Bolivia based on spatial analysis;
- Identify hotspots of endemic wild potato diversity and prioritise areas for species in situ conservation using complementary analysis.

Priority areas for in situ conservation for endemic wild relatives of potatoes



In situ gap analysis of genetic diversity of wild *Coffea* species from Mauritius and la Reunion

Objective was to study effectiveness protected area network in Mauritius in conserving genetic diversity of wild relatives of coffee



Wild relative of coffee -*Coffea macrocarpa*

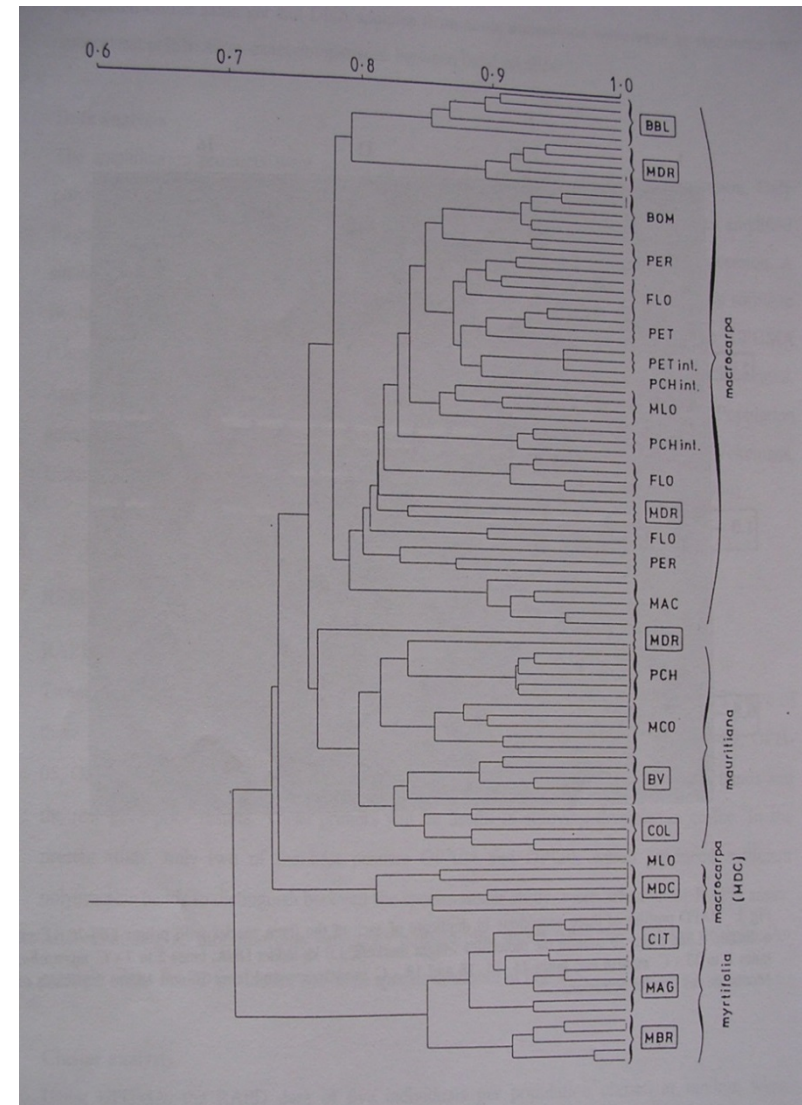



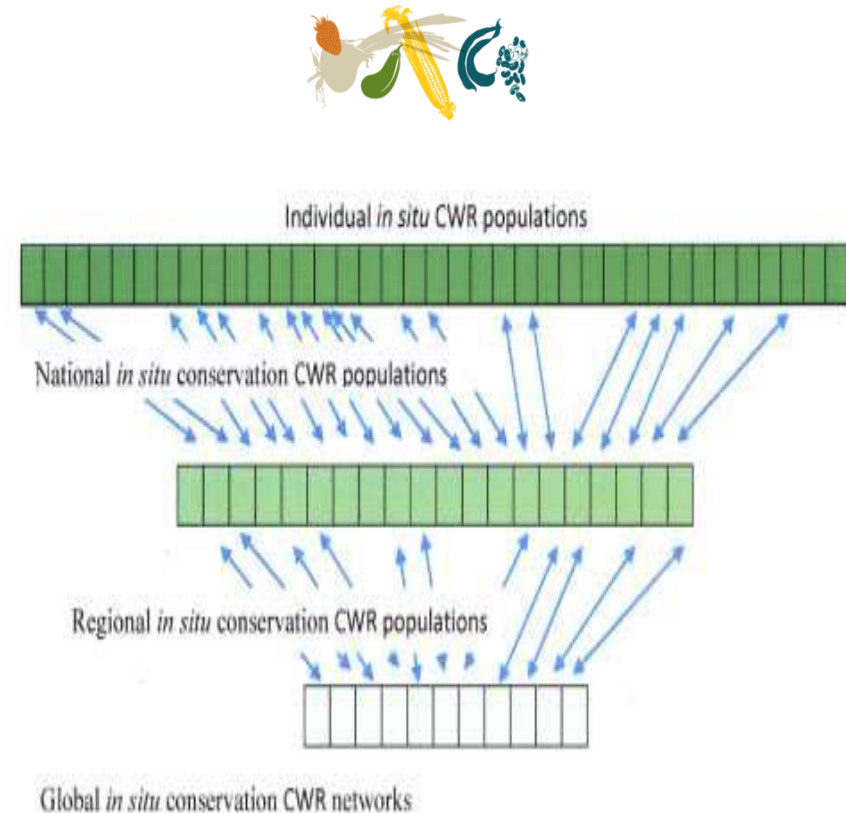
Fig 3: Dendrogram generated using UPGMA cluster method on NTSYS-pc software from 85 polymorphic markers for 92 individuals representing 16 *Coffea* populations. Scale is simple matching coefficient. Populations enclosed in box are located outside protected areas.



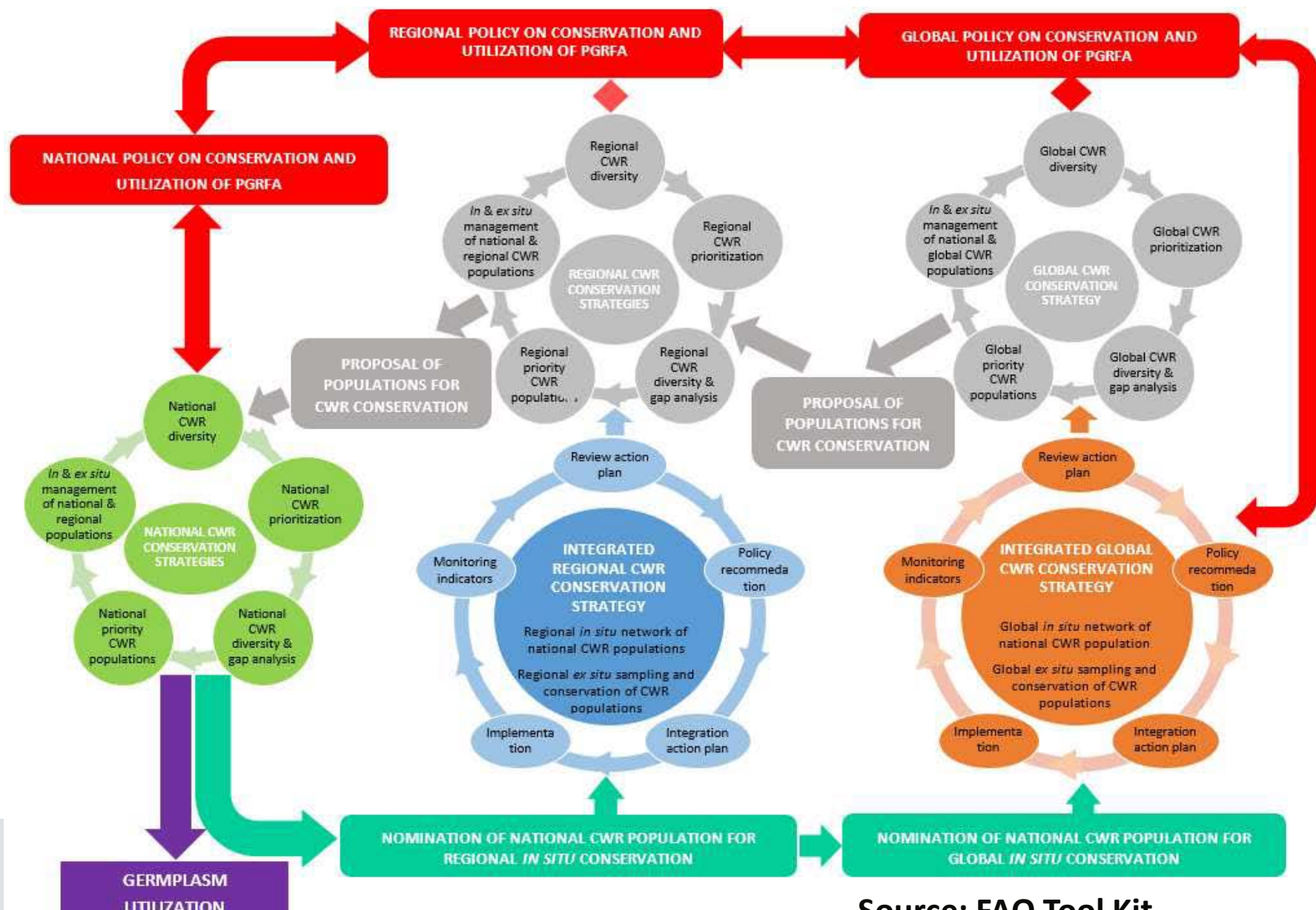
Global in situ conservation CWR network

Global in situ conservation CWR network

- **Global:** 13th Regular Session of FAO CGRFA (2011) recognised the need to pay greater attention to crop diversity essential for food security ... recognized that a global network for in situ conservation necessary to address challenges facing agricultural production, including climate change
- **European:** 13th meeting of ECPGR Steering Committee (2012) recognised importance of In situ conservation and recommended the development of a concept for in situ conservation of Crop Wild Relatives in Europe
- Both recommended a Network of Networks, broad, decentralized participation approach



In situ network of CWR populations





Conclusions

Key Challenges to address

- Capacity – Human Resources (taxonomy, in situ conservation and policy etc.)
- Cooperation and coordination between different institution, esp. environment (protected area managers) and agriculture (PGR scientist and breeders) sectors
- Systematic analysis of relevant information to help policy makers in making right decisions
- National Strategic Action Plan on Genetic Resources- Road map for strengthening conservation and use of PGRFA in protected areas
- Participative approach; more involvement of rural women gender sensitive



...Key Questions for discussion

- Are PAs a useful tool to protect the basis of our food security?
- How effective are PAs in conserving genetic diversity and how can we improve their effectiveness?
- How management interventions affect viability of target species?
- How can protected area managers take the necessary steps to enhance the important role of PAs in conserving plant and animal genetic diversity in the future?
- What knowledge, tools, networks do we have?



Thank you

