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CIAT
International Center for Tropical Agriculture
Since 1967 Science to cultivate change

Are genebanks serving farmers?

Marleni Ramirez, Ph. D.,

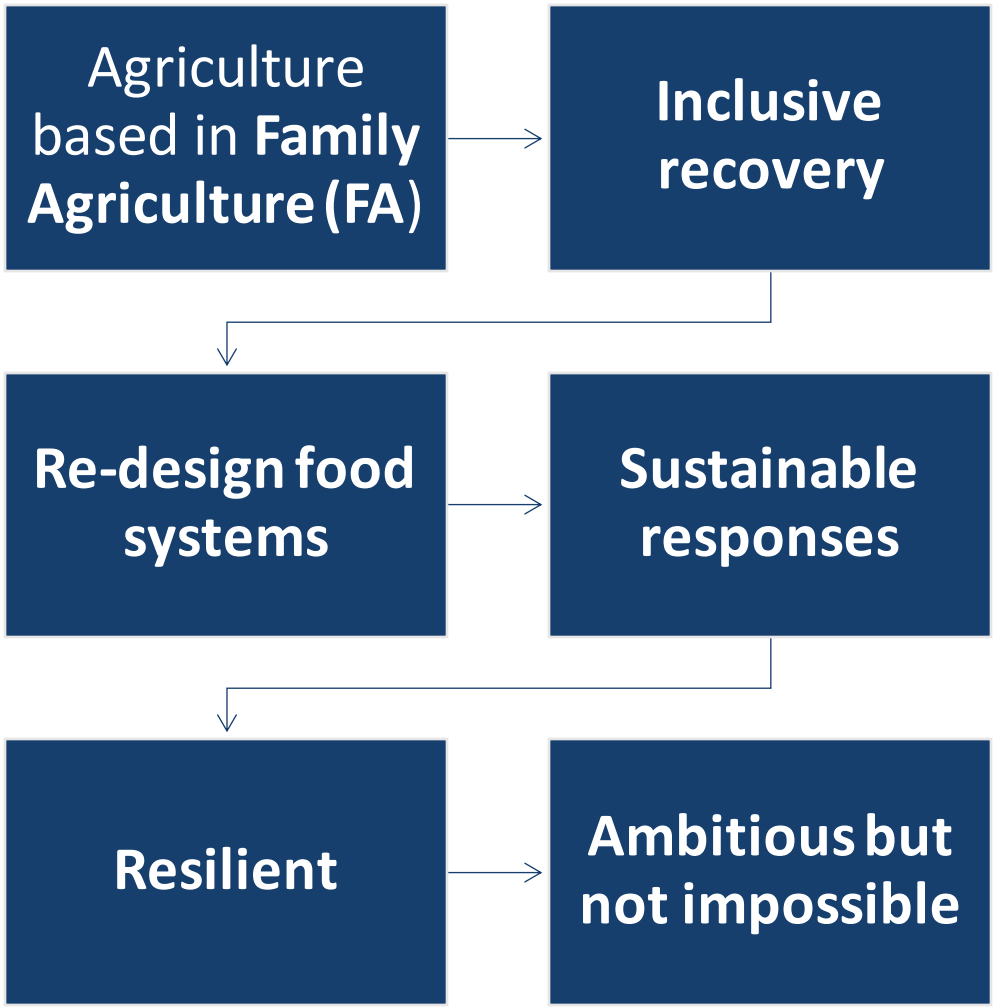
Alianza of Bioversity and CIAT

CGIAR

Food Systems Dialogues/Post -COVID Recovery Rural transformation processes

- Productive transformation: **more food**, better quality (nutritious) & taste, **technological** innovations, **incentives**, better logistical arrangements, environmentally sustainable, **integrated**
- Better livelihoods for **small-scale farmers**
- Better **health/nutrition for all, in cities and globally**
- How: **multi sectorial**, dialogue, **new governance**: central, regional and local
- Heads of **Ministries** of Agriculture, Environment, Production, Health, Treasury, Social Inclusion,Education, International Cooperation: IFAD, WFP, FAO

Buzzwords


Agriculture based in **Family Agriculture (FA)**
Inclusive recovery
Re-design food systems
Sustainable responses
Resilient
Ambitious but not impossible

Why a doubling of genetic diversity available to users?

- Currently:
  - Crop breeders calling for access to greater diversity to address climate change (Volkaert and Ajmone, 2007; Ceccarelli et al., 2008; Dalton et al., 2008; McCouch et al., 2013)
  - CWR are suffering erosion and extinction – 16 to 35% are IUCN threatened (Kell et al., 2012; Gustafson et al., 2021)

    99% of CWR conservation is *ex situ* as seed in genebanks and supplies users (Maxted et al., 2016)
  - Analysis of CWR holdings shows ≈ ¼ unconserved, ≈ ¼ poorly conserved (<10 accessions) and 95% are under-collected (Castañeda et al. (2016)
  - Similar data for LR is unavailable, no threat risk assessment, no complete national inventories and no estimates of *ex situ* holdings
- Complementary conservation means applying *ex situ* and *in situ* techniques together, but *in situ* (incl. on-farm) conservation is almost completely ignored
- Systematic *in situ* (incl. on-farm) conservation could at least double the diversity available to users who are acknowledging PGR availability is limiting breeding options

Greta Thunberg

ReSCA en Latino América: 2010-2020

4 Países

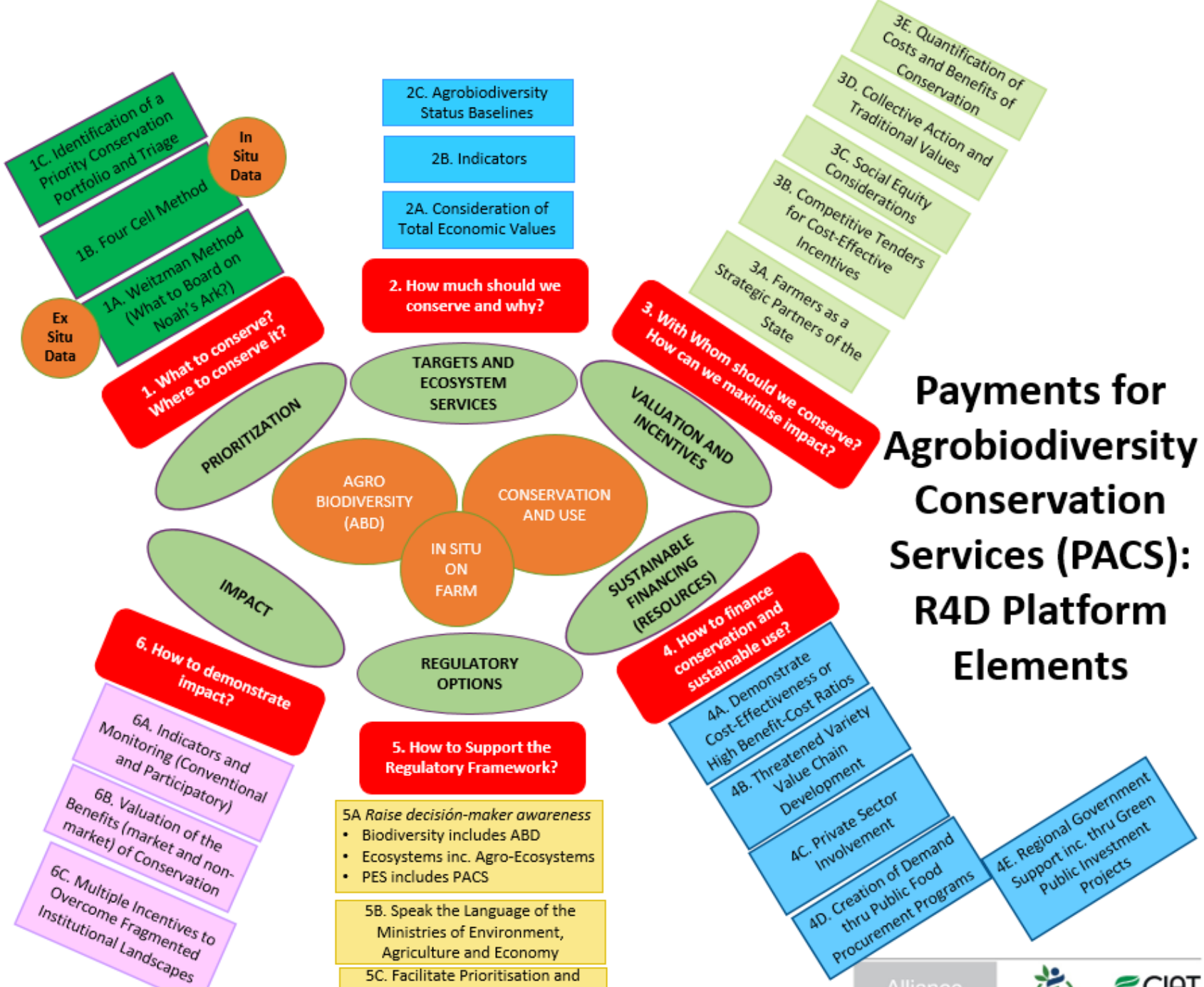
100 Comunidades

130 variedades amenzadas de varios cultivos

1,100 familias participaron

Peru (Puno and Cusco)

Payments for Agrobiodiversity Conservation Services (PACS): R4D Platform Elements



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Pending issues

- Prioritization, finding enough rare seeds for multiplication and distribution to bidding farmers
- Valuation and incentives, need to suport farmer managers of diversity, in establishing links with other key actors, e.g., genebanks, establish linkages with other initiatives, explore networking
- Draw attention to role of small-scale farmers in conservation, generation and value adding to crop genetic diversity (Halewood et al., 2021)

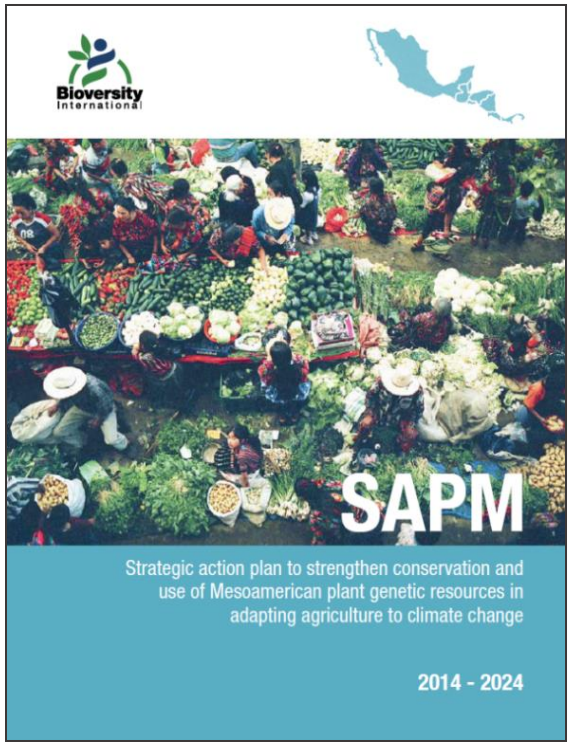
Action Plan to Strengthen the Conservation and Use of PGRFA in Mesoamérica (SAPM)

M. Ramirez, Regional Director, Americas Office

June 16-20, 2014

What is the SAPM?

- A roadmap to strengthen the conservation and use of native plant genetic resources of Mesoamerica strategic for the adaptation of agriculture to **climate change.**
- Focused on **10 Mesoamerican crops** important for **local** and **global food security**, with potential to generate income.
- Developed through a **systematic analysis** of relevant information + **broad consultation** with regional stakeholders resulting in the identification of a key set of activities (87) to be implemented in the **next decade**.



- Severe climatic events: Mesoamerica is highly vulnerable to climate change

- Interdependence: adaptation of agriculture to new climates will need materials found beyond national frontiers

- Opportunities: native PGRFA represent present and future options for access to adapted seeds; within framework of the International Treaty

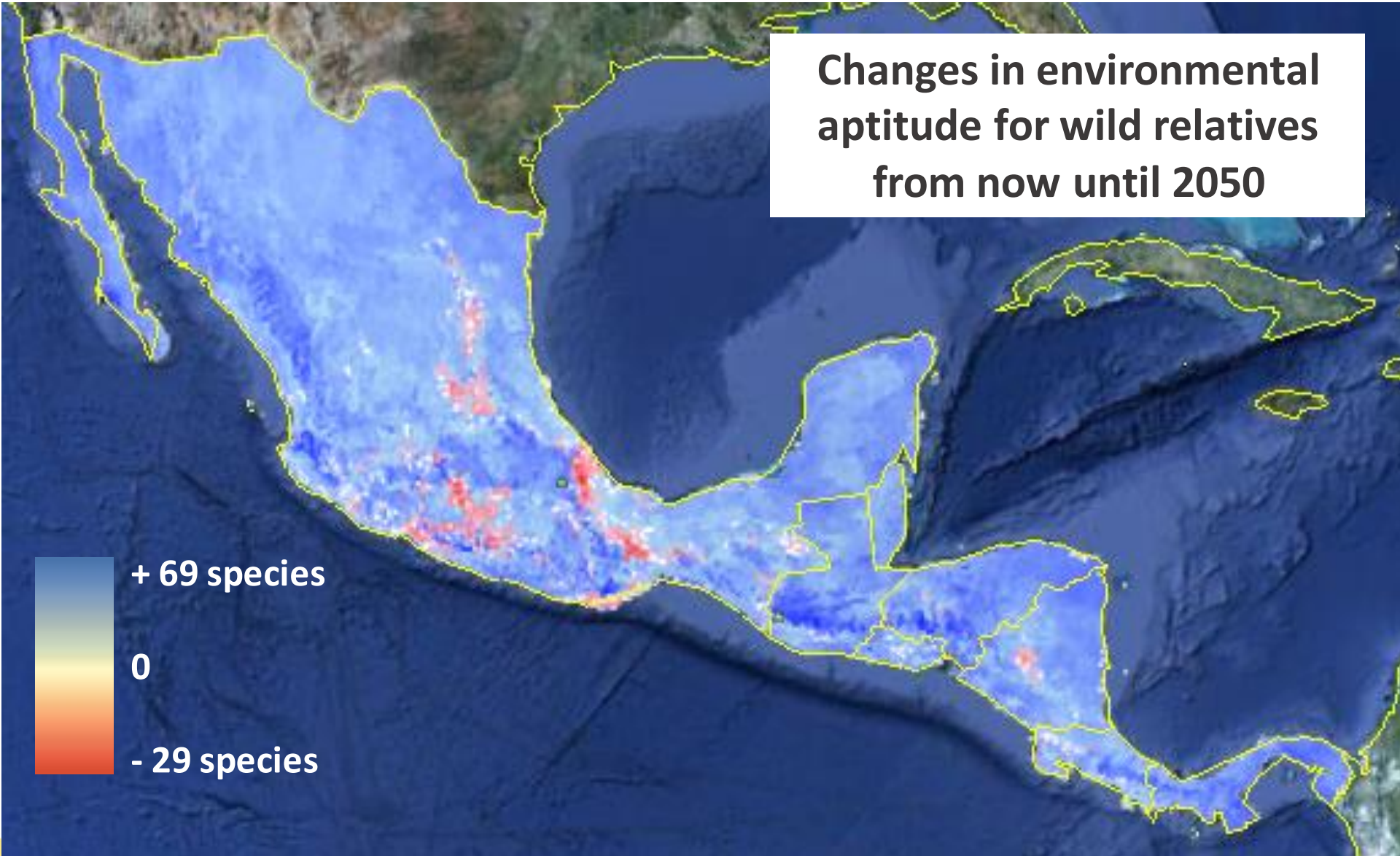
Focus genepools

- Baseline study focused on 10 genepools considered representative of agriculture in Mesoamerica: 26 crop species and >350 CWR

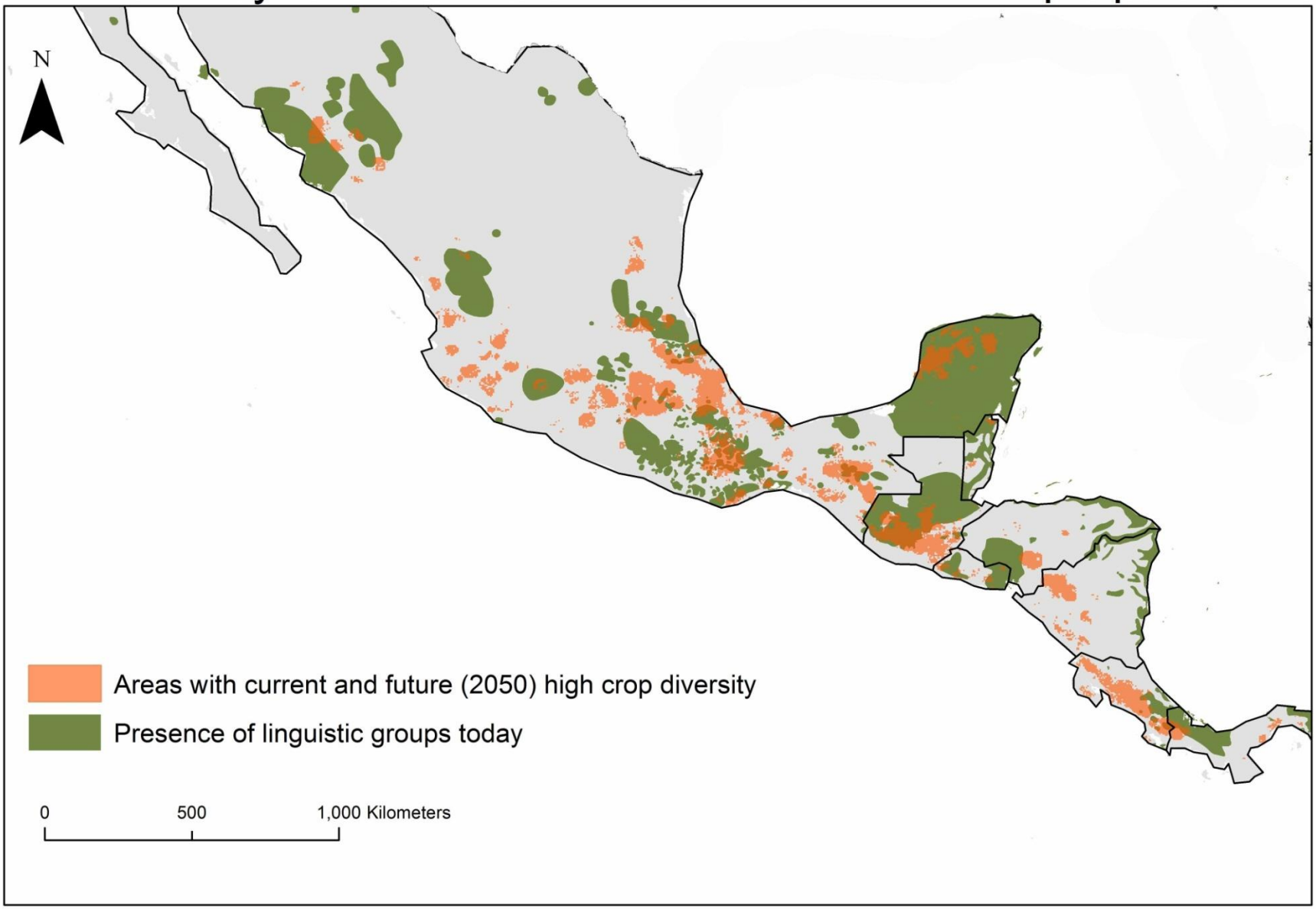
- ***Zea, Phaseolus, Manihot, Ipomoea, Cucurbita, Amaranthus, Capsicum, Carica, Persea, Tripsacum***

- Selection based on:
  - -Crop types: grains, tubers, horticultural, trees, fodder
  - -Treaty annex and non-annex
  - -Regional priority crops
  - -Important for food security, diets and income generation

Climate projections– Wild Relatives



Priority Areas for *In Situ* Conservation of Crop Species



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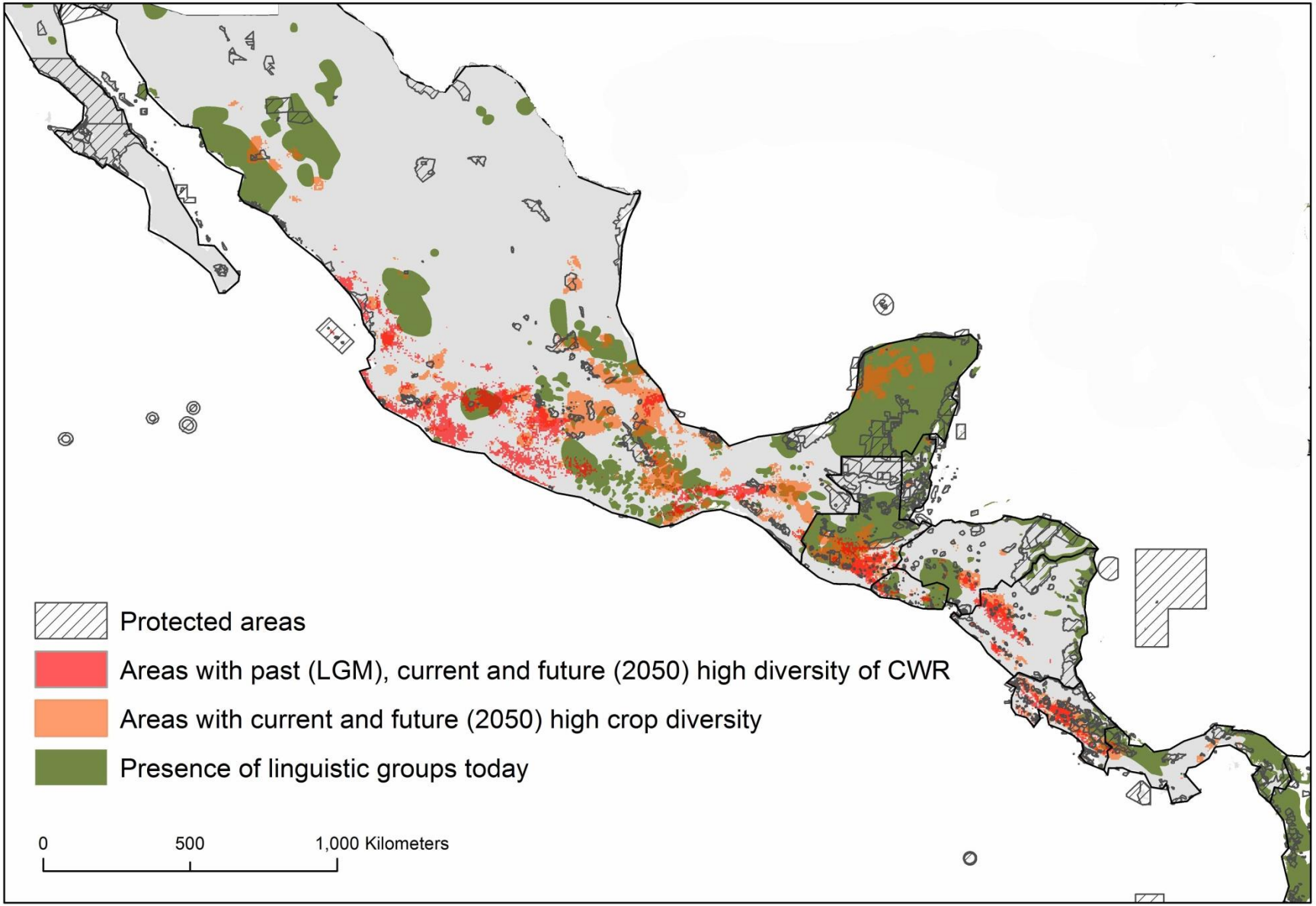
Priority Areas for *In Situ* Conservation of Crop and CWR Diversity



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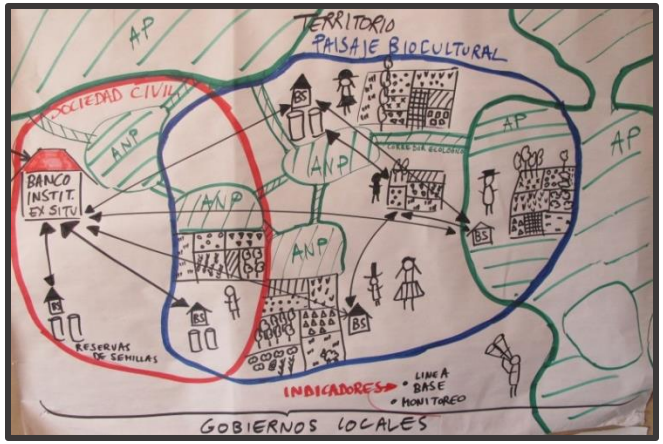
What are the priorities of farmers?

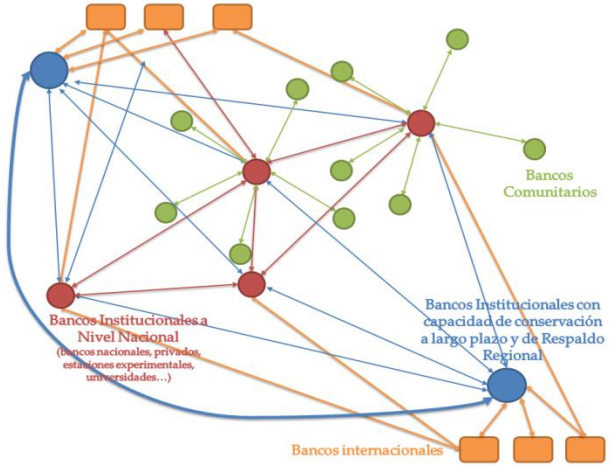
- 174 farmers from 5 neighboring countries involved in PPB were asked about their views on CC, their needs and suggestions
- What?
  - Access to adapted seeds
  - Information about weather to schedule planting, cultural activities
- How?
  - Support for community seed banks, local seed production, local extension

Participatory process

SAPM implementation



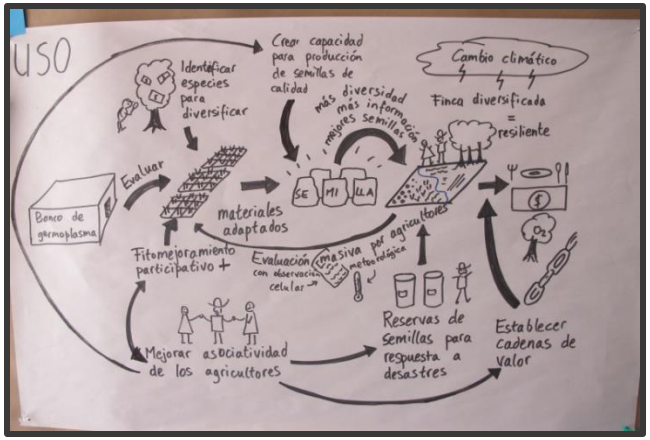
Biocultural territories



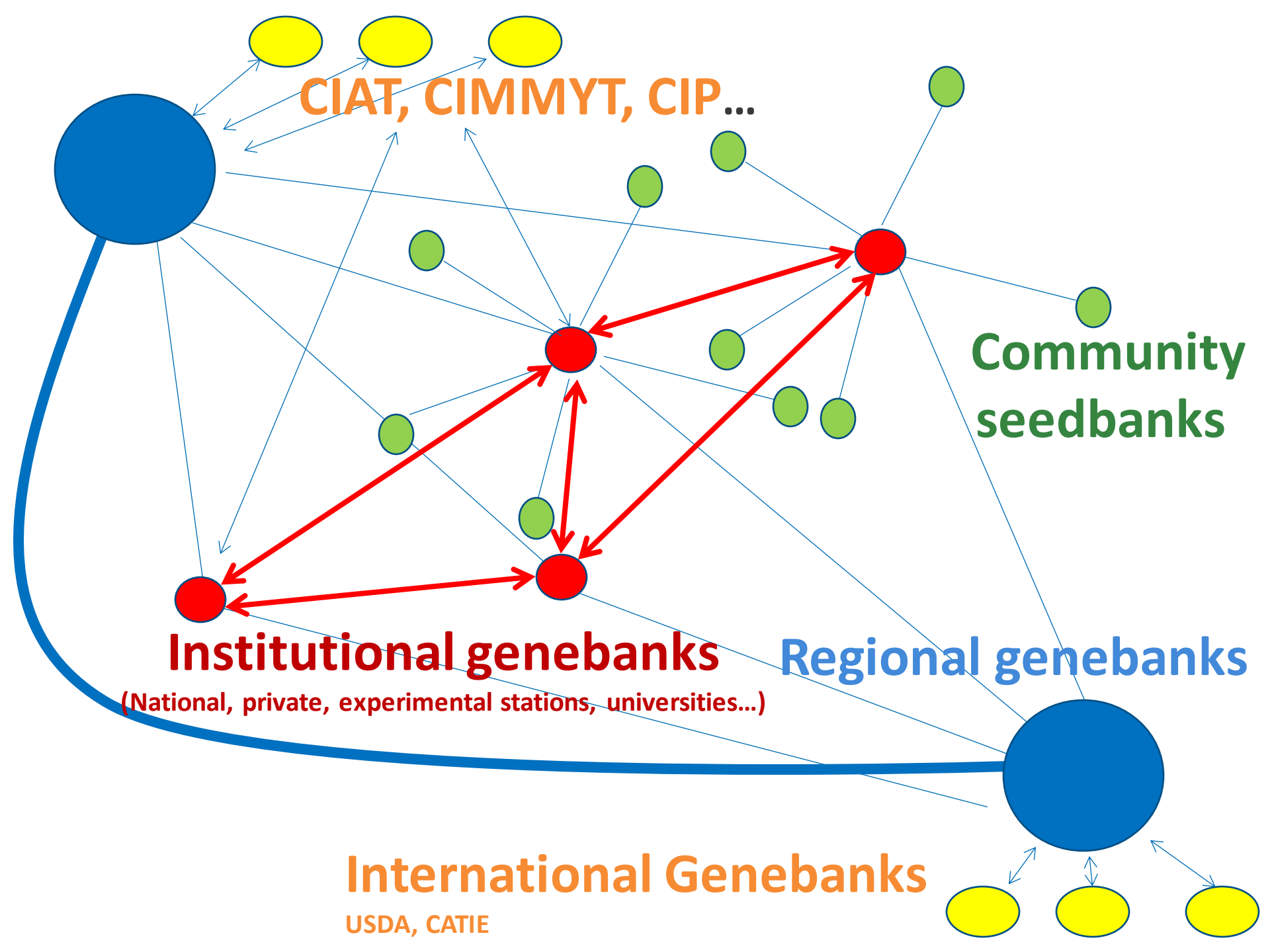
New architecture of ex situ conservation

- *ITPGRFF implementation institutionalized*
- *Farmers rights recognized and promoted*

- *National actors equipped to support and promote an integrated system of conservation and use of PGRFA*



Increased distribution of adapted material


CIAT, CIMMYT, CIP…
Community seedbanks
Institutional genebanks
(National, private, experimental stations, universities…)
Regional genebanks
International Genebanks
USDA, CATIE

Farmer-focused Actions

- Promote the establishment of sustainable biocultural territories integrated in existing conservation systems,
- Establishment of Community seed banks
- Crop diversification for risk management
- Promote PPB, cost effective mechanisms for exchange, evaluation and adoption
- Improve technical capacity to obtain, and interpret meteorological data for use by farmers, etc.
- Promotion of farmers rights and legal frameworks within IT implementation
- Creation of incentives for small holders to in situ conservation focused on areas of high diversity

Complementary → Dynamic conservation

in situ:

- allows for continued evolutionary dynamics on farm/in the wild
- allows for preservation of traditional knowledge/expertise

ex situ:

- Back-up function for *in situ*
- Allows for easier access through centralized repositories
- Long-term conservation

need to get better at:

- Working hand in hand
- Help stakeholders understand that they are not substitutes

Jamora, 2021

Diversity at risk

Funding gap for *in situ* conservation

Only partially conserved in *ex situ*

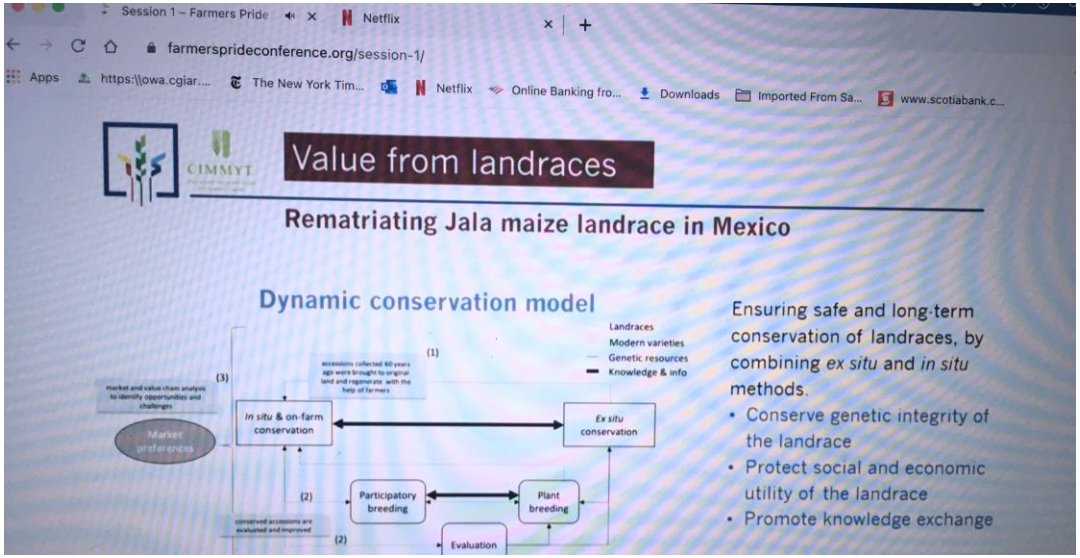
High risk of extinction and loss of traditional knowledge

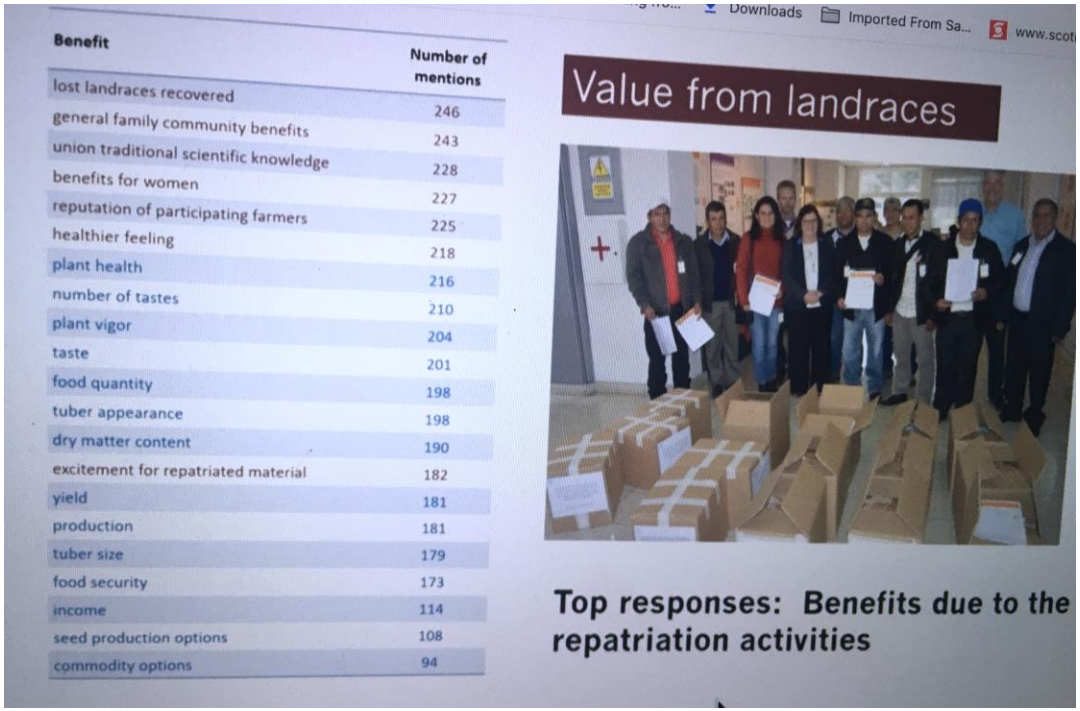
On farm Crop diversity at risk

- **Funding Gap for in situ conservation**
- **Only partially conserved ex-situ**
- **High risk of extinction and loss of traditional knowledge**

Rematriation and Repatriation

- Jamora, 2021





Benefit	Number of mentions
lost landraces recovered	246
general family community benefits	243
union traditional scientific knowledge	228
benefits for women	227
reputation of participating farmers	225
healthier feeling	218
plant health	216
number of tastes	210
plant vigor	204
taste	201
food quantity	198
tuber appearance	198
dry matter content	190
excitement for repatriated material	182
yield	181
production	181
tuber size	179
food security	173
income	114
seed production options	108
commodity options	94

AfricaRice

Farmer valuation

An experimental approach to farmer valuation of African rice genetic resources

1. WTP for ARICA varieties & WTA African rice landraces

   Mean: $0.50 (ARICA) and $0.47 (landrace)
   Max: $1.05 for a bag of seeds

   9% were not willing to pay anything for either type

2. Non-market elicitation of option and bequest values

   Annual contribution to the community seedbank

   (option value) Mean: $4.34 (ARICA) and $4.38 (landrace)

   (bequest value) Mean: $3.94 (ARICA) and $4.01 (landrace)

   Median $1.85

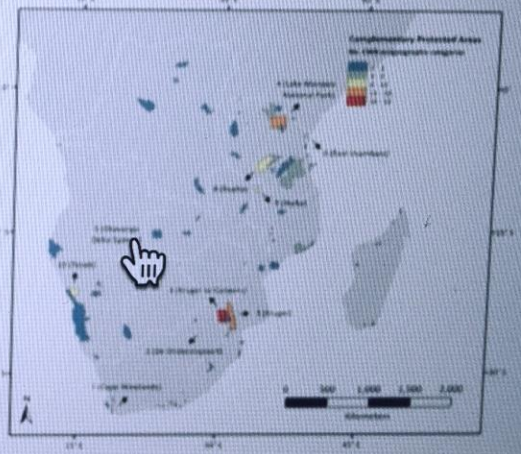
Tyack, Nicholas, Aboudou, Rachidi, Ndjondjop, Marie-Noelle, and Arouna, Aminou. An experimental approach to farmer valuation of African rice genetic resources. Genebank Impacts Working Paper (2021). CGIAR Genebank Platform and the CropTrust

Optimizing *in situ*/on-farm PGR population management

CROP WILD RELATIVE CONSERVATION PLANNING

IN SITU AND *EX SITU* CONSERVATION RECOMMENDATIONS

1. Genetic reserves: within the 120 complementary PA in 13 countries to cover 88 priority CWR and 50% of their ecogeographic diversity.
2. Genetic reserves: 151 sites outside PA in 11 countries to cover a further 21 CWR and remaining ecogeographic diversity. Alternatively, or as a first back-up, the CWR populations occurring in these sites should be conserved *ex situ*.
3. Prior to the establishment of the reserves: assessment of population occurrence, fitness status and suitability to implement the reserve.
4. Use the *Quality Standards for Genetic Reserve Conservation of CWR* (Iriondo *et al.* 2012).
5. Use the *CWR Population Management Guidelines* (see Iriondo *et al.*, 2021).

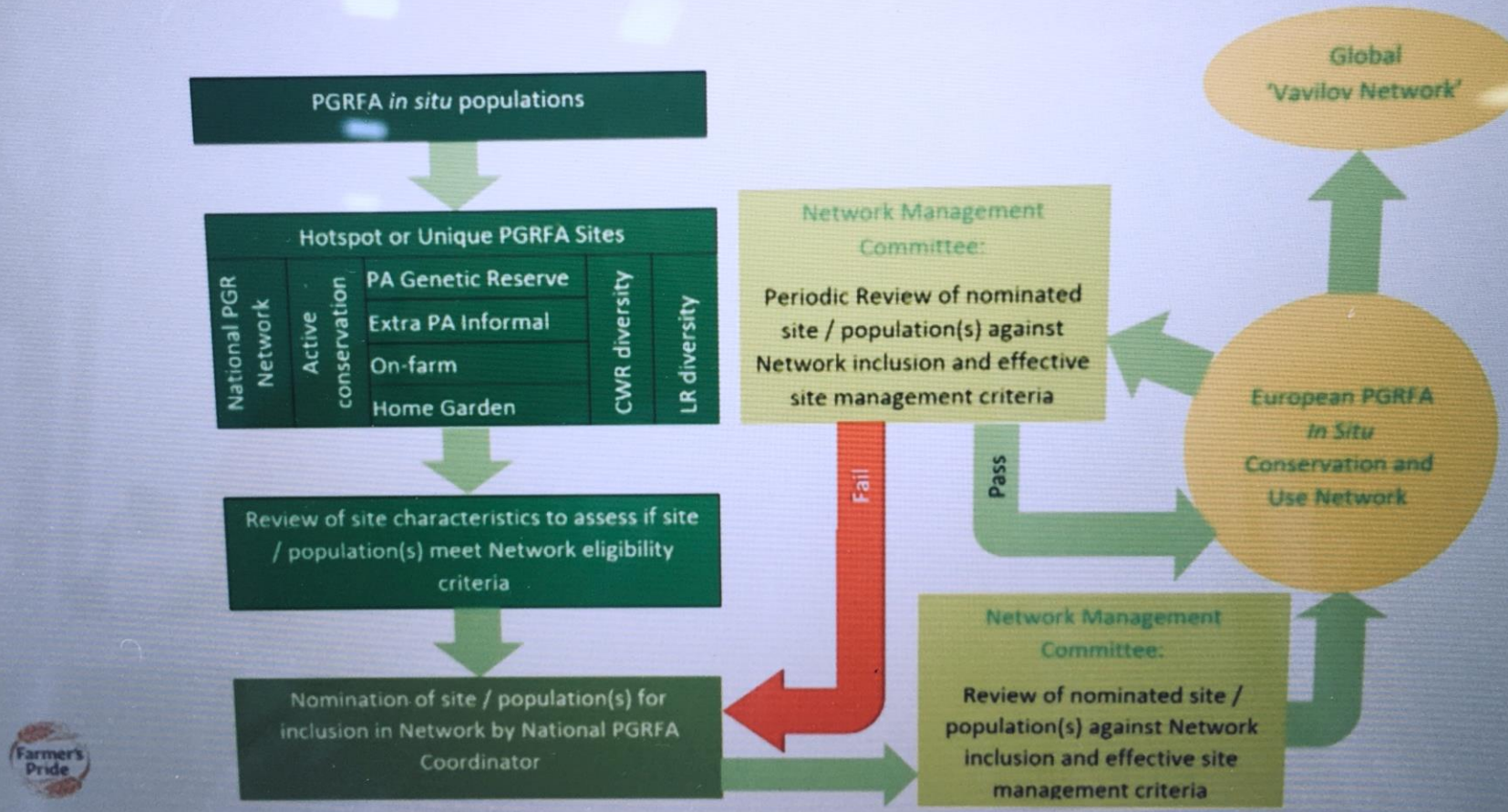


(Magos Brehm *et al.* in prep.)

Dulloo, 2021

In situ networks of CWR populations

Governance: a work in progress ....



Maxted, 2021

Collaborations

- Ensuring communities have seed at hand, locally adapted through targeted multiplication
- Properly document local/farmer varieties (database development and maintenance)
- Identify lost varieties of high value and conserve most threatened or endangered species/varieties
- Reintroduce lost varieties of high value in the community, national genebank can provide lost varieties and CSB multiplies and stores
- Carry out research and incorporate new findings re:new technologies for the storage, conservation and multiplication

Collaborations…

- Train farmers on conservation methods
- Build capacity for the production of quality seed for the benefit of the farming communities
- Promote CSB as a platform for community development
- Document and share information about emerging dynamics
- Promote agroecology as sound agricultural management practices
- Organize seed (diversity) fairs and exchange visits
- Work together on participatory crop improvement
- Adapted from Maxted, 2021

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Since 1967 Science to cultivate change

Thank you!

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CGIAR

Enfoque integrado multi-propósito de cadenas de valor basado en la biodiversidad

- Mejoramiento
- Variedades mejoradas
- Buenas prácticas agrícolas y de recolección
- Sistemas de semillas eficientes

- Tecnología de procesamiento mejorada
- Buenas prácticas de manufactura, HACCP
- Nuevo desarrollo de productos
- Recetas (viejas/nuevas)
- Estándares de calidad

- Concientización nutricional
- Preparación de comida
- Preferencias del consumidor
- Disposición a pagar
- Políticas facilitadoras

Diversidad Genética | Selección de cultivos | Cosecha | Valor agregado | Mercadeo | Uso final

Uso mejorado, mejor nutrición, ingresos y medios de vida

- Rescatar y conservar la diversidad *ex situ/in situ*
- Caracterización (taxonomía, molecular, morfología etc.
- Evaluar la diversidad de los rasgos valiosos (micronutrientes etc.)
- Documentar el conocimiento indígena y los usos tradicionales
- Sequía, heladas, tolerancia a la salinidad

- Tecnología post-cosecha mejorada
- Seguridad Alimentaria

- Evaluación y mejoramiento de cadenas de valor
- Comercialización de marca
- Plataformas de cooperación e innovación

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