Accessing and Using Genetic Diversity for Climate Change Adaptation

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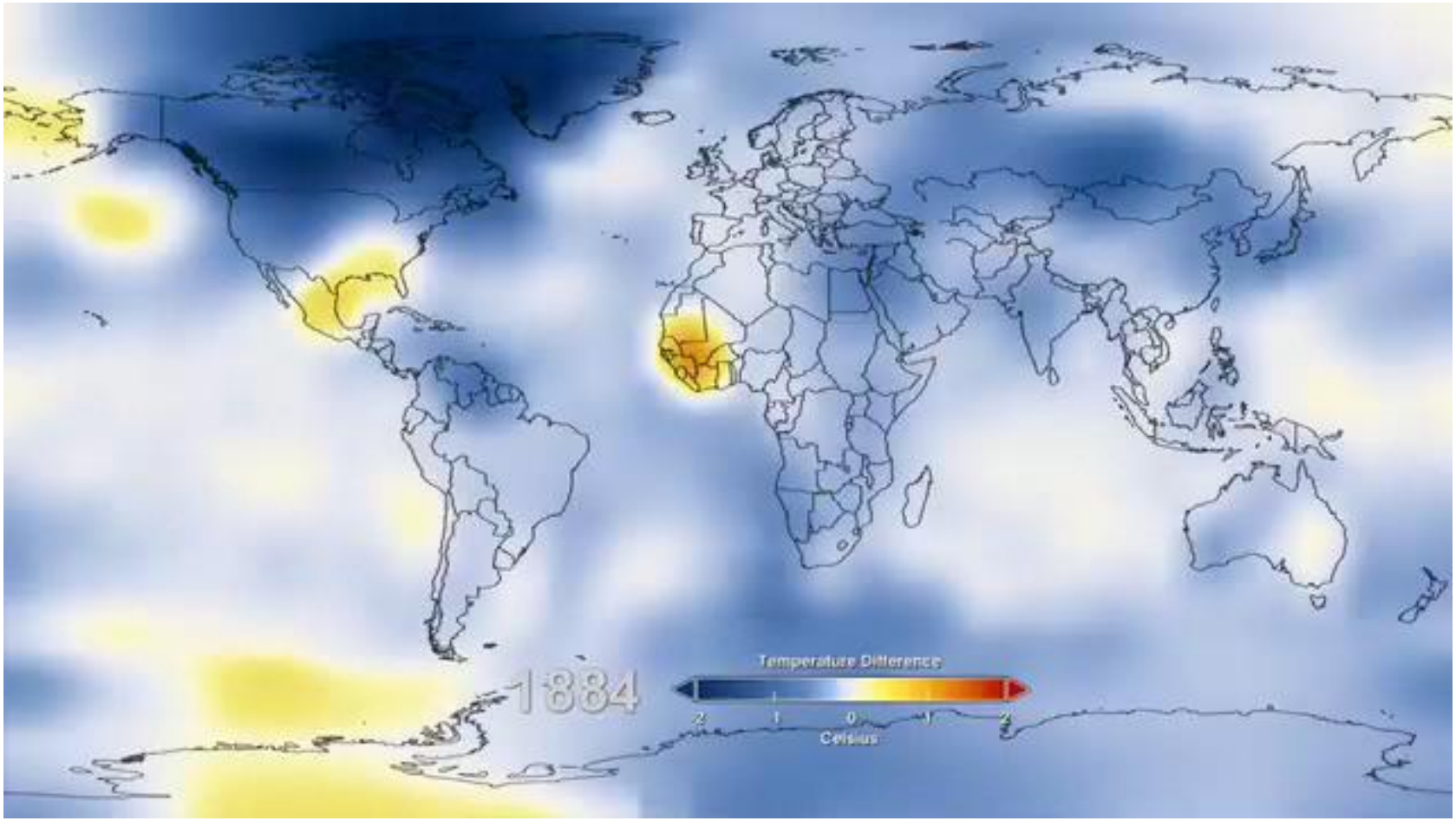
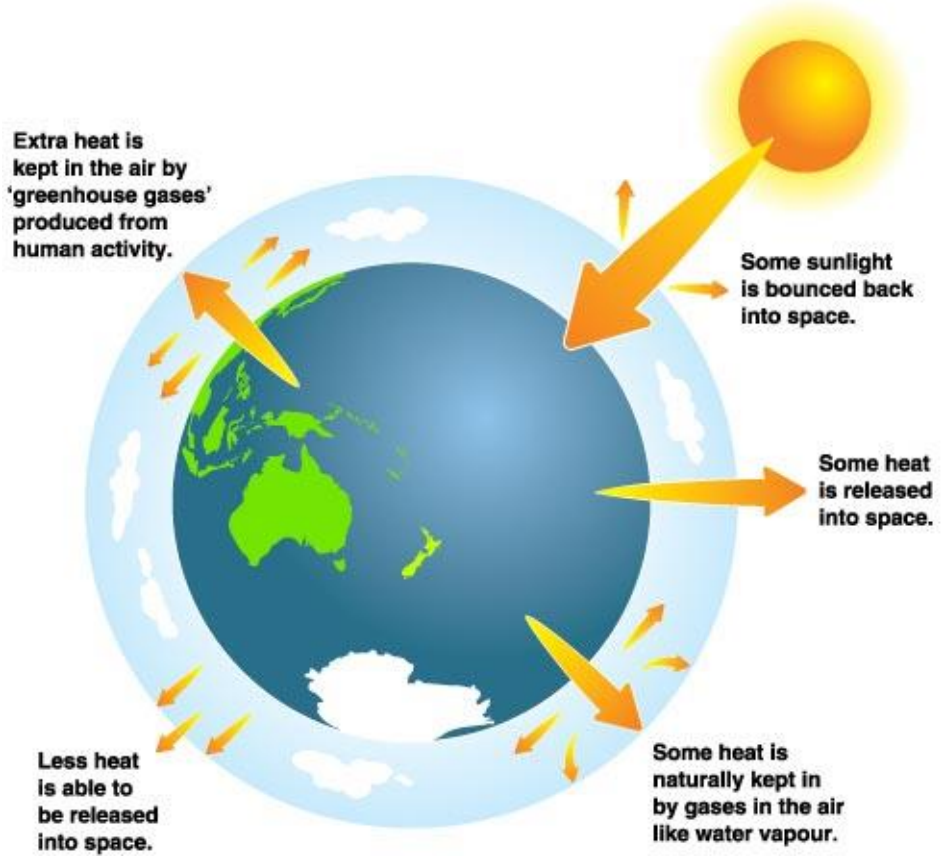
Climate Change: Some Evidence

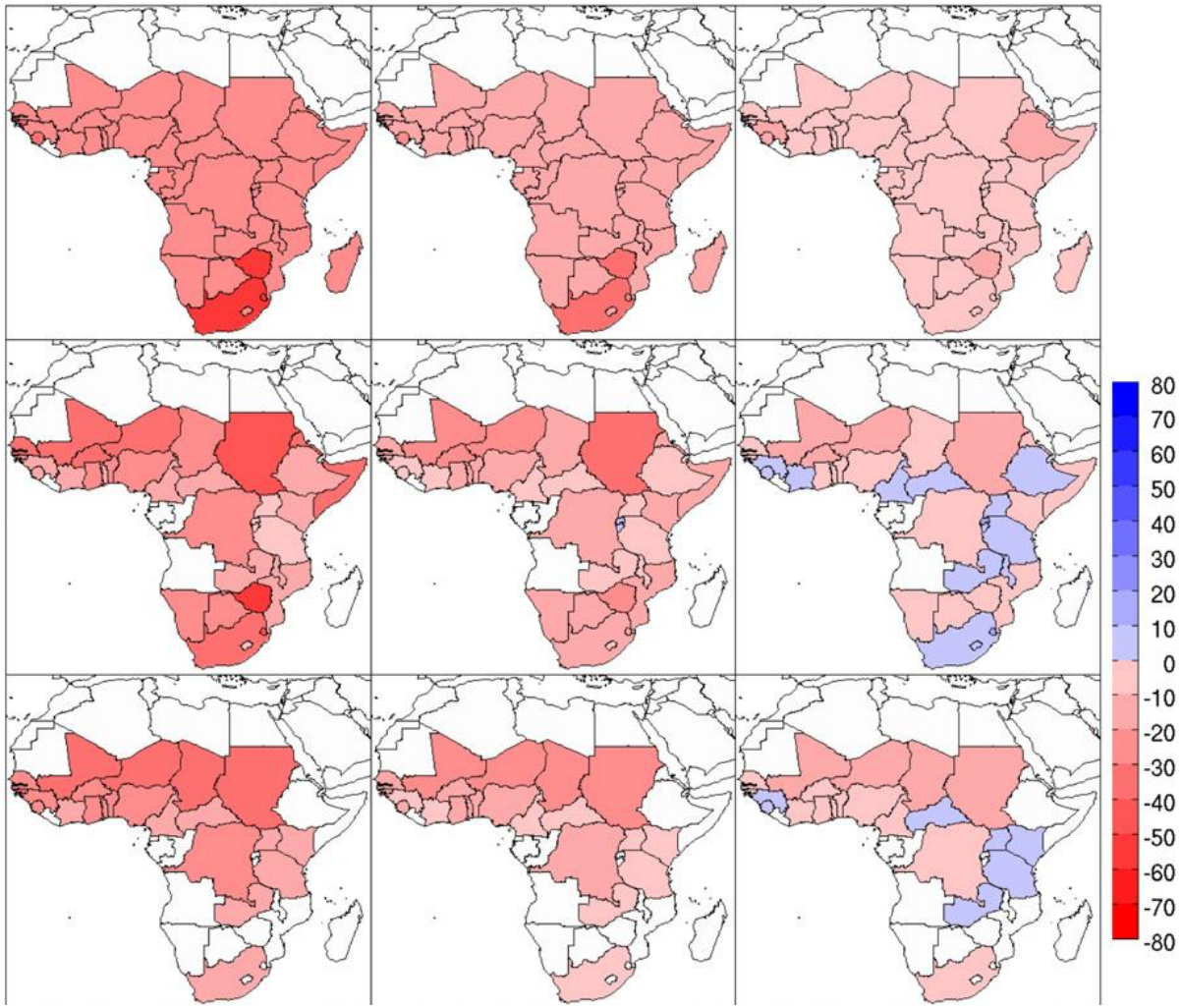


Major Environmental Threats to Sustainable Production



- Climate change, floods, droughts, unpredictable temperatures and rainfall
- Changing pest and pathogen populations and levels of pollination efficiency
- Increased soil and land degradation

Impact on Crops in Africa



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Adaptation to climate change: recommended actions by the IPCC

Improving crop tolerance to new conditions

Improving access to gene banks to develop varieties with appropriate adaptive characteristics

Indigenous Knowledge (IK) has developed adaptive strategies thus contributing to food security in many parts of the world

The fundamental question:

How can we ensure that agricultural productivity increases are accomplished in ways that create and enhance ecosystem resilience and services for the poor?

Productivity and reduced vulnerability

(reducing the probability of loss of agricultural productivity in the future, while enhance productivity today)

Under conditions of change

The Case of Durum Wheat – The Research

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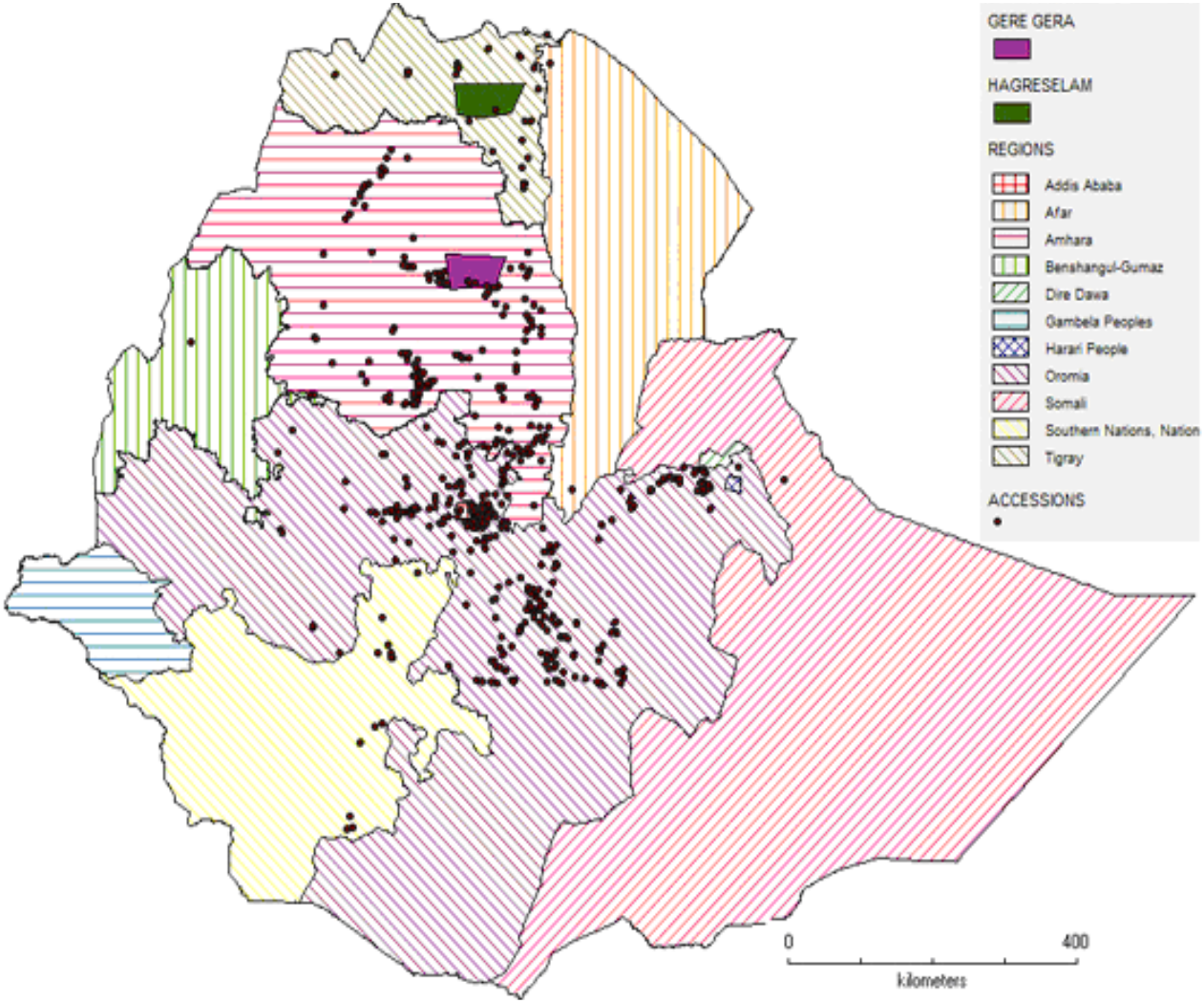
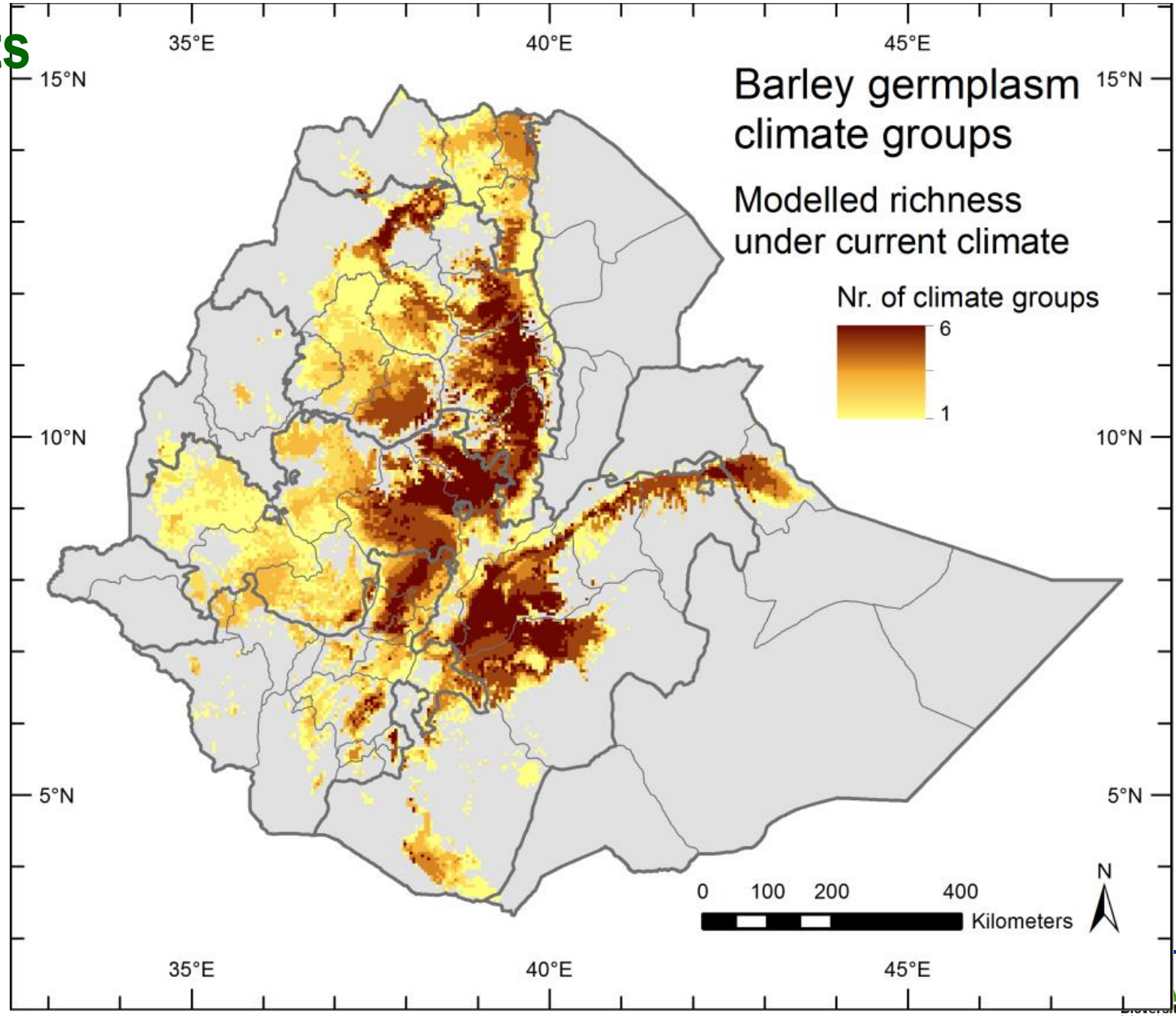
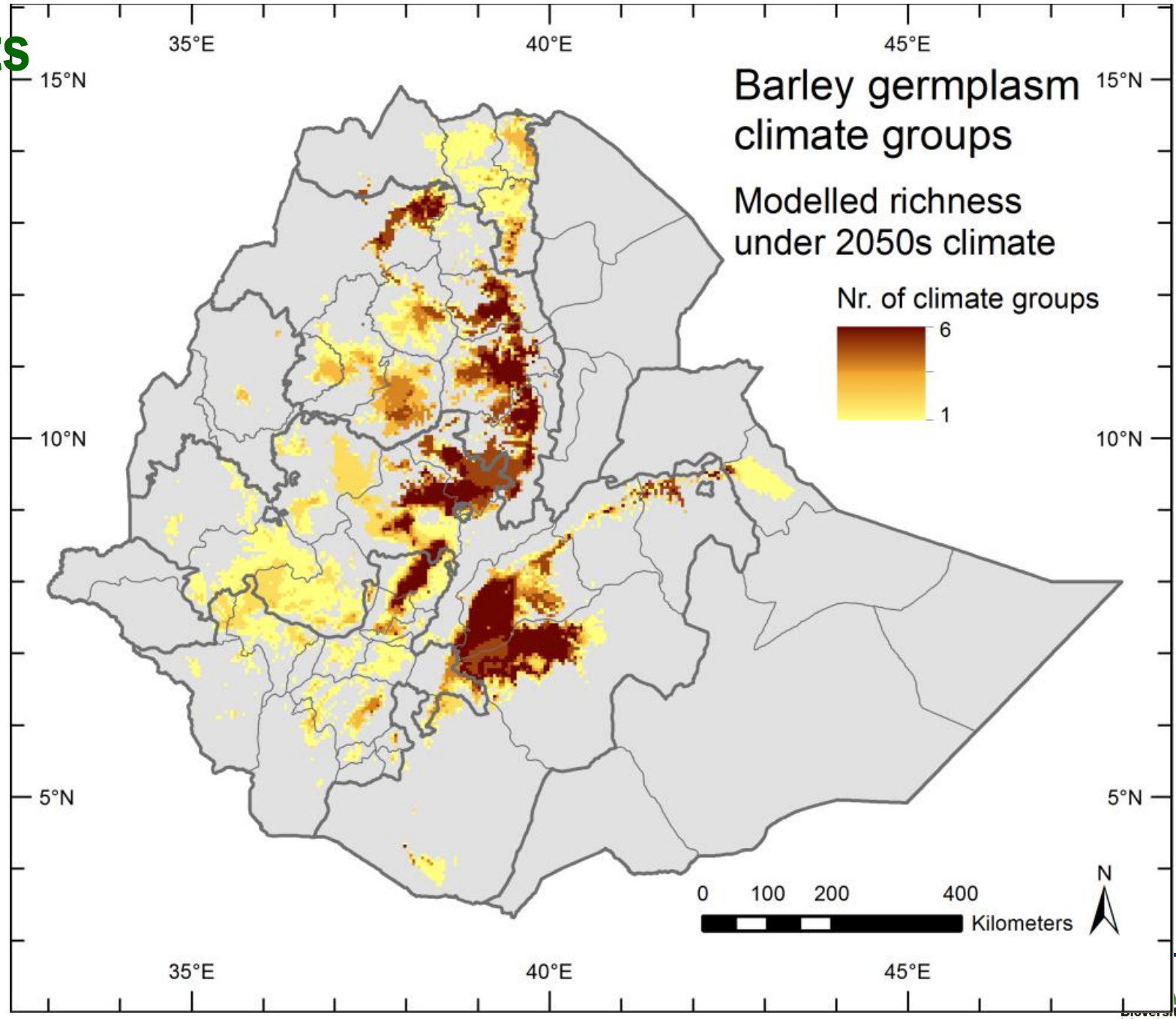
What We Did


GERE GERA
HAGRESELAM
REGIONS
Addis Ababa
Afar
Amhara
Benshangul-Gumaz
Dire Dawa
Gambela Peoples
Harari People
Oromia
Somali
Southern Nations, Nation
Tigray
ACCESSIONS
0
400
kilometers

Results


Barley germplasm climate groups
Modelled richness under current climate
Nr. of climate groups
6
1
35°E
40°E
45°E
15°N
10°N
5°N
0
100
200
400
Kilometers
N

Results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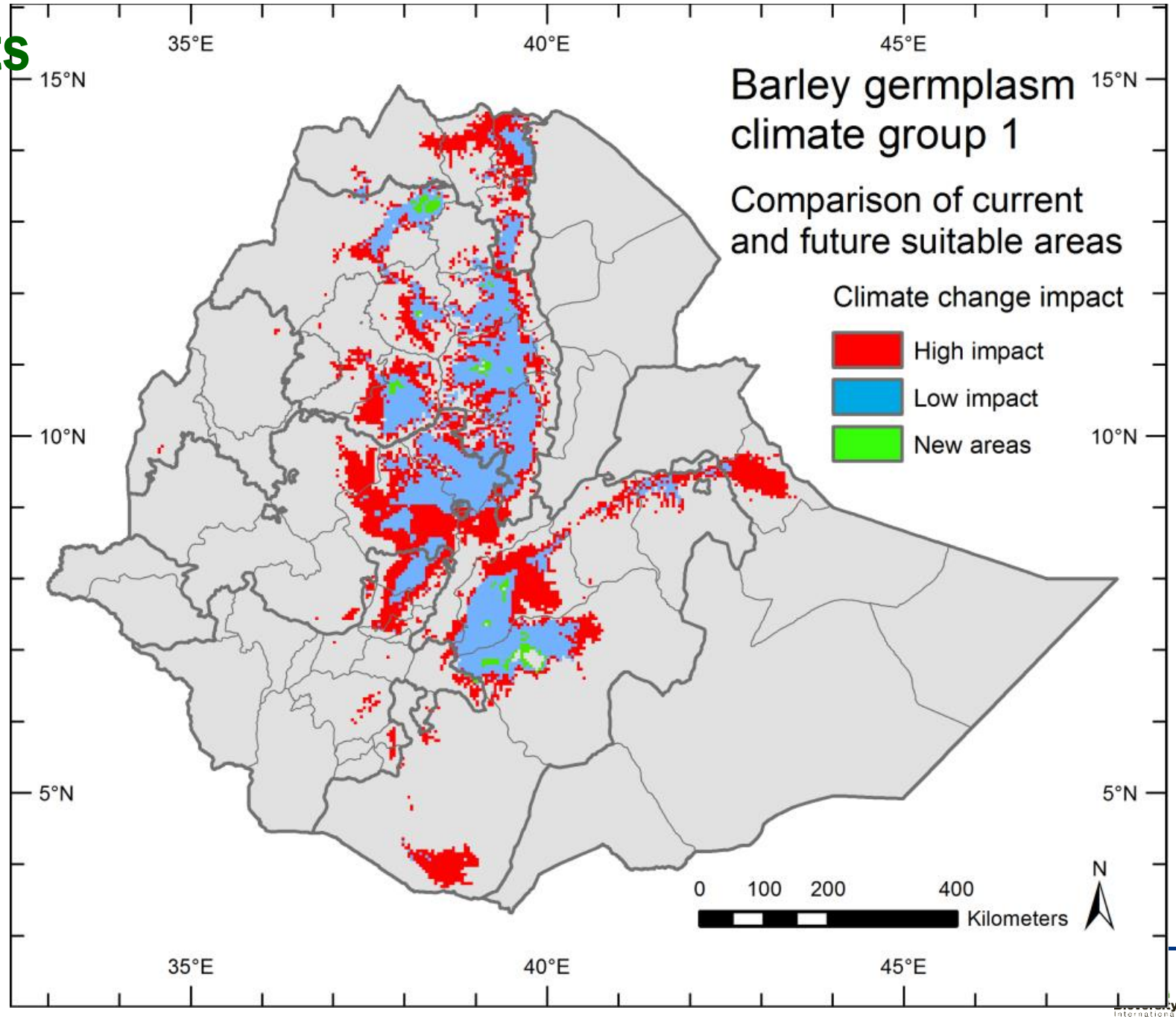
Barley germplasm climate group 1
Comparison of current and future suitable areas
Climate change impact
High impact
Low impact
New areas
35°E
40°E
45°E
15°N
10°N
5°N
0 100 200 400
Kilometers
N

Landraces Performance Compared With the Best Improved Variety

Trait	Superior (IM)	Superior (LRs)	no‡	%age	No Geregera	% Geregera
DB*	59.69	55.54	1	0.3	1	0.3
DF*	70.8	69.88	1	0.3	5	1.6
DM*	116.59	109.34	57	18.4	71	23.0
PH	110.34	115.07	8	2.6	5	1.6
NET	7.14	7.48	90	29.1	48	15.5
SPL	7.94	9.5	125	40.5	19	6.1
SPS	41.67	41.83	1	0.3	2	0.6
BY	7.17	9.99	97	31.4	47	15.2
GY	2.17	3.49	68	23.9	22	7.1

The table tells that:

- 21%, averaged over traits, of the landraces are superior to the best performer IM variety
- Many landraces mature earlier than the IM varieties
- A yield advantage of 61% obtained from the best landrace over the best IM variety (Robe)

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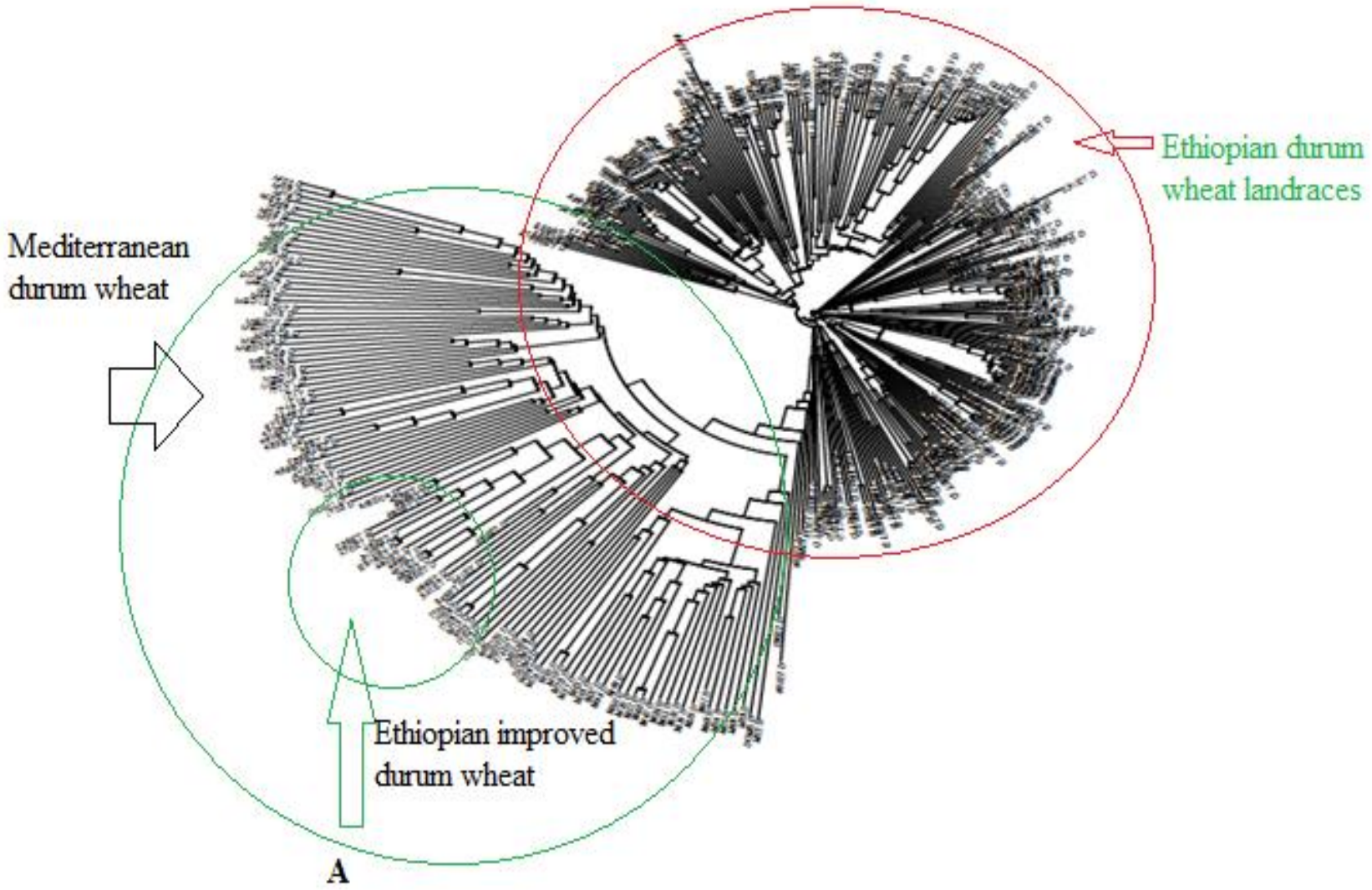
Ethiopian Unique Genetic Diversity



The Seeds for Needs – The farmers

The process

1. A broad set of varieties is evaluated

2. Each farmer gets a different combination of varieties

3. Farmers test and report back by mobile phone

4. Farmers receive tailored variety recommendations and can order seeds

4. Data are used to detect demand for new varieties and traits

3. Environmental data (GPS, sensors) to assess adaptation

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Participatory Evaluation

- 30 farmers per location (15 male + 15 female)
- Individual score on 5 traits for 800 plots
- > 200,000 data points

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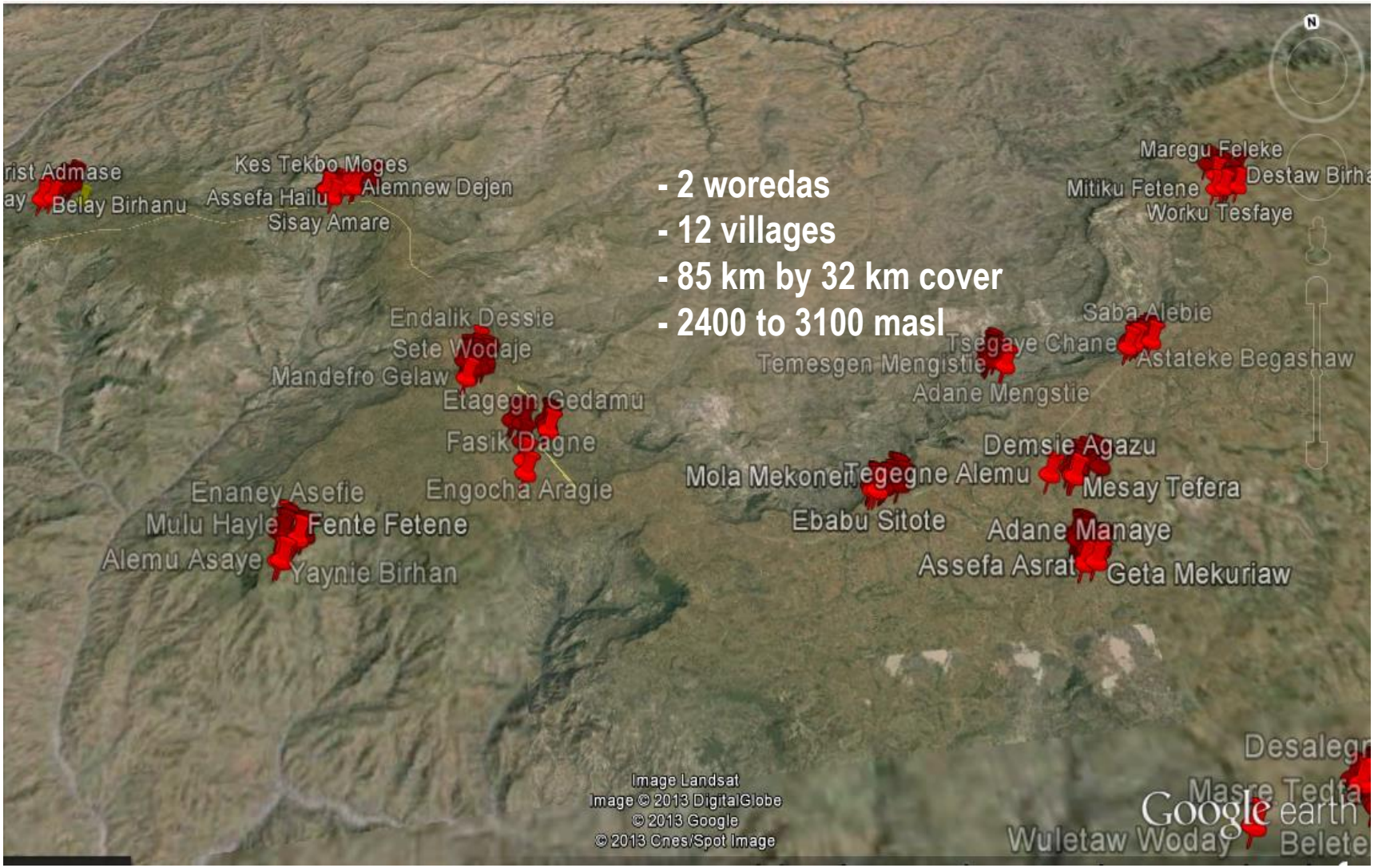
Crowd sourcing



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Harvesting and data collection

Balance was distributed to all villages

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Strengthening Community Seed Systems

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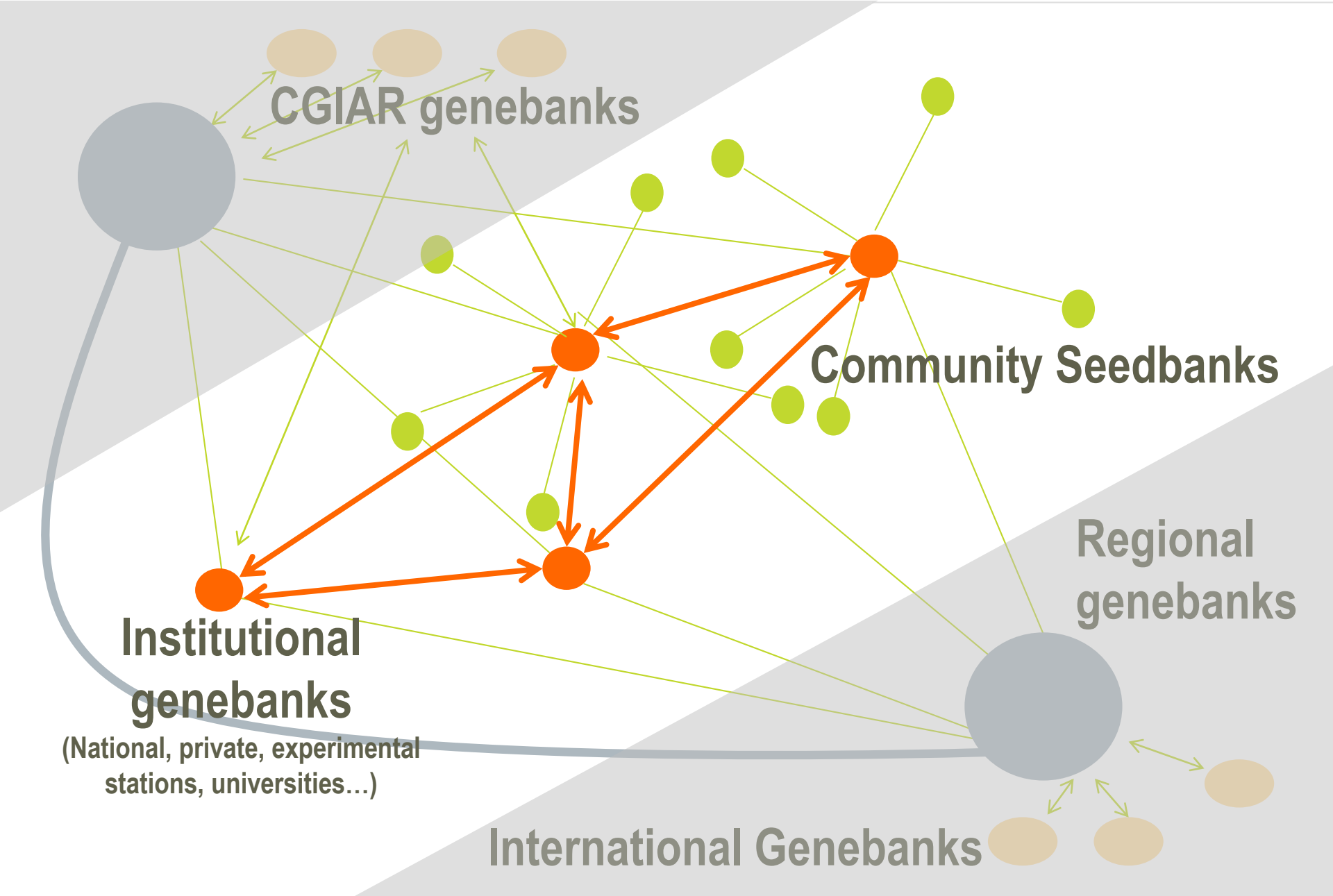
Business Plan – Strengthening Seed Systems



Upscaling and Outscaling Seeds for Needs

Reaching more farmers and for more crops

- Capacity development
- Approach institutionally embedded in extension services and agro-dealer networks
- Methodology improved and expanded using ICT-based solutions
- Reaching more farmers in different countries (Kenya and Tanzania)

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Thank you

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CGIAR
Science for a food secure future