CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CCAFS

Leb by CIAT

Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture
Consultative Group on International Agricultural Research

Climate Change, Agriculture and Food Security (CCAFS)

CGIAR Research Program

1 January 2013

Global alliance

CGIAR

RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

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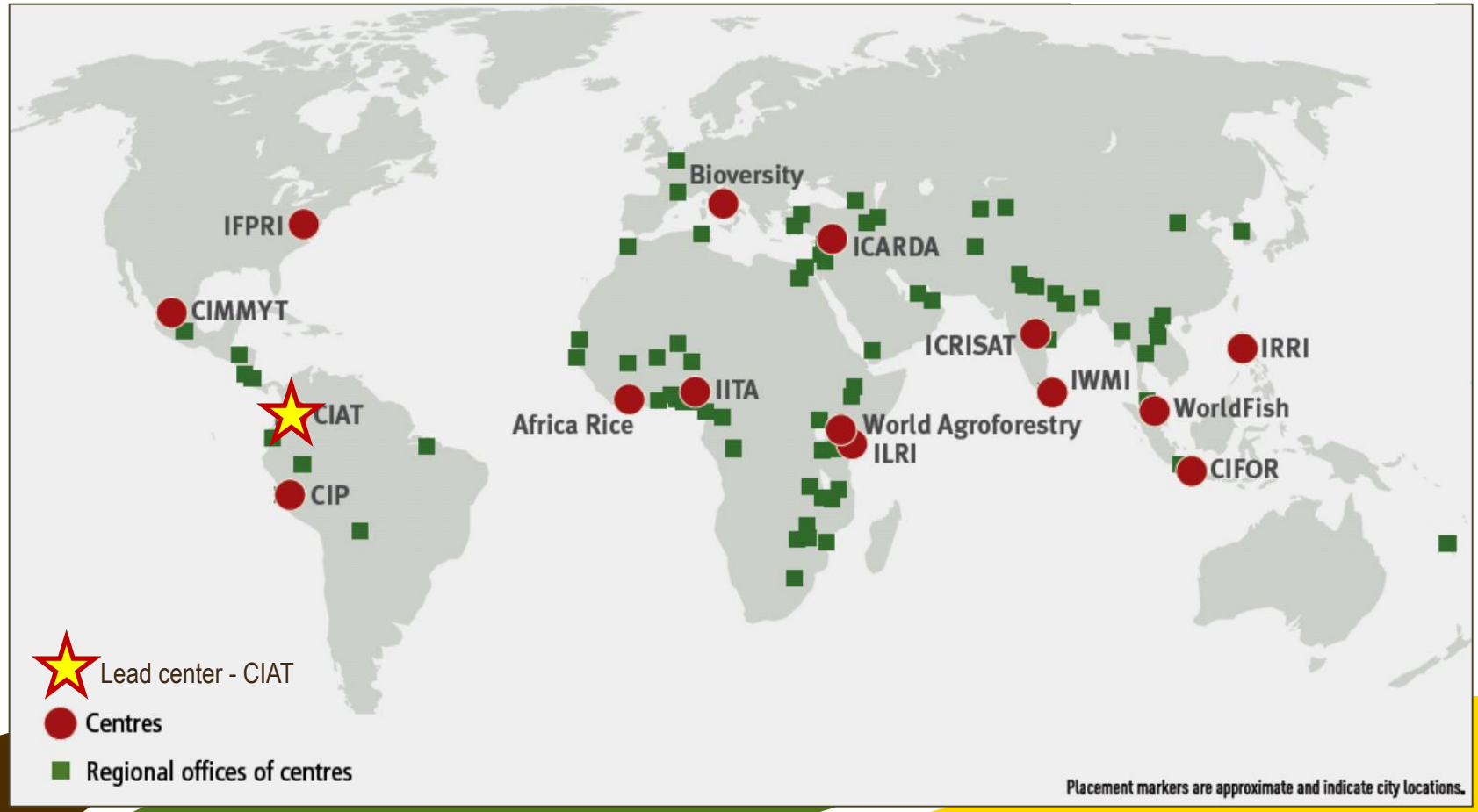
15 CG centers and ~70 regional offices

Earth System Science Partnership



Objectives

Identify and develop **pro-poor adaptation and mitigation practices, technologies and policies** for agriculture and food systems.

Support the inclusion of agricultural issues in **climate change policies**, and of climate issues in **agricultural policies**, at all levels.

Commit to **data availability**, **cross-center cooperation**, and **making an impact** on both the global and regional level.

CCAFS Framework

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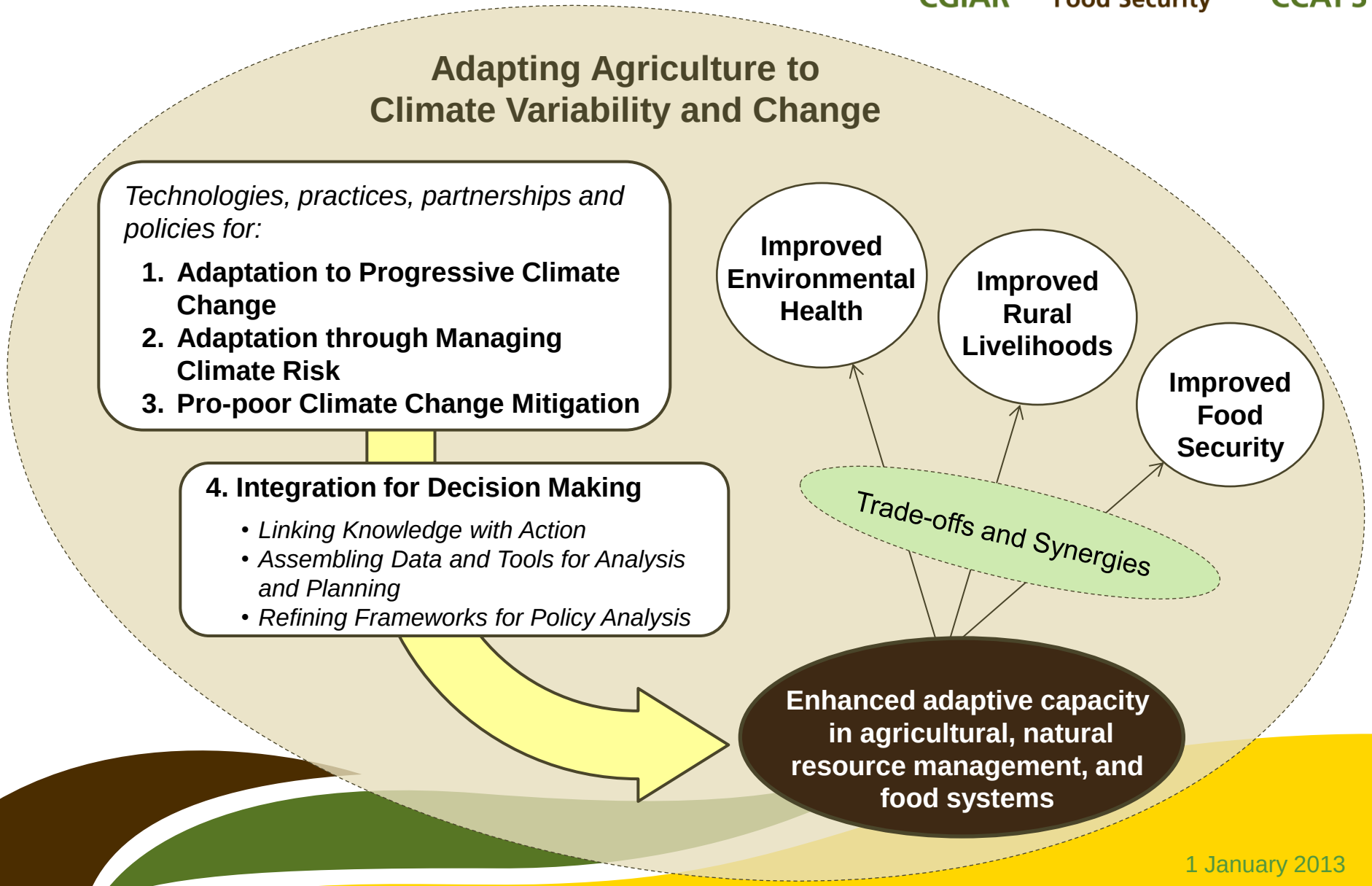

Place-based field work

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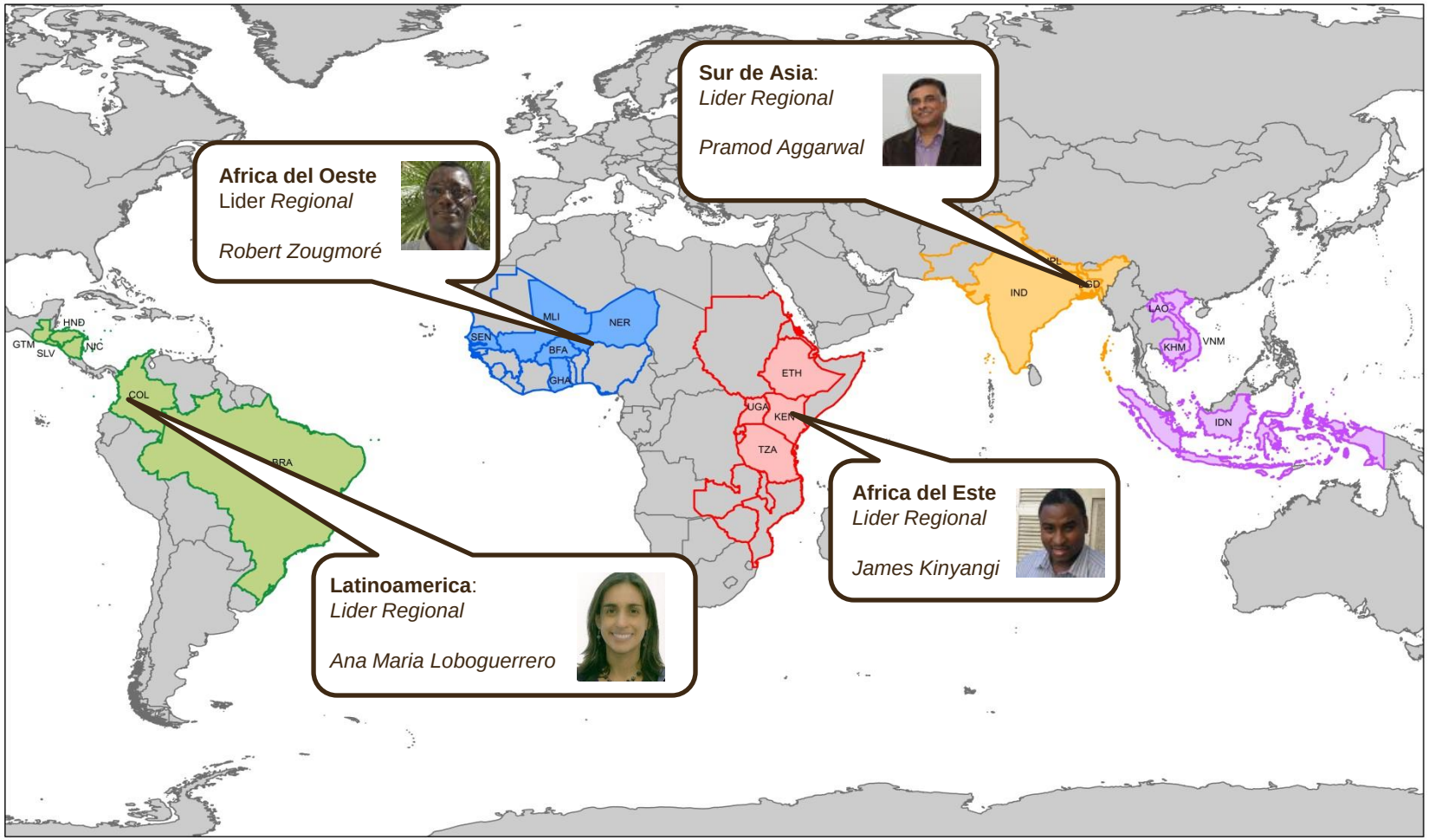
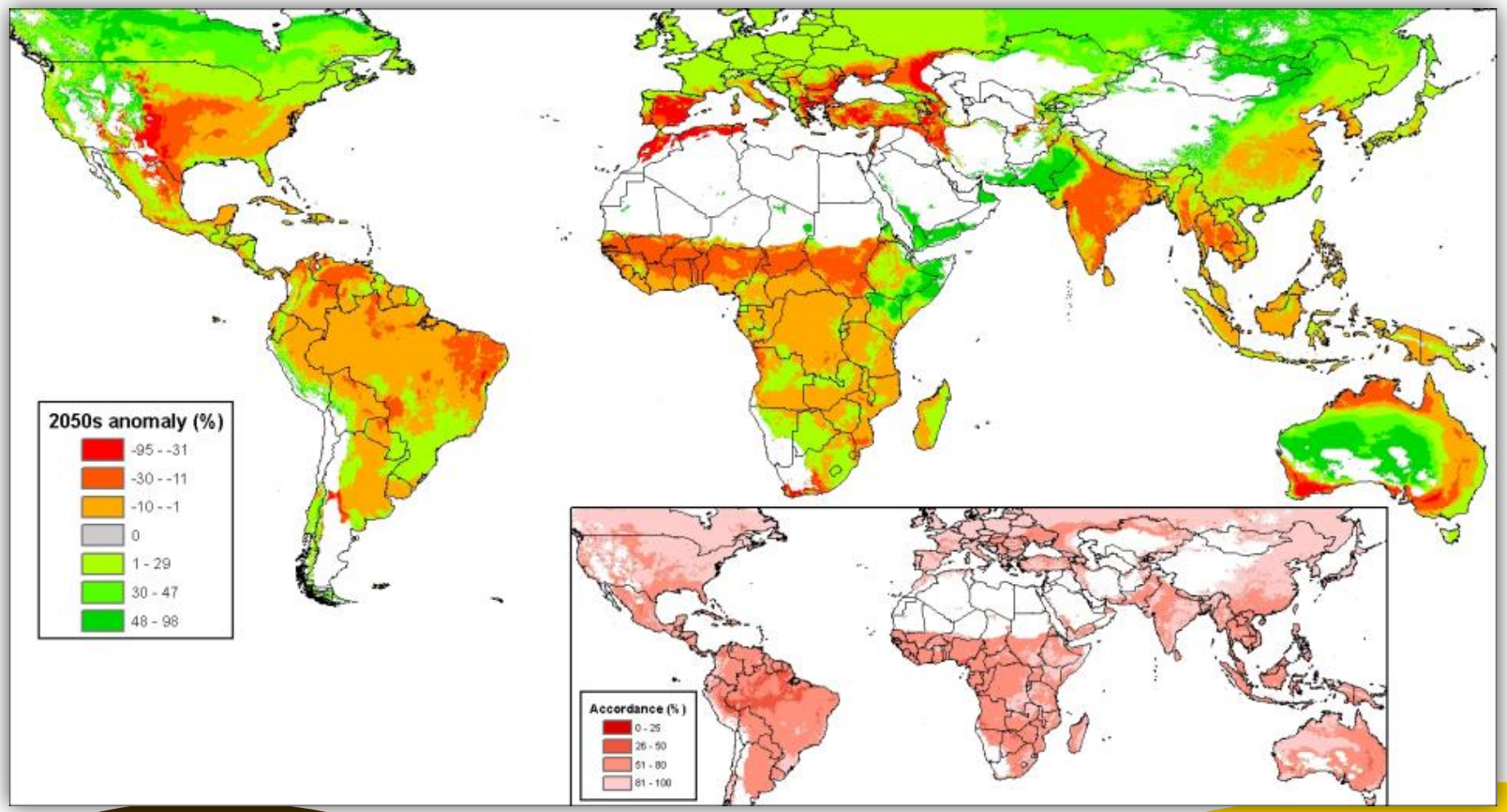


Crop climate-suitability is changing

Average change of climate-suitability of 50 crops in 2050



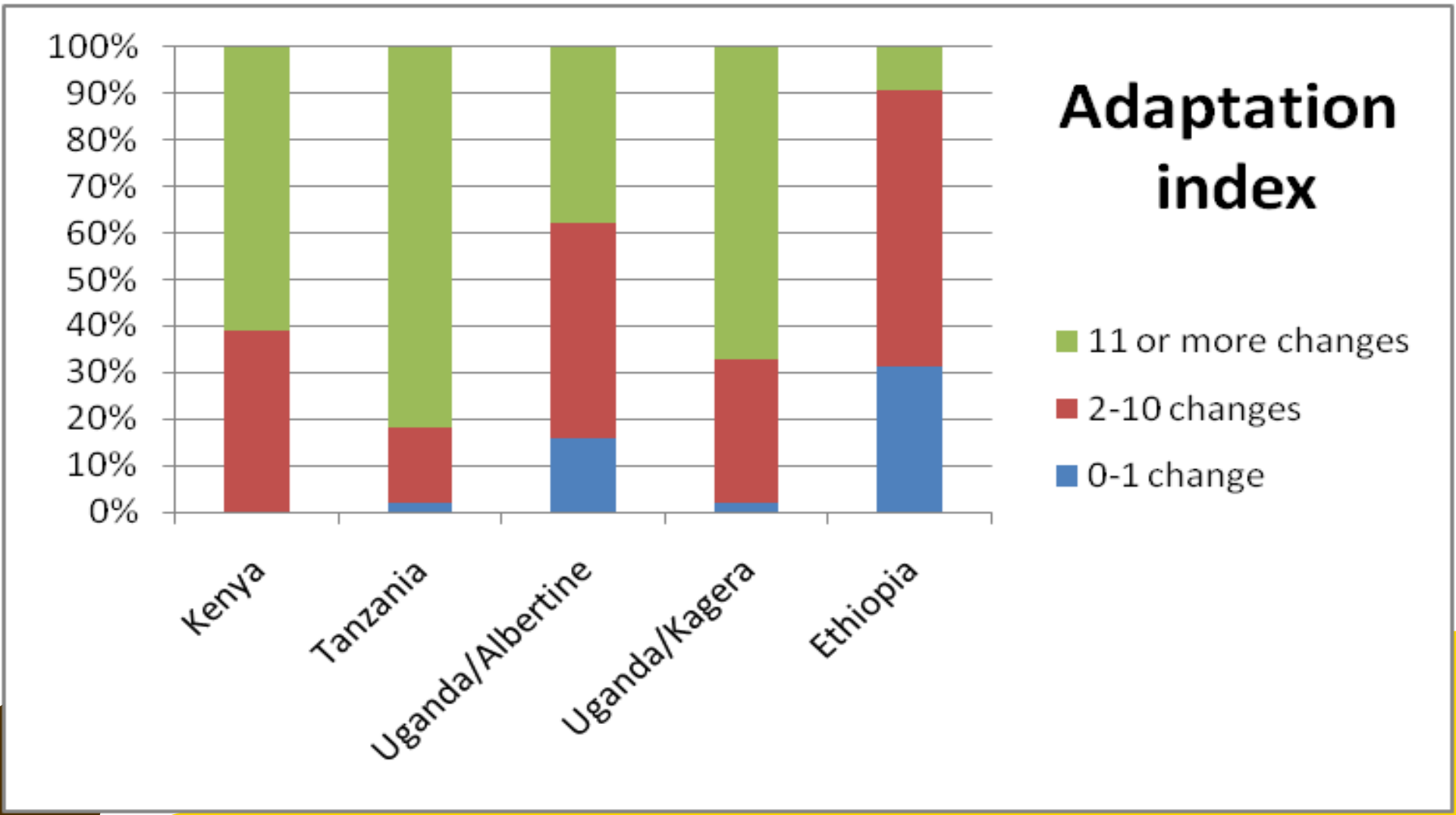
Sites and baseline

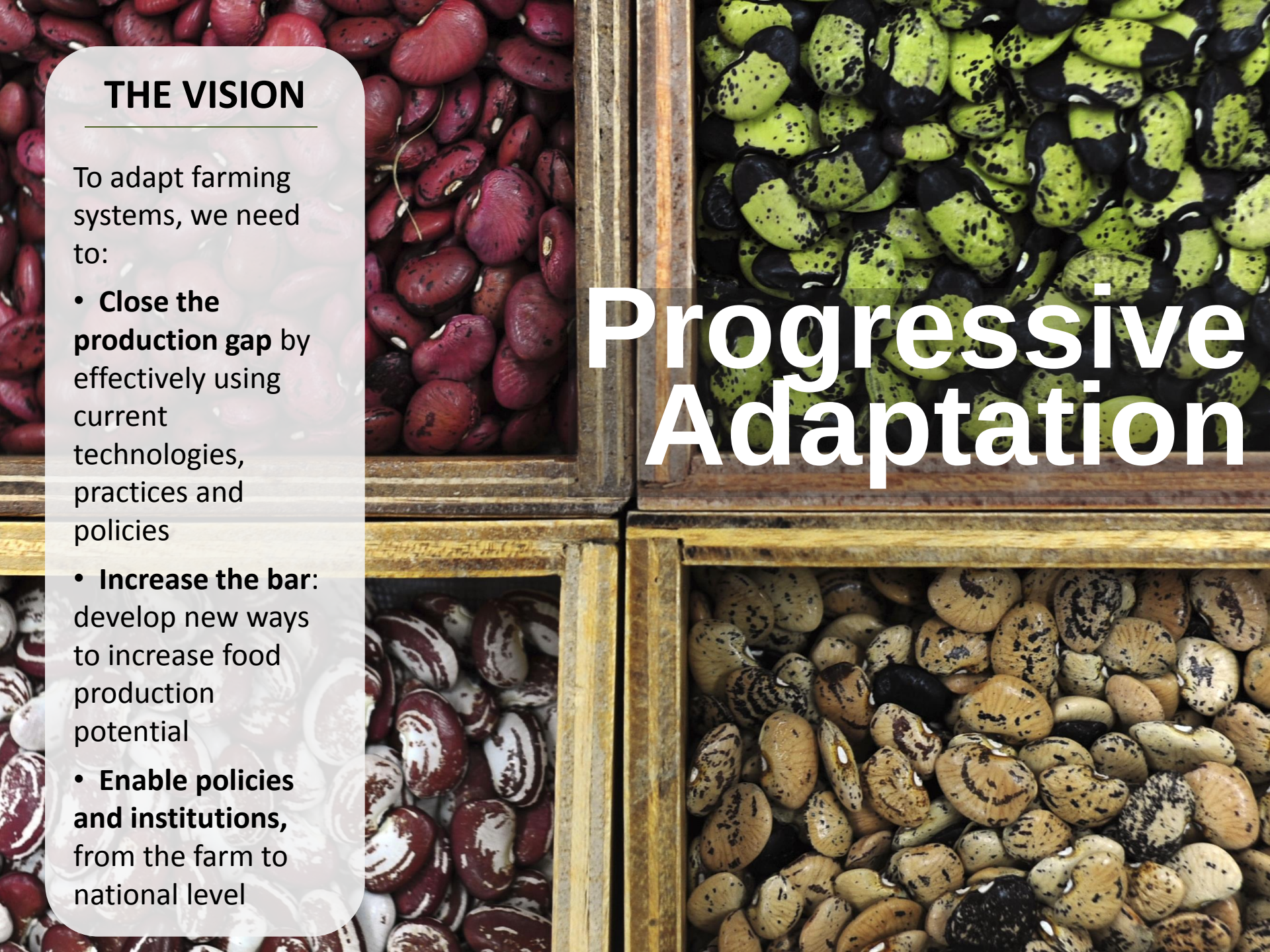
- Selection criteria (exposure, sensitivity and capacity to respond).
- Initially: 12 countries; 36 benchmark sites
- HH survey: 252 villages with 5,040 households

http://ccafs.cgiar.org/resources/baseline-surveys

Dataverse: http://dvn.iq.harvard.edu

How many changes have they been making to their farming practices?





Progressive Adaptation

THE VISION

To adapt farming systems, we need to:

- **Close the production gap** by effectively using current technologies, practices and policies
- **Increase the bar**: develop new ways to increase food production potential
- **Enable policies and institutions,** from the farm to national level

Risk Management

THE VISION

- **Climate-related risk impedes development**, leading to chronic poverty and dependency
- **Actions taken now can reduce vulnerability** in the short term and enhance resilience in the long term
- Improving current climate risk management will **reduce obstacles to making future structural adaptations**.

Pro-poor Mitigation

VISION

Short-term: Identifying options **feasible for smallholder mitigation** and trade-offs with other outcomes

Long-term: Addressing conflict between achieving food security and agricultural mitigation

Integration

VISION

- Provide an **analytical and diagnostic framework**, grounded in the policy context
- **Synthesize lessons learned**
- **Effectively engage** with rural stakeholders and decision makers
- **Communicate** likely effects of specific policies and interventions
- **Build partners' capacity**

Quick Stats: CCAFS 2011

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- **15** centers involved in **152** unique projects, in **14** different countries
- **5040** households in **252** villages in WA, EA, & IGP reached through baseline surveys
- **65** peer-reviewed papers
- **24** book chapters
- **3** books
- **22** policy briefs
- **39** conference papers
- **9** science-policy bulletins
- over **100** other publications

(working papers, site characterizations and field reports)


Hacia
Soluciones

Necesidad de datos y modelos

- Diferentes métodos de bajar la escala de la información climática (modelos regionales, downscaling estadístico)
- Datos disponibles a nivel mundial, regional y local de múltiples fuentes y socios: http://www.ccafs-climate.org

Our data bases

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Spatial Downscaling

Statistical Downscaling
Delta Method

Pattern Scaling
MarkSim Weather Generator

Statistical Downscaling
ClimGen
Tyndall Centre

Dynamical Downscaling
RCMs
PRECIS
Providing REgional Climates for Impacts Studies

Our data bases

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- Reducidos de escala empíricamente y disaggregados para todo el mundo de 1 a 20 km.
- Reducidos de escala dinámicamente (PRECIS) para Sur América.
- 20 GCM para 2050, 9 para 2020 (Datos Stanford) dowscalados a 20km, 5km, 1km
- 7 GCMs con información Tyndall.

Agtrials

http://agtrials.org/

Public data!
4517 trials
20000 varieties/races

- ✓ Calibration, validation of crop models
- ✓ Exploration and testing of adaptation options
  - Genetic improvement
  - On-farm management practices
- ✓ Assess technology transfer options
- ✓ Build “adaptation packages”

Using multi-site experimental data for seasonal potato yield forecasting

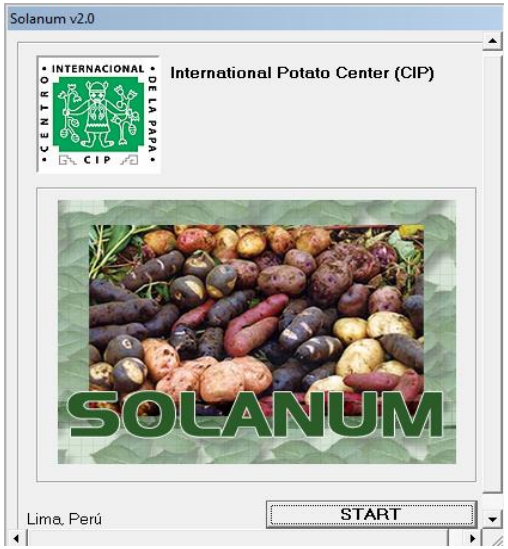
Climate and crop data collation → **Potato yield simulation using observed data** → **Potato yield simulation using ETA model output** → **Impacts**

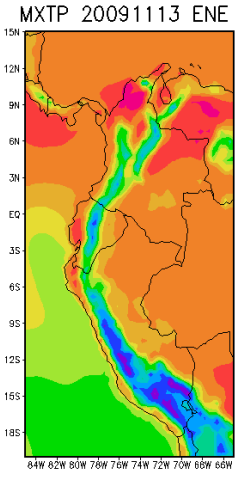
www.agtrials.org

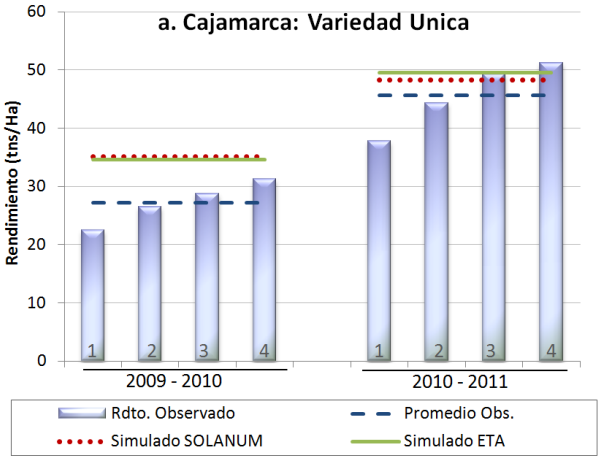
CLIMATE CHANGE AGRICULTURE AND FOOD SECURITY

The Global Agricultural Trial Repository

Home | About AgTrials







Diana Giraldo
MSc. Intern CPTEC / CCAFS / CIAT / CIP

Seasonal climate forecast data is useful for driving the SOLANUM model for most sites/seasons

CPTEC

CLIMATE CHANGE AGRICULTURE AND FOOD SECURITY

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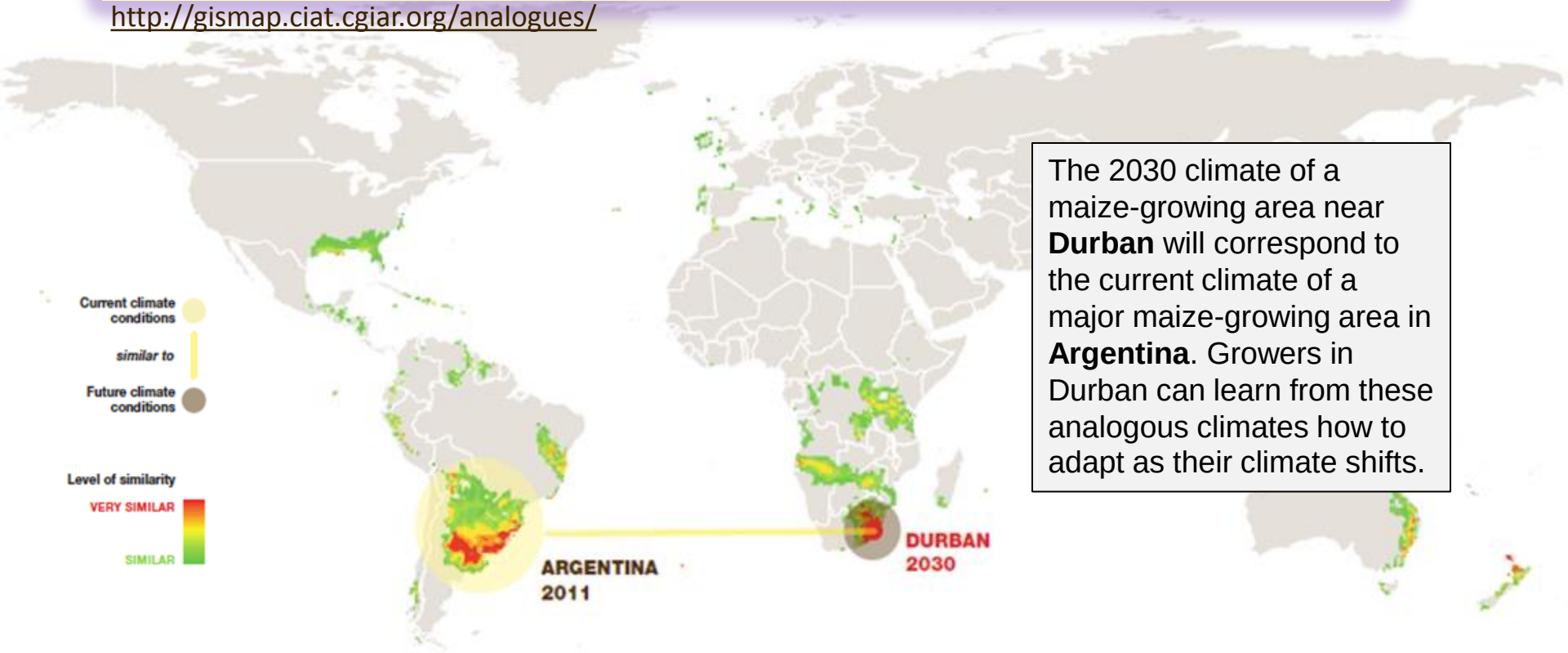
International Center for Tropical Agriculture
Ciencia con Historia que Conduce al Cambio
Desde 1967

INTERNACIONAL CENTRO DE LA PAPA CIP

Climate Analogues: Finding future climates for actual adaptation

http://gismap.ciat.cgiar.org/analogues/

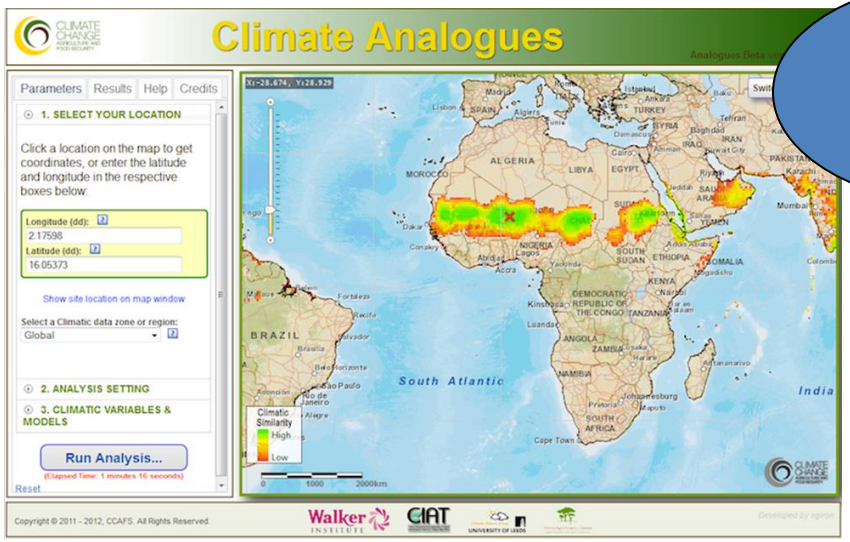


The 2030 climate of a maize-growing area near **Durban** will correspond to the current climate of a major maize-growing area in **Argentina**. Growers in Durban can learn from these analogous climates how to adapt as their climate shifts.

- 70% of expected future climates already exist somewhere else
- Facilitates exchange of knowledge, technology, and practices between analogue sites
- Validates computational models and develops novel research

Analogue Tool: Finding Tomorrow's agriculture today

Methodology development



Katmandu
Dakar
Nairobi

Regional trainings

http://gismap.ciat.cgiar.org/Analogues/

- 15 countries
- 70 local researchers
- WP:Climate Analogues: Finding tomorrow's agriculture today

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Walker INSTITUTE

Climate impacts Group
UNIVERSITY OF LEEDS

ie university

World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

Farms of the future

Journey to Yamba's plausible futures

Analogue study Tour

Villages visited

Starting point

- SACCOS visit
- Market visit

-Market value chain social enterprise visit
- Input supply Stockists

-Weather station visit
- Bean trial visit
- Tree nursery visit

-Weather station visit
- Avocado trial
-Banana varieties trial
- Maize fertility mngt

Sepukila Village:
-Matengo pits: Traditional soil and water conservation technique
-Coffee nursery
-Stoves

Masasi Village:
-Water source
-Fish pond
-Biogas

Mtama Village:
- Bee keeping

Evaluating adaptation and mitigation options

- Stakeholder workshop to identify medium-long list of mitigation measures
  - Industry, government, civil society participation
- Quantification of costs and benefits of each measure
  - Modelling
  - Empirical evidence
  - Tools e.g. Cool Farm Tool
- Prioritisation of measures based on a range of cost/benefit criteria
- Stakeholder driven selection of mitigation portfolio for sector or sub-sector

Opciones de adaptación y mitigación: Arroz de riego y secano

Medidas de Mitigación

- Reducir el consumo volumétrico del agua.
- Reducir el uso de fertilizantes en los sistemas productivos.
- Mejorar el manejo de los residuos de la cosecha y post-cosecha en el campo.
- Uso de hongos fijadores de nitrógeno
- Inhibición de nitrificación biológica.

Medidas de Adaptación

- Seguros agrícolas.
- Adecuación de distritos de riego actuales.
- Aumento del área irrigada.
- Desarrollo de nuevas variedades.
- Cambio varietal

Nota: algunas de las medidas de mitigación propuestas para el subsector de arroz, pueden ser también empleadas como medidas de adaptación

Análisis costo-eficacia de las medidas

Medidas como el **manejo del agua** y de los **residuos de cosecha**: las más recomendables

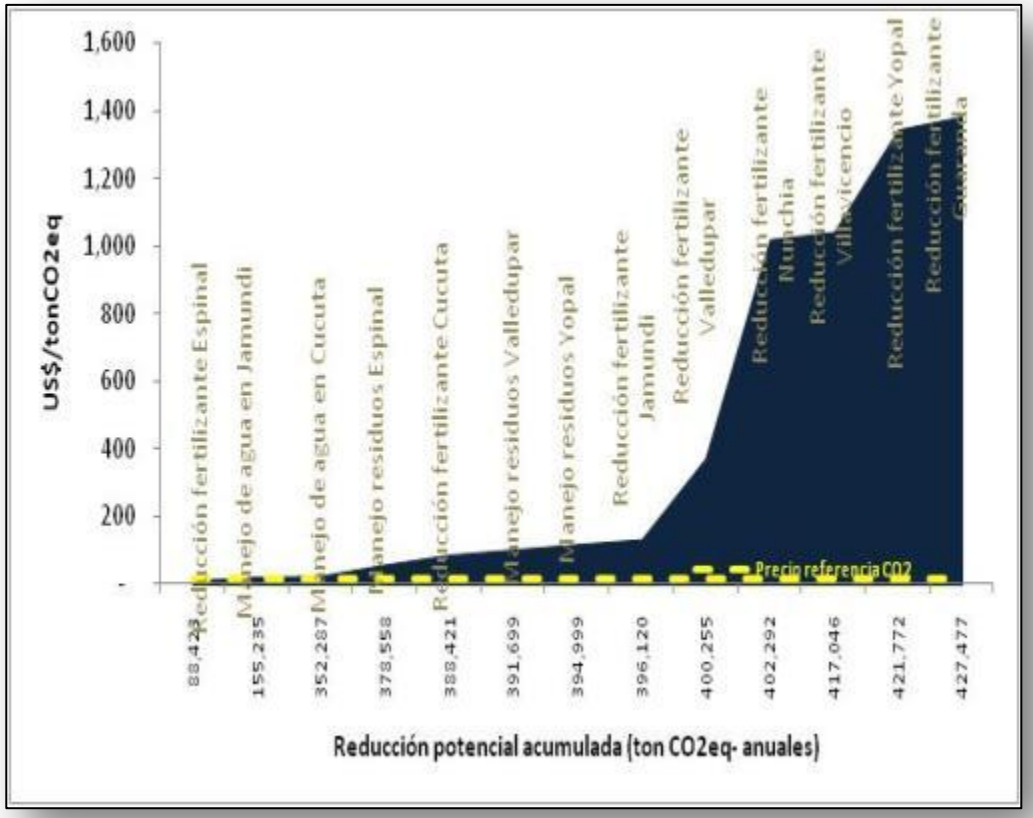
Manejo racional de la **fertilización**: solo para algunas regiones productoras.

Aumento anual promedio (aprox) de los costos (US$2005):

Mitigación: US$130 millones

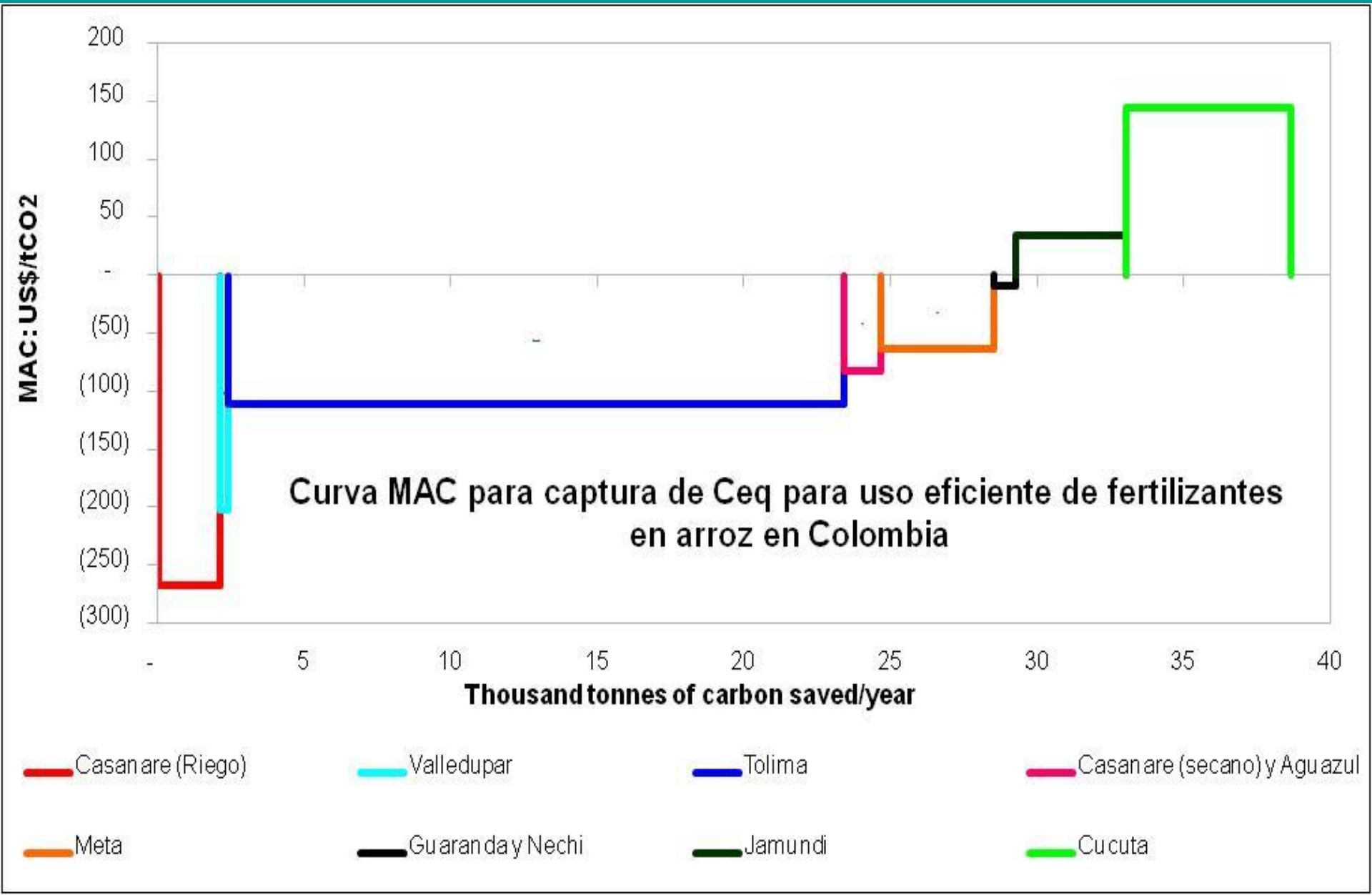
Adaptación: US$45 millones

Los mayores incrementos estarán relacionados con la adquisición de equipos, las obras de infraestructura y los costos de producción de los cultivos.



Curva de abatimiento en arroz

Private perspective: 100% investment and O&M are assumed for farmers



Costs of mitigation practices

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Technology options	Practices	Case study	Establishment costs	Average maintenance costs
			US$/ha	US$/ha/year
Agro-forestry	Various agro-forestry practices	*Grevillea agroforestry* system, Kenya	160	90
		Shelterbelts, Togo	376	162
		Different agroforestry systmes in Sumatra, Indonesia	1,159	80
		Intensive agroforestry system (high input, grass barriers, contour ridging), Colombia	1,285	145
Soil and water conservation	Conservation agriculture (CA)	Small-scale conservation tillage, Kenya	0	93
		Minimum tillage and direct planting, Ghana	220	212
		Medium-scale no-till technology for wheat and barley farming, Morocco	600	400
	Improved agronomic practices	Natural vegetative strips, The Philippines	84	36
		Grassed *Fanya juu* terraces, Kenya	380	30
		Konso bench terrace, Ethiopia	2,060	540
	Integrated nutrient management	Compost production and application , Burkina Faso	12	30
		Tassa planting pits, Niger	160	33
		Runoff and floodwater farming, Ethiopia	383	814
Improved pasture and grazing management	Improved pasture management	Grassland restoration and conservation, Qinghai province, China (1)	65	12
	Improved grazing management	Rotational grazing, South Africa	105	27
		Grazing land improvement, Ethiopia	1,052	126

Sources: Wocat 2007, Liniger et al. 2011, FAO 2009, Cacho et al. 2003

(1) Project estimates

CP

Climate smart villages:
Key agricultural activities for managing risks

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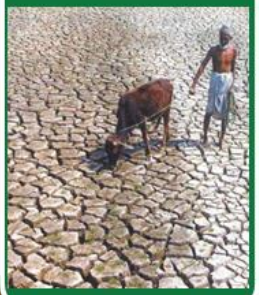
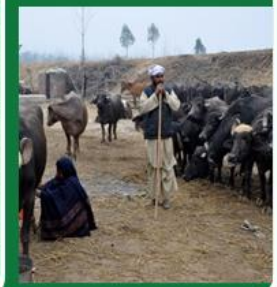
CLIMATE SMART VILLAGE / FARM

Weather smart
- Seasonal weather forecasts
- ICT based agro-advisories
- Index based insurance
- Climate analogues



Water smart
- Aquifer recharge
- Rainwater harvesting
- Community management of water
- Laser leveling
- On-farm water management

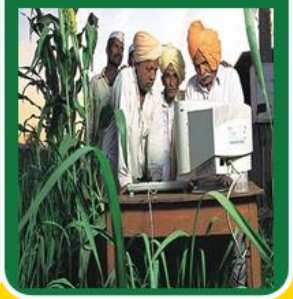
Carbon smart
- Agroforestry
- Conservation tillage
- Land use systems
- Livestock management



Nitrogen smart
- Site specific nutrient management
- Precision fertilizers
- Catch cropping / legumes

Energy smart
- Biofuels
- Fuel efficient engines
- Residue management
- Minimum tillage

Knowledge smart
- Farmer-farmer learning
- Farmer networks on adaptation technologies
- Seed and fodder banks
- Market info
- Off-farm risk management-kitchen garden



Strengthening capacity of farmers and local institutions: *to reduce climate risk through seasonal forecast communication and evaluation at Kaffrine*

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33 farmers trained in Kaffrine (Senegal) on using probabilistic seasonal forecast and to evaluate the impact of the forecast products and communication process on farmers' management decision.

Partners involved: ANAMS,ISRA, SDDR Kaffrine, ANCAR, World Vision

Dos grandes resultados que queremos

- Mejores politicas a nivel nacional y regional:
  - NAPAs, NAPs, NAMAs, explicitos con sector agropecuario
- Impacto escalado de instrumentos que facilita la adaptation/mitigacion:
  - Intrumentos de manejo de riesgo
  - Mejores tecnologias y practicas
  - Con fondos de inversion apoyando

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