

Agroecology

The need for technical and institutional innovation

Prof. dr. Pablo A. Tittone

Farming Systems Ecology Group, Wageningen University, The Netherlands



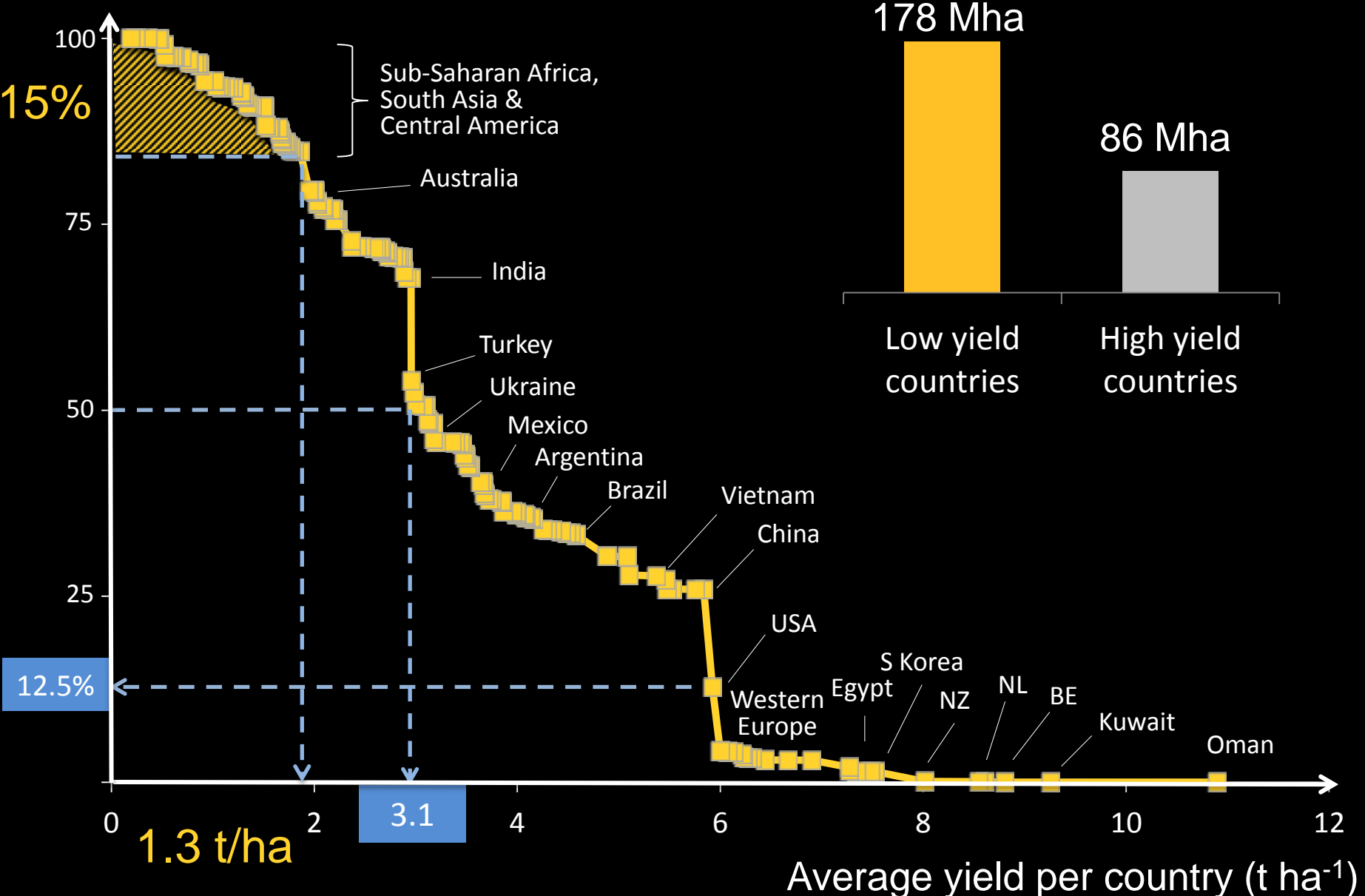
Program Natural Resources &
Environment
Instituto Nacional de
Tecnología Agropecuaria - Argentina



WAGENINGEN UNIVERSITY
WAGENINGEN **UR**

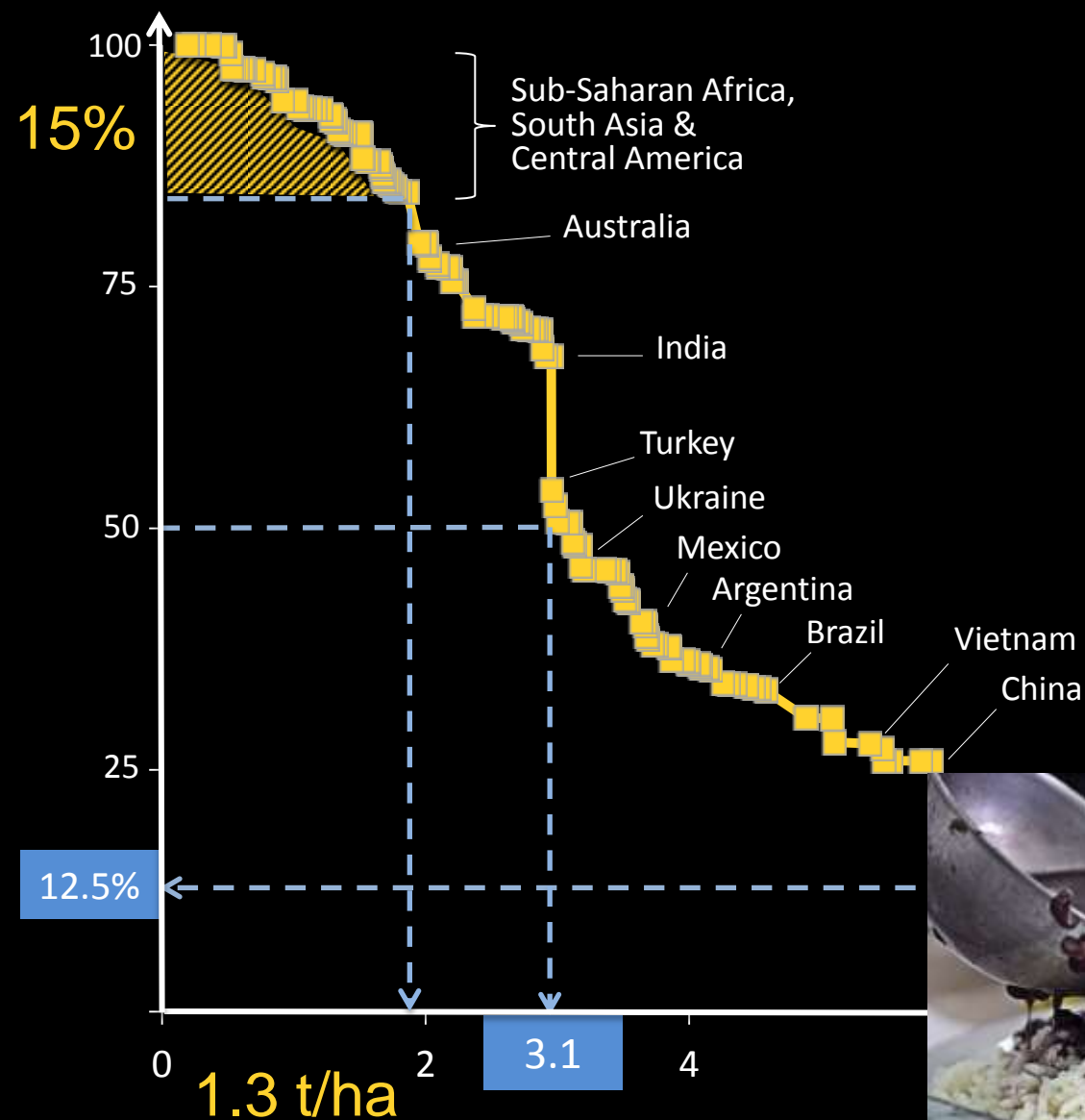
Contribution to world production (%)

Land available



Source: FAOSTAT 2014

Contribution to world production (%)

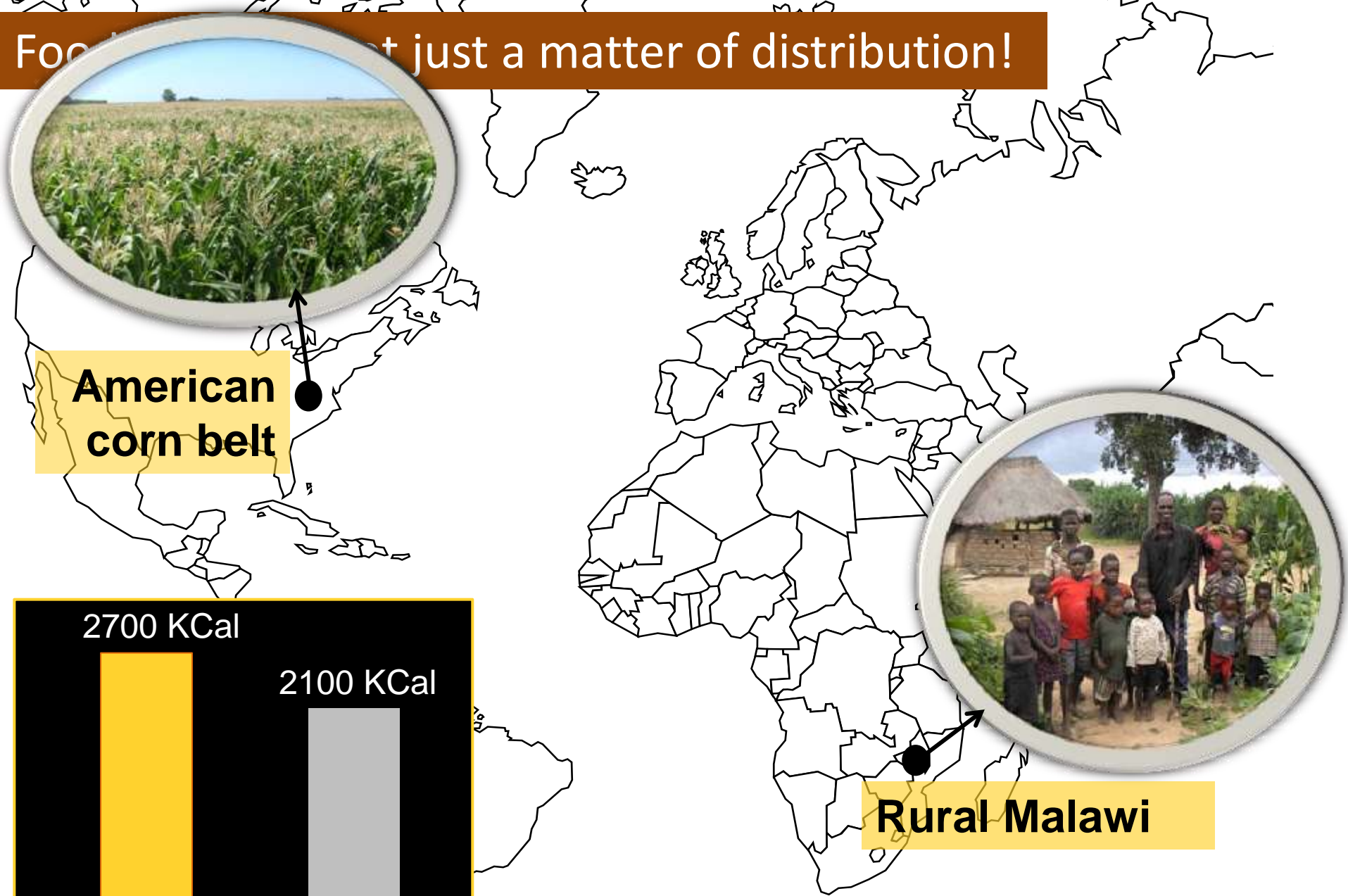


Food security

- ✓ Availability
- ✓ Access
- ✓ Stability
- ✓ Utilisation

12
a⁻¹)

Food is not just a matter of distribution!

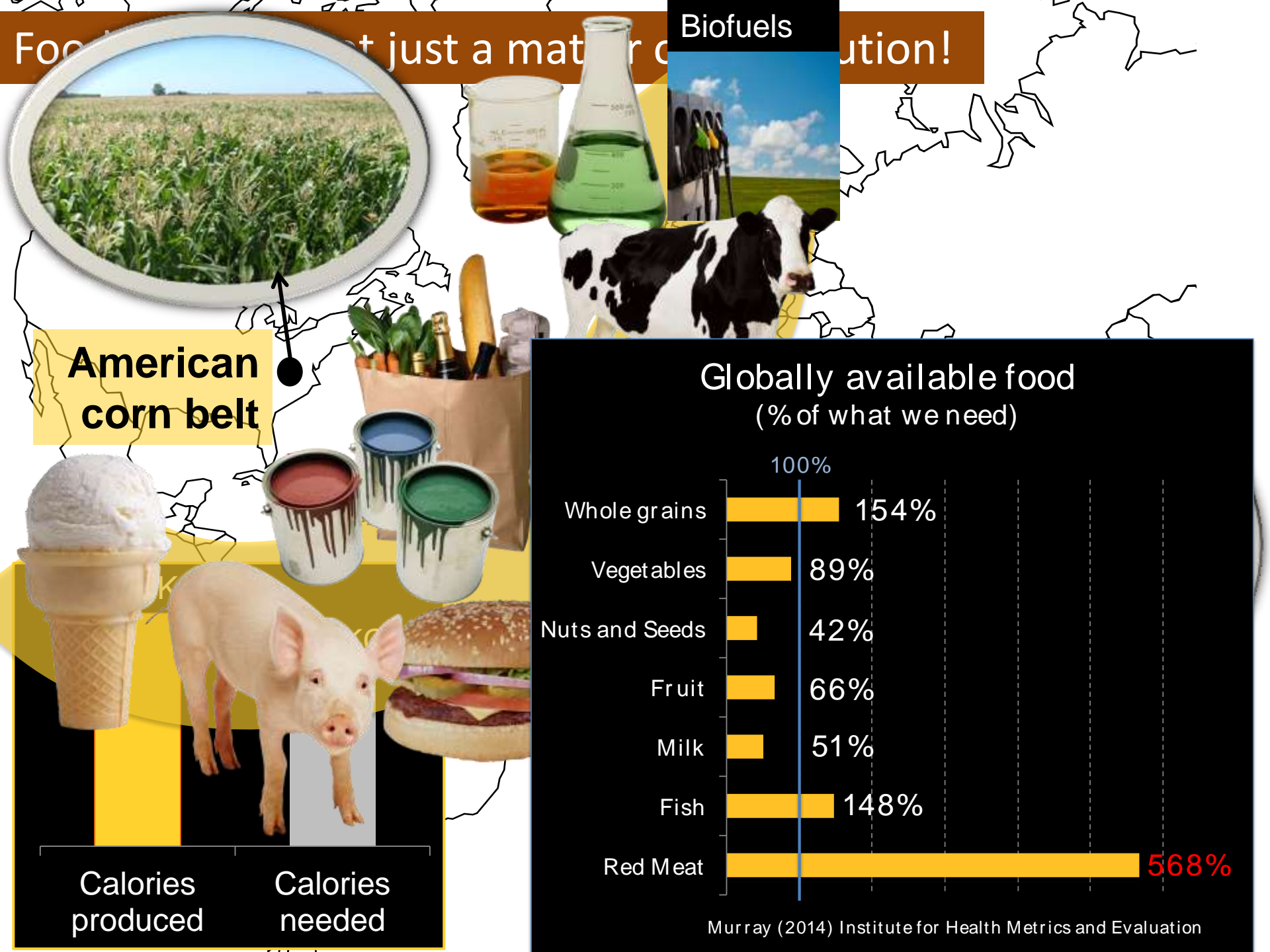


2700 KCal

2100 KCal

Calories
produced

Calories
needed



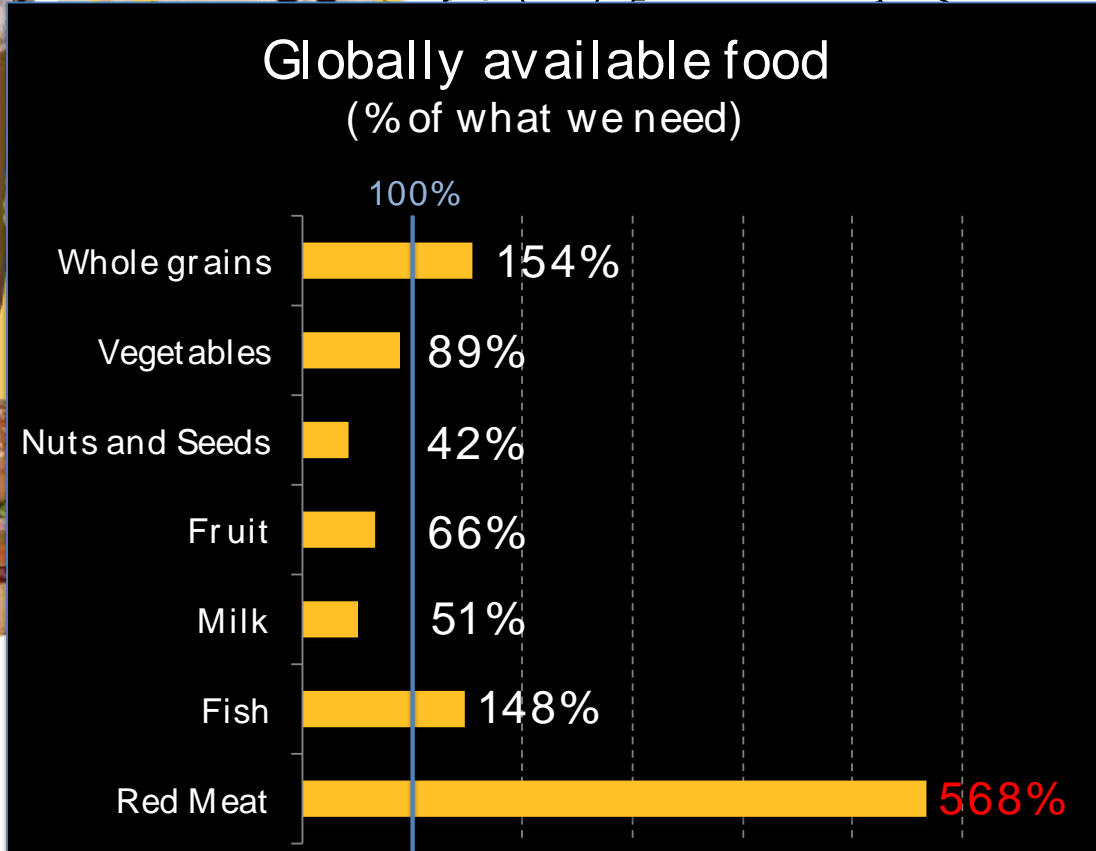
Food is not just a matter of production!



American corn belt

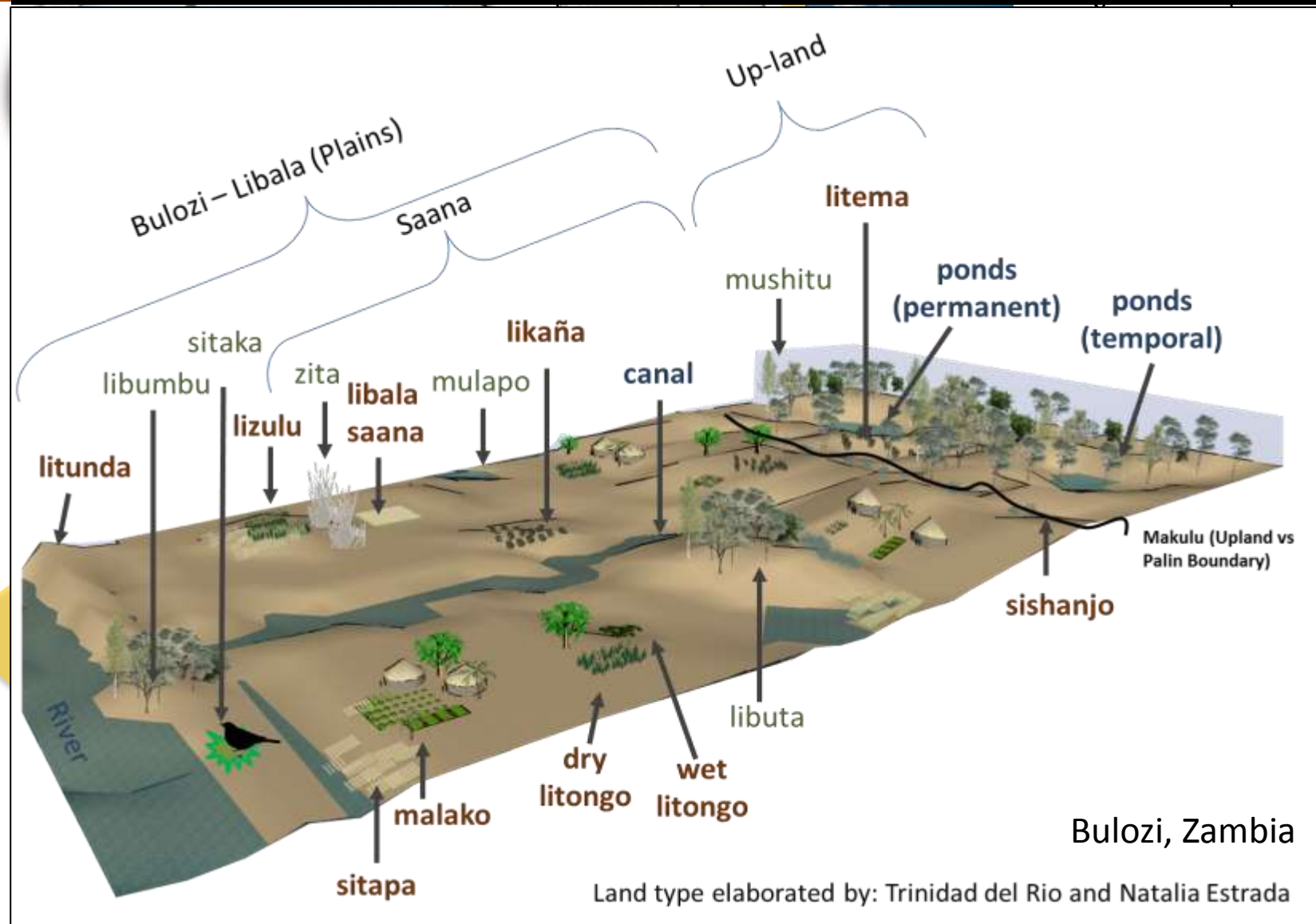


Calories produced Calories needed



Murray (2014) Institute for Health Metrics and Evaluation

Nutrition-sensitive landscapes



Calories
produced

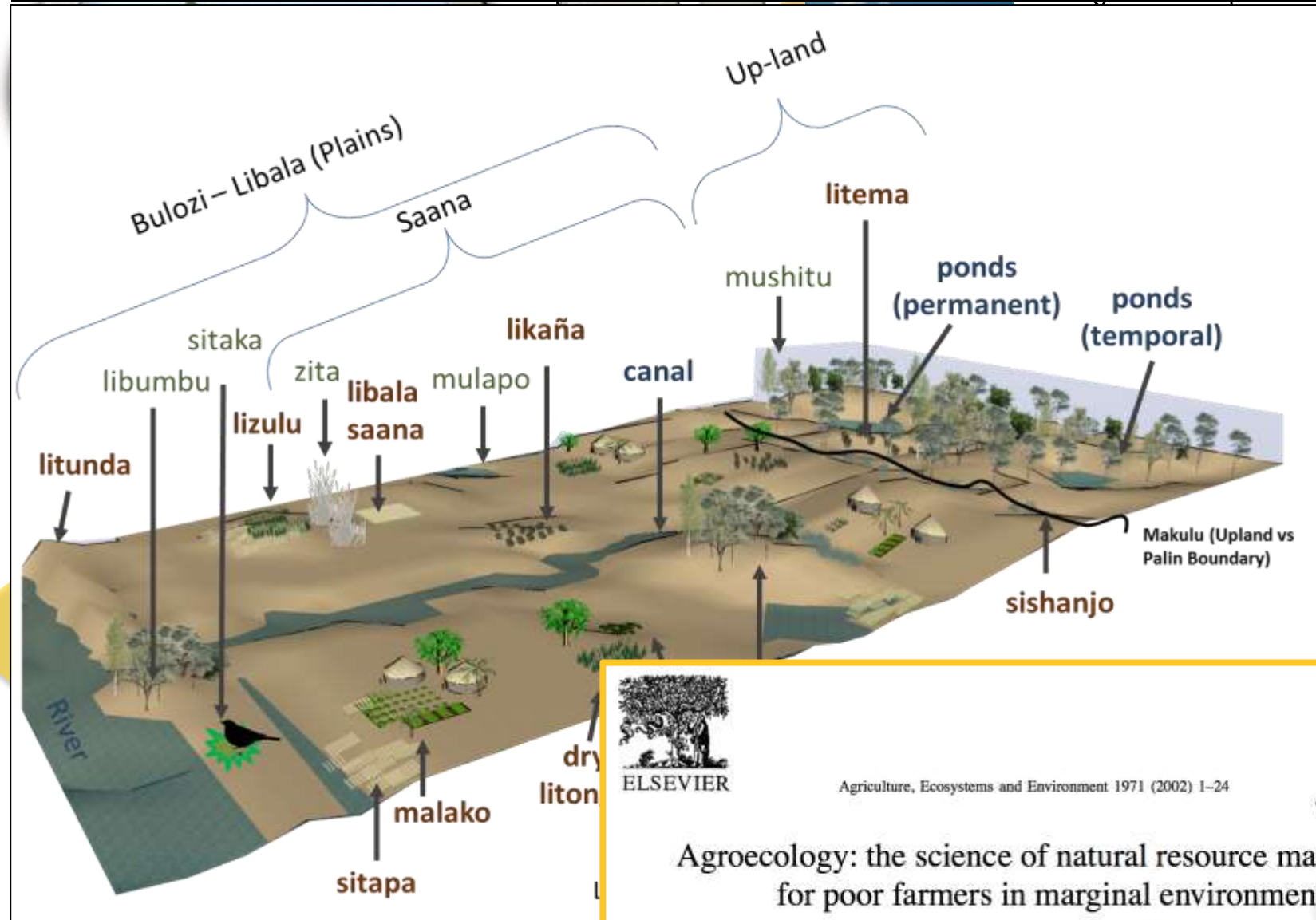
Calories
needed

Red Meat

568%

Murray (2014) Institute for Health Metrics and Evaluation

Nutrition-sensitive landscapes



Calories
produced

Calories
needed



Agriculture, Ecosystems and Environment 1971 (2002) 1–24

**Agriculture
Ecosystems &
Environment**

www.elsevier.com/locate/agce

**Agroecology: the science of natural resource management
for poor farmers in marginal environments**

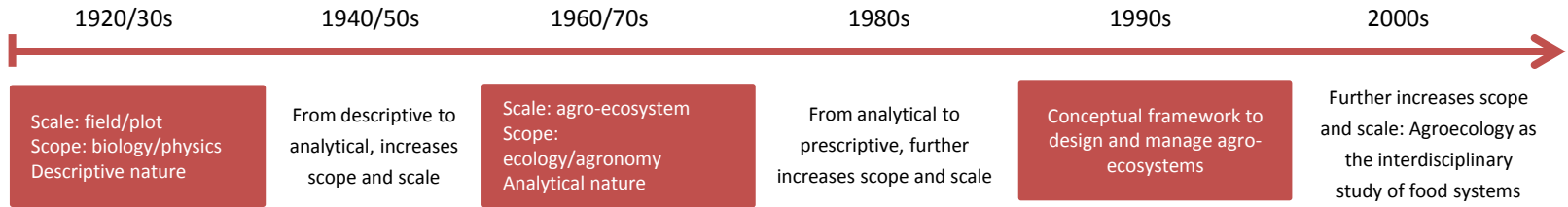
Miguel A. Altieri*

*Department of Environmental Science Policy and Management, University of California,
201 Wellman Hall 3112, Berkeley, CA 94720-3112, USA*

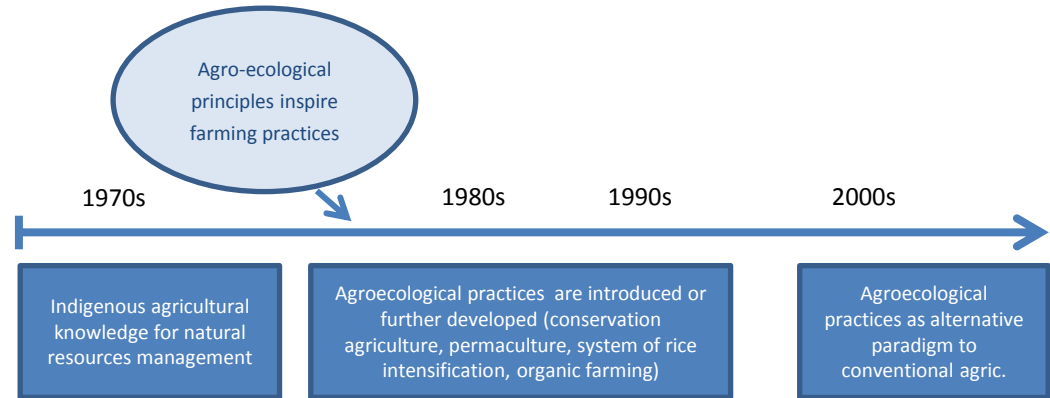
Received 19 July 2001; received in revised form 8 May 2002; accepted 20 May 2002

Historical perspective

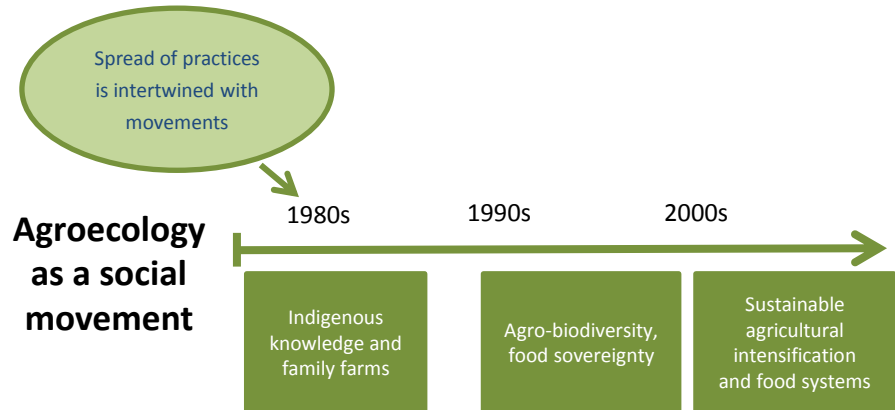
Agroecology as a scientific discipline



Agroecology as a set of practices



Agroecology as a social movement



Agroecology

What it is and what it has to offer

Laura Silici

Issue Paper
June 2014

Food and agriculture
Agroecology: Social work learning,
food sovereignty, Agroecology

Historical perspective

Agroecology as a scientific discipline

1920/30s

1940/50s

Scale: field/plot
Scope: biology/physics
Descriptive nature

From descriptive to analytical, increases scope and scale

Sc
Sc
ec
Ar

Agroecology as a set of practices



Bases tecnológicas de sistemas de producción agroecológicos. Nodos Agrícola Ganadero, Horticultura Orgánica y Cultivos Perennes.

Editor: Ing. Agr. Jorge A. Lillo

EEA San Pedro
AGROECOLOGÍA. INFORME TÉCNICO 2013

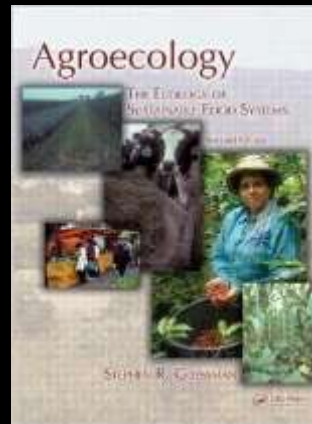


Ediciones

Instituto Nacional de
Tecnología Agropecuaria



Agroecology principles



- ✓ Diversity
- ✓ Resource efficiency
- ✓ Recycling
- ✓ Natural regulation
- ✓ Synergies

Yield-increasing potential of different interventions in Africa

Table 3 Summary of productivity outcomes from African case studies (Pretty et al. 2011)

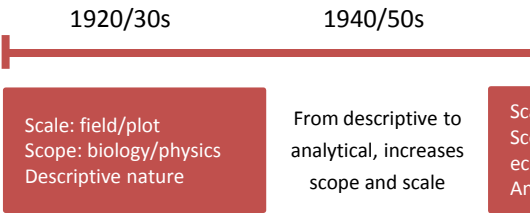
Thematic focus	Area improved (ha)	Mean yield increase (ratio)
Crop variety and system improvements	391,060	2.18
Agroforestry and soil conservation	3,385,000	1.96
Conservation agriculture	26,057	2.20
Integrated pest management	3,327,000	2.24
Horticulture and very small-scale agriculture	510	nd
Livestock and fodder crops	303,025	nd
Novel regional and national partnerships and policies	5,319,840	2.05
Aquaculture	523	nd
Total	12,753,000	2.13



- ✓ Recycling
- ✓ Natural regulation
- ✓ Synergies

Historical perspective

Agroecology
as a scientific
discipline



Social movements: 'medium' on which agroecology spreads



Synergies

agroecology

1. Innovative design
2. A landscape approach
3. A dialogue of wisdoms
4. Social organisational innovation

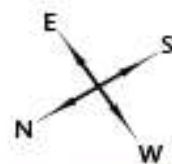
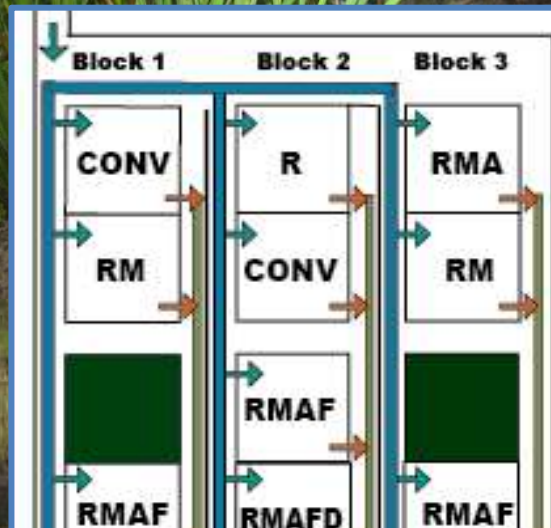
Building upon local agroecological knowledge

Rice-ducks-fish-azolla - Indonesia

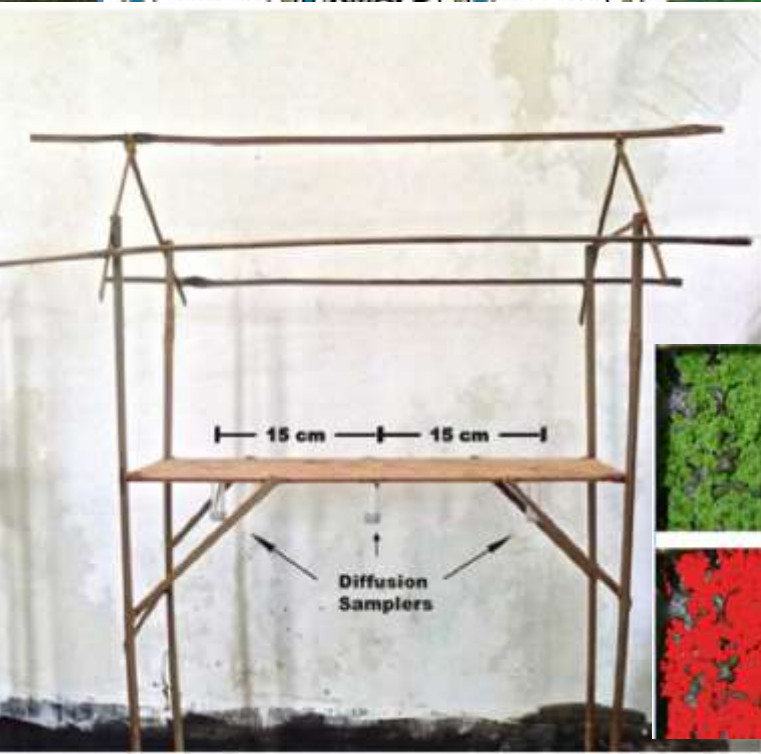




Building upon local agroecological knowledge

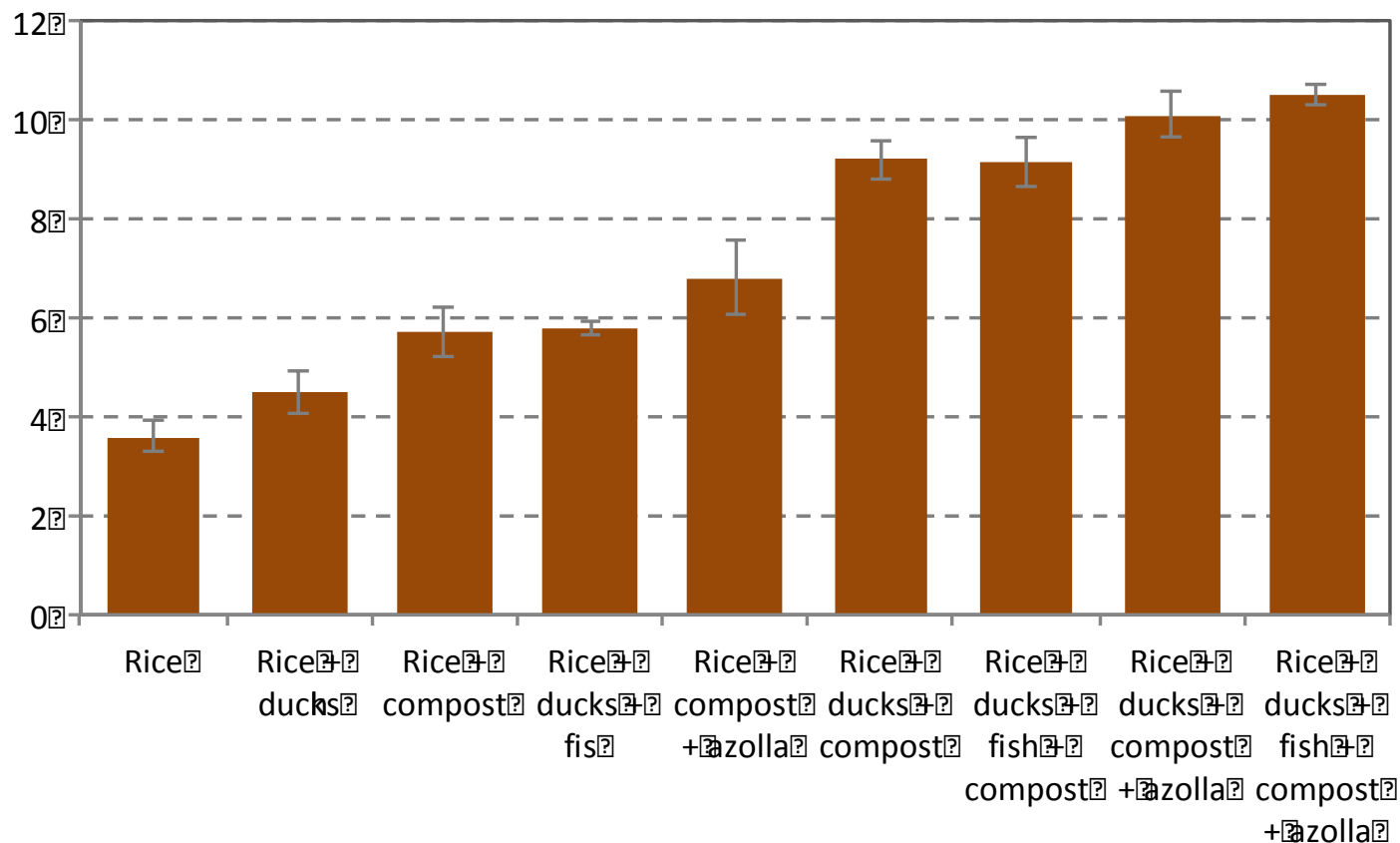


Assessing greenhouse gas emissions
(T. del Rio, 2014)



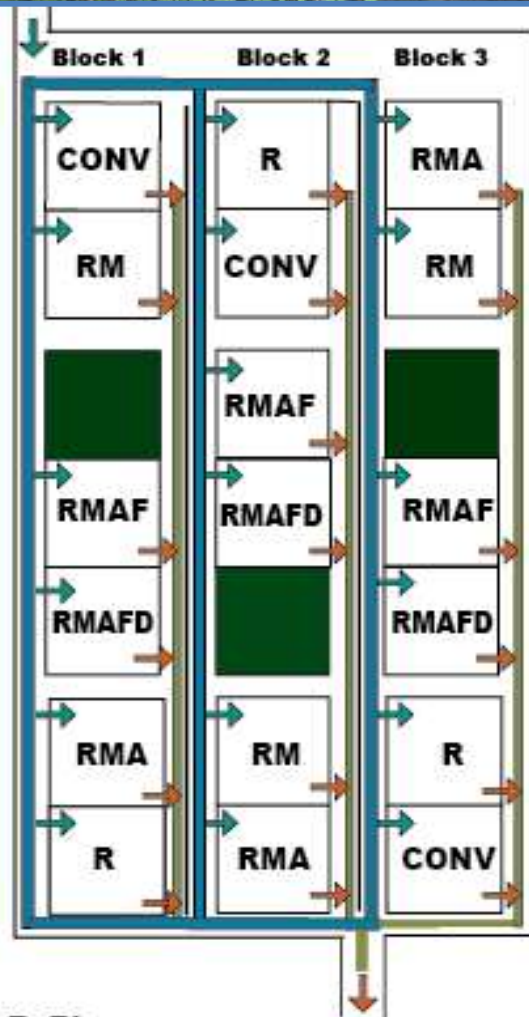
Rice-ducks-fish-azolla - Indonesia

Rice yield (t ha⁻¹) at increasing levels of complexity

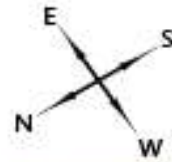


Building upon local agroecological knowledge

Assessing greenhouse gas emissions
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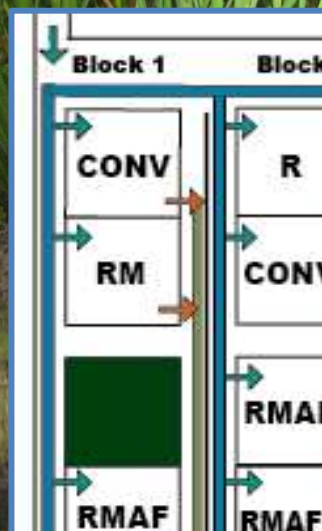


R: Rice
RM: Rice- Manure
RMA: Rice-Manure-Azolla
RMAF: Rice-Manure-Azolla-Fish
RMAFD: Rice-Manure-Azolla-Fish-Ducks
CONV: Conventional (Urea)

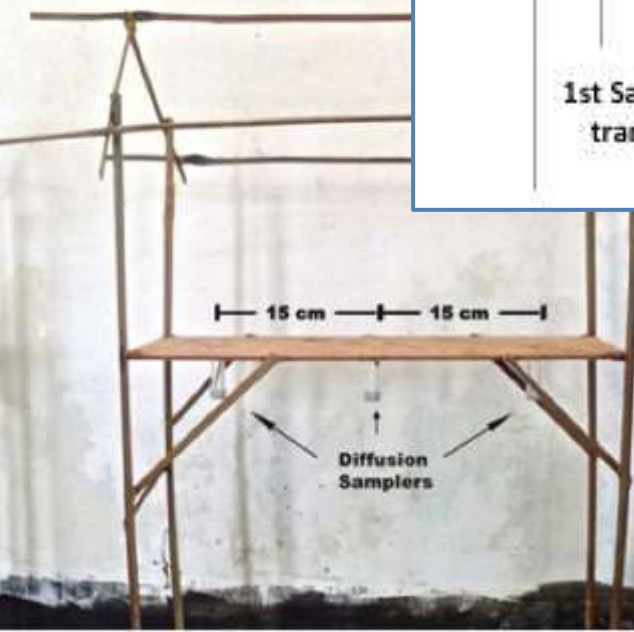
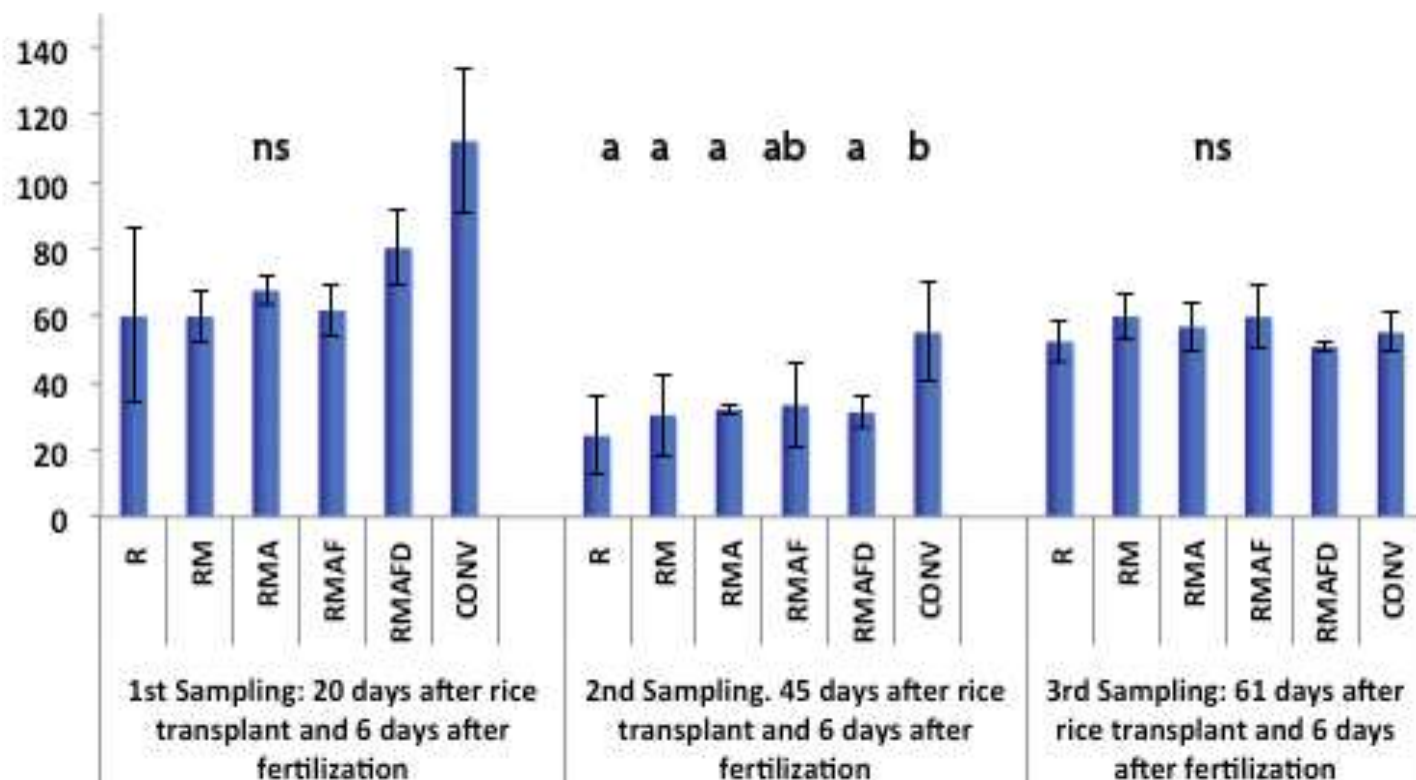


→ Water inflow
 → Water outflow
 ■ Plot not considered for the study

Air ammonia concentration at 3 sampling dates

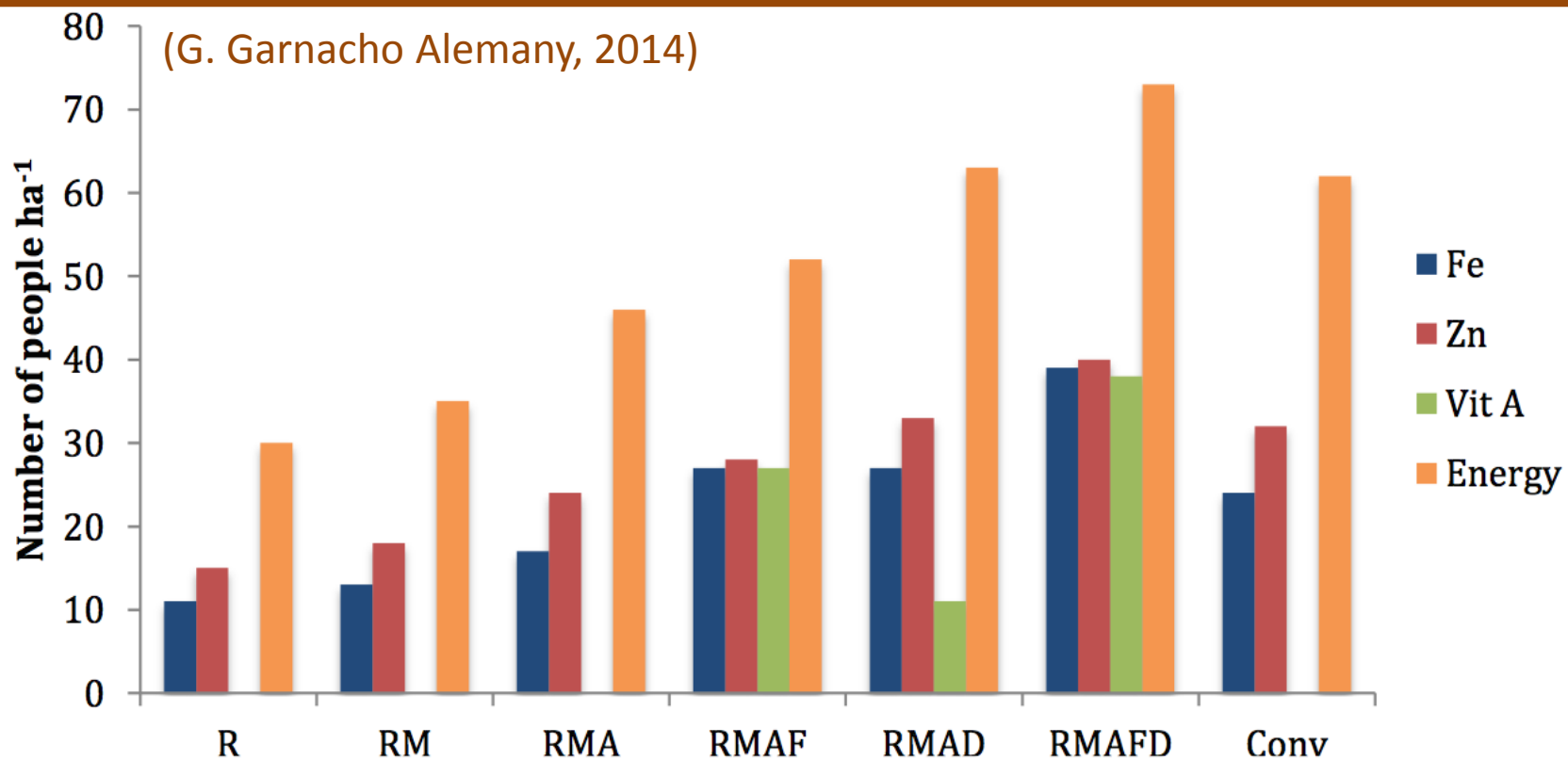


AV ($\mu\text{g m}^{-3}$)



AV ($\mu\text{g m}^{-3}$)

Nutritional 'carrying capacity' of each system

Diffusion
Samplers

AV ($\mu\text{g m}^{-3}$)

Nutritional 'carrying capacity' of each system



Arthropod-mediated ecosystem services

- Pest control, pollination, weed seed predation, decomposition
- Pest control: **400 billion** US\$/year world wide
- Pollination: **117 billion** US\$/year world wide



Landis et al. 2008; Losey & Vaughan 2006; Costanza et al. 1997



National Vegetation Database



National Vegetation Database



Geselecteerd aantal opnamen: 42

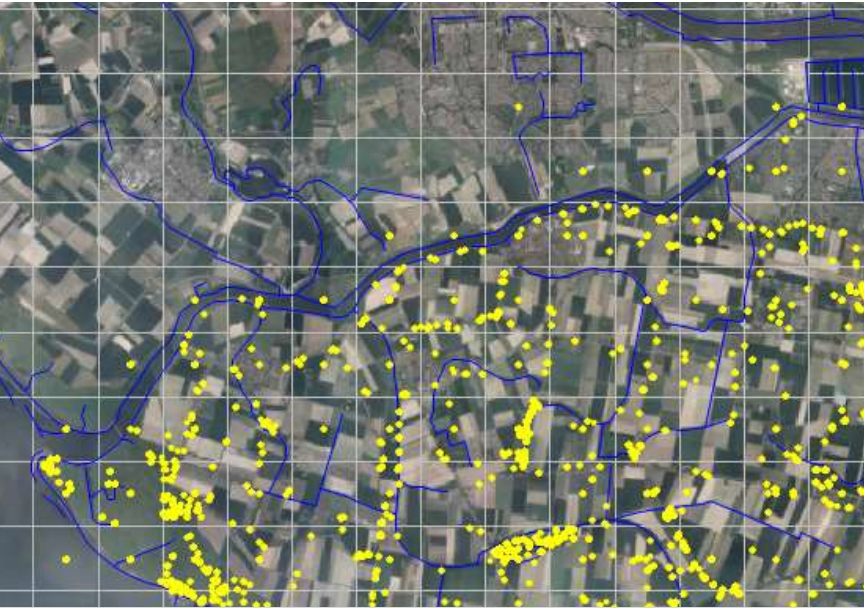
Opnamenr.	Bronhouder	Jaar	Code pq.	Naam plantengemeenschap	Resolutie
729893	Prov. Z-Holland	2004	29AA04	Eleocharito acicularis-Limoselletum	Punt
729900	Prov. Z-Holland	2004	32RG07	RG Pulicaria dysenterica-[Convolvulo-Filipenduletea/Agrostietalia stolonife	Punt
729901	Prov. Z-Holland	2004	29AA04	Eleocharito acicularis-Limoselletum	Punt
729906	Prov. Z-Holland	2008	16RG06	RG Carex disticha-[Calthion palustris]	Punt
729911	Prov. Z-Holland	2004	31CA01B	Echio-Melilotetum typicum	Punt
731152	Prov. Z-Holland	2002	05BA04	Potameto-Nymphoidetum	Punt

Opnameschaal: Braun/Blanquet (B,D&S)

Soortnaam	Vegatatielaag	Bedekking
Callitriche species (Sterrenkroos (G))		+
Carex riparia (Oeverzegge)		+
Ceratophyllum demersum (Grof hoornblad)		+
Equisetum palustre (Lidrus)		+
Glyceria maxima (Liesgras)		+
Lemna gibba + L. minor (Bultkroos en Klein kroos)		+
Nymphoides peltata (Watergentiaan)		2a
Phragmites australis (Riet)		+
Rumex hydrolapathum (Waterzuring)		r
Sparganium erectum (Grote en Blonde egelskop)		+

731158	Prov. Z-Holland	2002	31RG04	RG Elymus repens-[Artemisietea vulgaris]	Punt
731159	Prov. Z-Holland	2007	31RG04	RG Elymus repens-[Artemisietea vulgaris]	Punt
731169	Prov. Z-Holland	2002	16RG09	RG Alopecurus pratensis-Elymus repens-[Arrhenatheretalia]	Punt
731176	Prov. Z-Holland	2004	32RG07	RG Pulicaria dysenterica-[Convolvulo-Filipenduletea/Agrostietalia stolonife	Punt
731177	Prov. Z-Holland	2008	32RG05	RG Phalaris arundinacea-[Convolvulo-Filipenduletea]	Punt
732078	Prov. Z-Holland	2002	38AA03C	Cardamino amarae-Salicetum urticetosum	Punt
732079	Prov. Z-Holland	2005	33AA05A	Urtico-Aegopodietum alliarietosum	Punt
732085	Prov. Z-Holland	2002	33RG02	RG Anthriscus sylvestris-[Galio-Urticetea]	Punt
732086	Prov. Z-Holland	2007	33RG01	RG Urtica dioica-[Galio-Urticetea]	Punt
732091	Prov. Z-Holland	2002	08RG01	RG Glyceria maxima-[Phragmitetea]	Punt
732107	Prov. Z-Holland	2002	08RG01	RG Glyceria maxima-[Phragmitetea]	Punt
732113	Prov. Z-Holland	2002	08RG01	RG Glyceria maxima-[Phragmitetea]	Punt
732118	Prov. Z-	2002	16RG09	RG Alopecurus pratensis-Elymus repens-[Arrhenatheretalia]	Punt

National Vegetation Database

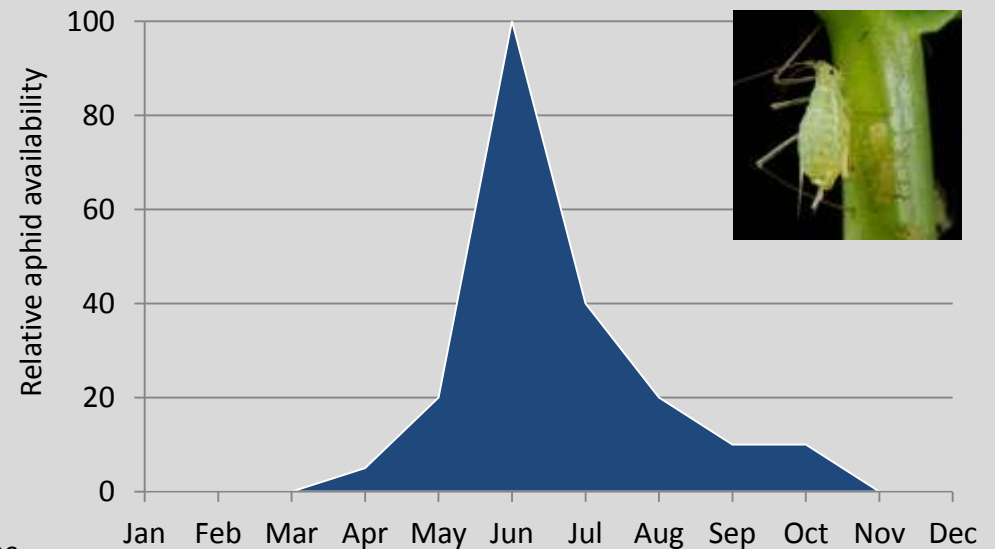
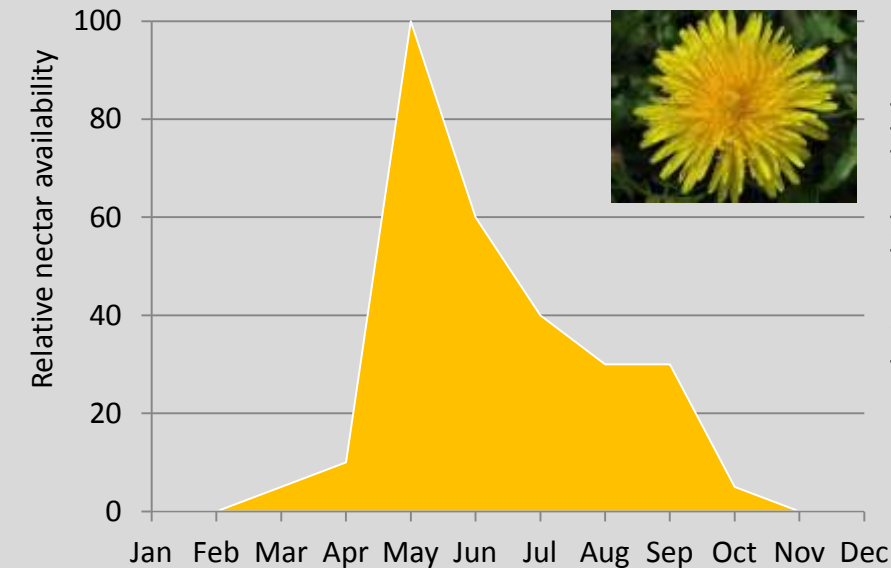


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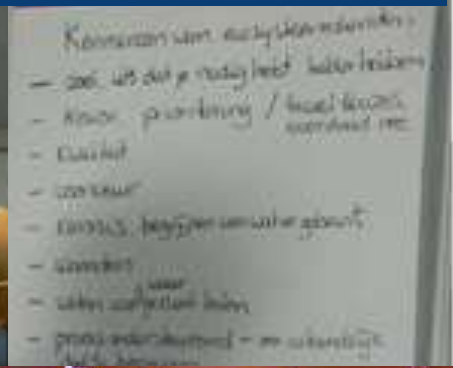
Participatory landscape design

grey = field borders
green = existing hedgerows
red = planned new hedgerows



Resolutie
Punt
Punt
Punt
Punt

7 objectives
prioritised



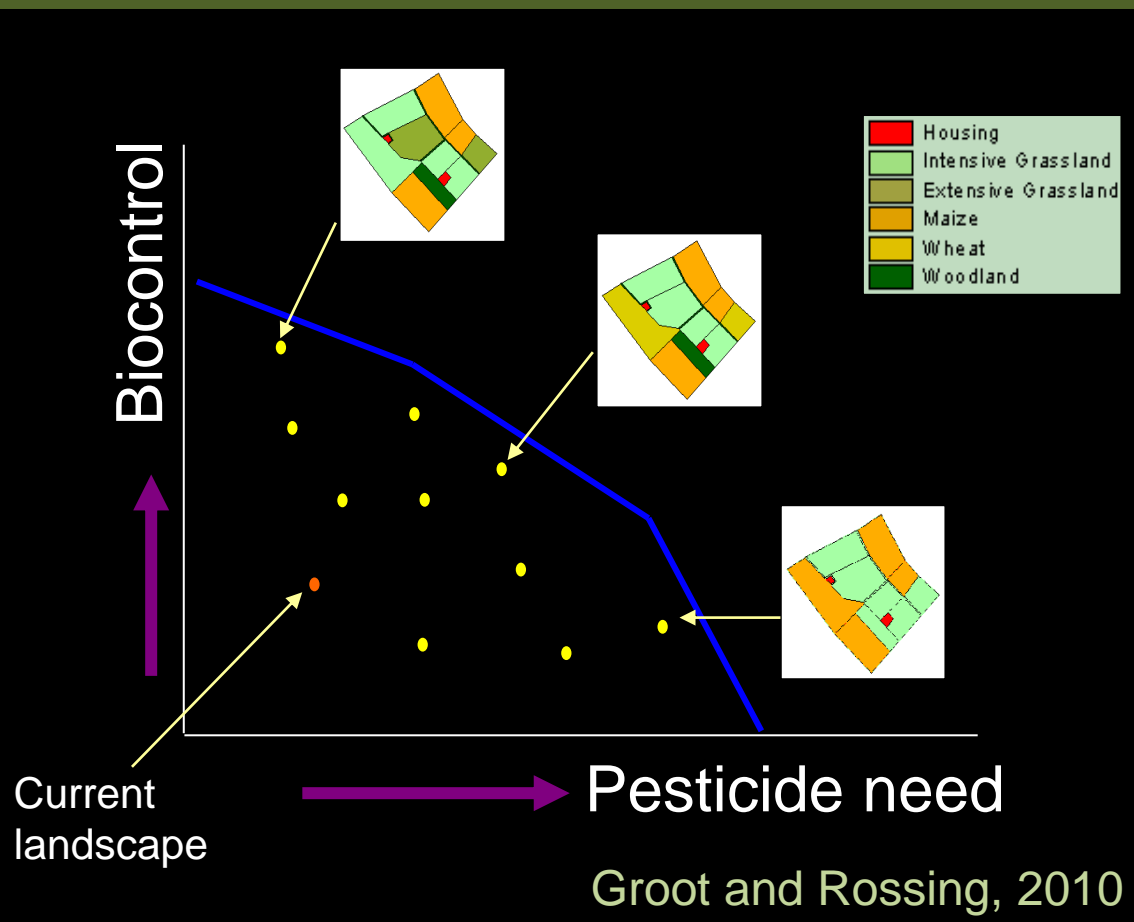
Participatory landscape design

grey = field borders
green = existing hedgerows
red = planned new hedgerows

500 m.



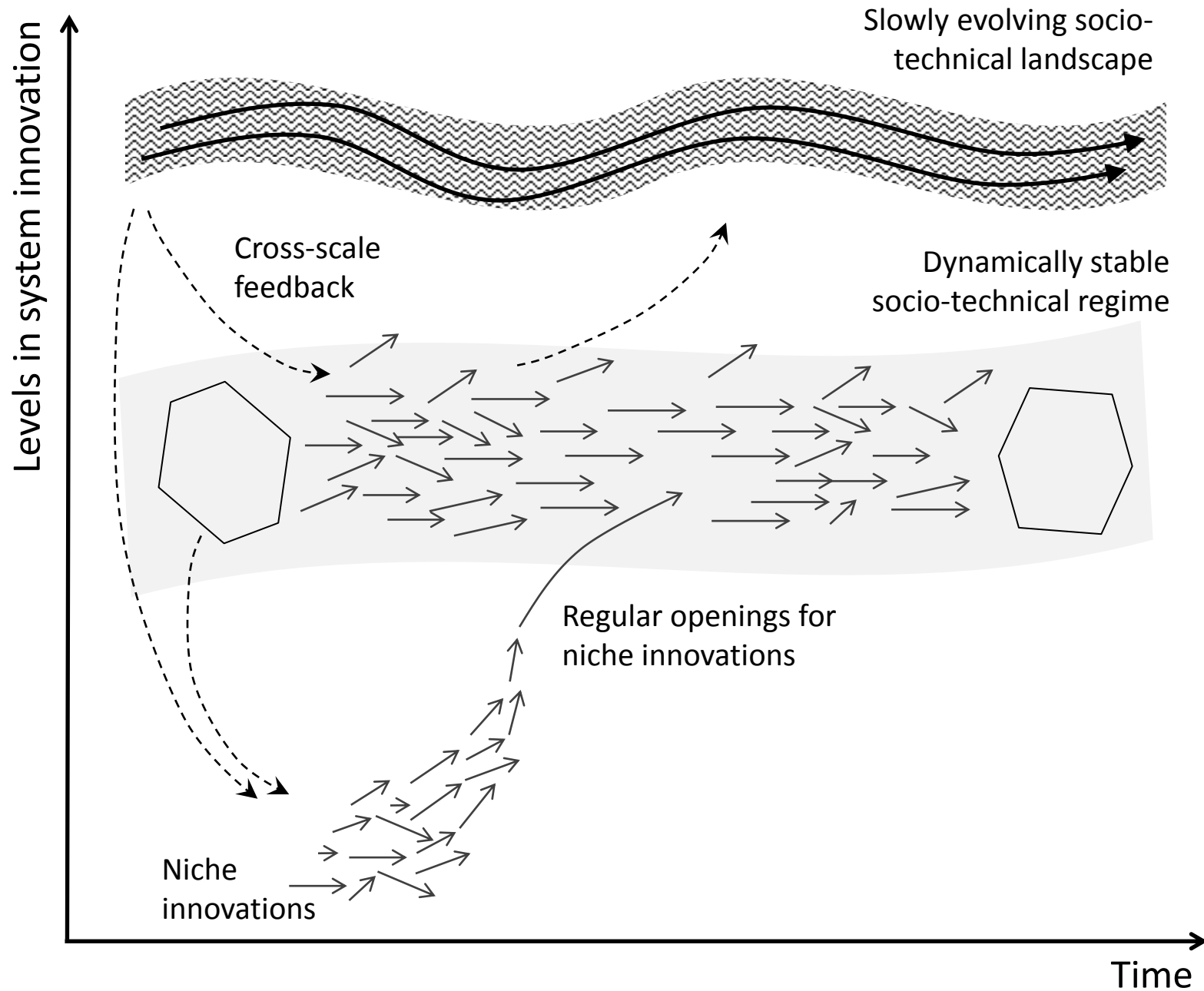
Exploration of alternative landscape structures



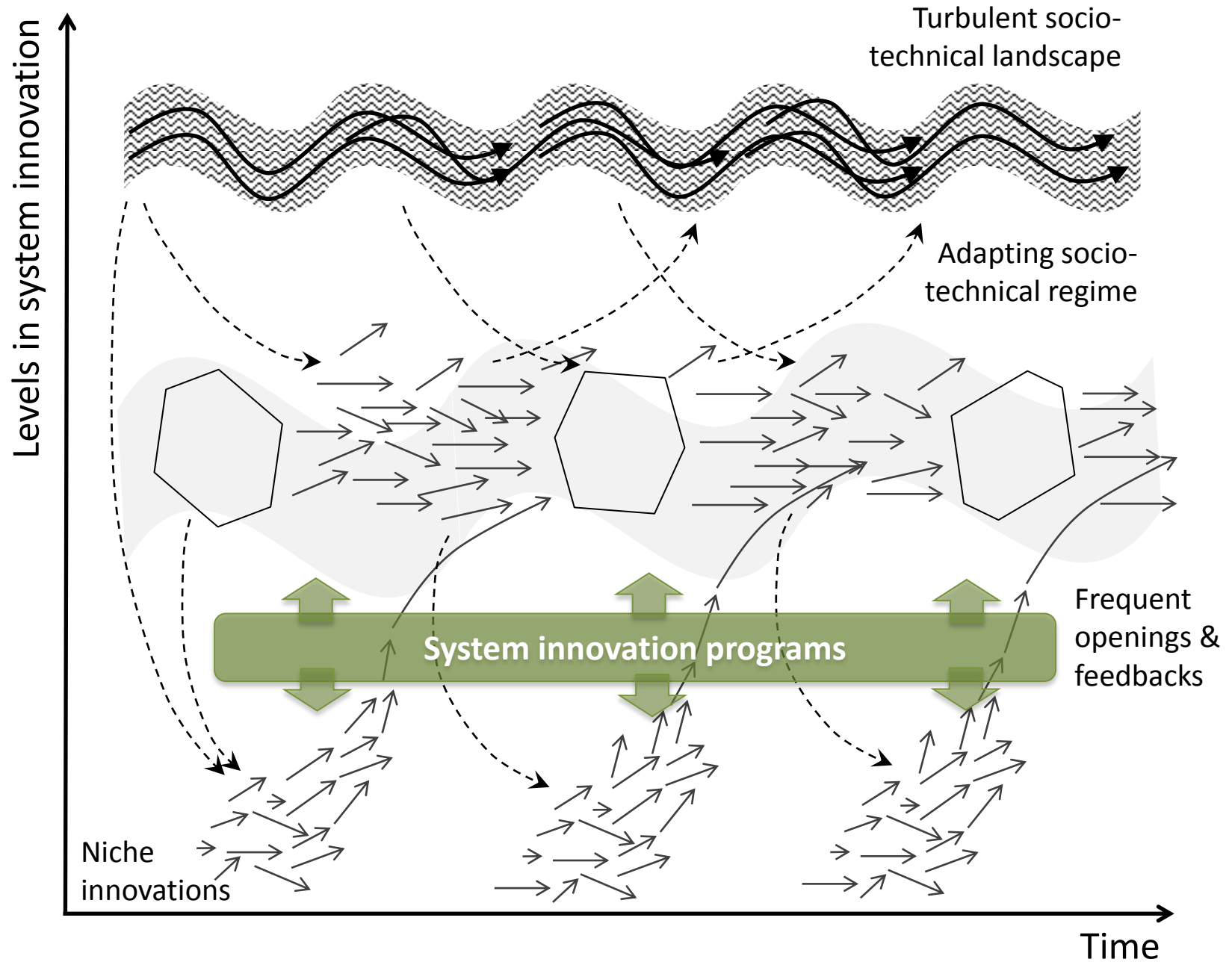


Policy innovation

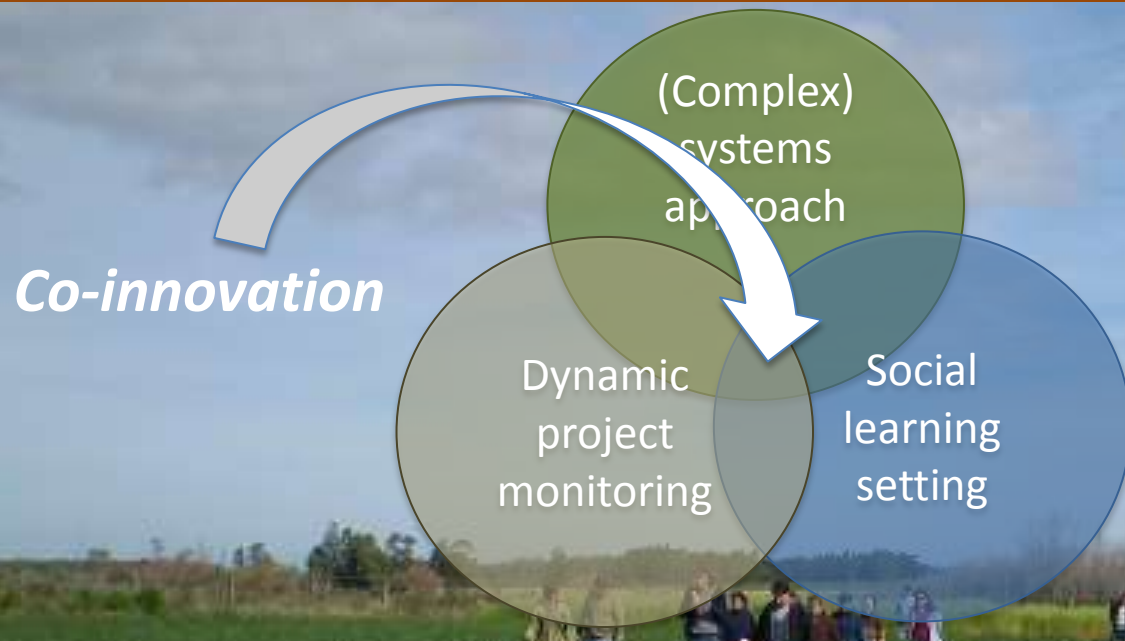
Landscapes, regimes and niches



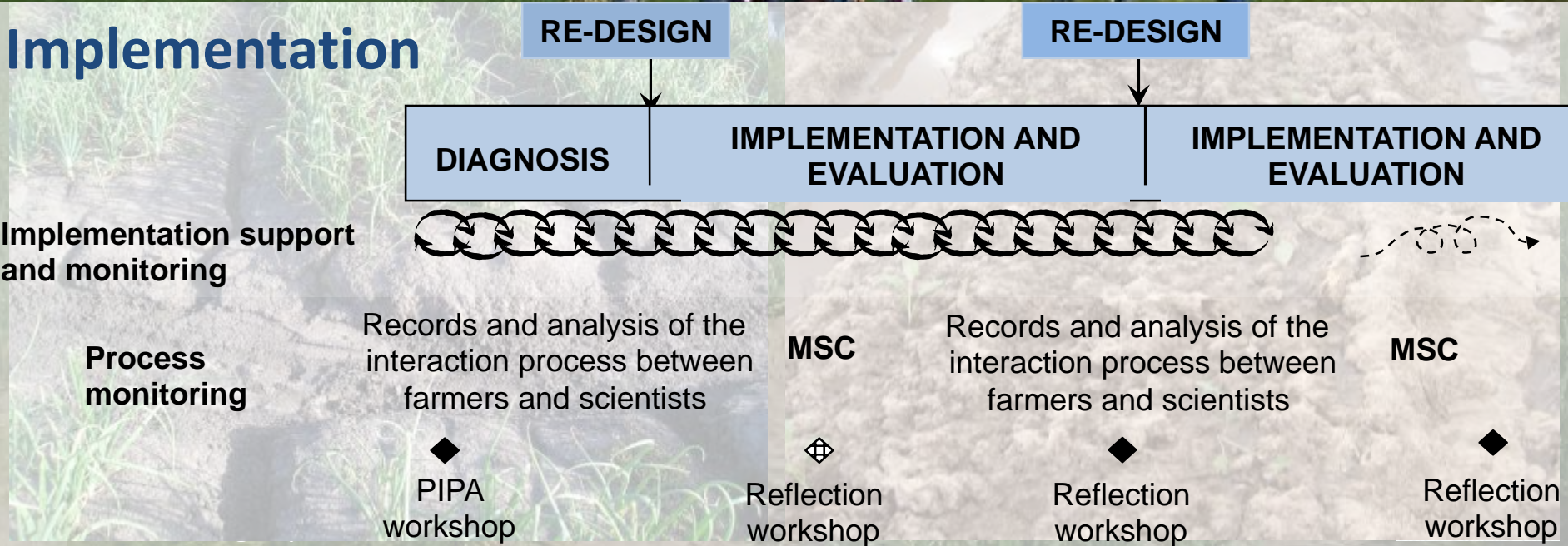
Landscapes, regimes and niches



Co-innovation in family agriculture (Latin America)



Implementation



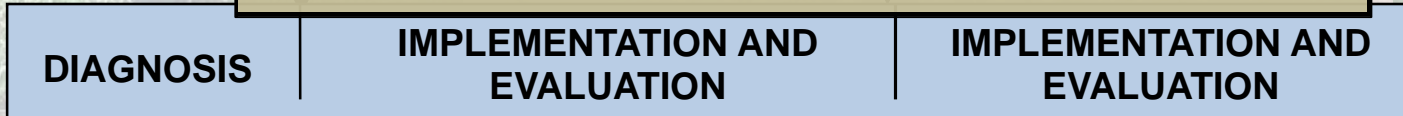
Co-innovation in fami

Post-project adoption (Dogliotti et al., 2014)

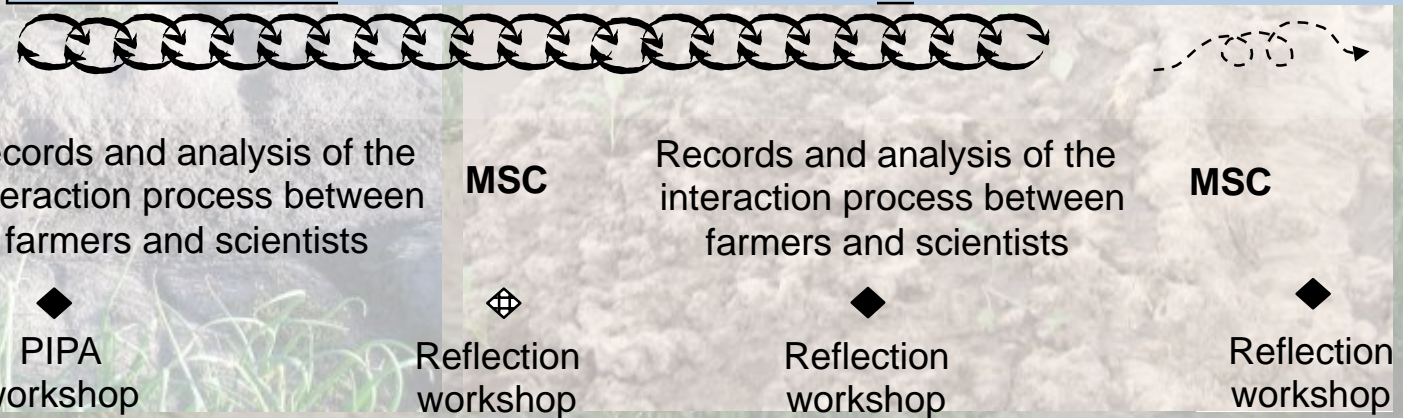
Co-innovation

Planned improvements	% adoption
Drainage and erosion control	83
Green manures	88
Chicken manure	100
Crop Rotation	75
Rotation with pastures	64
Area of Crops	100
Crop manag	93
Strategic weed control	81
Record sheets	44

Implementation

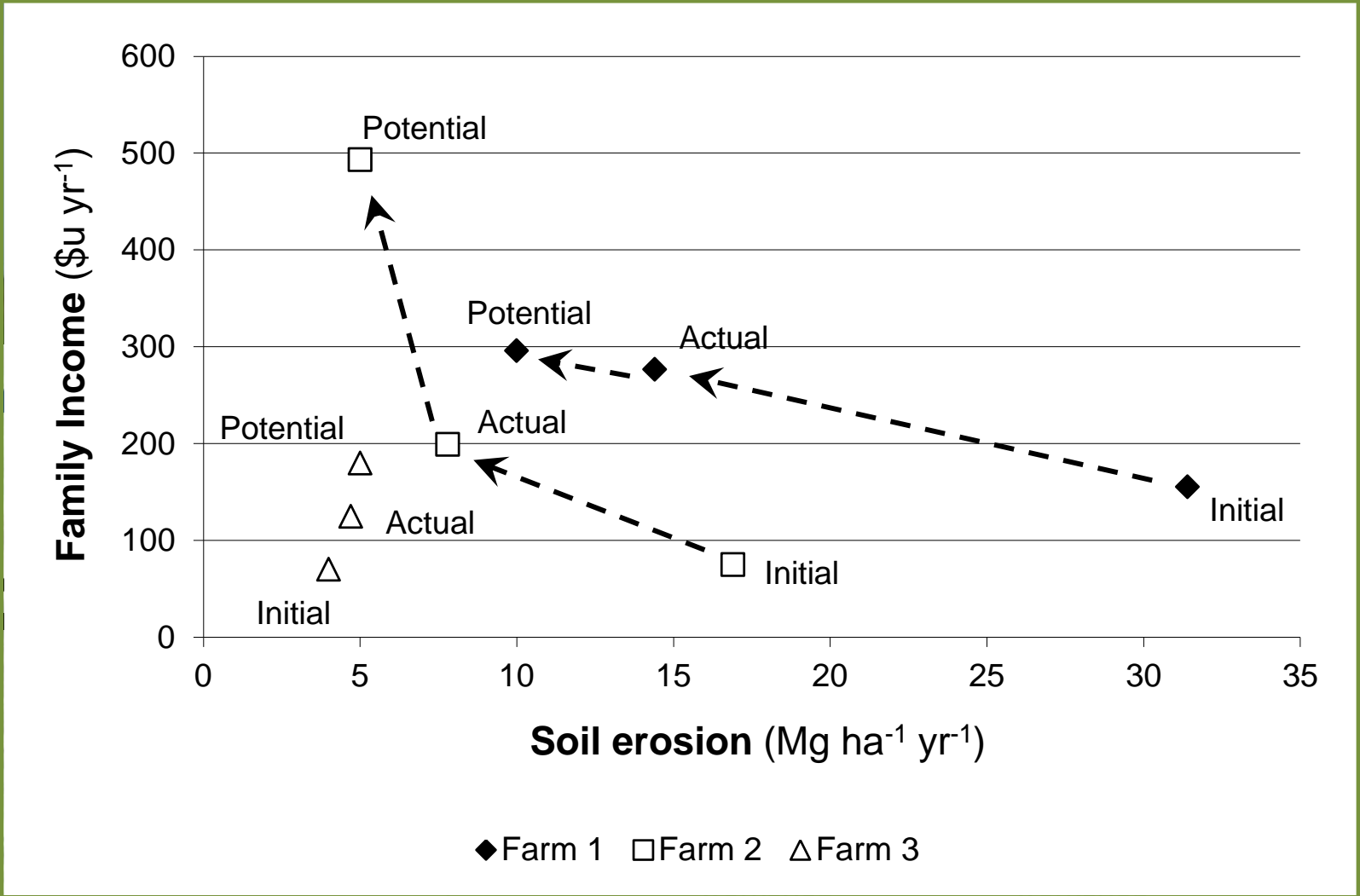


Implementation support and monitoring



Planned improvements	% adoption
Drainage and erosion control	83

Farm monitoring + model exploration



ATION AND
TION

MSC

Reflection
workshop



Before

After

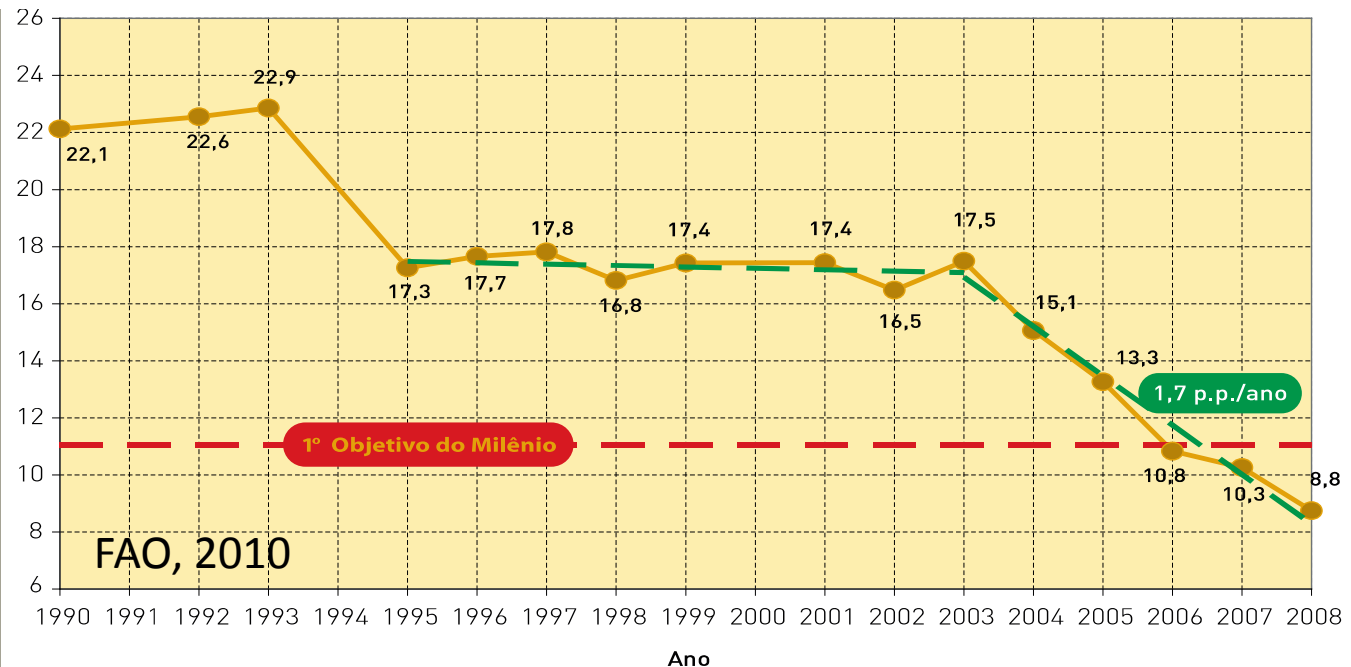
Minas Gerais, Brazil

Before

After



Extreme poverty (%) in Brazil, 1990-2008



Minas Gerais, Brazil

Zero hunger program

1. Acesso aos Alimentos

- Renda: Bolsa Família
- Programas de Alimentação:
 - Alimentação Escolar (PNAE)
 - Distribuição de Vitamina A e Ferro
 - Alimentos aos grupo populacionais específicos
 - Educação Alimentar e Nutricional
 - Sistema Vigilância Alimentar e Nutricional (SISVAN)
 - Programa de Alimentação dos Trabalhadores (PAT)
- Redes de SAN locais e regionais: Restaurantes Populares, Cozinhas Comunitárias, Feiras, Agricultura Urbana e Bancos de Alimentos
- Água: Cisternas

2. Fortalecimento da Agricultura Familiar

- Financiamento da Agricultura Familiar (PRONAF): Seguro Agrícola e Seguro Safra
- Programa de Aquisição de Alimentos (PAA)



3. Geração de Renda

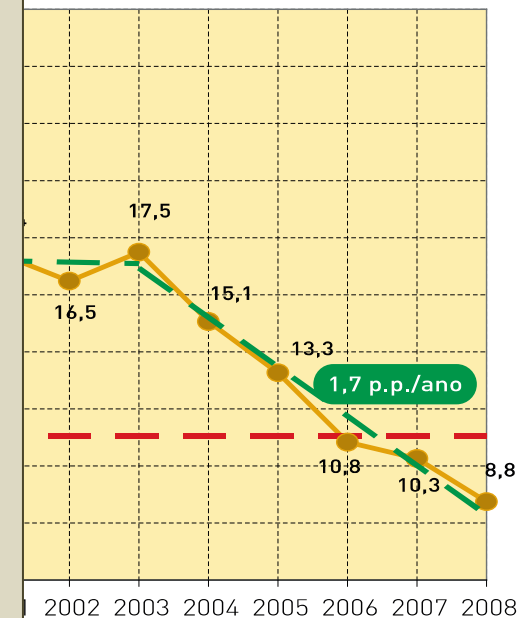
- Qualificação Social e Profissional
- Próximo Passo
- Economia Solidária e Inclusão Produtiva
- Microcrédito Produtivo Orientado
- Arranjos Regionais de SAN:
 - CONSADs, Território da Cidadania



4. Articulação, Mobilização e Controle Social

- Centros de Referências em Assistência Social (CRAS) e Programa de Atenção Integral as Famílias (PAIF)
- Conselhos e Comitês de Controle Social
- Educação Cidadã e Mobilização Social
- Doações
- As Parcerias com Empresas e Entidades

After
1990-2008



Minas Gerais, Brazil

Zero hunger program

1. Acesso aos Alimentos

- Renda: Bolsa Família
- Programas de Alimentação:
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3. Geração de Renda

- Qualificação Social e Profissional
- Próximo Passo
- Economia Solidária e Inclusão
- Microcrédito Produtivo Orientado
- Arranjos Regionais de SAN: CONSADs, Territórios



2. Fortalecimento da Agricultura Familiar

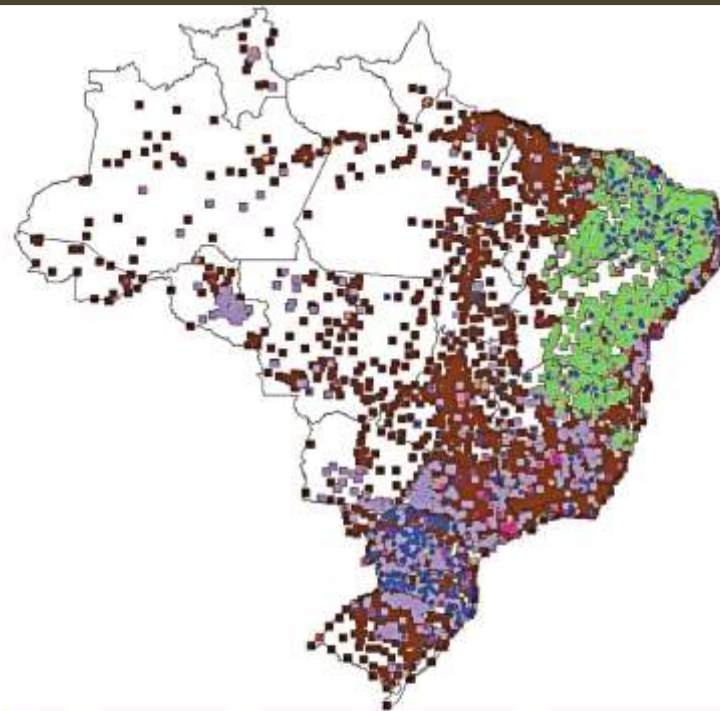
- Financiamento da Agricultura Familiar (PRONAF): Seguro Agrícola e Seguro Safra
- Programa de Aquisição de Alimentos (PAA)

4. Articulação, Mobilização Social

- Centros de Referências em Agricultura e Programa de Atenção Integral às Famílias (PAIF)
- Conselhos e Comitês de Controle Social
- Educação Cidadã e Mobilização Social
- Doações
- As Parcerias com Empresas e Entidades



Targeted actions



Legendas:

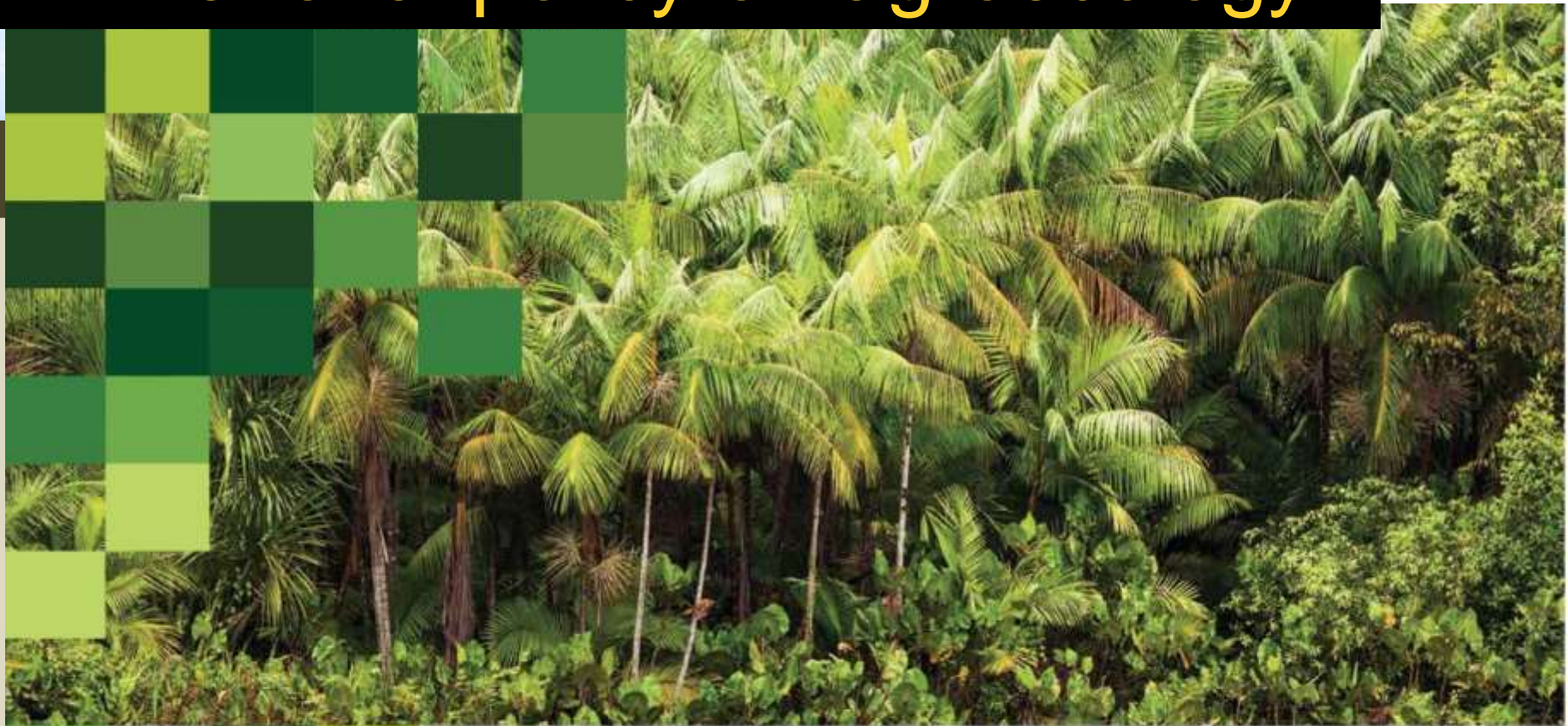
- CRAS - Censo 2010
- Prog. de Aquisição de Alimentos
- Cisternas
- Restaurantes Populares
- Cozinhas Comunitárias
- Bancos de Alimentos
- Bolsa Família (todos os municípios)
- Alimentação Escolar (todos os municípios)
- ▨ Limite Estados

Fonte: Matriz de Informação Social - SAGI/MDS/2010.

2002 2003 2004 2005 2006 2007 2008

Minas Gerais, Brazil

A national policy on agroecology



Brasil
agroecológico

**Plano Nacional de Agroecologia
e Produção Orgânica - Planapo**

- Educação Cidadã e Mobilização Social
- Doações
- As Parcerias com Empresas e Entidades

Ministério do
Desenvolvimento Agrário



Minas Gerais, Brazil

Supporting transitions

- Challenge the current system
- Prove that alternatives work
- Work towards convergence*

* Warning!

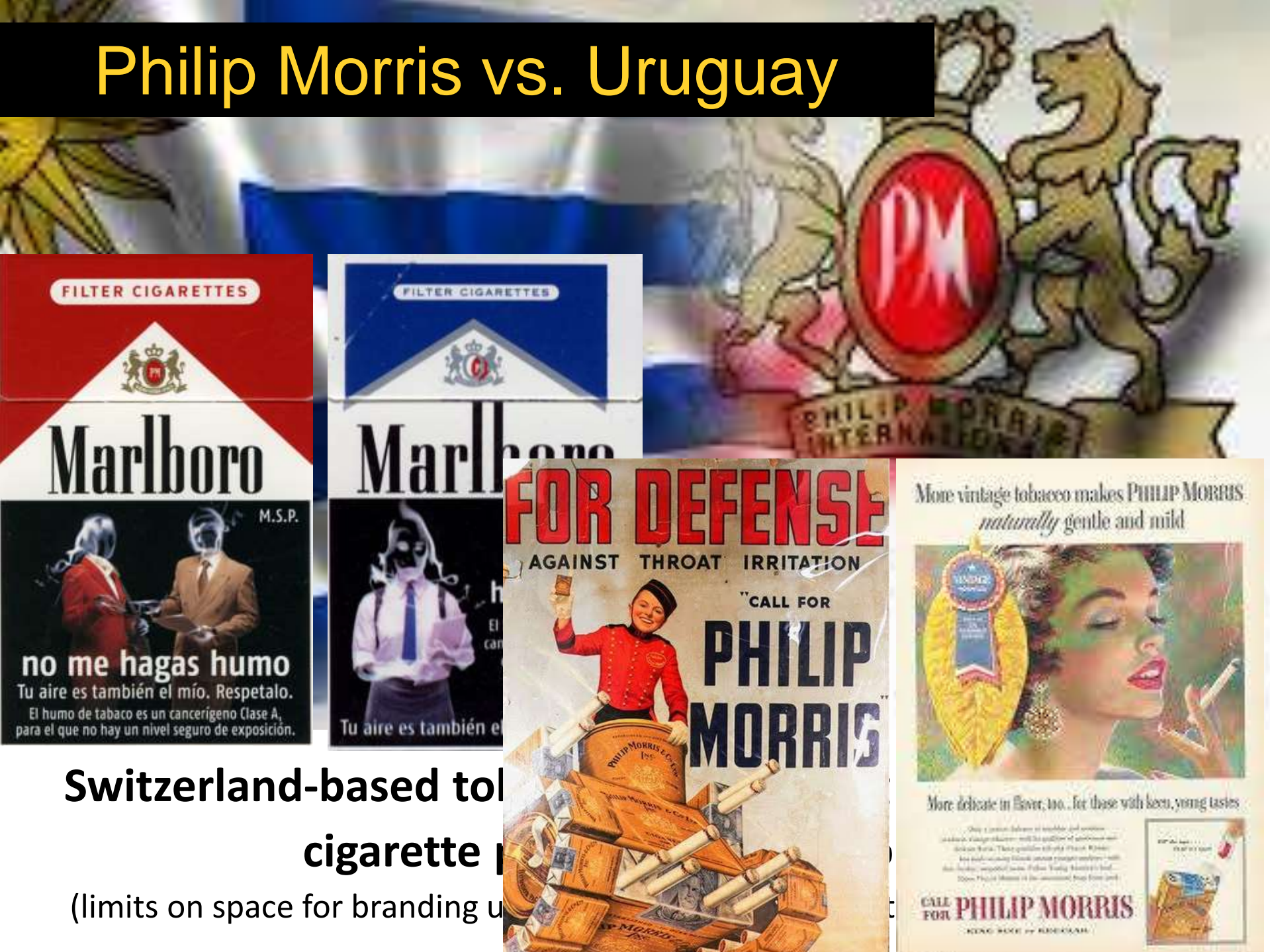
Philip Morris vs. Uruguay



**Switzerland-based tobacco giant is suing Uruguay over
cigarette packaging restrictions**

(limits on space for branding unfairly infringes on intellectual property rights)

Philip Morris vs. Uruguay



no me hagas humo
Tu aire es también el mío. Respetalo.
El humo de tabaco es un cancerígeno Clase A,
para el que no hay un nivel seguro de exposición.

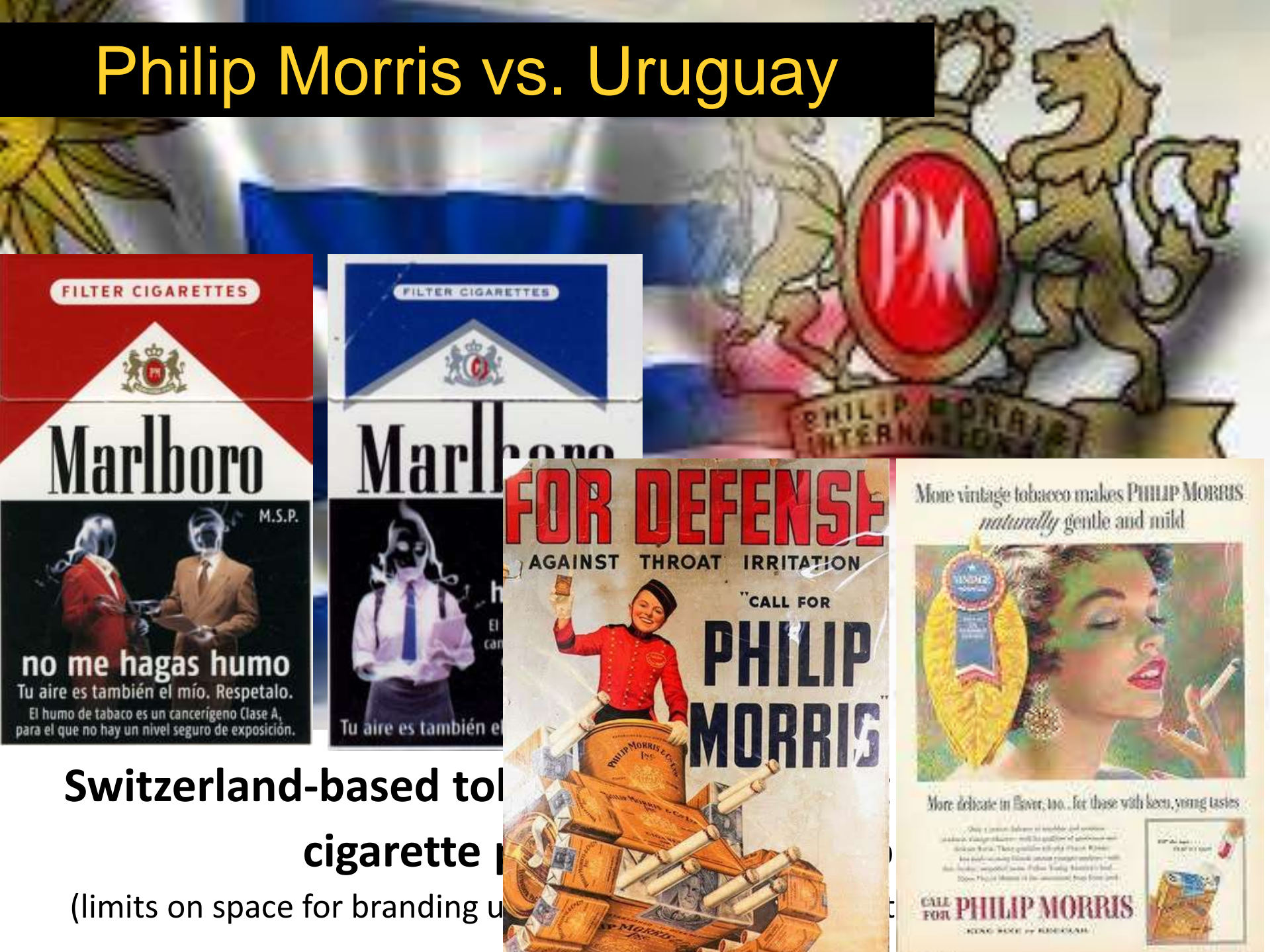
FOR DEFENSE
AGAINST THROAT IRRITATION
"CALL FOR
PHILIP MORRIS

More vintage tobacco makes PHILIP MORRIS
naturally gentle and mild

More delicate in flavor, too... for those with keen, young tastes

CALL FOR PHILIP MORRIS
KING SIZE 11 CIGARETTES

Philip Morris vs. Uruguay



Switzerland-based tobacco giant Philip Morris

Uruguay

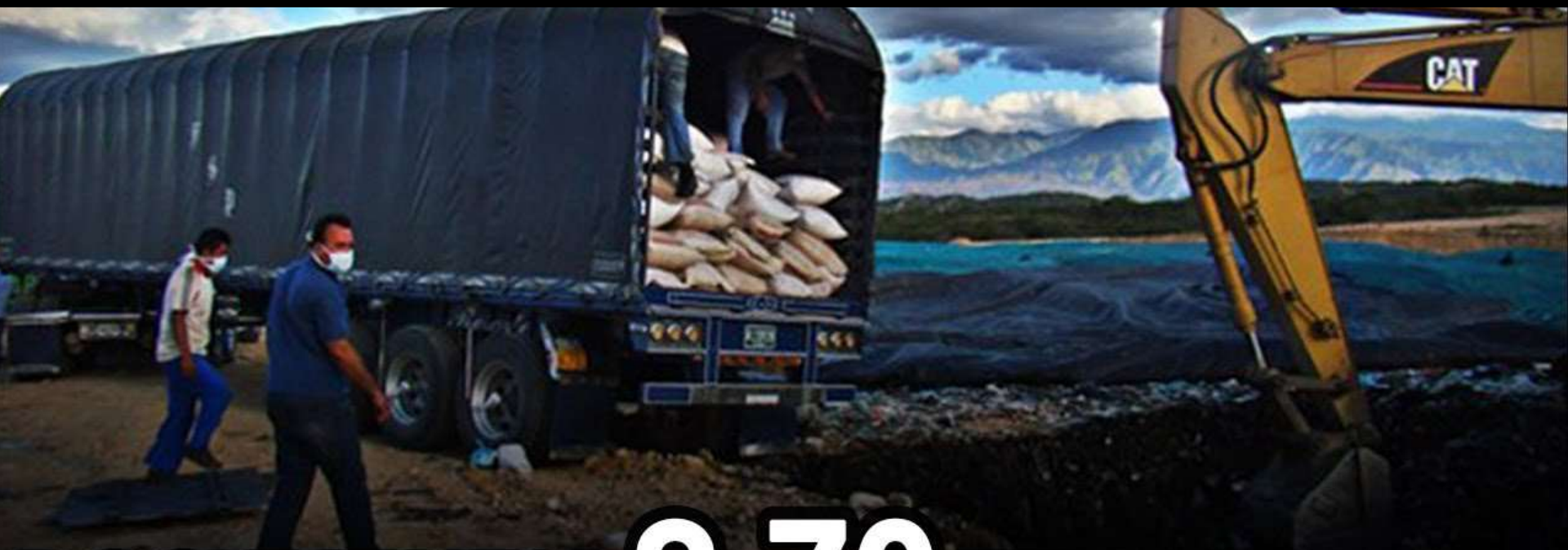
(limits on space for branding on cigarette packs)

LOS HEROES EN COLOMBIA

SI EXISTEN !



Food sovereignty



DOCUMENTAL 9.70 EN
YOUTUBE



Food sovereignty



DOCUMENTAL



Learning from practice: Agroecology series



Smallholder agro-forest landscape,
Bellavista, Colombia

WAGENINGEN UR
For quality of life

Education
Program

Home • Expertise & Services • Chair groups

Agroecology series

mailen

Complex adaptive rice cultivation - Indonesia



Agroecology in movement - Brasil



Movement means something that moves

Restoring landscapes - Tanzania



Final messages

- Agroecology already offers technical solutions to smallholders around the world – how to scale them up?
- It is not so much the technical but the social organisational aspects that need to be supported
- Let us not be misled by popular myths, false advocacy or corporate interest... no time to be politically correct!
- Agroecological principles to guide the design of large scale agriculture

Smallholder agro-forest landscape,
Bellavista, Colombia



Thanks for your attention



pablo.tittonell@wur.nl
www.wageningenUR/FSE
<https://www.facebook.com/FSE.WageningenUR>