

UNFCCC Workshop on technical and scientific aspects of ecosystems with high-carbon reservoirs not covered by other agenda items under the Convention; Bonn, 24-25/10/2013.
UNFCCC.int/7797

Trees Outside Forest on the Mitigadadaptation interface



Meine van Noordwijk

World Agroforestry Centre (ICRAF)

Eco- and Socio-Ecological Systems

worthy of special interest

Tentative

	Part of global emissions		Mitigation actions feasible?	Link to local human vulnerability	Adaptation actions feasible?	RIO policy instruments apply?
	C-density	Area				
Forest	***					
Mangrove	****					
Peatlands	****					
Other wetlands	**					
Permafrost & tundra	*****					
Seagrass	*					
Trees outside forest						
Drylands						

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Trees Outside Forest on the Mitigadaptation interface



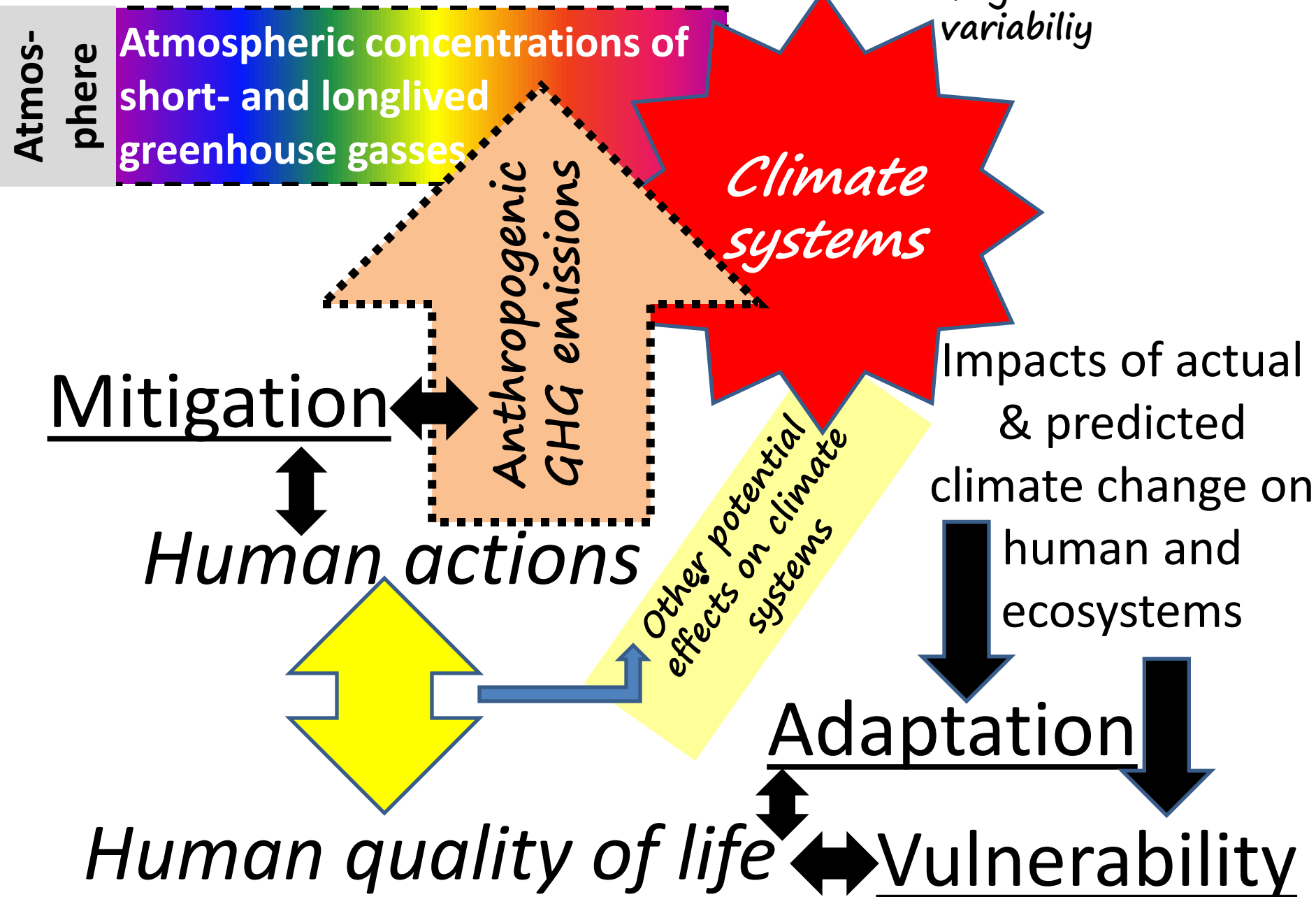
Meine van Noordwijk

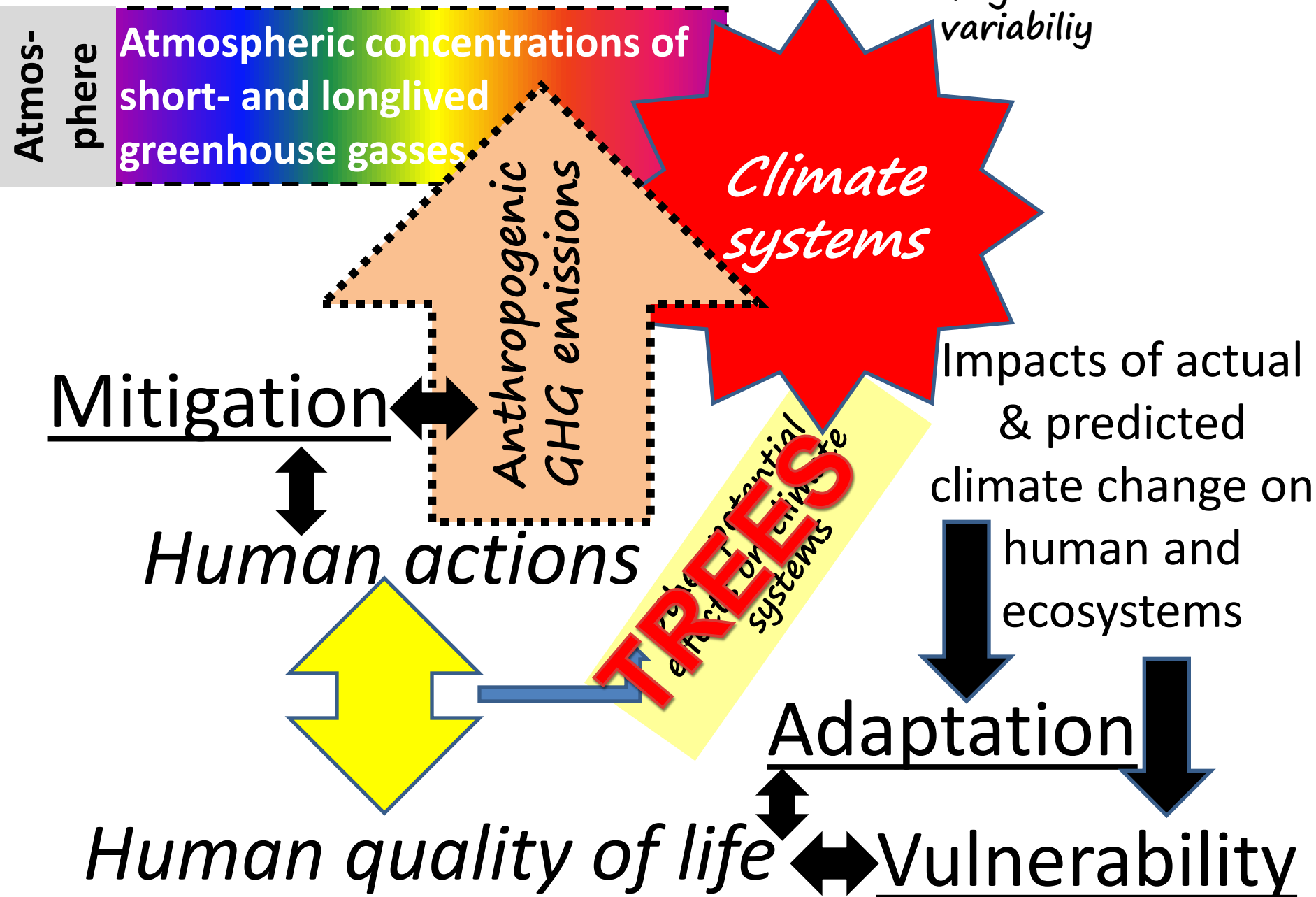
World Agroforestry Centre (ICRAF)

Scientists love gradients, uncertainty & continua
Politicians love ambiguity if it increases their
platform, and all voters expect to somehow gain

Governance and effective policies need
clear demarcations between 'in' and 'out'

Traditional governance systems & local
knowledge tend to be fuzzy and flexible






IPCC Accounting framework is comprehensive in design (not in practice?)

		Forest land	Crop-land	Grass-land	Wet-lands	Settle-ments	Other land
Standard 5 pools for IPCC accounting	Tree biomass & understorey/herb(aboveground)	XXXX (X)	x X	x x	Xx x	(x) pm	?
	Aboveground necromass	X	(x)	(X)	X	pm	?
	Litter (aboveground)	x	(x)	X	X	pm	?
	Root biomass (all) (belowground)	XX	X	Xx	x	pm	?
	Soil carbon 0-0.3 m	XX X	X	Xx	XXXX	X	?
	Soil carbon 0.3-1 m	(x)	(x)	X	XXXX	pm	?
	Soil carbon >1 m		Pm		XXXX	pm	?

What may have fallen through the cracks?

		Mitigation relevance beyond existing UNFCCC policy instruments				Adaptation relevance	
	IPCC AFOLU national accounting categories	TIF	TOF & TOTOF	PIF	POF & POPOF	Trees	Peat
4	Forest Land	REDD+	-	REDD+	-	++	(+)
5	Cropland	 A/R-CDM	+	-	++	++	(+)
6	Grassland		+	-	(+)	+	-
7	Wetlands		++	-	++	+	+
8	Settlements		-	+	-	-	++
9	Other Land	-	?	-	-	-	-

Institutional forest definition ~ land use & cover

Agro- and urban forestry agenda

TIF = Trees inside forest
 TOF = Trees outside forest (see FAO report 2013)
 TOTOF = Trees beyond TOF definition
 PIF = Peat inside forest (wetland supplement)
 POF = Peat outside forest (wetland supplement)
 POPOF = Peat beyond PIF and POF definitions, and including other high C-density soils: andisols, spodosols, mangrove soils

Chapters:

<http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

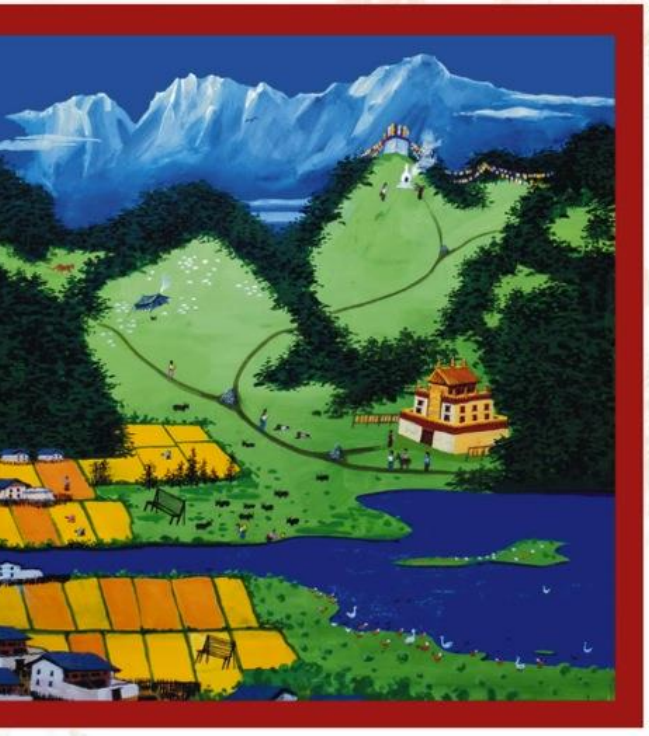
TOWARDS THE ASSESSMENT OF TREES OUTSIDE FORESTS

A THEMATIC REPORT PREPARED IN THE FRAMEWORK OF
THE GLOBAL FOREST RESOURCES ASSESSMENT

Hubert de Foresta, IRD
Eduardo Somarriba, CATIE
August Temu, ICRAF
Désirée Boulanger
Hélène Feuilly
Michelle Gauthier, FAO

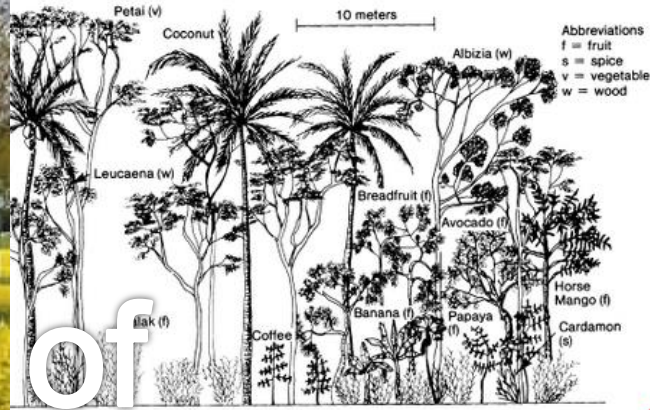


Rome 2013



Which trees are part of “forest”, which ones part of the “agroforest”, or “agriculture”?





Trees as part of plant production systems



*Mitig-
Adapta-
tion*

*Social
safe-
guards*

Local ecological knowledge (LEK)
(dynamic; local observations;
flexible concepts; encyclopedia of
diversity + explanatory stories +
meaning in social/religious terms

*Mitig-
Adapta-
tion* *State
forest
claims*

Public/policy
ecological know-
ledge (PEK):
categories
**International
conventions**



Public/policy
ecological know-
ledge (PEK): laws
& national cate-
gories; carrots,
sticks, sermons

*Trees
outside
forest*

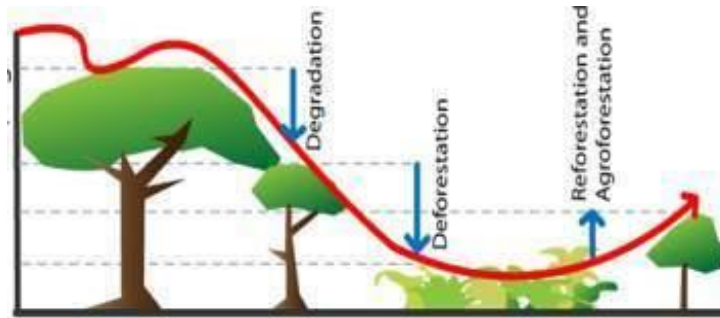
*Mitig-
Adapta-
tion*

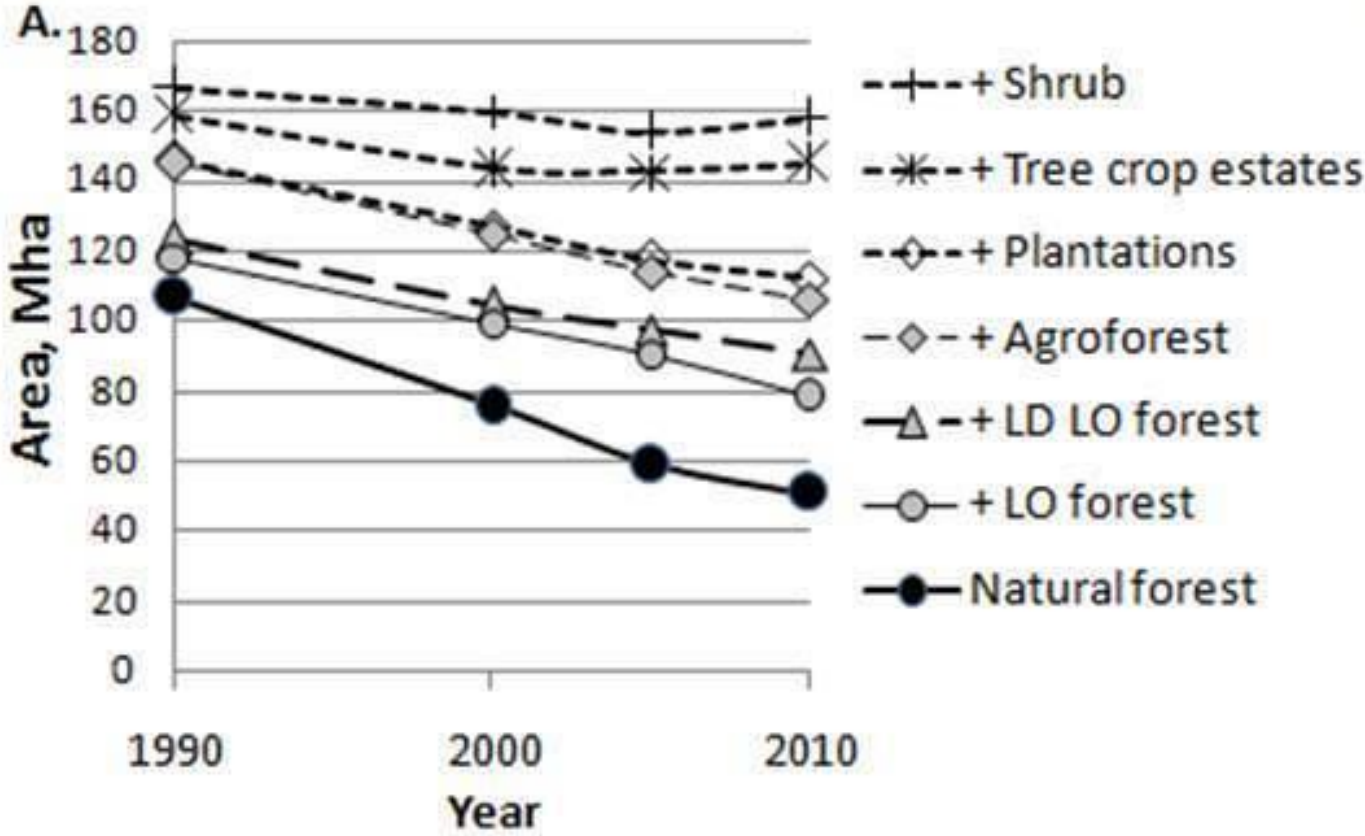
Modelers' ecological knowledge
(MEK) (dynamic; global
observations; stepwise shifts in
concepts (paradigm shifts); strict
(?) segregation of science from
real-life (except when it comes to
popular communication stories)

Agro

Forest
*Mitig-
Adapta-
tion*

- TIF = Trees inside forest
- TOF = Trees outside forest (see FAO report 2013)
- TOTOF = Trees beyond TOF definition
- <http://blog.worldagroforestry.org/index.php/2013/04/08/tif-tof-and-totof-trees-or-universal-tree-rights/>



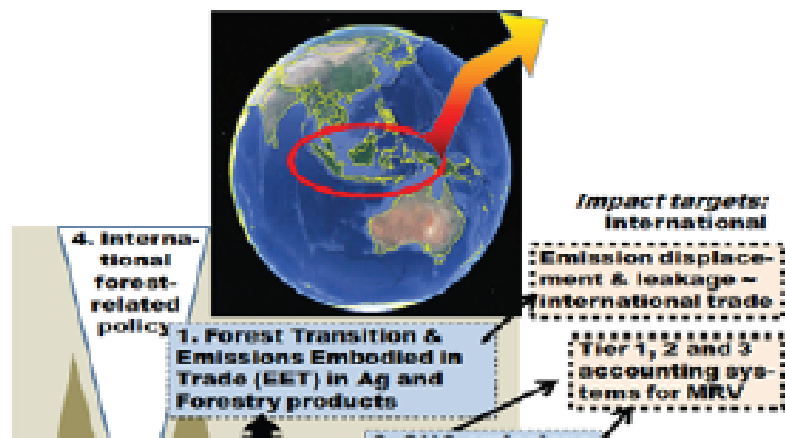


World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

Stakeholder:

- 1. Undisturbed natural forest ← *Rainforest foundation*
- 2. Undisturbed + sust. logged natural forest ← *Conservation agency*
- 3. Closed canopy undisturbed + logged forest
- 4A. as 3 + agroforest ← *Forest ecologist*
- 4B. as 3 + timber plantations ← *Ministry of Forestry*
- 4C. as 3 + agroforest + timber plant's + estate crops ← *UNFCCC definition*
- 4D as 4C + shrub ← *Modis data*

Reducing emissions from all land uses in Indonesia: motivation, expected funding streams and multi-scale policy instruments

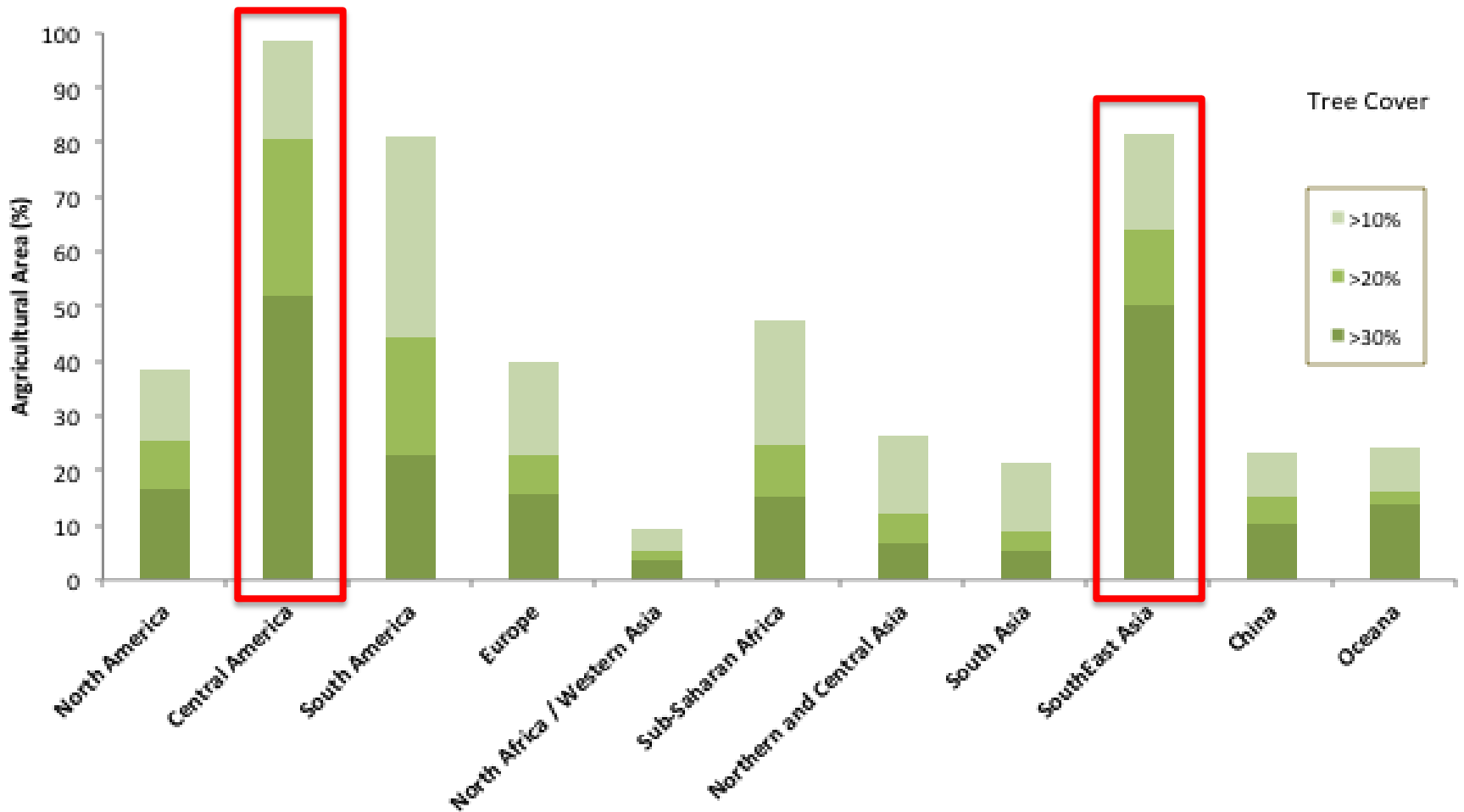


In the past decade, Indonesia became known as the country with the highest land-based carbon emissions. Debatable emissions are focused on land-mitigation.



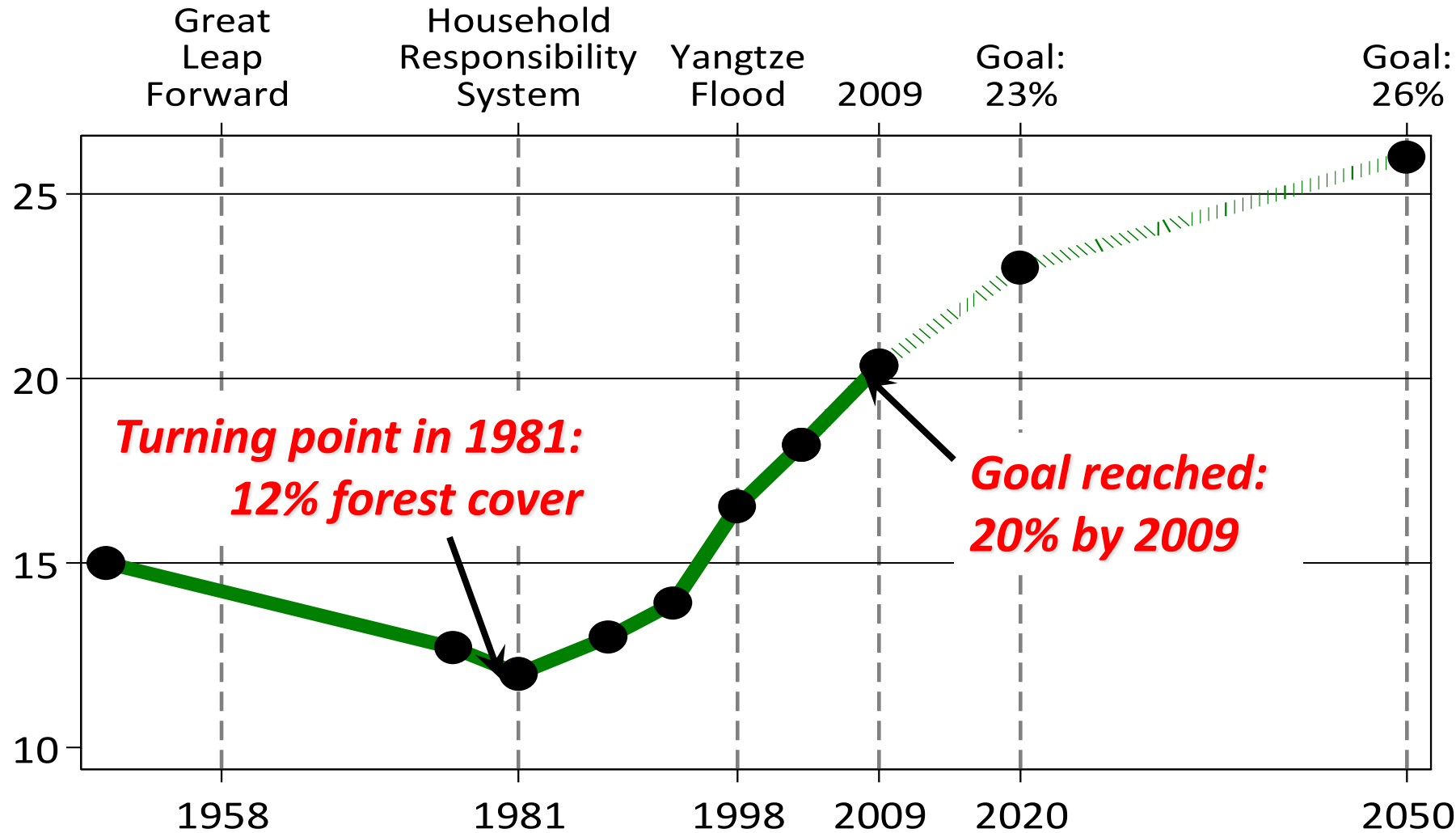
NAMA/LAAMA

Percent of Agricultural Area with Tree Cover - Year 2000



Zomer et al. 2009

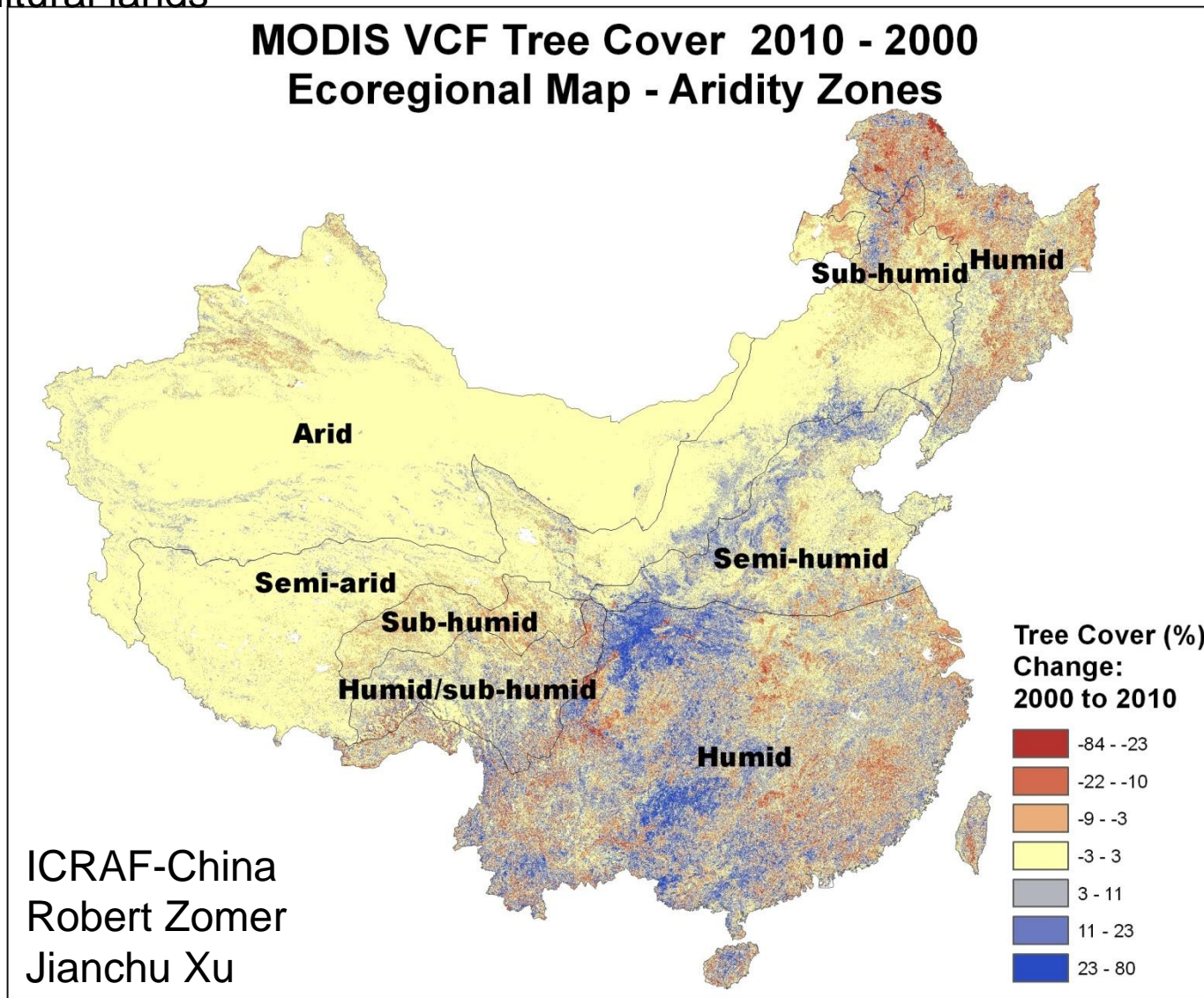
Forest cover change in China



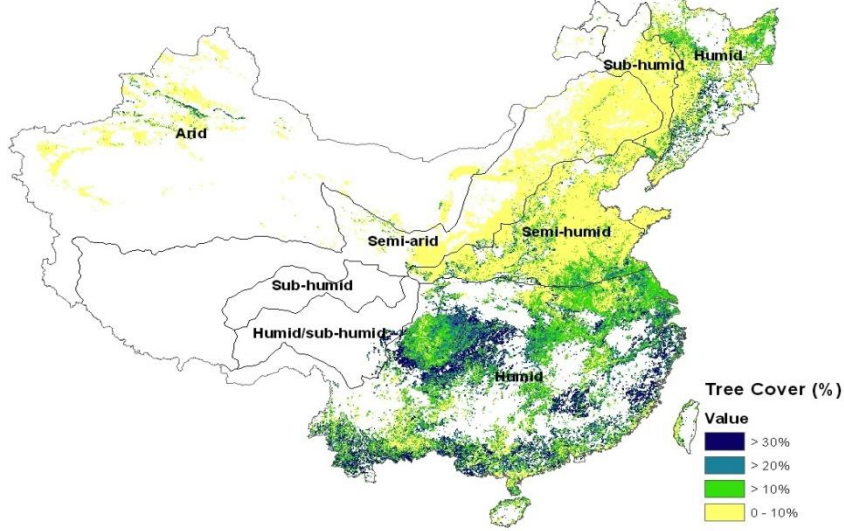
Sources: Zhang (1949); Forestry Surveys (1976-2009); Forestry Ministry (2020, 2050)

Forest Tree Cover Change in China – 2000 - 2010

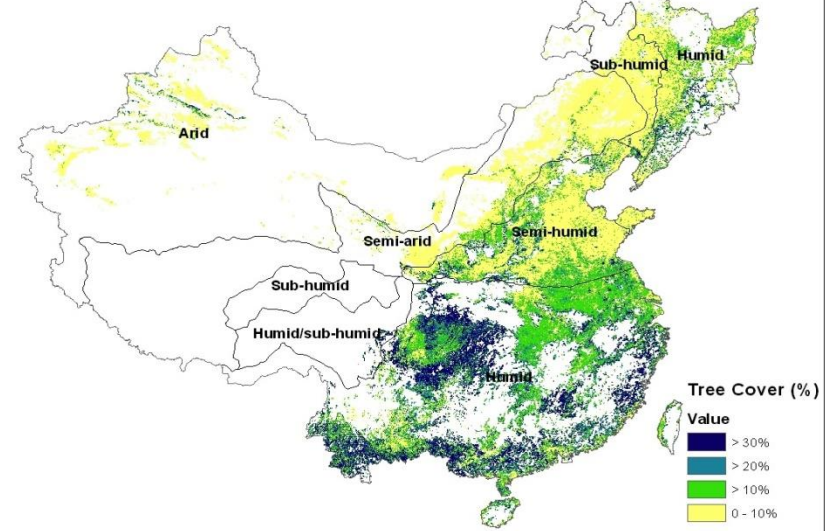
Agricultural lands



China - MODIS VCF Tree Cover (2000) - Agricultural Land
Ecoregional Map - Aridity Zones



China - MODIS VCF Tree Cover (2010) - Agricultural Land
Ecoregional Map - Aridity Zones



Tree Cover on Agricultural Land in China 2000 – 2010 (Percent of Total Agricultural Land)

Tree cover on Agricultural land	> 10%	> 20%	> 30%
Year 2000	41	17	7
Year 2010	47	20	11
Global Average - Year 2000	46	27	17

<http://www.soilcarbon.org.uk/index.html>



Benefits of Soil Carbon

An International Rapid Assessment Project

Home

SCOPE

People

Sponsors

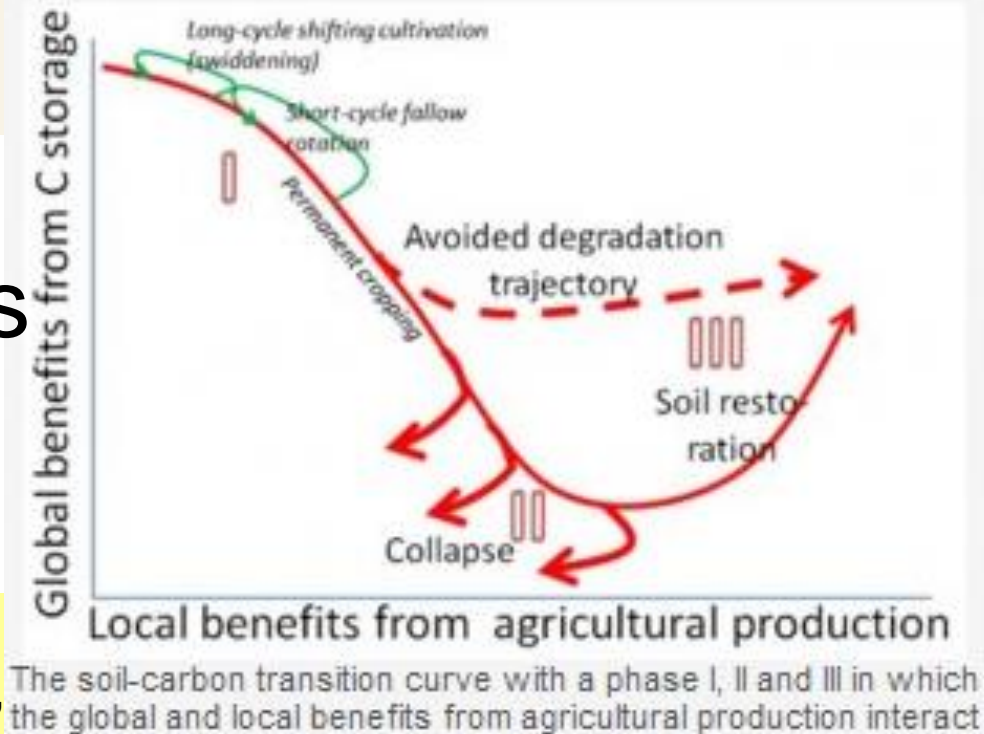
Links

Contact

Members

Benefits of Soil Carbon

27 background +
4 synthesis chapters
to be online by
end of 2013



Banwart S., Noellemeyer E. and Milne E (Eds) (In review). Benefits of Soil Carbon, SCOPE Volume 71, Paris

Global circu-
lation models

Global economic
scenarios incl
mitigation levels

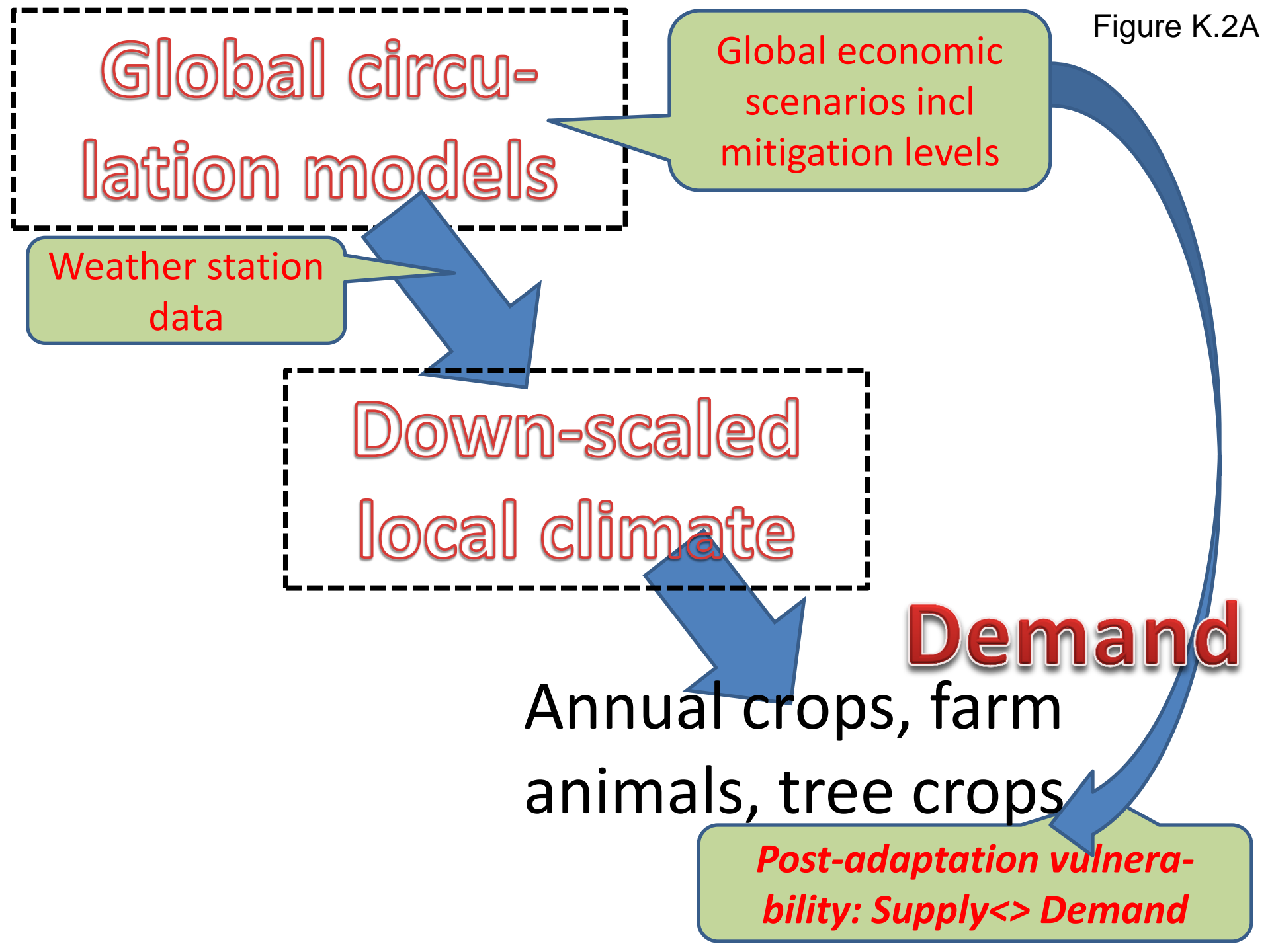
Weather station
data

Down-scaled
local climate

Annual crops, farm
animals, tree crops

Demand

*Post-adaptation vulnera-
bility: Supply <> Demand*



Global circulation models

Global economic scenarios incl mitigation levels

Weather station data

Down-scaled local climate

Adaptation: changing
1. Genotype,
2. Cropping pattern & crop management,
3. Farming system,
4. Land use

Pre-adaptation vulnerability:
Climate * Soil response functions

Demand
Annual crops, farm animals, tree crops

Post-adaptation vulnerability: Supply <> Demand

Global circulation models

Global economic scenarios incl mitigation levels

Weather station data

- Adaptation: changing**
1. Genotype,
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Down-scaled local climate

Demand

Annual crops, farm animals, tree crops

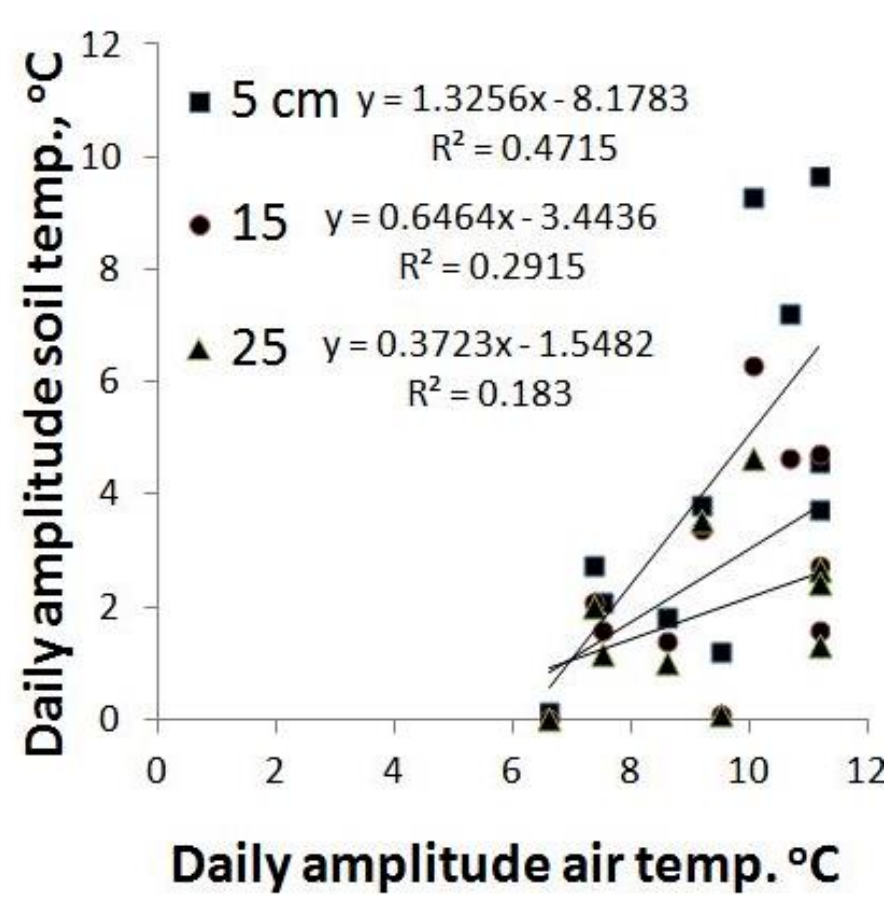
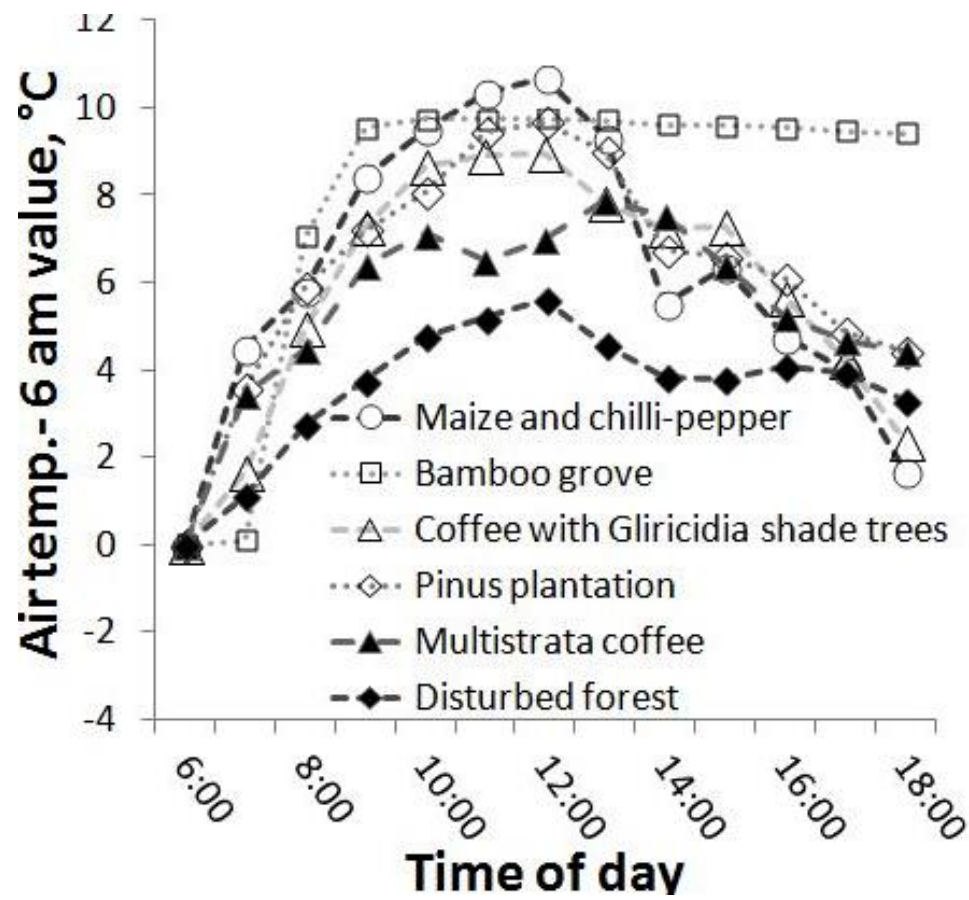
Including micro & meso climate effects of trees, agroforestry and forest

Pre-adaptation vulnerability:
Climate * Soil response functions

Adaptation: MODIFYING microclimate

Ecosystem-based Adaptation (EBA)

Post-adaptation vulnerability: Supply <> Demand

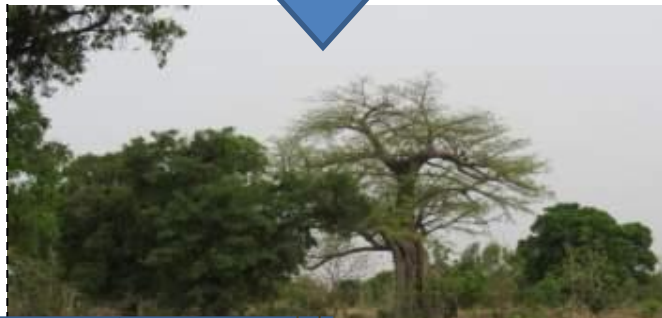
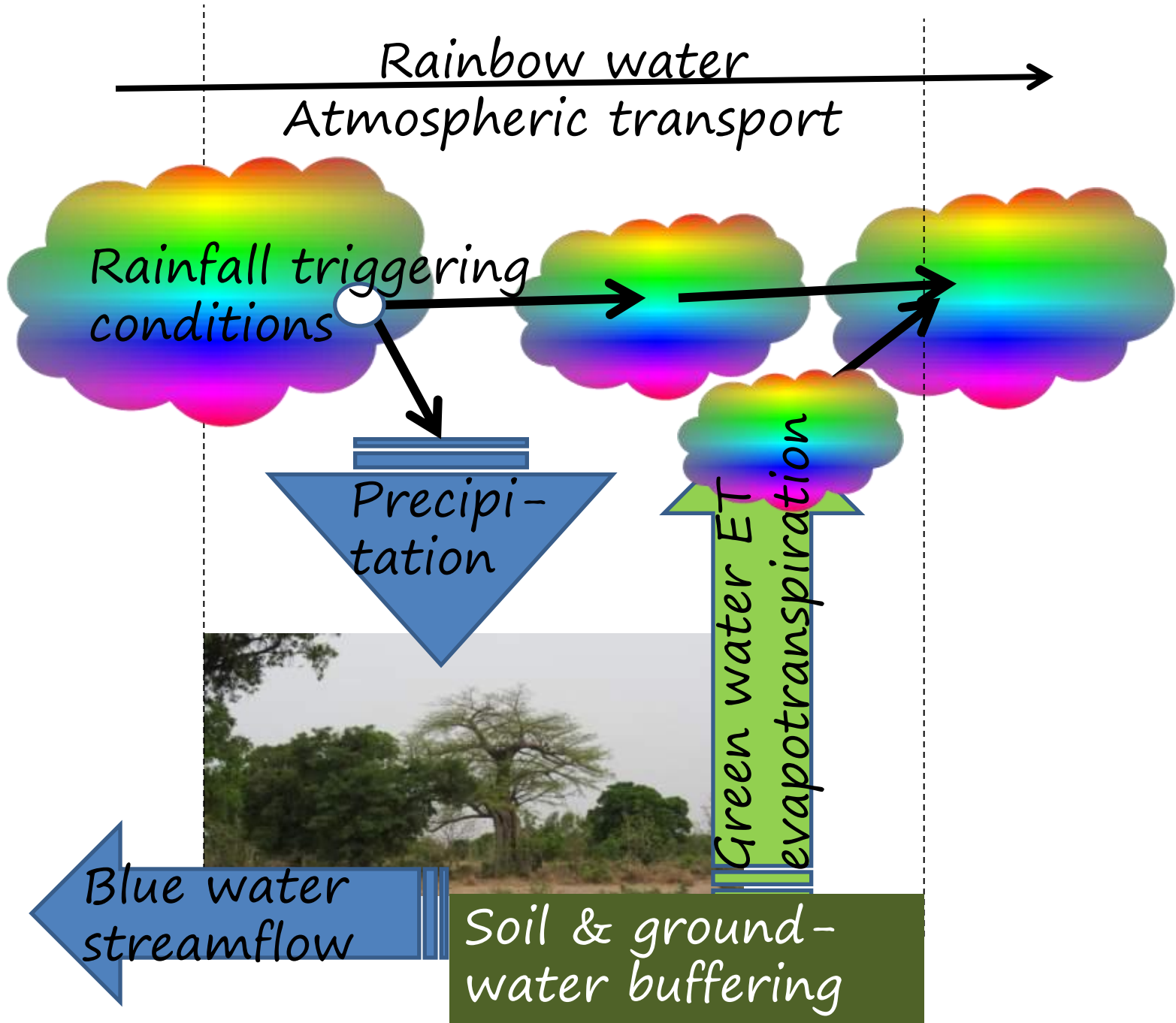


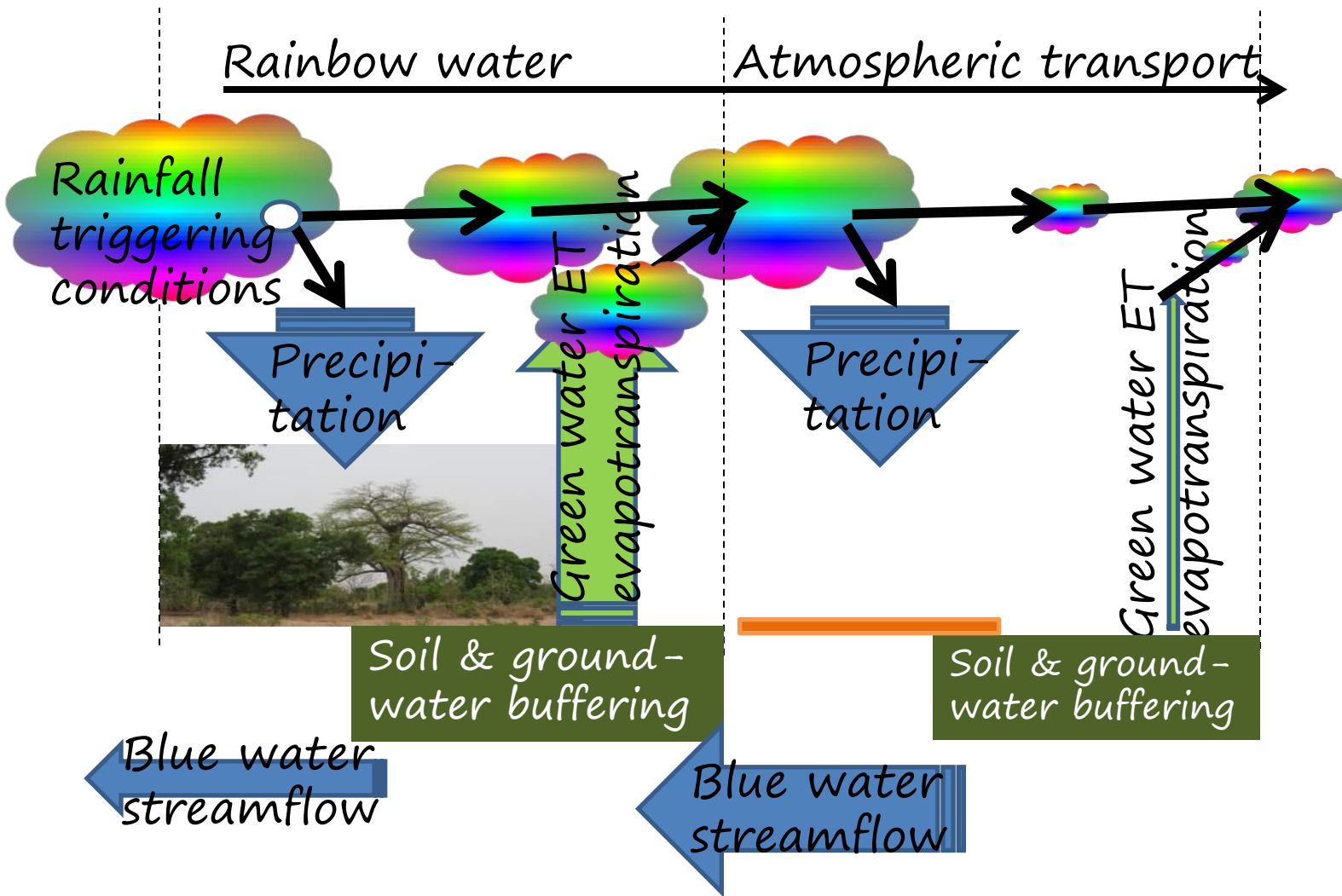
14. Agroforestry solutions for buffering climate variability and adapting to change

Meine van Noordwijkⁱ, Jules Bayalaⁱ, Kurniatun Hairiahⁱⁱ, Betha Lusianaⁱ, Catherine Muthuriⁱ, Ni'matul Khasanahⁱ and Rachmat Muliaⁱ

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ii. Brawijaya University, Malang, Indonesia





Origin and fate of atmospheric moisture over continents

Rudi J. van der Ent,¹ Hubert H. G. Savenije,¹ Bettina Schaeffli,¹
and Susan C. Steele-Dunne¹

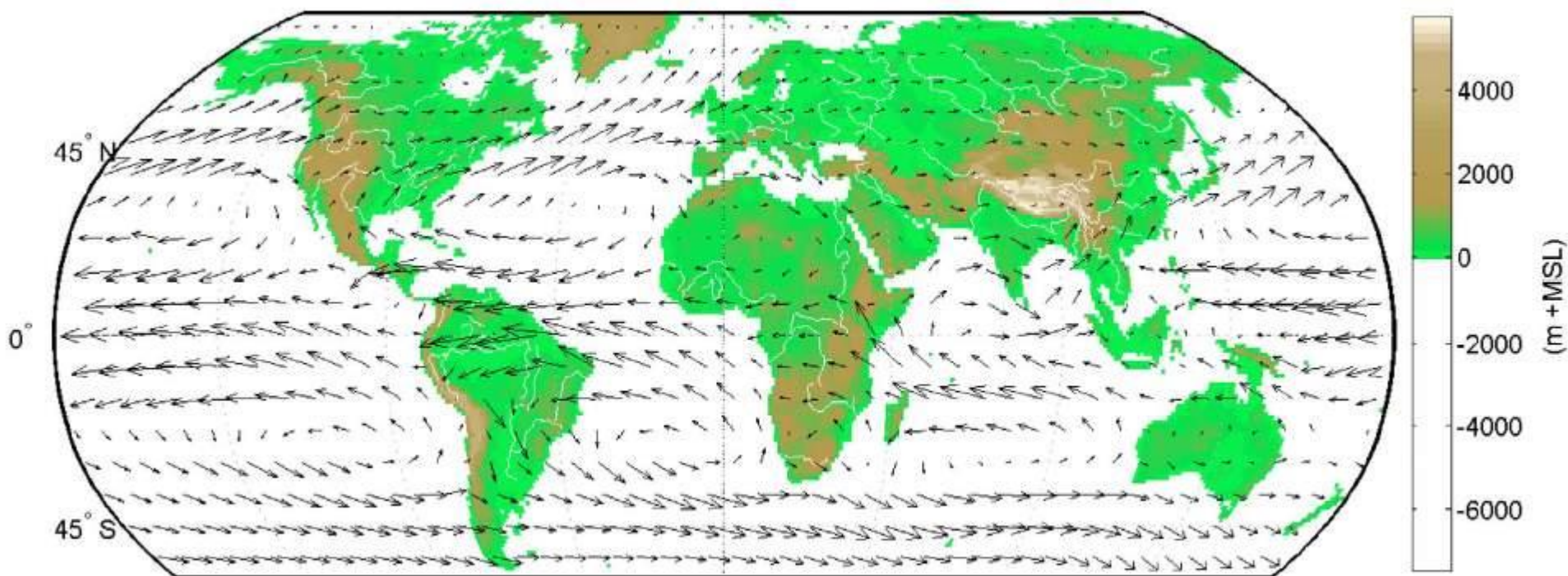


Figure 1. Global topography: height above Mean Sea Level (MSL), major rivers, and average horizontal (vertically integrated) moisture flux (1999–2008).

Continental precipitation recycling ratio ρ_c

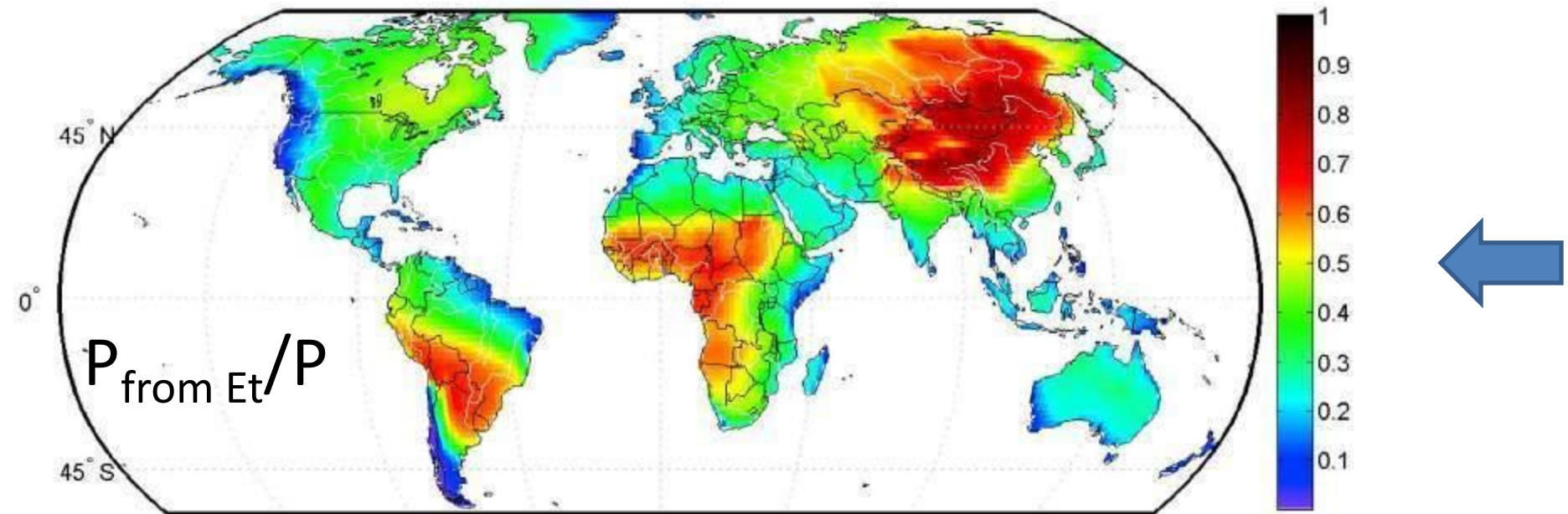


Figure 3. Average continental precipitation recycling ratio ρ_c (1999–2008).

van der Ent RJ, Savenije HHG, Schaefli B, Steele-Dunne SC, 2010. Origin and fate of atmospheric moisture over continents. Water Resources Research 46, W09525,

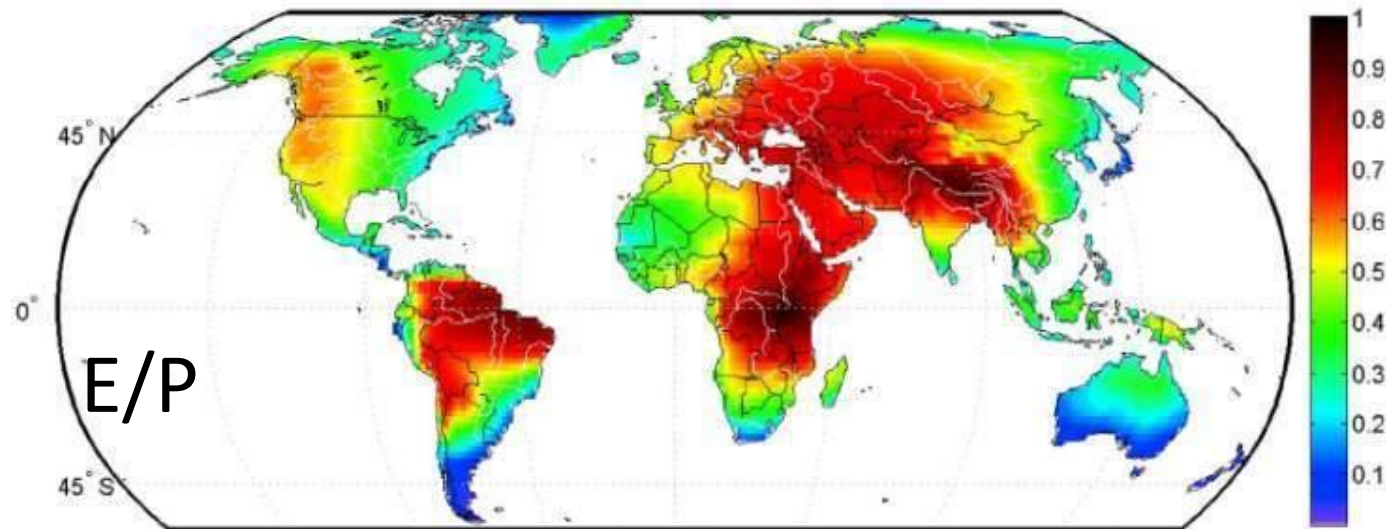
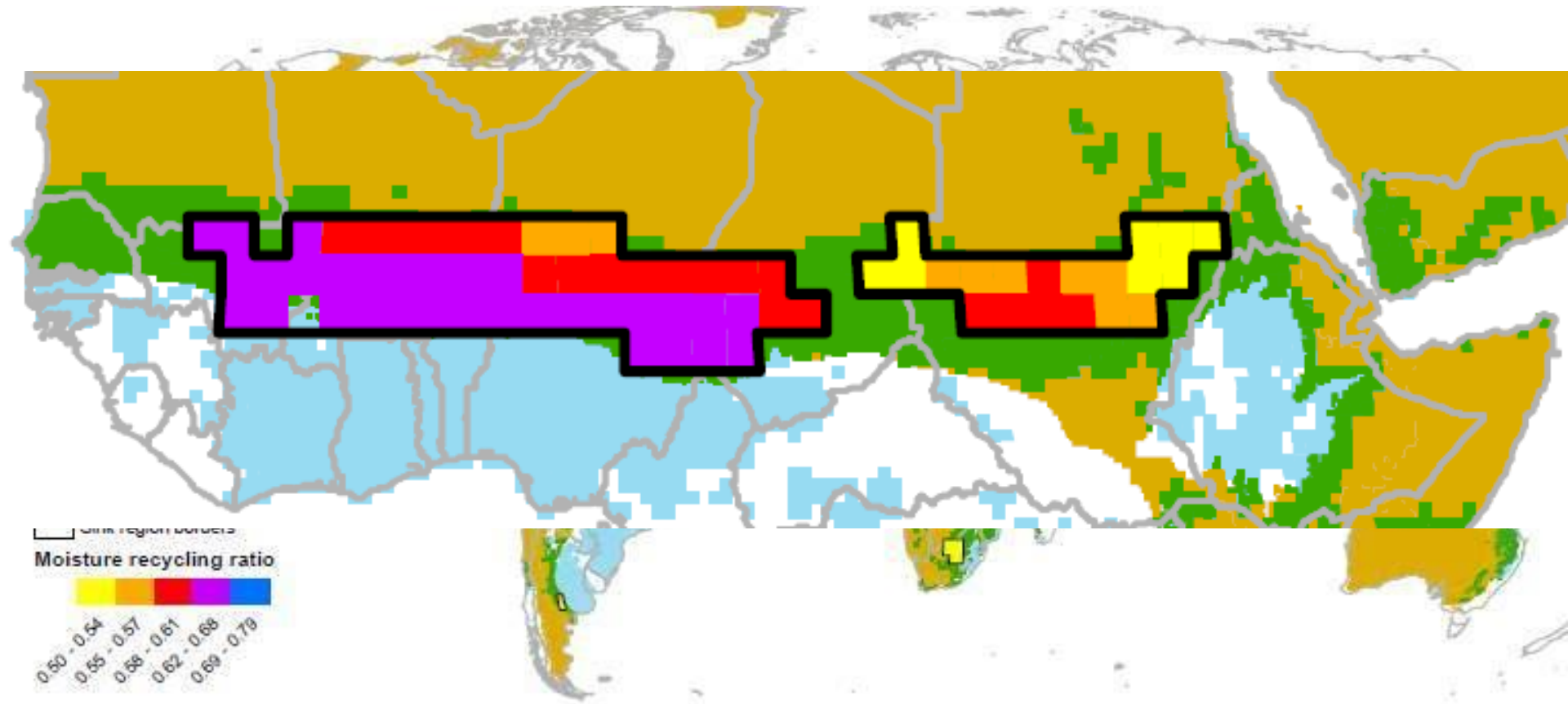


Figure 4. Average continental evaporation recycling ratio ϵ_c (1999–2008).

Dryland agricultural areas where more than 50% of rainfall is derived from terrestrial recycling



Keys PW, van der Ent RJ, Gordon LJ, Hoff H, Nikoli R and Savenije HHG, 2012. Analyzing precipitationsheds to understand the vulnerability of rainfall dependent regions, *Biogeosciences*, 9, 733–746

Pricing rainbow, green, blue and grey water: tree cover and geopolitics of climatic teleconnections

Meine van Noordwijk¹, Sara Namirembe¹, Delia Catacutan¹,
David Williamson^{1,2} and Aster Gebrekirstos^{1,3}

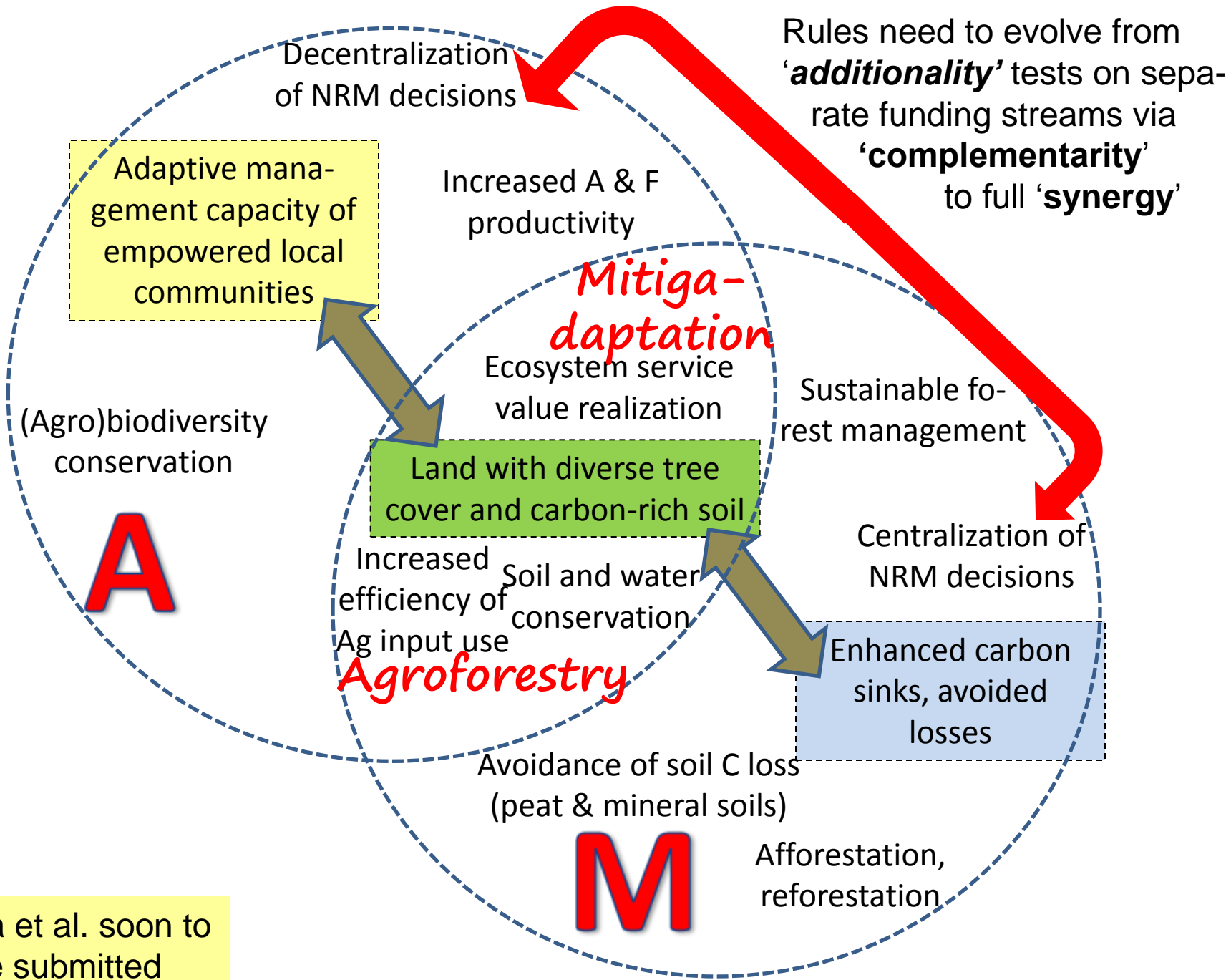
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2. Institut de Recherche pour le Développement (IRD), Laboratoire d'Océanographie et du Climat: Expérimentation et Approches Numériques. PO Box 30677-00100, Nairobi, Kenya. E-mail: David.Williamson@ird.fr

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Lalisa et al. soon to be submitted

Eco- and Socio-Ecological Systems

worthy of special interest

Tentative

	Part of global emissions		Mitigation actions feasible?	Link to local human vulnerability	Adaptation actions feasible?	RIO policy instruments apply?
	C-density	Area				
Forest	***	***	***	*	**	A/R-CDM, REDD+, CBD
Mangrove	****	*	***	***	***	MA NA PA CBD
Peatlands	****	**	***	*	**	NA PA CBD
Other wetlands	**	*	***	***	***	MA NA PA CBD
Permafrost & tundra	*****	*****	-?	(*)	-?	MA NA PA
Seagrass	*	*	*	*	*	MA NA PA CBD
Trees outside forest	*	****	***	***	***	MA NA PA UNCCD
Drylands						