

September 29th - 30th, 2016
Palmeraie Golf Palace,
Marrakesh



29 - 30 septembre 2016
Palmeraie Golf Palace,
Marrakech

HIGH-LEVEL MEETING ON THE INITIATIVE FOR THE ADAPTATION OF AFRICAN AGRICULTURE TO CLIMATE CHANGE "AAA"

RENCONTRE DE HAUT NIVEAU SUR L'INITIATIVE POUR L'ADAPTATION DE L'AGRICULTURE AFRICAINE AUX CHANGEMENTS CLIMATIQUES "AAA"

RATTAN LAL

Nobel Prize Recipient





THE OHIO STATE UNIVERSITY

Sustainable and Resilient Soil Management in Climate Context

Carbon Management and Sequestration Center

Dr. Rattan Lal

Morocco



THE AFRICAN DILEMMA

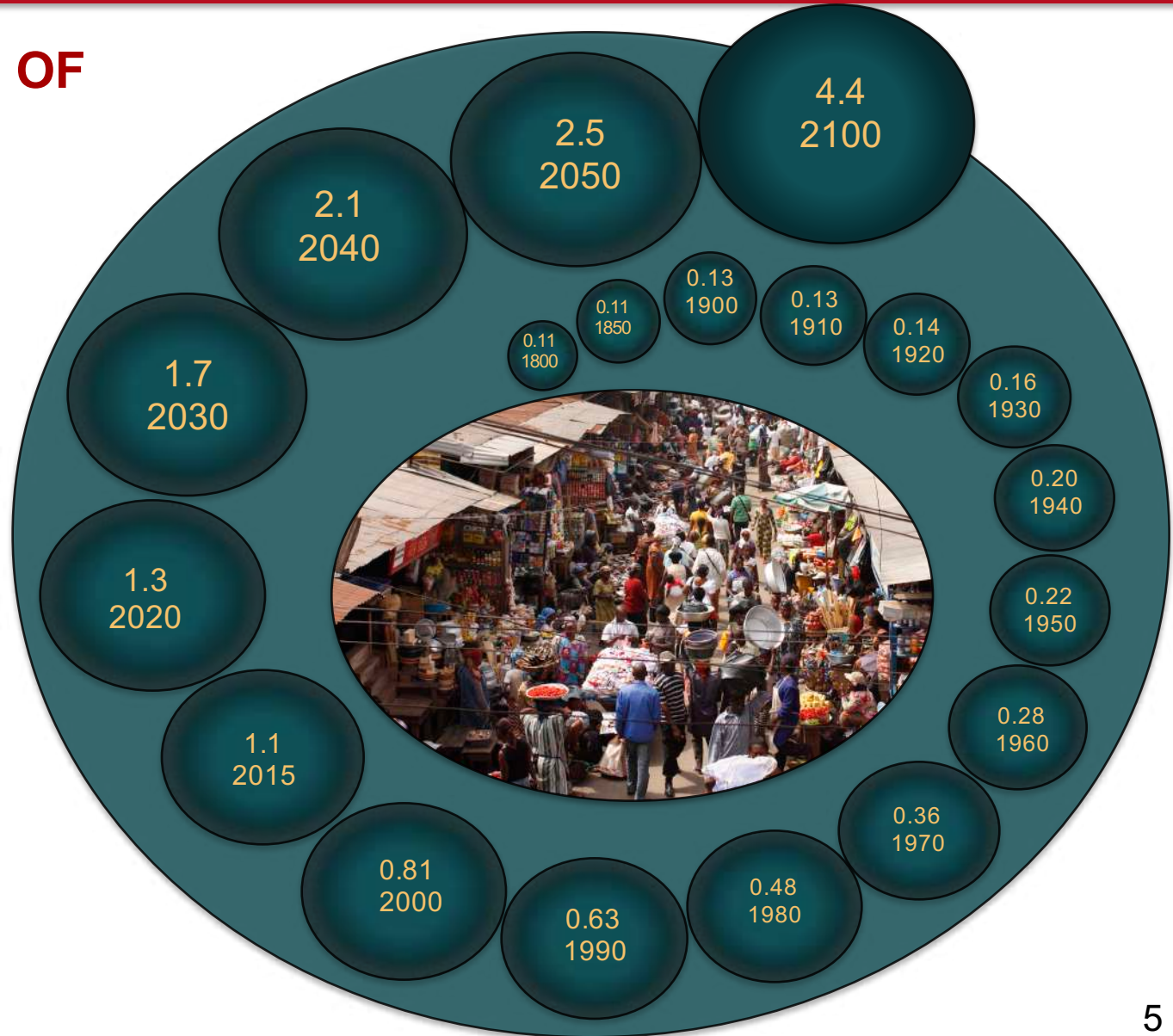
It is ironic that Africa; despite vast endowments of natural resources comprising of a wide range of climates/biomes/soils and human capital; and with capacity to be a bread basket of the world by creating the so-called "Cerrado Miracle" within its own savannas and steppes; cannot even feed itself. This is the dilemma that the AAA initiative to proposed at COP22 must address.



POPULATION OF AFRICA

$$I = P \times A \times T$$

- P = Population
- A = Affluence
- T = Technology





MAIZE YIELD GAP IN AFRICA

Region	Grain Yield (Mg/ha)		
	Potential	Average	Gap
Mid-Altitude Sub-Tropical	7	2.5	4.5
Tropical Lowland	4.5	0.7	3.8
Western Kenya	3.7	1.7	2.0

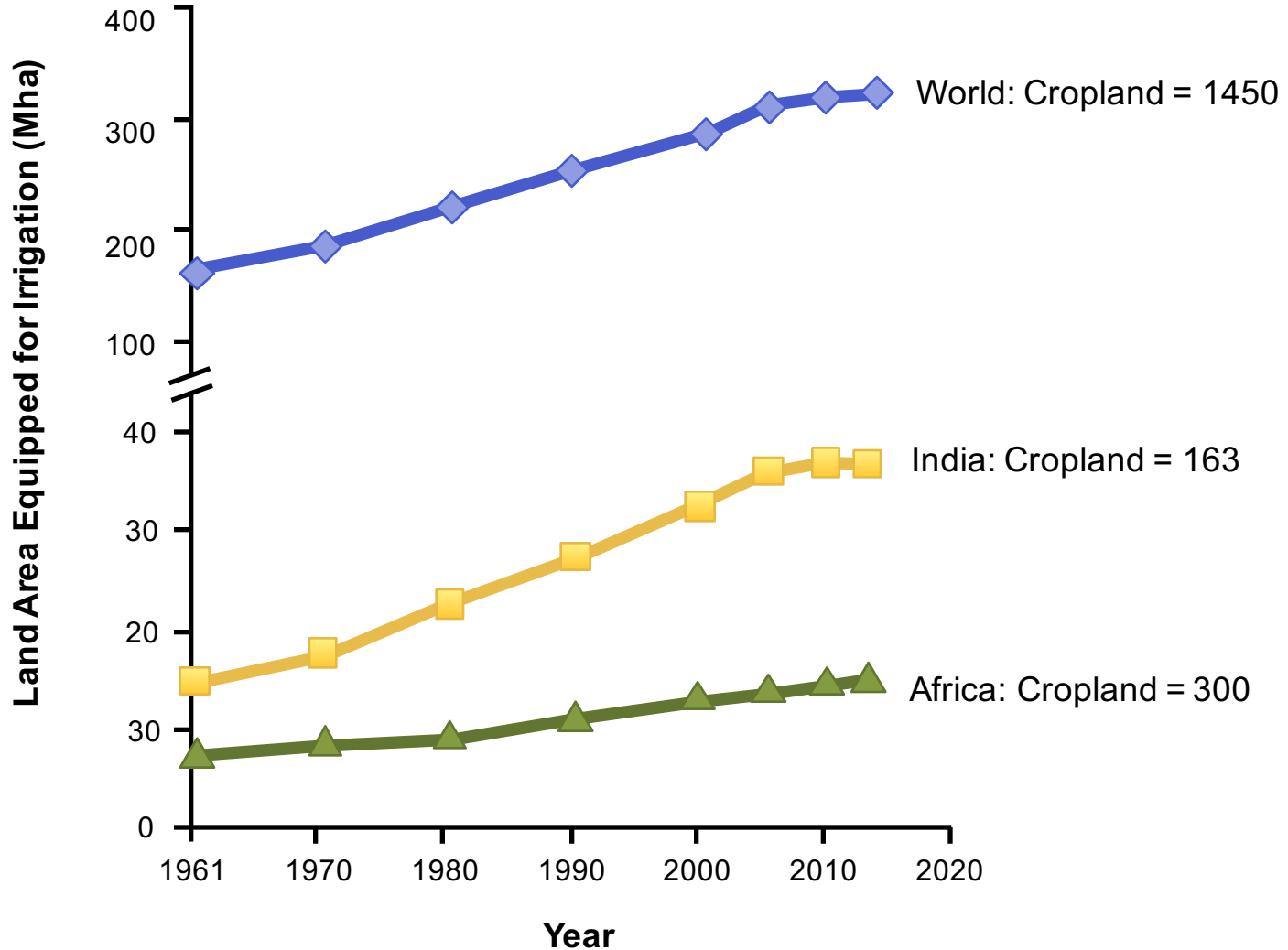


SUSPENDED SEDIMENT TRANSPORT AND SOIL EROSION IN THE MAGHREB (PROBST AND SUCHET, 2016)

Watershed/Region	Suspended Sediment Yield (Mg/km².yr)	Suspended Sediment Discharge (10⁶Mg/yr)
Atlantic Ocean	613	152
Mediterranean Sea	397	100
Total Maghreb	504	252



LAND AREA EQUIPPED FOR IRRIGATION





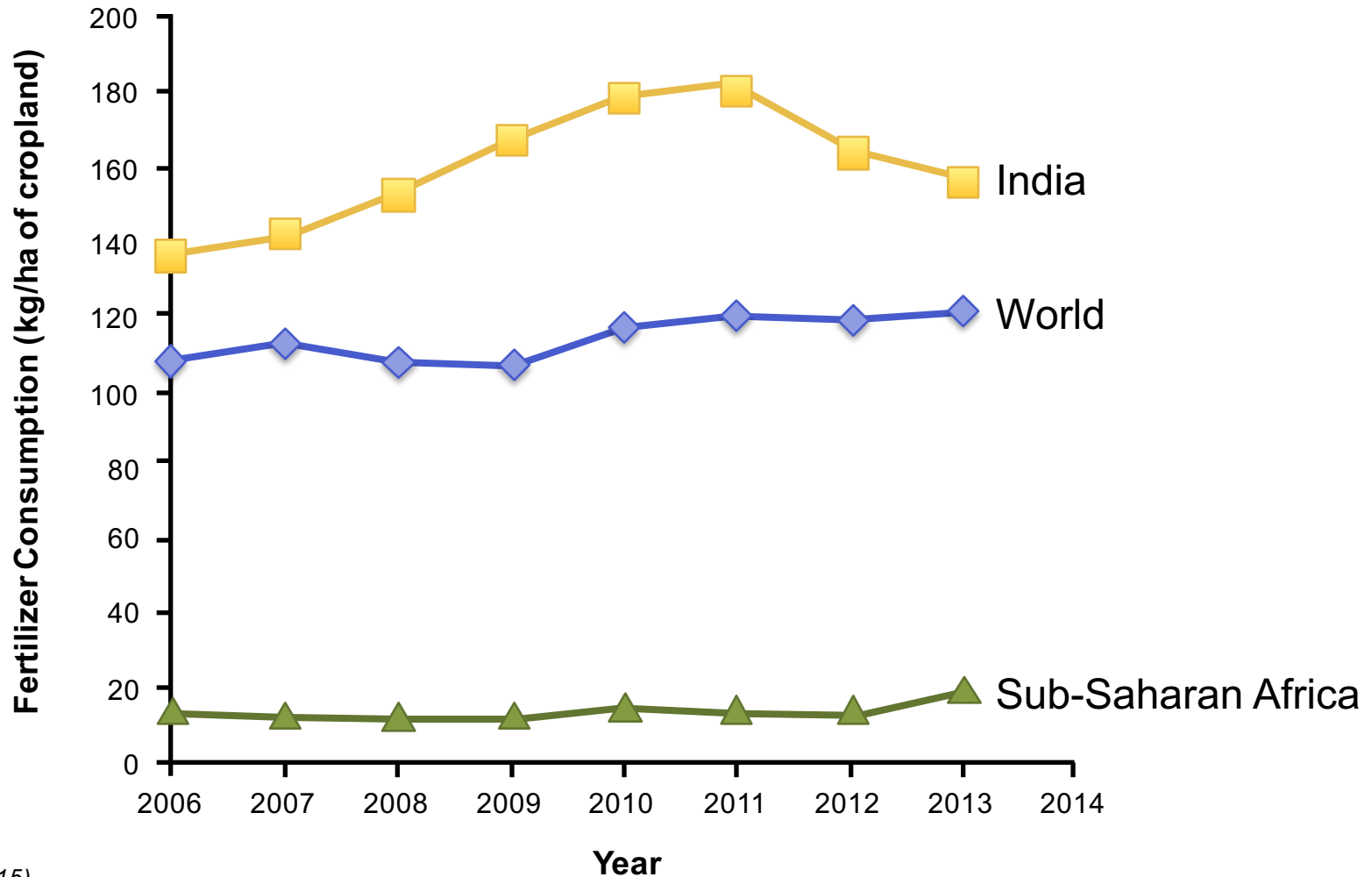
IRRIGATION POTENTIAL AND USE IN AFRICA

(FAOSTAT, 2012)

Status	Area (10⁶ha)	
	2007	2011
Area Equipped for Irrigation	2.1	3.5
Irrigation Potential	45.1	45.1
Area Under Actual Irrigation	1.9	1.7



COMPARATIVE FERTILIZER CONSUMPTION IN INDIA, SUB-SAHARAN AFRICA AND THE WORLD





SDG-TARGET 2.4

"By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality."

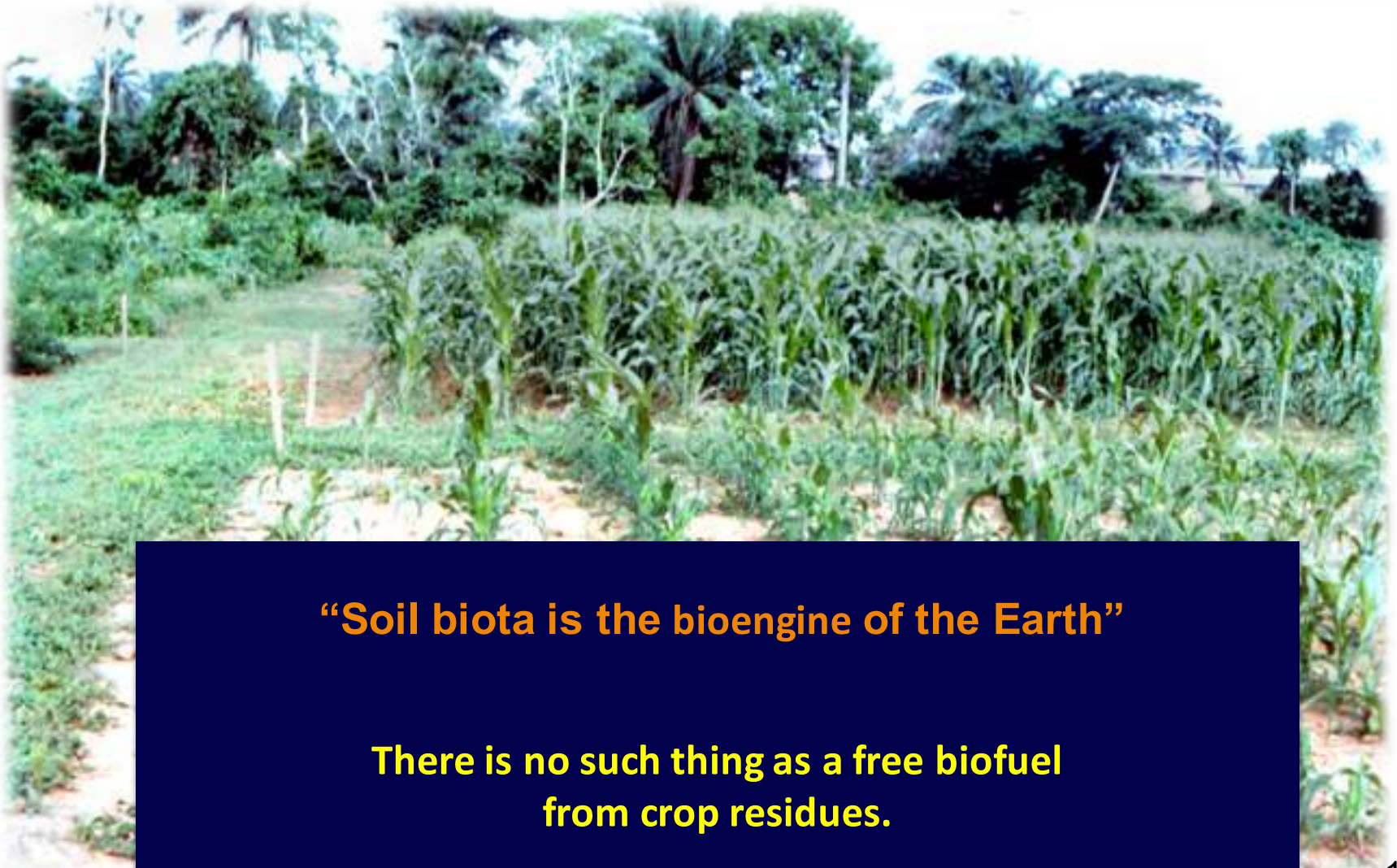


SDG-TARGET 15.3

"By 2020. combat desertification, restore degraded land and soil, including land by desertification, drought and floods, and strive to achieve a land degradation neutral world."



ECONOMICS OF RESIDUE REMOVAL FOR BIOFUEL



“Soil biota is the bioengine of the Earth”

**There is no such thing as a free biofuel
from crop residues.**

THE REGIME SHIFT BY EXTRACTIVE FARMING

- Extractive Farming/Subsistence
- Depletion of SOC and Nutrients
- Decline in Soil Structure

• Loss of Soil Resilience

- Decline in Ecosystem Functions and Services

- Loss of Soil biodiversity
- Disruption of Key Processes

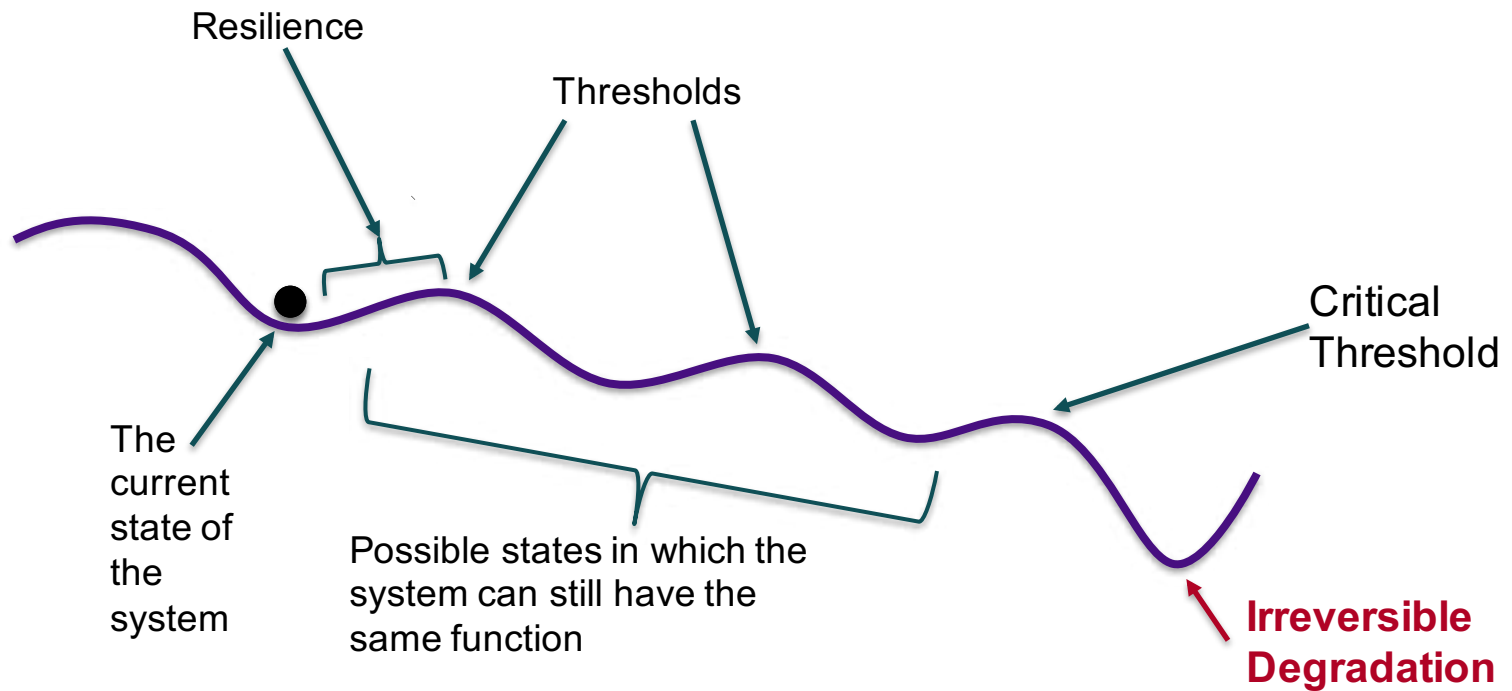
- Hunger
- Malnutrition
- Political Unrest
- Civil Strife
- War and insecurity
- 65 Million Refugees in 2016

Severe Degradation



RESILIENCE OF SOIL-ECOLOGICAL SYSTEMS

It has multiple regimes (stable states) which are separated by thresholds





SUSTAINABLE INTENSIFICATION

The strategy is to produce more crops:

Produce more
from less

Pulses in rotation can produce more from less

- from less land
- per unit of energy, and
- per unit of C emission.





SUSTAINABLE SOIL MANAGEMENT

- Replace what is removed,
- Respond wisely to what is changed, and
- Predict what will happen from anthropogenic and natural perturbations
- Enhance soil resilience



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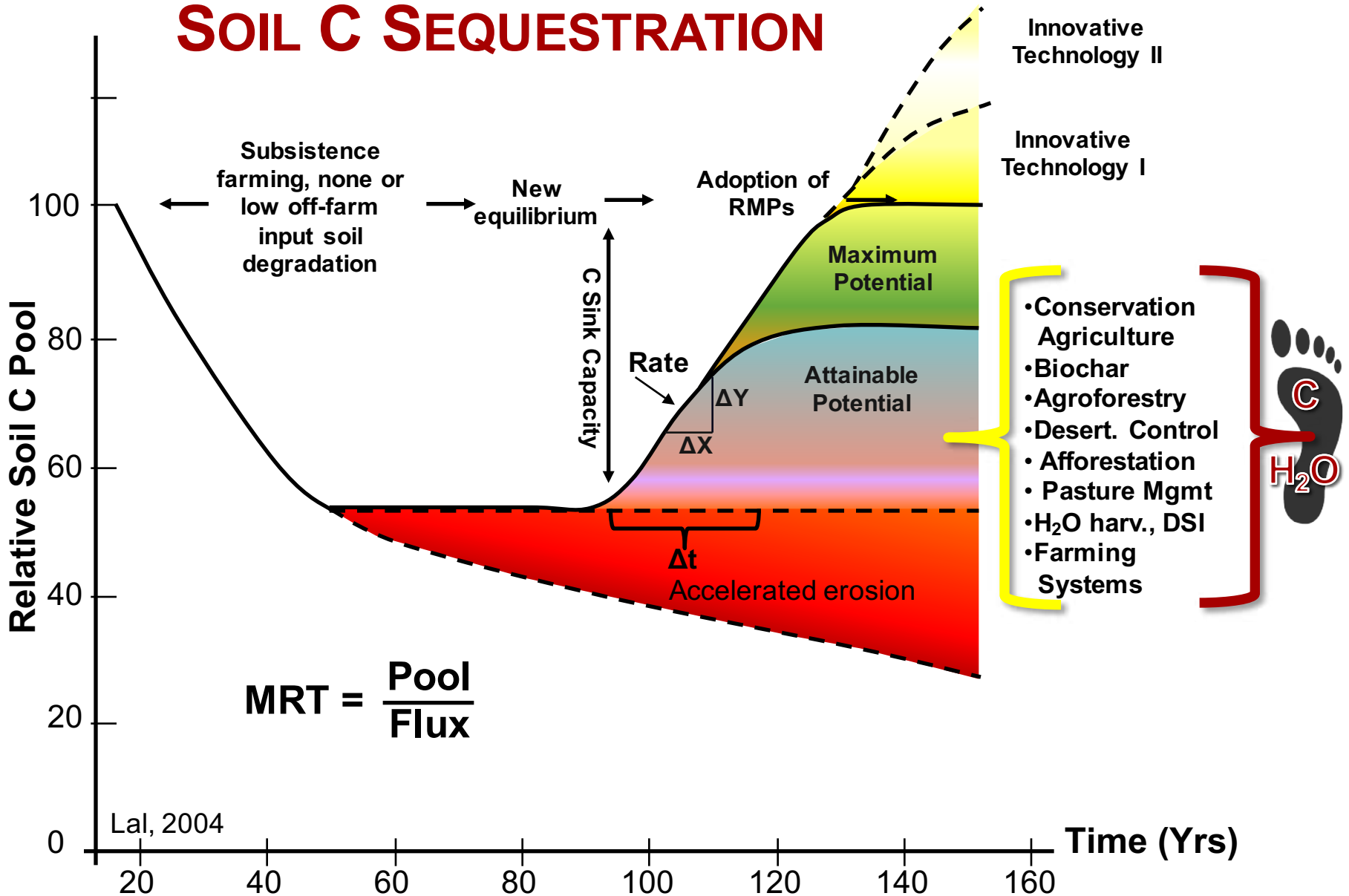
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SOIL C SEQUESTRATION





A HEALTHY AND AN ECO-EFFICIENT SOIL

