

Nürnberg, 19 February 2007 | Othmar Schwank

Biofach – 2007

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# IMPACTS OF CLIMATE CHANGE ON DEVELOPING COUNTRIES AND ADAPTATION STRATEGIES

# CONTENT

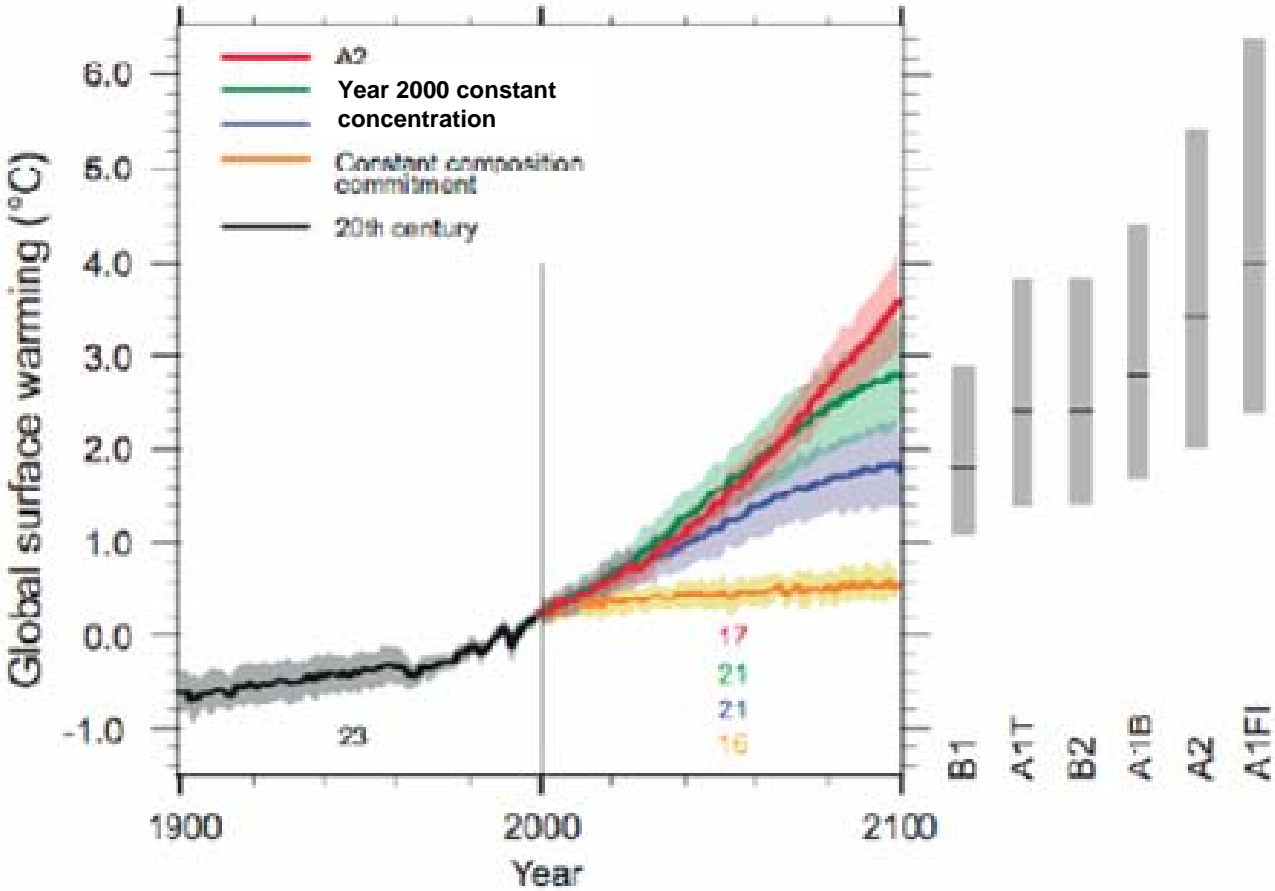
1. Climate risks of developing countries
2. Sectoral impacts on agriculture/water  
- regional examples
3. Organic farming as a response  
measure?

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DEZA DIREKTION FÜR ENTWICKLUNG UND ZUSAMMENARBEIT  
DDC DIRECTION DU DÉVELOPPEMENT ET DE LA COOPÉRATION  
DSC DIREZIONE DELLO SVILUPPO E DELLA COOPERAZIONE  
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COSUDE AGENCIA SUÍZA PARA EL DESARROLLO Y LA COOPERACIÓN



# 1. CLIMATE RISK– IPCC AR4 2007 (Emission scenario based projections)



Surface warming (relative to 1980-99) for A2, A1B and B1 Scenarios.

# 1. Climate Risk cont. IPCC (2007)

Case	Temperature Change (°C at 2090-2099 relative to 1980-1999) <sup>a</sup>		Sea Level Rise (m at 2090-2099 relative to 1980-1999)
	Best estimate	Likely range	Model-based range excluding future rapid dynamical changes in ice flow
Constant Year 2000 concentrations <sup>c</sup>	0.6	0.3 – 0.9	NA
B1 scenario	1.8	1.1 – 2.9	0.18 – 0.38
A1T scenario	2.4	1.4 – 3.8	0.20 – 0.45
B2 scenario	2.4	1.4 – 3.8	0.20 – 0.43
A1B scenario	2.8	1.7 – 4.4	0.21 – 0.48
A2 scenario	3.4	2.0 – 5.4	0.23 – 0.51
A1FI scenario	4.0	2.4 – 6.4	0.26 – 0.59

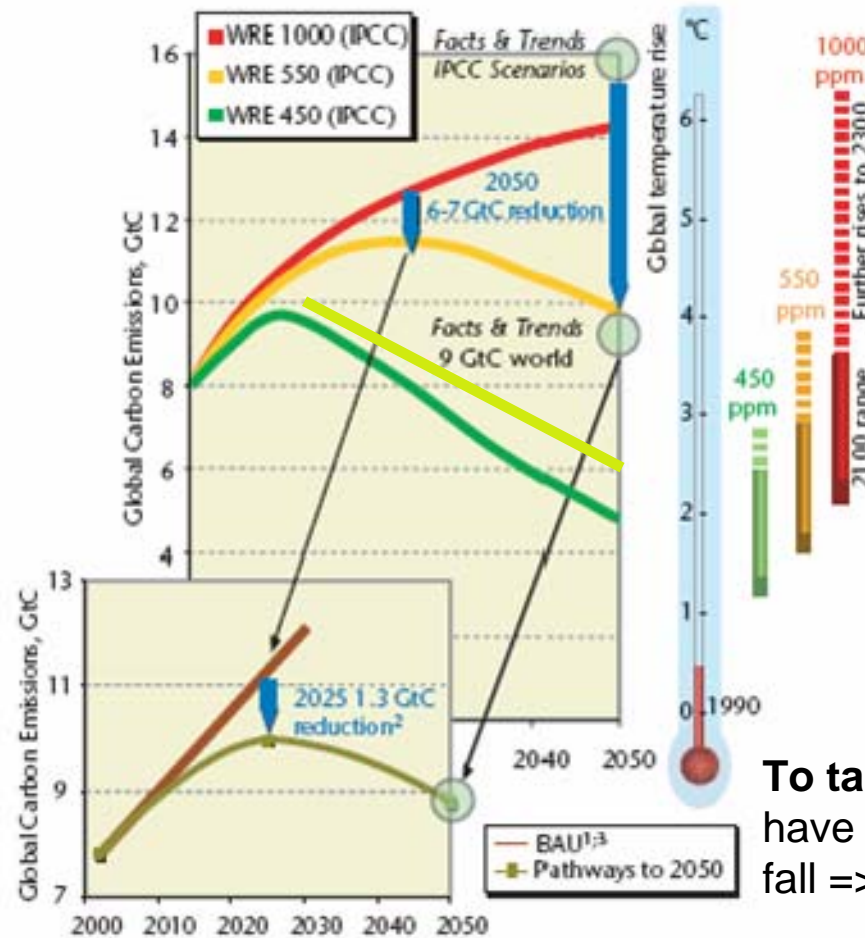
Notes:

<sup>a</sup> These estimates are assessed from a hierarchy of models that encompass a simple climate model, several EMICs, and a large number of AOGCMs.

<sup>c</sup> Year 2000 constant composition is derived from AOGCMs only

Warming 1.8-4.0 degrees and Sea Level Rise (0.2-0.6m) for selected Scenarios IPCC/SRES. B1 (2090-99): 600ppm CO<sub>2</sub>e

# 1. IPCC, STERN (2006) and 2°C TARGET



2°C target assumes higher damages/risks than Kempfert, if T > 2°C

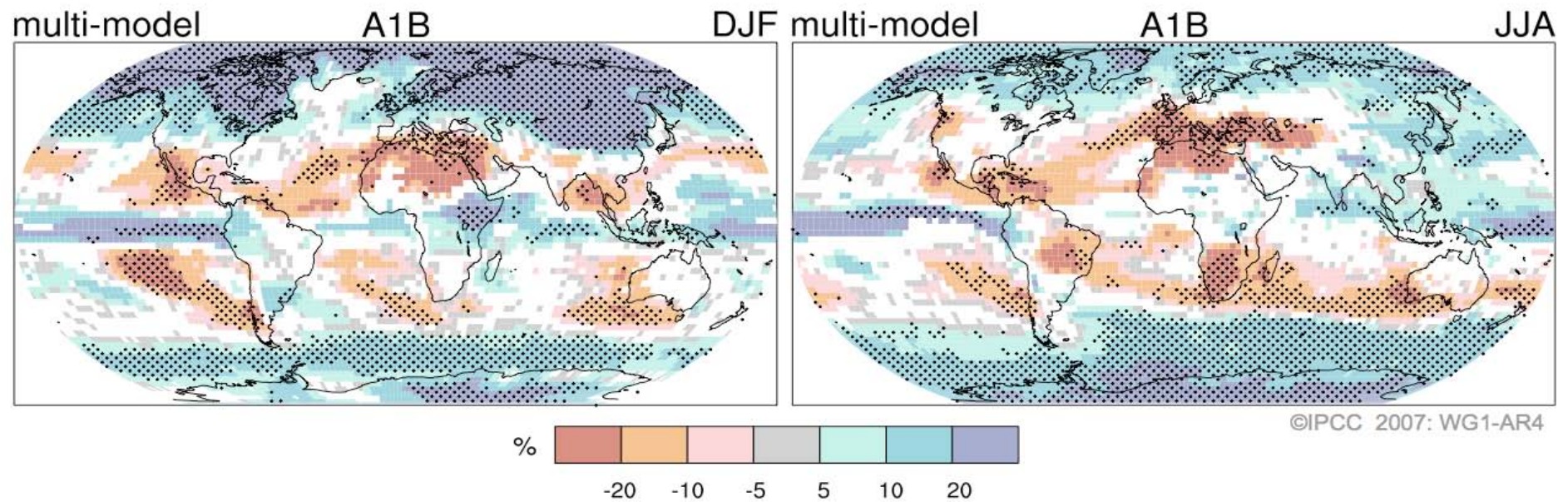
— Stern Review 550ppm CO<sub>2</sub>e

**To target 550ppm CO<sub>2</sub>:** Emissions have to stabilize by 2030 and then to fall => 2.4 - 3°C by 2100 (<-> >B1)

**To target 450ppm CO<sub>2</sub>:** Emissions have to stabilize by 2020, and fall by 2050 to < 6GtC

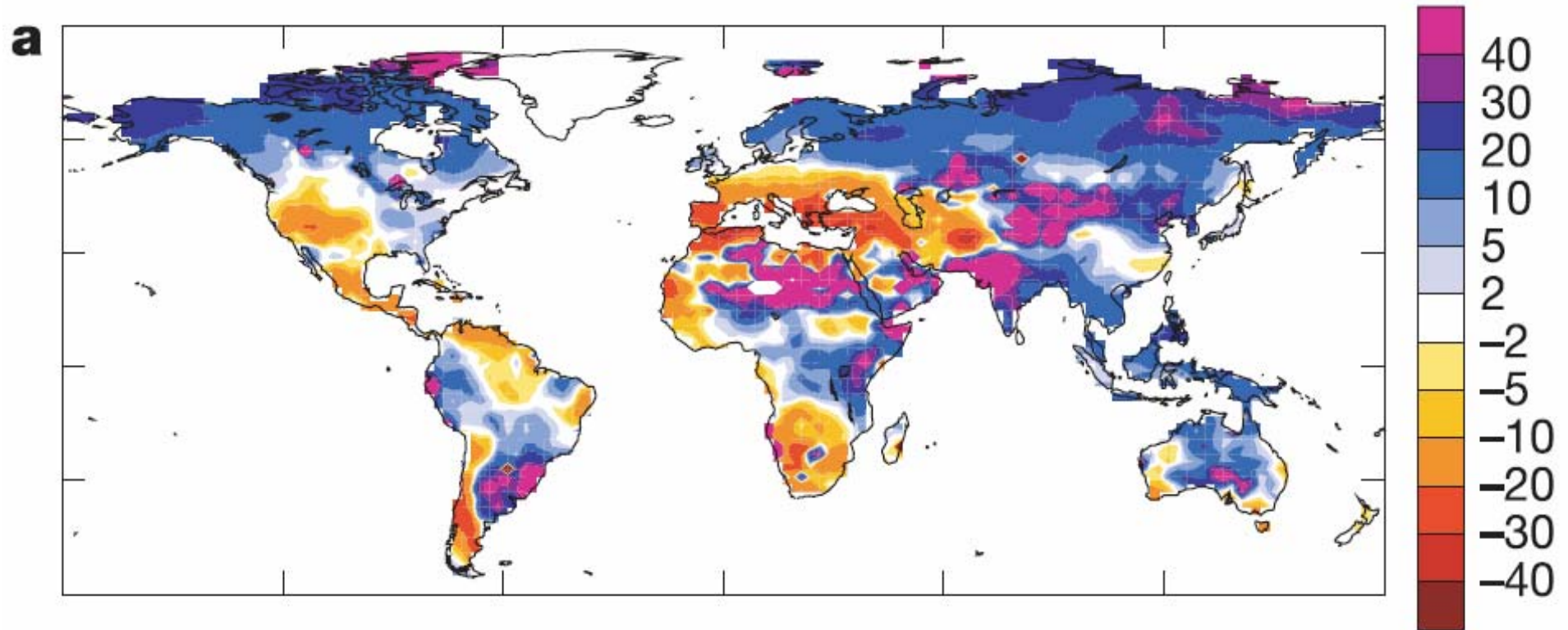
(Quelle: WBCSD)

# 1. Climate Risk: Precipitation 2090-2099 (IPCC 2007)

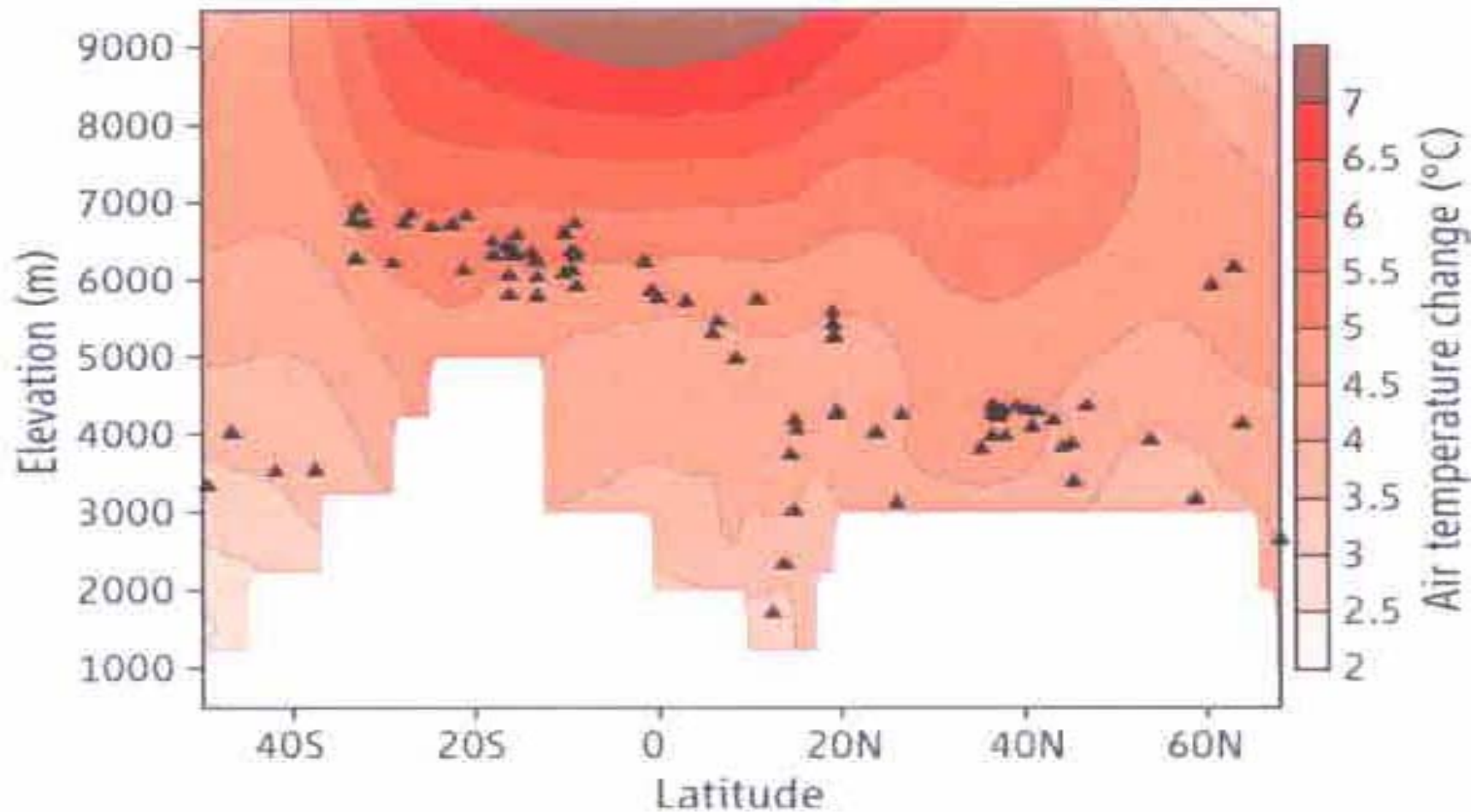


CLIMATE SCIENCE – GLOBAL PROJECTIONS

**% CHANGE IN RUNOFF IN 2050 – MAJOR FOOD BOWLS  
BECOME DRIER**



Source: Milly et al; Nature Nov 2005



**Global warming in the American Cordillera.** Projected changes in mean annual free-air temperatures between (1990 to 1999) and (2090 to 2099) along a transect from Alaska (68°N) to southern Chile (50°S), following the axis of the American Cordillera moun-

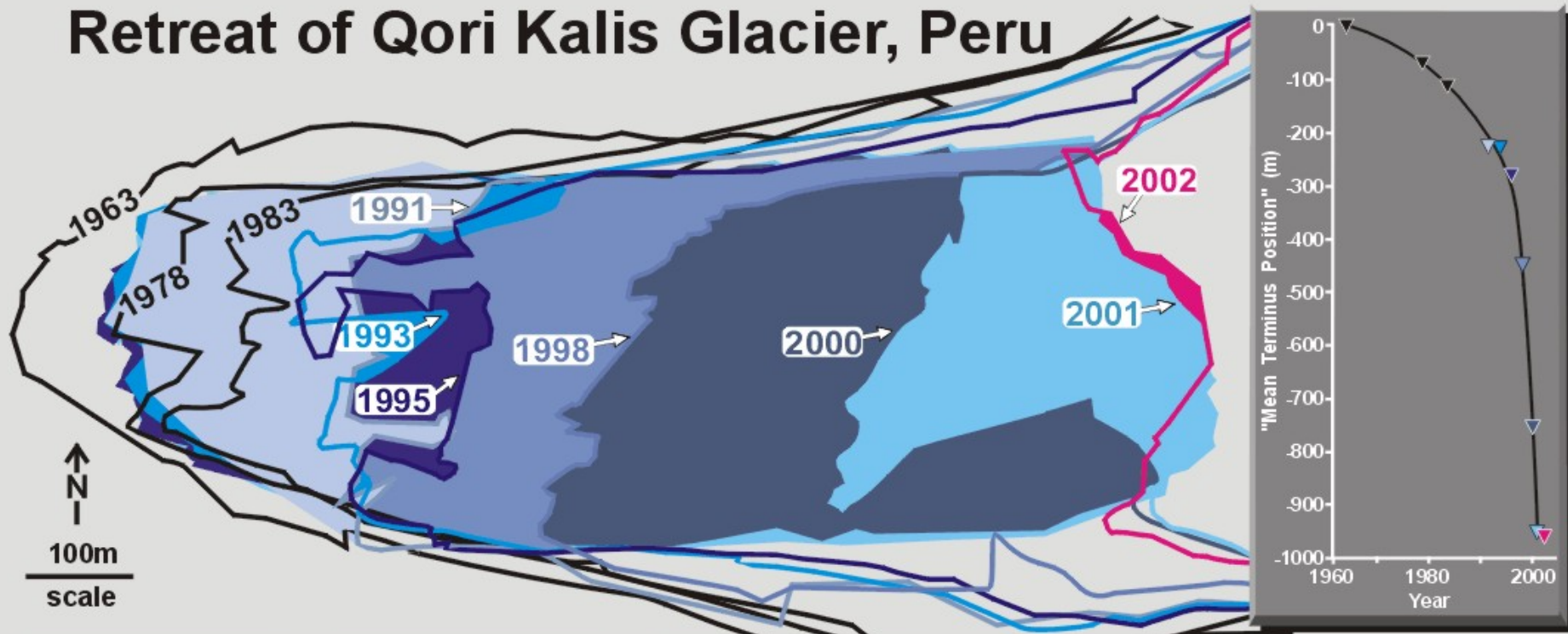
Source: Bradley, Vuille and Vergara, 2006



# GLACIER YANAMAREY ( Cordillera Blanca-altitude 4786 m-asl.)



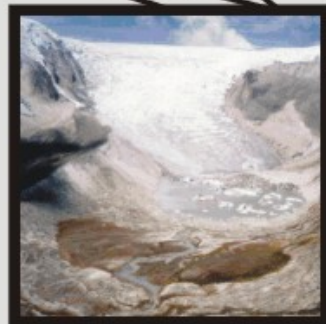
# Retreat of Qori Kalis Glacier, Peru



1978



1991



1998



2000

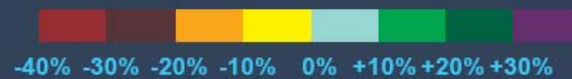
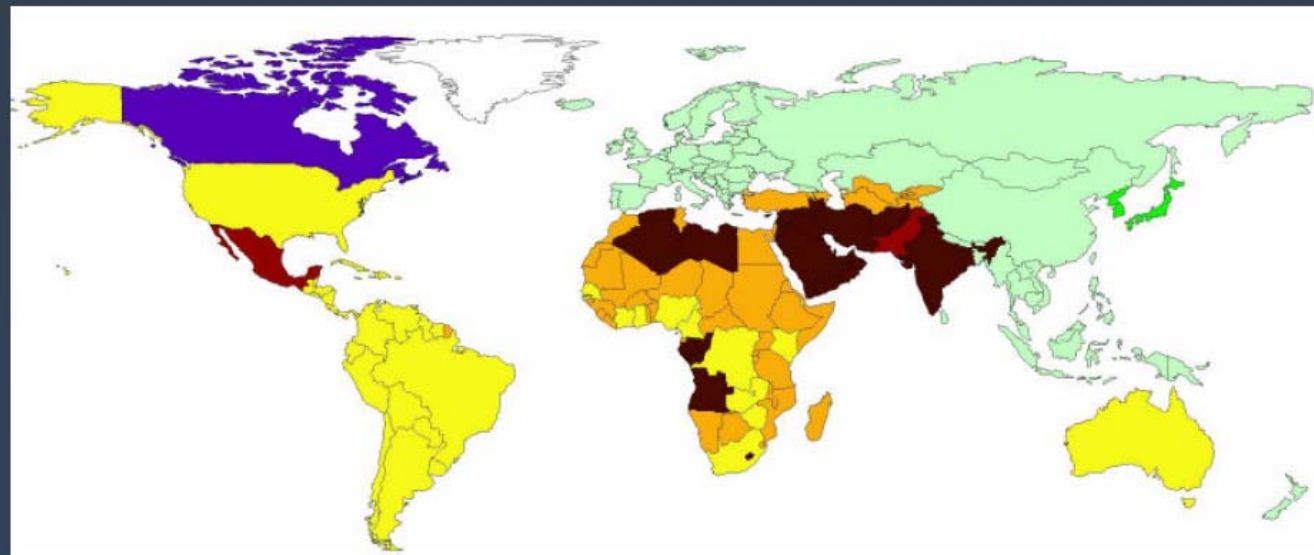


2002

Source: Byrd Polar Research Center 2005

FOOD SECURITY IS A MAJOR CONCERN (BENISTON 2002)

## Changes in agricultural yields: 2080



Yields compared to 1990

© 2004 Martin Beniston, University of Fribourg, Switzerland

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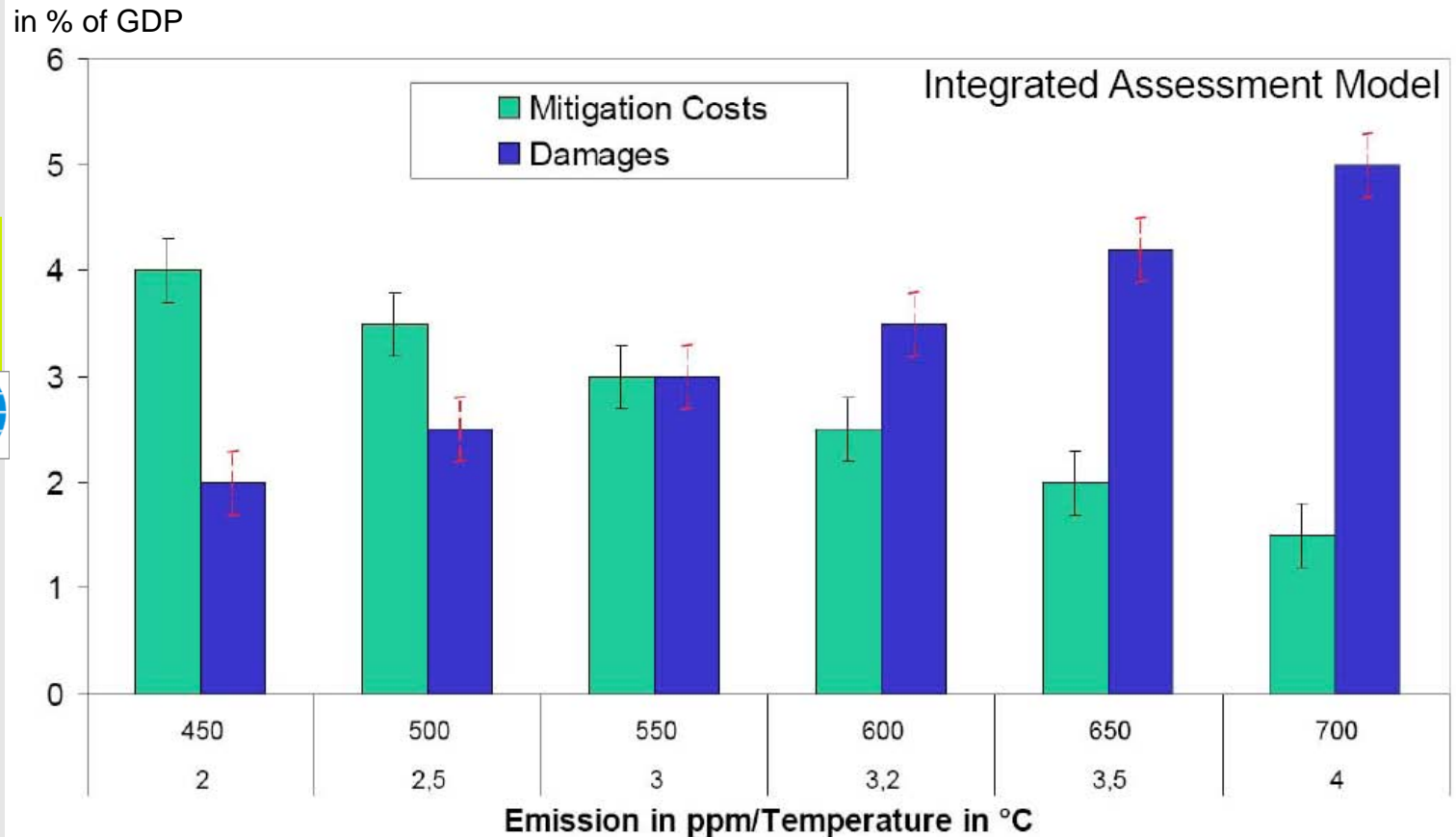
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## CLIMATE RISK – GLOBAL ECONOMIC IMPACT PROJECTIONS

### ACTION VS. NON-ACTION:

### MITIGATING CLIMATE CHANGE AND COPING WITH IMPACTS



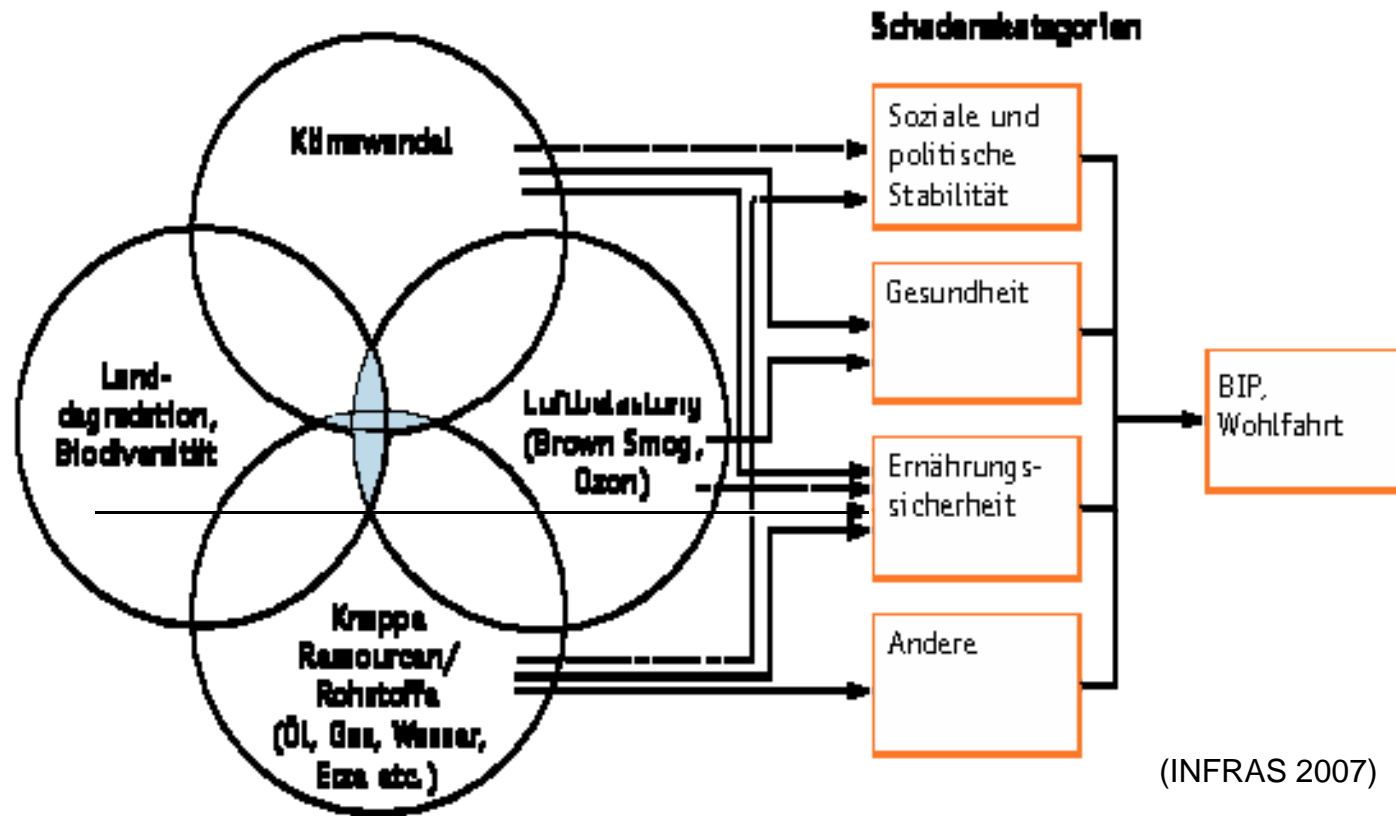
Source: C. Kemfert 2002, Berlin

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## 2. Climate risks $\leftrightarrow$ global change



Other global change processes are overlaying climate change impacts and tend to increase vulnerability e.g. Land Degradation -> Jakarta Flood

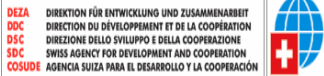
## SUMMING UP CLIMATE RISKS

- › Change in precipitation across the globe does increase the risk for heavy rains, drought and flooding.
- › Global temperature rise above 2°C, enhances the risk:
  - › dangerous anthropogenic interference
  - › irreversible damage to regional ecosystems,
  - › tropical/temperate glacier loss -> hydrology
  - › accelerated/abrupt changes in the global climate system

Damages with stabilisation target set at 550 ppm CO<sub>2</sub> - >2.5°C may derail sustainable development.

How to better understand dynamics at regional level?

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## 2 REGIONAL EXAMPLES

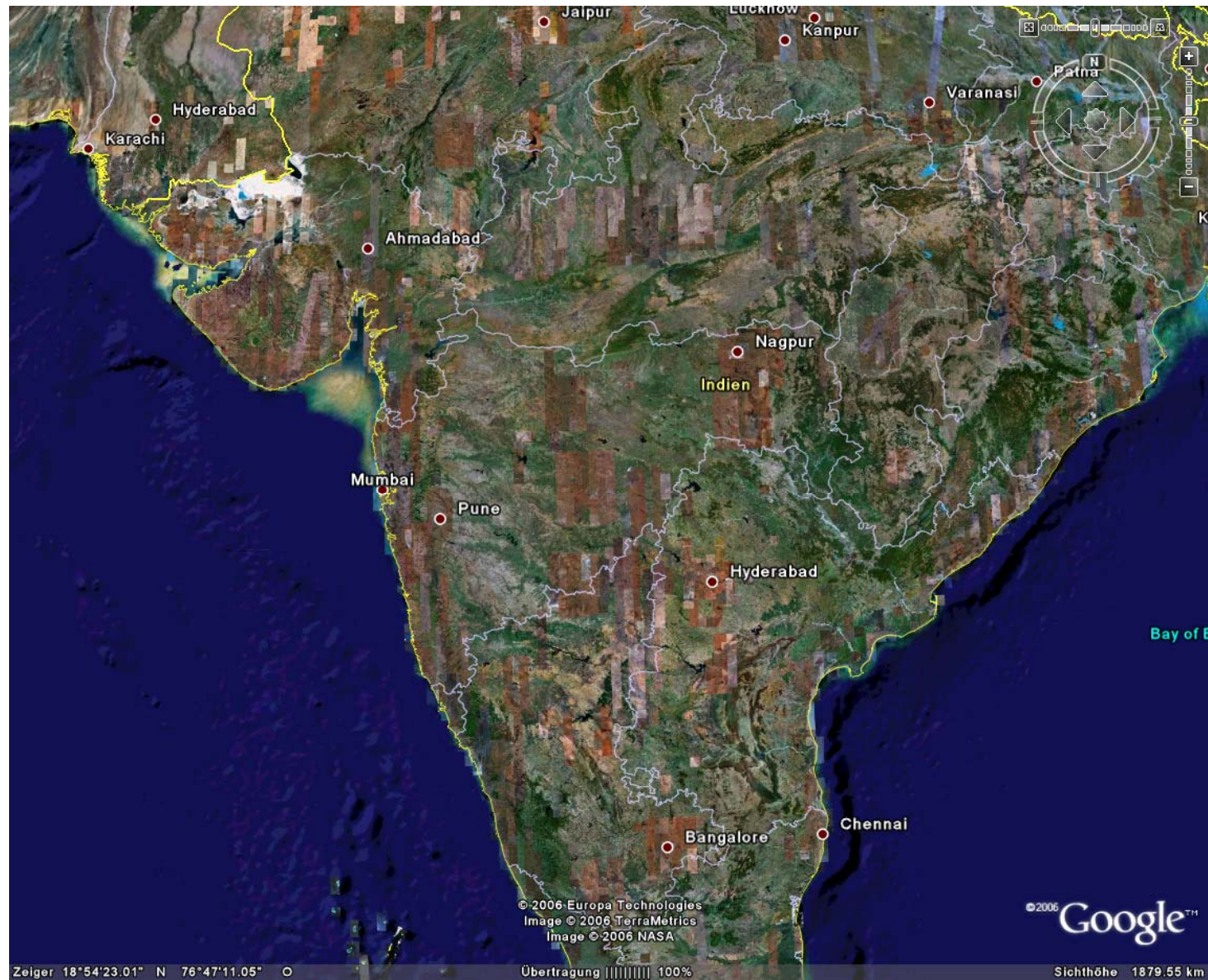
- **ANDEAN** GLACIERS and HYDROLOGY
- FOOD SECURITY IS A MAJOR CONCERN
- **INDIA:** RAJASTHAN & ANDHRA PRADESH, SOILS & ORGANIC COTTON
- **BRAZIL/AMAZONIA** ORGANIC PERMACULTURE

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DEZA  
DDC  
DSC  
SDC  
COSUDE



## REGIONAL EXAMPLES – INDIA, RAJASTHAN & ANDRA PRADESH



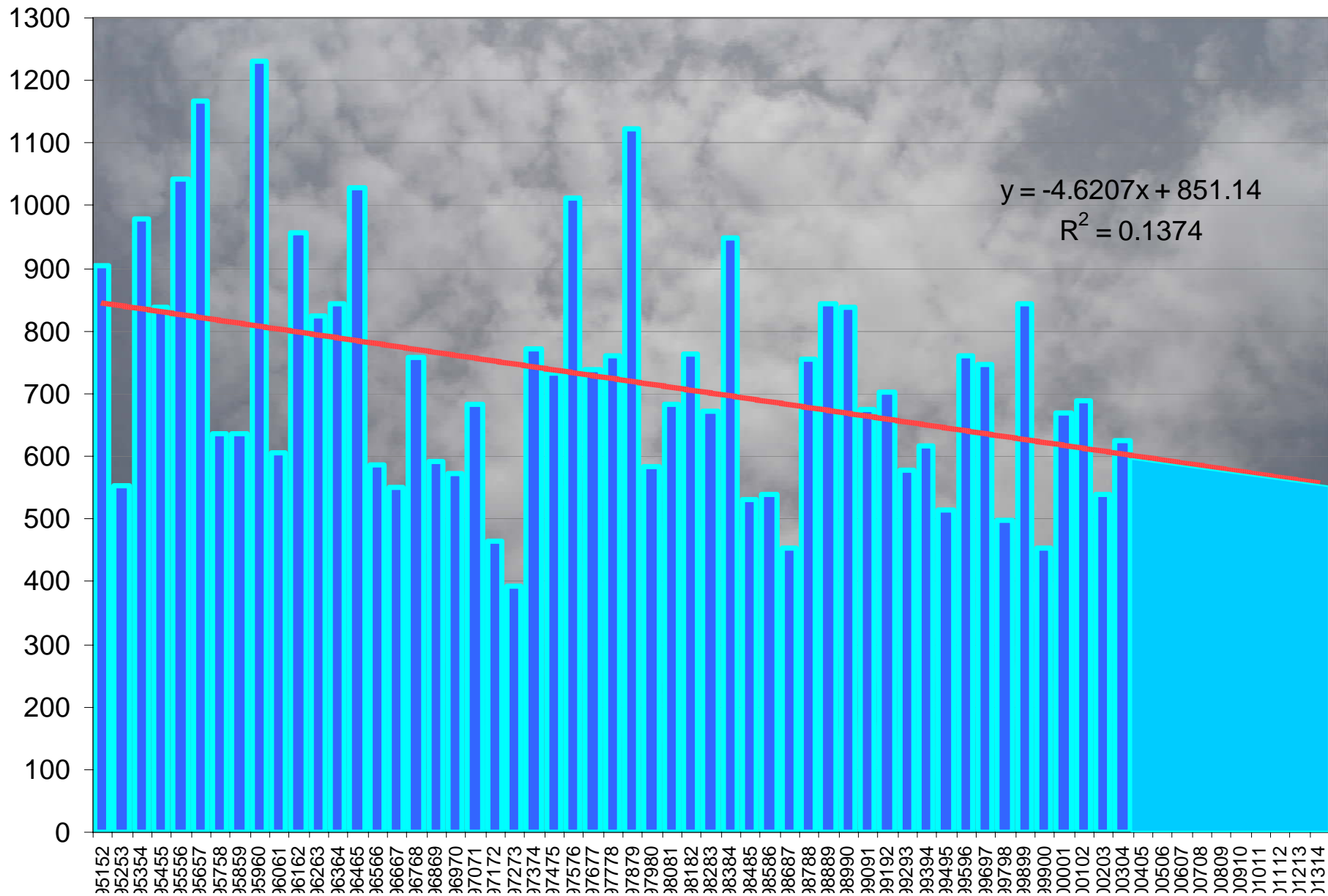
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# Rain Fall Mahaboonaagar District 1952-2003



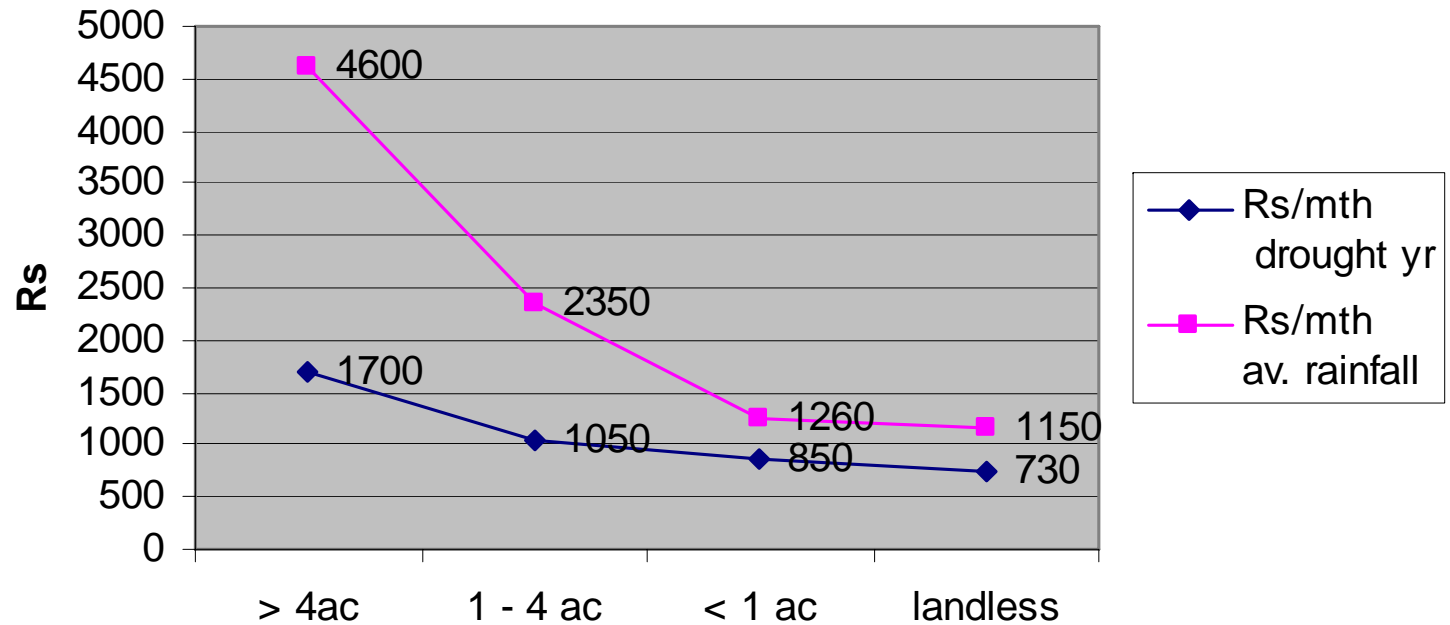
REGIONAL EXAMPLES – INDIA SDC V&A PROGRAMME,  
ANDHRA PRADESH

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Drought impact AP (WB/TERI)



## REGIONAL EXAMPLES – INDIA SDC V&A PROGRAMME, ANDHRA PRADESH



Prosopis juliflora bushes, drought affected cotton field Andhra Pradesh

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## REGIONAL EXAMPLES – INDIA SDC V&A PROGRAMME, RAJASTHAN



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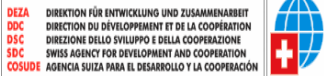


Biomass and Water retention are key, Kundai village, Rajasthan

## DEBT, DROUGHTS, SUICIDES

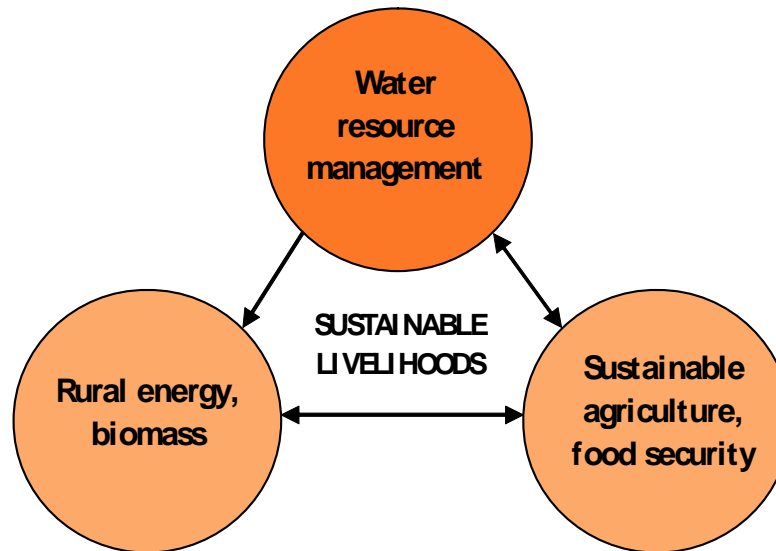
- › Half of India's 89 million farmer households are in debt.
- › 1993-2003: 100'000 farmers committed suicide.
- › 1998-2005: Bad seeds, costly pesticides and droughts have triggered debt, then suicide for 4'500 farmers in AP alone.
- › Socio-economic data analysis reveal the larger >4ac farmers are more vulnerable to suicide.
- › Droughts/flooding destructs financial, social and human capital -> out-migration opens skill and investment capability gap -> food security

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# 3. Organic cotton cultivation reduces vulnerability

Optimized delivery systems, practices, knowledge, technology ,  
and coping mechanisms at the local, community level



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# Organic Permaculture Amazonia (OROVERDE)



Degraded pasture land 2005 →

Fruit tree plantation 2006

