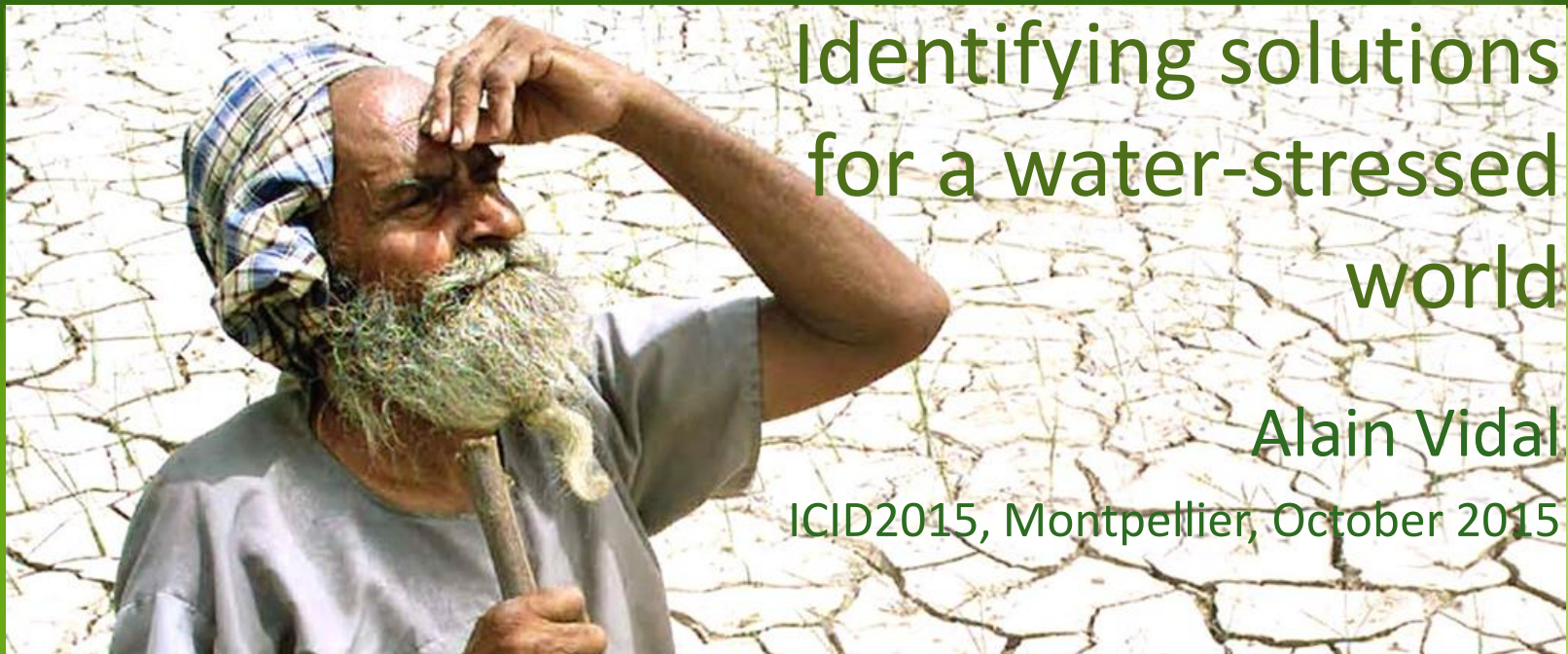




CGIAR is a global research partnership for a food secure future



Identifying solutions
for a water-stressed
world

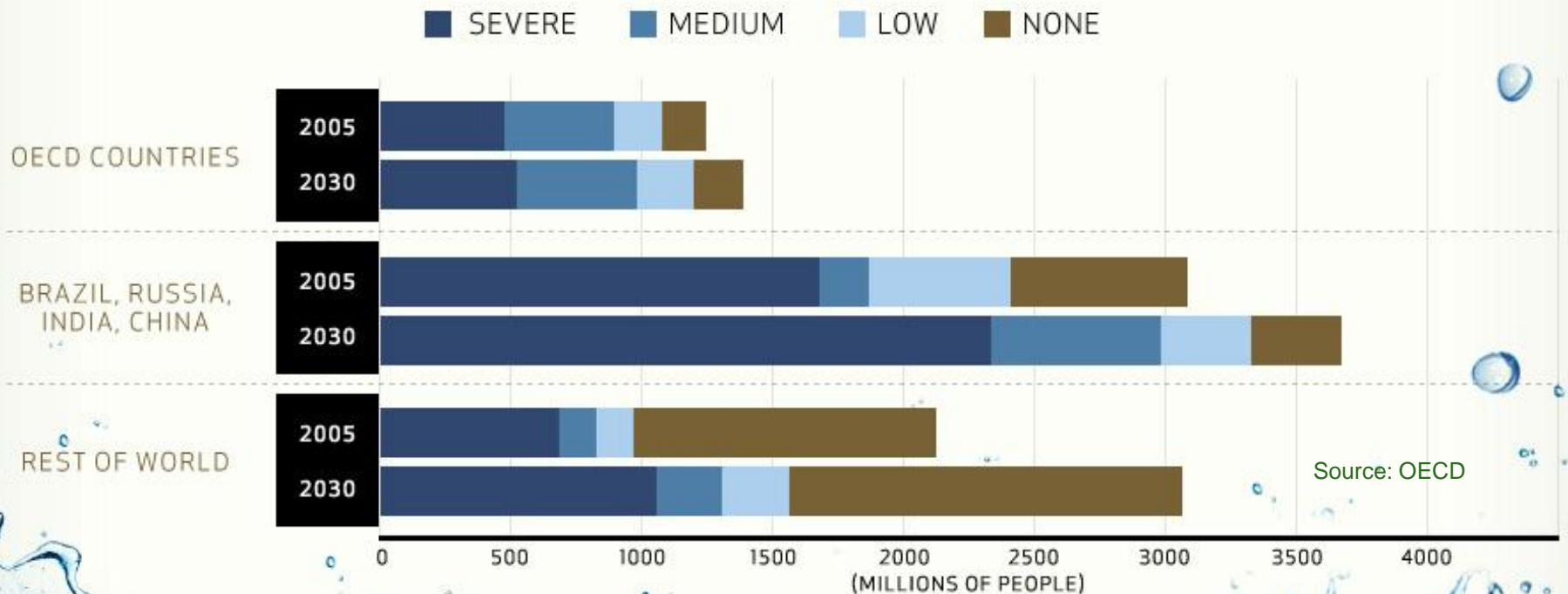
Alain Vidal

ICID2015, Montpellier, October 2015

Challenges for today and tomorrow

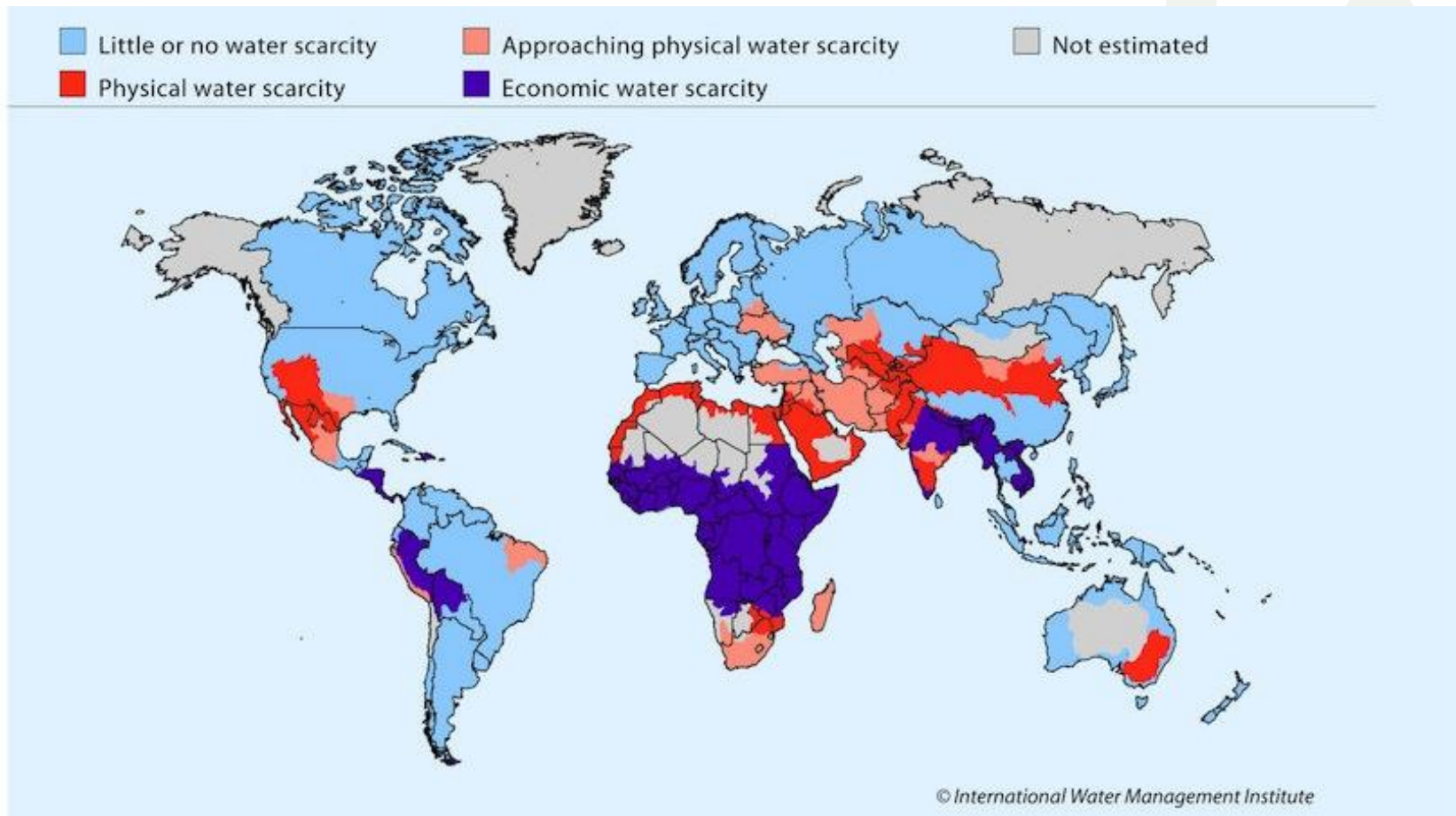
WATER STRESS

By **2030**, almost half of the global population (3.9 billion) is expected to experience severe water scarcity, especially in the emerging BRIC countries.



Source: OECD

Global water scarcity



Climate variability will impact on food production

Effects of Climate Change on Global Food Production



Projected Maize Yield Change in %
1970-2000 Baseline to 2050, SRES A1F Scenario



Copyright 2010, The Trustees of Columbia University in the City of New York.
Source: Iglesias, A., and C. Rosenzweig, 2010. Effects of Climate Change on Global Food Production. Data available at <http://cgsi.cornell.edu/food/impacts/>
Publish Date: March 2010

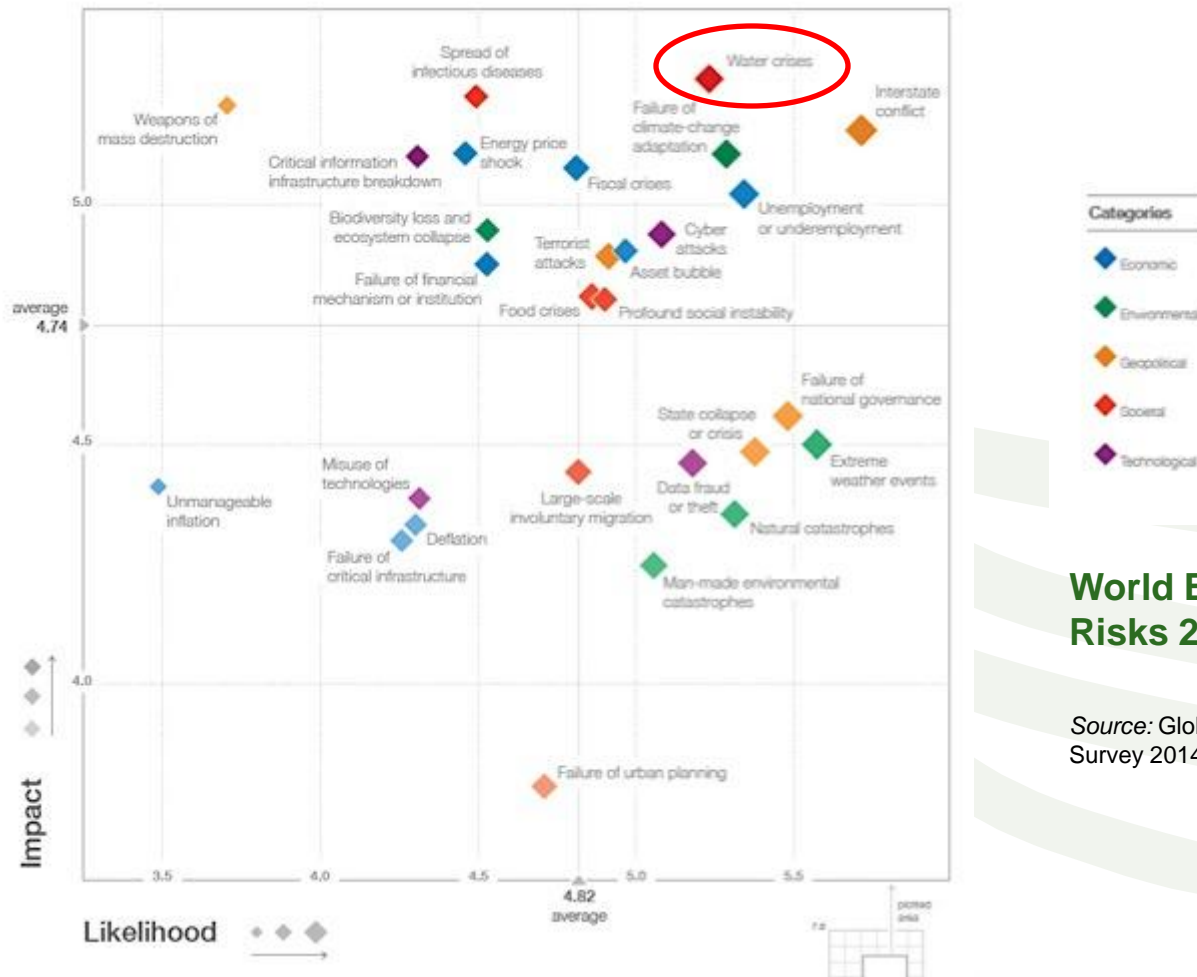
This map is for illustrative purposes and does not imply the expression of any opinion on the part of the co-authors, CGIAR, or their sponsors concerning the legal status of any country or territory or concerning the delimitation of frontiers or boundaries.



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Source: Socioeconomic Data and Applications Center (SEDAC)

The water crisis : a global risk to business



World Economic Forum, Global Risks 2015 - Insight Report

Source: Global Risks Perception Survey 2014.

Identifying solutions for a water-stressed world



1. 'Smart' irrigation
2. Re-using waste
3. Ground water governance
4. Help agriculture become part of climate solutions



Photo: Hamish John Appleby/IWMI



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Incentives to rapid expansion of drip irrigation... Yet suitability depends on context

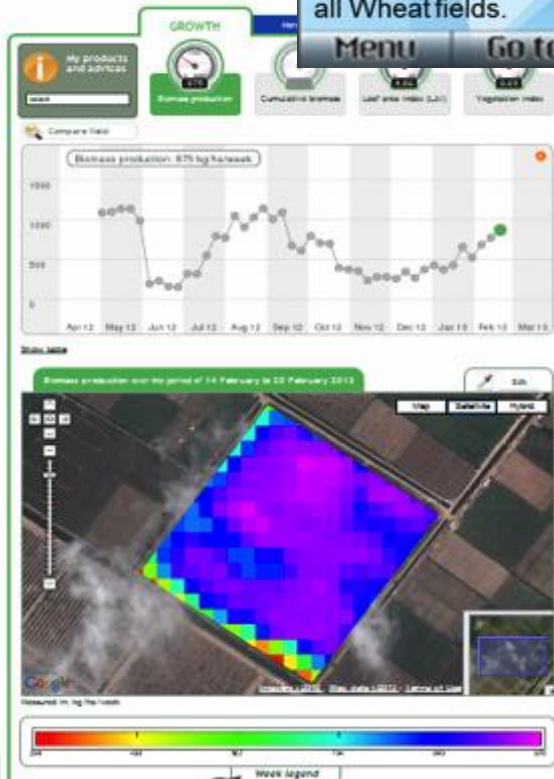


Photo: Hamish John Appelby / IWMI

Bring smart and affordable ICT to everyday farm management for smallholders



- Mobile-phone and web-based agro-advisory system developed and tested in in Sudan, Ethiopia and Egypt
- Spatial data translated into simple SMSs - both qualitative and quantitative, and both on-demand and weekly “push”



Precision surface irrigation

A viable alternative to drip irrigation

Pakistan: Land and Water productivity increases, reduced diesel costs

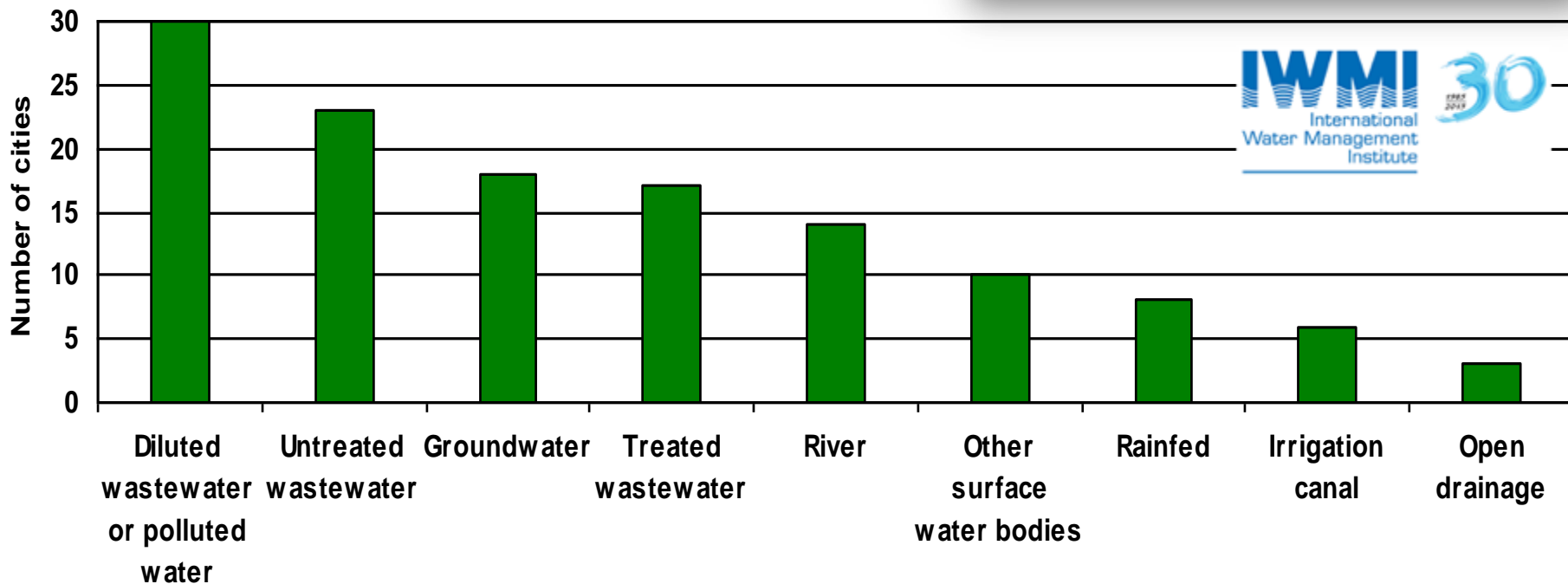


Photos: Arif Anwar / IWMI



Global survey - irrigation source in urban & peri-urban areas

In and around *three* of *four* cities in the developing world, farmers use polluted irrigation water for the production of high-value crops



Wastewater: a valuable asset



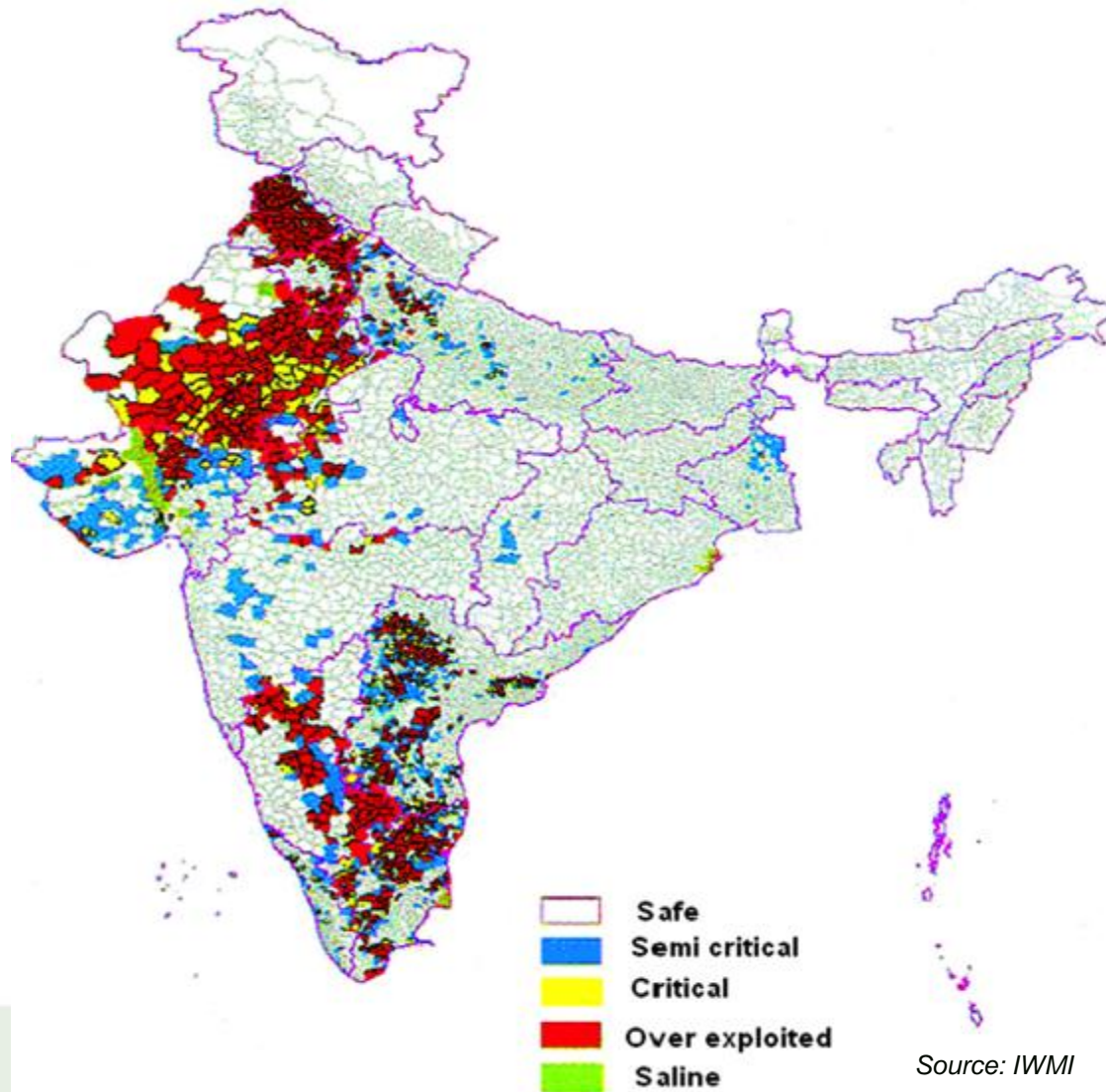
Photo: Pay Drechsel/IWMI



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India: Twin cases of 'over-abstraction' and 'under-utilization'



Solar pumps – renewable, but sustainable?

Getting the incentives right

Selling Sunlight

To support sustainable irrigation



The number of solar pumps in India nearly tripled in 2013.

The CGIAR Research Program on Water Land and Ecosystems (WLE) is researching the likely impact of solar powered groundwater pumping in India.

Recommendations are already emerging to ensure that this technology promotes sustainable water extraction. There are promising signs that some Indian states are already adopting these approaches, and interest is growing at a national level.

Groundwater

Solar panels offer a cheap and reliable way for farmers to extract groundwater.

But, "free" power may lead to unrestricted pumping, depleting aquifers.



Solar power as a cash crop

Farmers could potentially sell excess solar power to the national grid.

With targeted subsidies, the average farmer could benefit by up to \$1,200 per year.

Solar can also lift the power economy up by freeing it from farm power subsidies.



Carbon neutral irrigation

21 million diesel and electric pumps produce 15% of India's food.

6% of it's total carbon emissions. CO₂

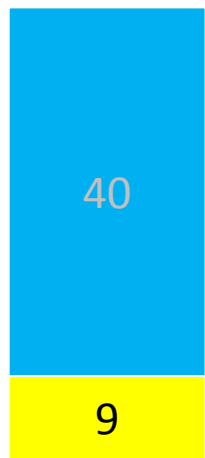
Solar pumps could help reduce their carbon footprint and boost food security.



CGIAR
Science for a food-secure future

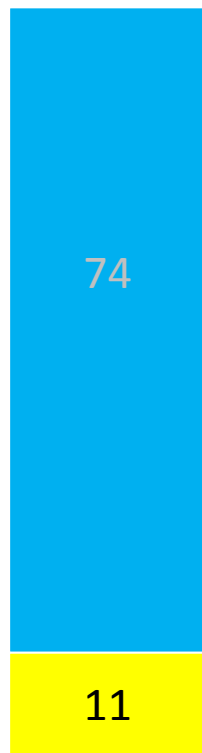
Help agriculture become part of the climate solutions

- Non-agricultural emissions
- Agricultural and agriculture-driven land-use change emissions



2010

85



2050
(Business as usual)

“Business as usual” (BAU) agriculture emissions would comprise ~50% of allowable emissions to achieve a 2°C world

22



2050

(2°C target)

~50%



CGIAR

Science for a food-secure future



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



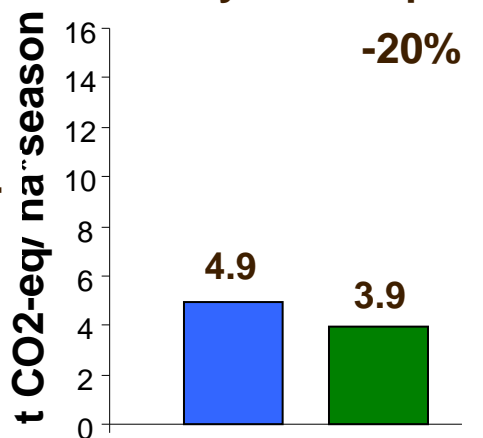
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Alternate-Wetting-and-Drying (AWD)

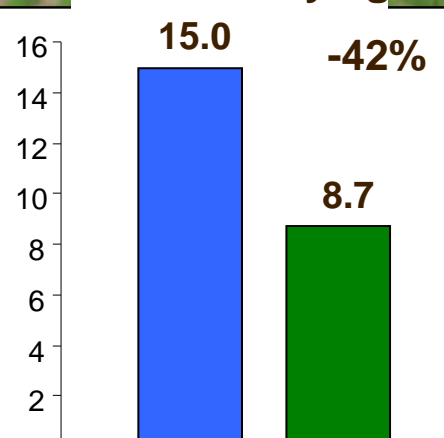


Summer-Autumn

Hilly mid-slopes

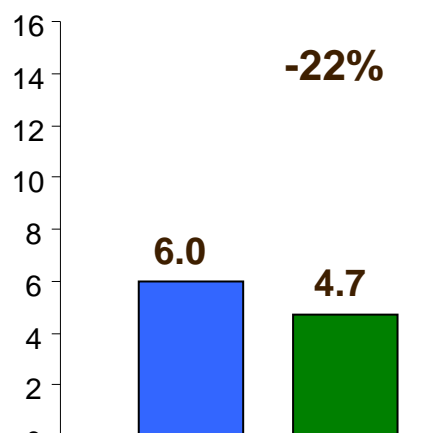
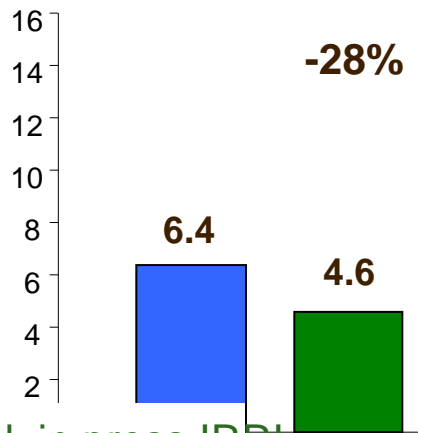


Delta low-lying



Conventional AWD

Winter-Spring



- Keep flooded for 1st 15 days and at flowering
- Irrigate when water drops to 15 cm below the surface

30% water

20-50% GHG

Without compromising yield

Major policy initiative in
African Nations

✓ Increase, stabilize,
diversify
production

✓ 60%
increase in
soil carbon*

✓ Climate
resilience

*temperate system
Entry et al. 2002

Smart water solutions



Because of increased variability, a continuum of water management technical and institutional innovations are needed

- decentralized, adaptable, inexpensive
- applicable under scenarios of increasing or decreasing rainfall