

Adapting agriculture to climate change: listening to many voices

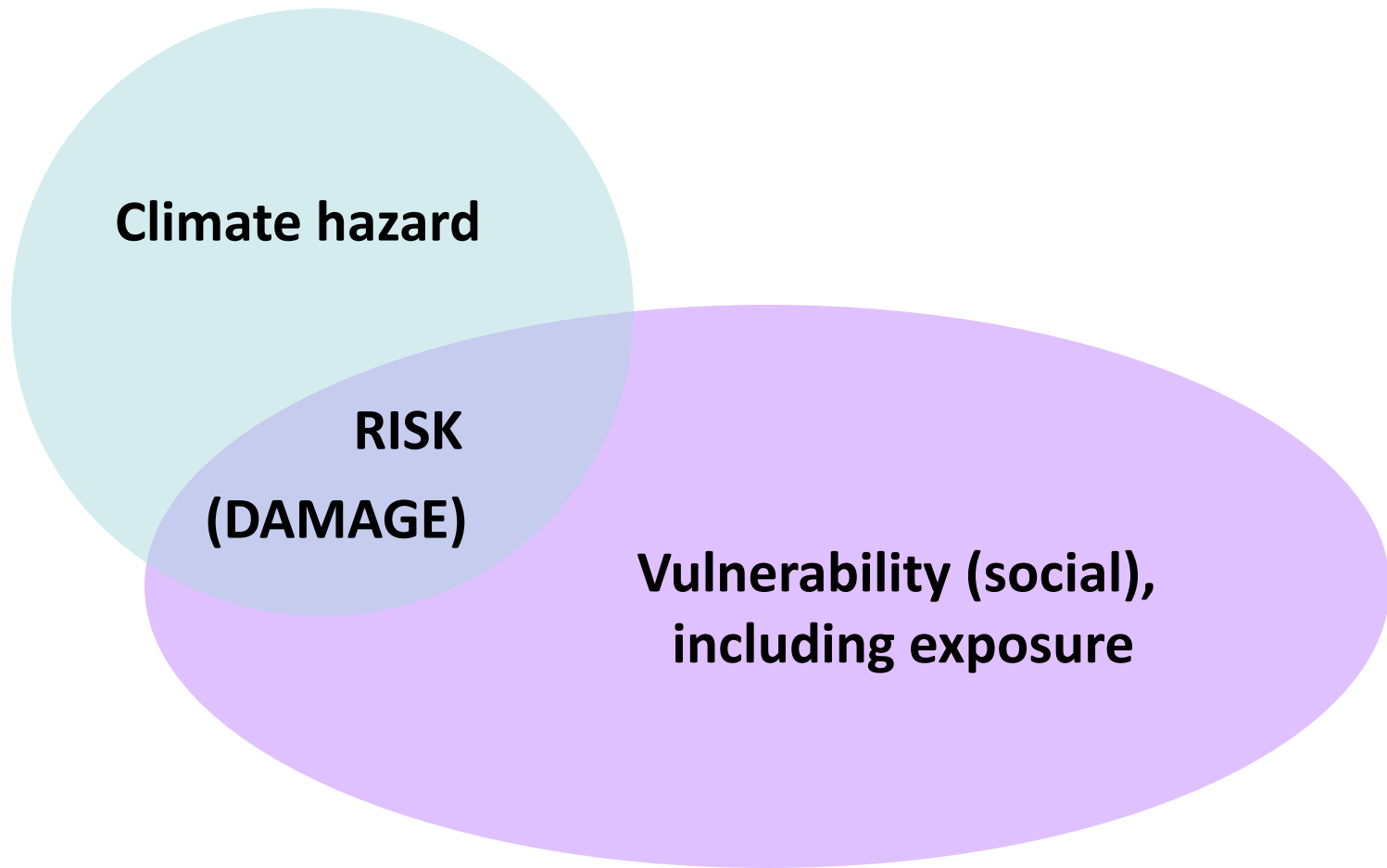
Ana Iglesias

Universidad Politécnica de Madrid (UPM), Spain

Climate Change Impacts on the MED-Agro-Food chain: From Theory to Practice
Schloss Rauischholzhausen, Ebsdorfergrund, Germany
Day 2, Tuesday, 10/09/2019

Expected results

- You will gain an understanding of the main challenges for developing climate change adaptation plan
- You will be able to develop a critical review of the potential actions to improve climate change adaptation in different case studies
- Lecture, participation, pluralism, communication



Climate hazard

**RISK
(DAMAGE)**

**Vulnerability (social),
including exposure**

“Es hört doch jeder nur, was er versteht”

Goethe (1749 – 1832)

1 key issue can adaptation be improved by listening to many voices?

3 assertions

- Understanding the benefits of **cooperation** is essential for improving adaptation
- Understanding and reducing vulnerability demands **understanding the system**
- Vulnerability reduction is a human rights issue, therefore it has to be **linked to development**. It is politically difficult to justify vulnerability reduction on economic grounds

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Too hot



Too dry

Adaptation depends on socio-economic and environmental determinants



Infrastructure and technical solutions, experience in planning under climate variability

Citizen awareness of importance of adaptation and environmental problems

Rural areas with experience in uncertainty, taking flexible solutions, multiple risks

Environmental awareness of importance of nature based solutions



Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman



Research article

Defining adaptation measures collaboratively: A participatory approach in the Doñana socio-ecological system, Spain

Lucia De Stefano ^{a, *}, Nuria Hernández-Mora ^b, Ana Iglesias

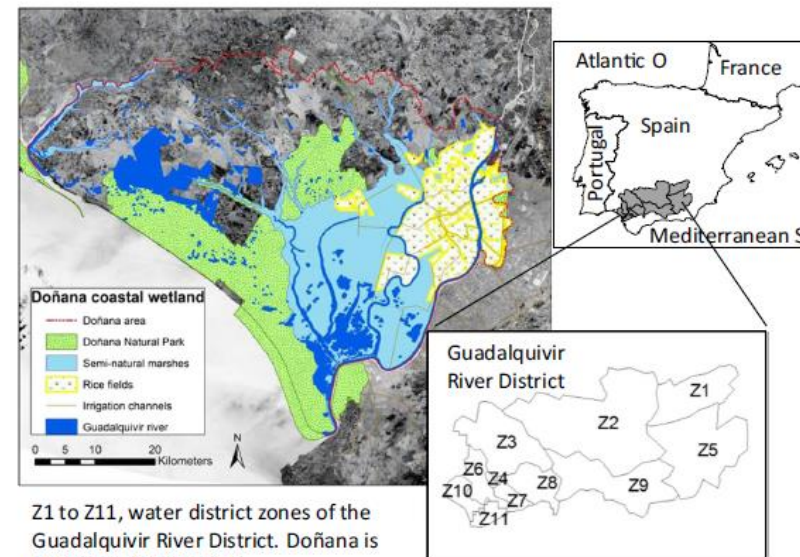
^a Universidad Complutense de Madrid, Facultad de Ciencias Geológicas, c/ José Antonio Nováis, 12, 2,

^b Universidad de Sevilla, Facultad de Geografía e Historia, c/ Doña María de Padilla, s/n, 41004, Sevil

^c Universidad Politécnica de Madrid, Escuela Técnica Superior de Ingenieros Agrónomos, Departamer Complutense s/n, 28040, Madrid, Spain

Water Resour Manage

DOI 10.1007/s11269-015-0995-x



Z1 to Z11, water district zones of the Guadalquivir River District. Doñana is located in Z10 and Z11

Fig. 1 Geographical location of the Doñana coastal wetland and the Guadalquivir River Basin District

Towards Adaptation to Climate Change in the Coastal Wetlands of Doñana, Spain

Ana Iglesias¹ • Berta Sánchez¹ • Luis Garrote² • Iván López³

Although it is clearly demonstrated that cooperation is essential, it remains a challenge



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Decisions affected by climate

A golden wheat field under a blue sky with a tractor in the distance.

Farmer

Before

- Crop
- Variety
- Plant density
- Inputs

During

- Irrigation
- Harvest

After

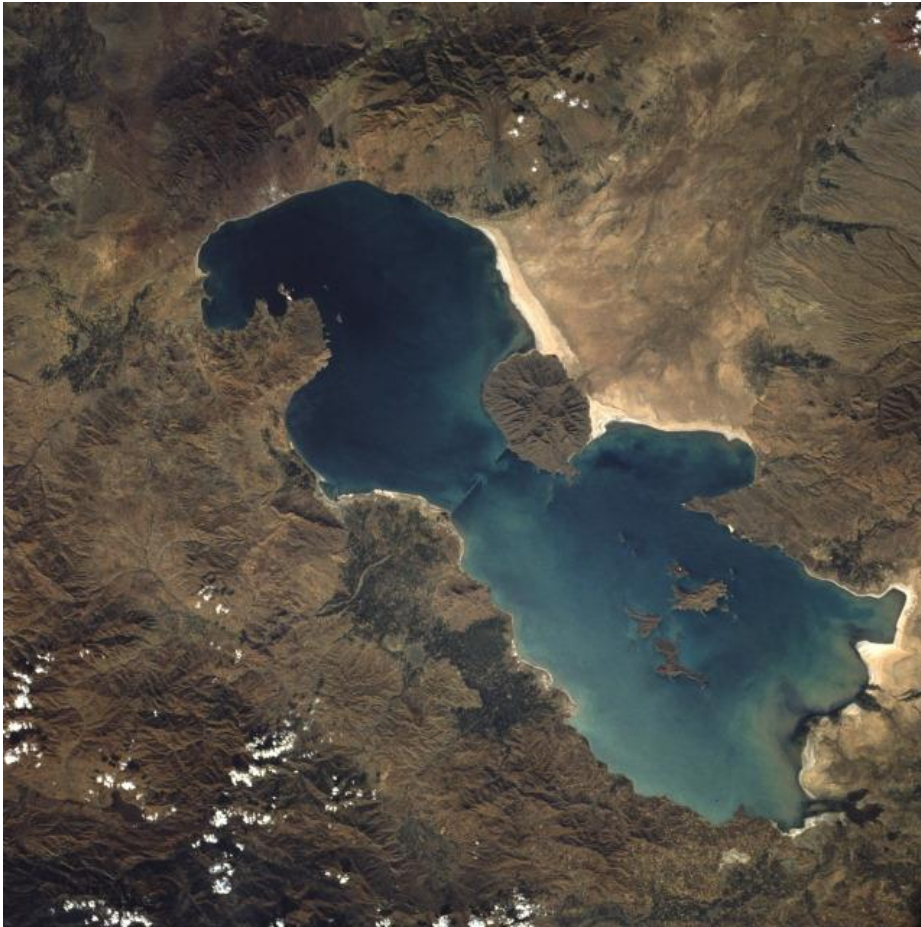
- Markets
- Storage

Industry

- Input production
- Credit
- Transport
- Insurance

Resource management

- Water
- Emergency planning



Source: www.earthkam.ucsd.edu

- West Azarbayjan
- East Azarbayjan
- Kordestan
- 3 groups, mixed background (UN, University, Government – water, agriculture, environment – state government

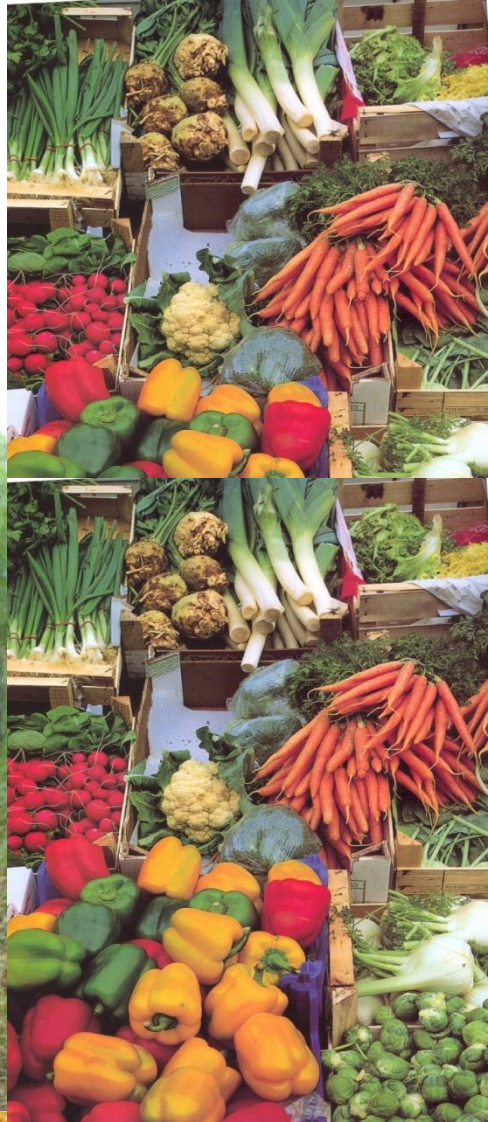


atmosphere

management

soil

crop





ELSEVIER

available at www.sciencedirect.com



journal homepage: www.elsevier.com/locate/envsci



Re-thinking water policy priorities in the Mediterranean region in view of climate change

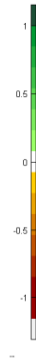
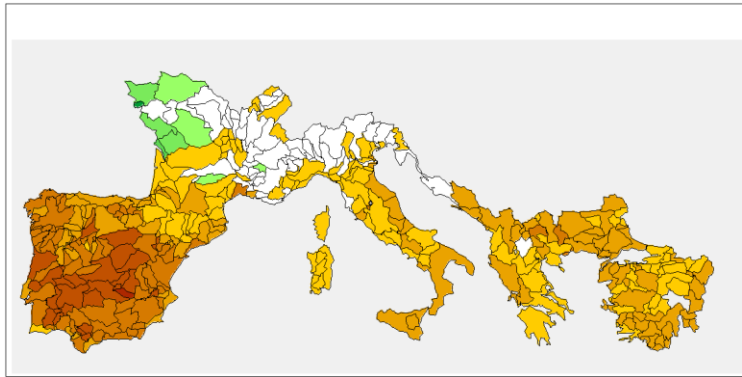
Ana Iglesias^{a,*}, Luis Garrote^b, Agustin Diz^a, Jeremy Schlickenrieder^a,
Francisco Martin-Carrasco^b

^a Department of Agricultural Economics and Social Sciences, Universidad Politécnica de Madrid, Spain

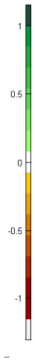
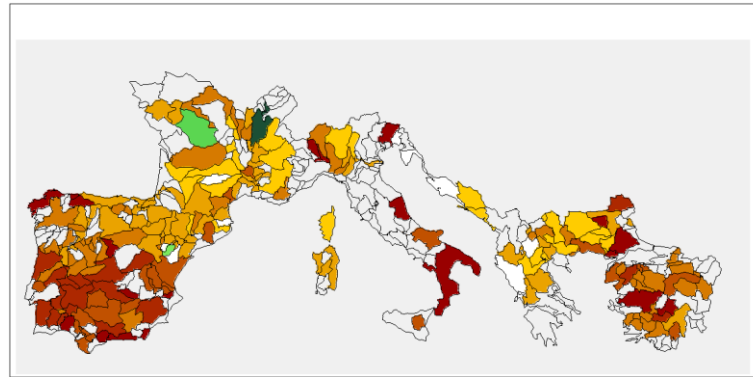
^b Department of Hydraulic and Energy Engineering, Universidad Politécnica de Madrid, Spain

Type of policy	Quantify the results of policy
Supply management policies	Water allocation for environmental and consumptive uses
	Reuse of urban water
	Reduction of water allocation
	Increase water supply
	Increase supply efficiency
Demand management policies	Reduction of per-capita or per-hectare water use
	Water rights exchange programs
	Increase resource efficiency

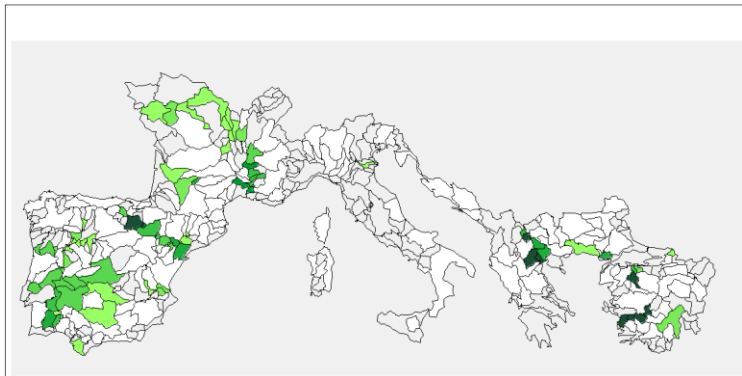
Change (A2-control) in mean annual runoff



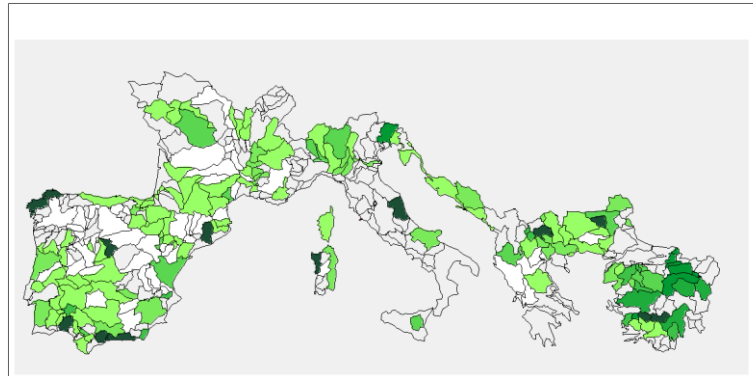
Change (A2-control) in water availability guarantying unrestricted urban demand



Effect of policy measures on **supply management** on water availability (A2 scenario)



Effect of policy measures on **demand management** on water availability (A2 scenario)





Contents lists available at [ScienceDirect](#)

Agricultural Water Management

journal homepage: www.elsevier.com/locate/agwat



Review

Adaptation strategies for agricultural water management under climate change in Europe

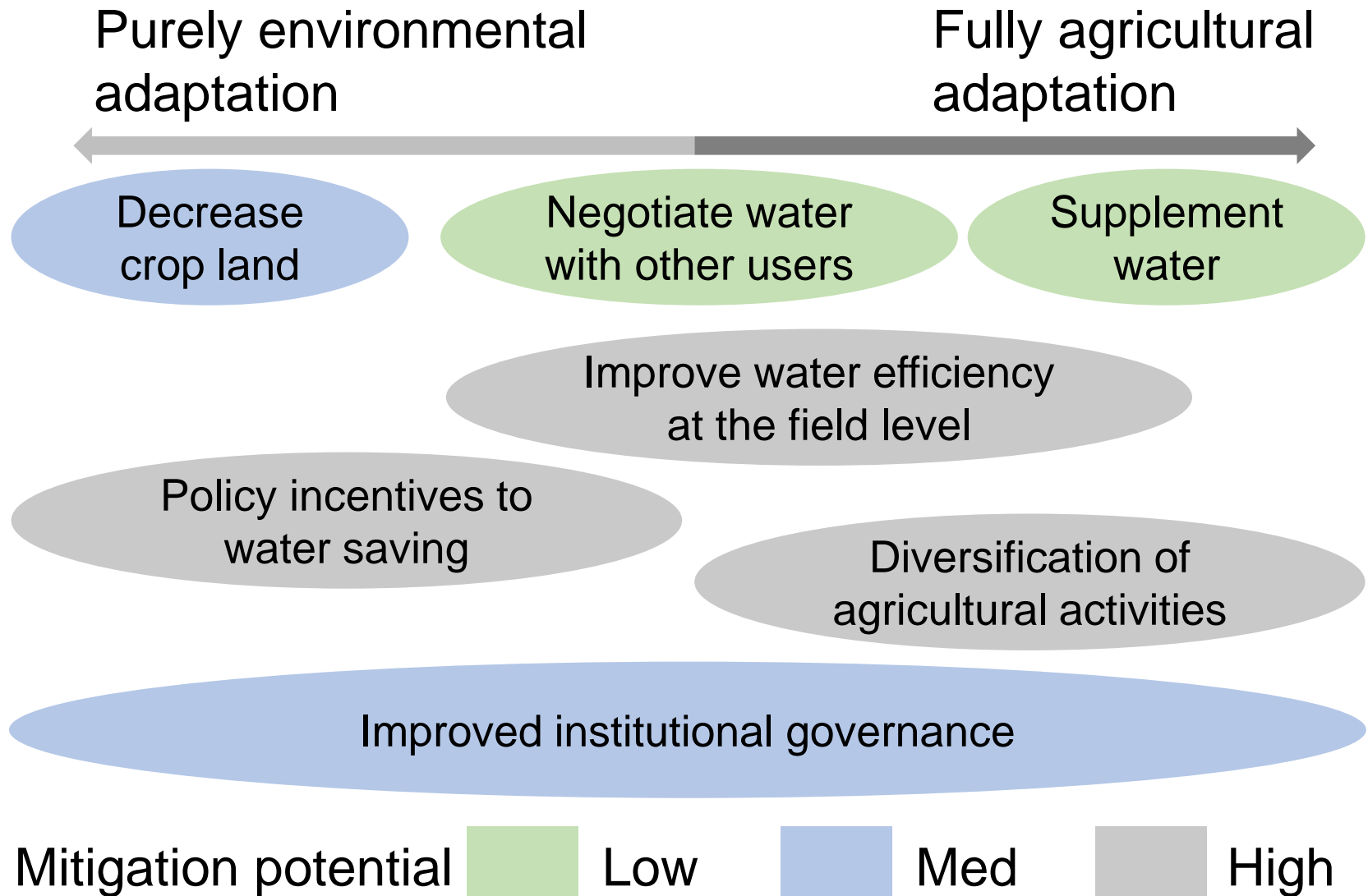
Ana Iglesias^{a,*}, Luis Garrote^b

^a Department of Agricultural Economics and Social Sciences, Universidad Politecnica de Madrid, Spain

^b Department of Civil Engineering, Universidad Politecnica de Madrid, Spain



Screening options for adaptation and mitigation: agricultural water management (Iglesias et al., 2015)

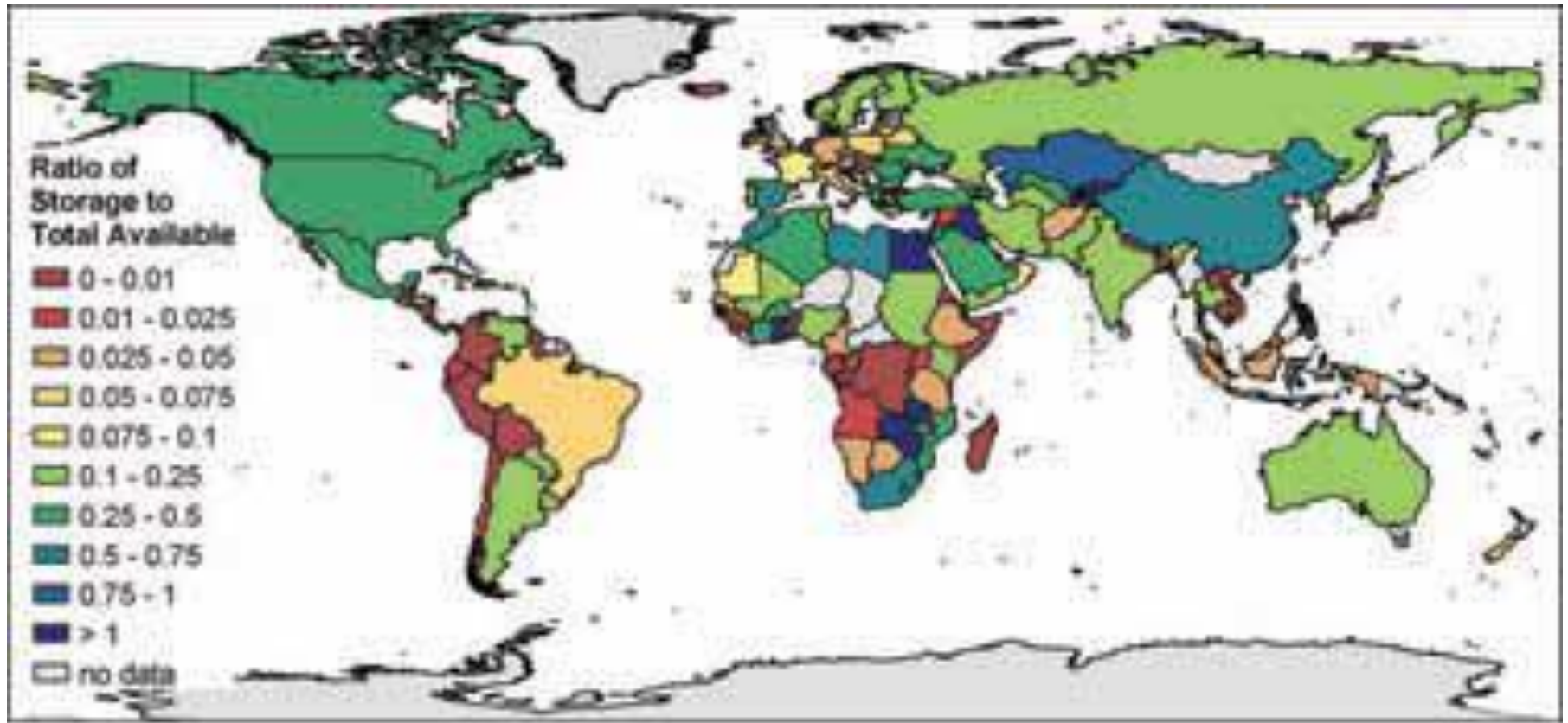




JUN 18 2006

Adaptation capacity index

Component	Indicators, examples
Human capital	literacy rate; Population with level of education; Rural population
Economic development	% of GDP from agriculture/GDP per capita, Life expectancy at birth % Access to drinkable water
Mechanisms of risk sharing	Insurance, Agricultural policies
Institutional response	Drought regulations; Drought management plans; Institutional drought agencies; Access to financial services
Environmental aspects	Soil degradation
Agricultural Aspects	Cultivation techniques; Crop varieties



Storage as a Proportion of a Country's Total Annual Renewable Freshwater Resources

1 key issue can adaptation be improved by listening to many voices?

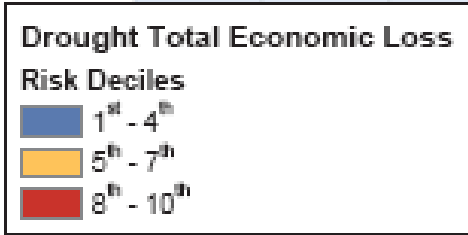
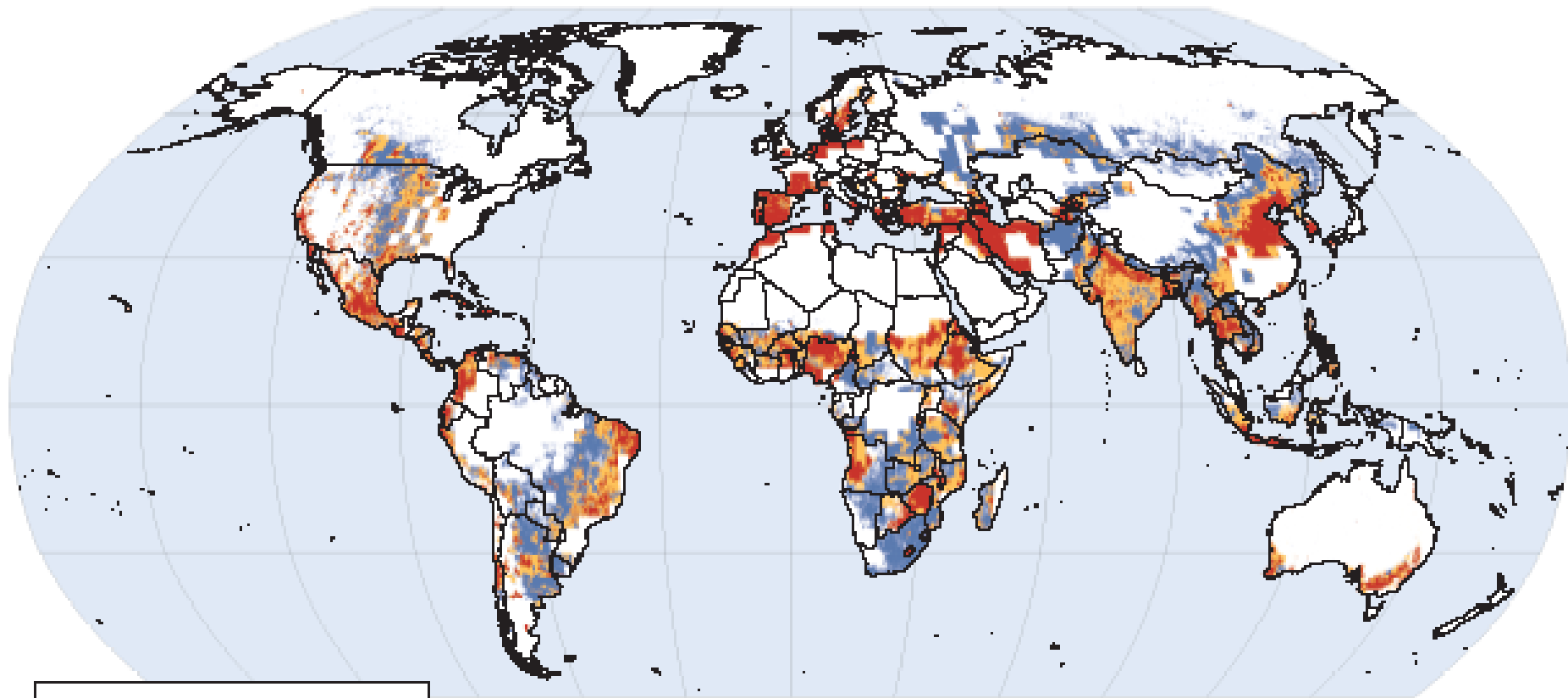
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Global Distribution of Drought Risk

Total Economic Loss



CENTER FOR HAZARDS & RISK RESEARCH
AT COLUMBIA UNIVERSITY

Climate change: 'Invest \$1.8 trillion to adapt'



Investments - like the purchase of a water pump for irrigation - can provide a sustainable farming income for farmers like Sanfo Karim in Burkina Faso

10 Sept
2019





Human displacement

Mapping the Effects of Climate Change on Human Migration and Displacement



- A society vulnerable to climate change, limits its potential development
- Despite the importance of adaptation for social and economic development, people continue to think that climate change is either not important or unavoidable
- Can we be optimistic?

Planning linked
to development
MDGs

The diagram consists of two rectangular boxes, one light blue on the left and one yellow on the right. A dashed orange line forms a large frame around both boxes. At the top-left corner of this frame, an arrow points right towards the blue box. At the top-right corner, an arrow points left towards the yellow box. The text 'Planning linked to development MDGs' is centered in the blue box, and 'Local solutions' is centered in the yellow box.

Local
solutions

Can we be optimistic?

PERMANENT actions

- Improve the situation (reduce vulnerability of the system)
- Examples:
 - Monitoring and early warning systems
 - Technology (water re-use)
 - Aquifer management
 - Increment supply
 - Cooperation in policy development
 - Many others

PRE-ALERT actions

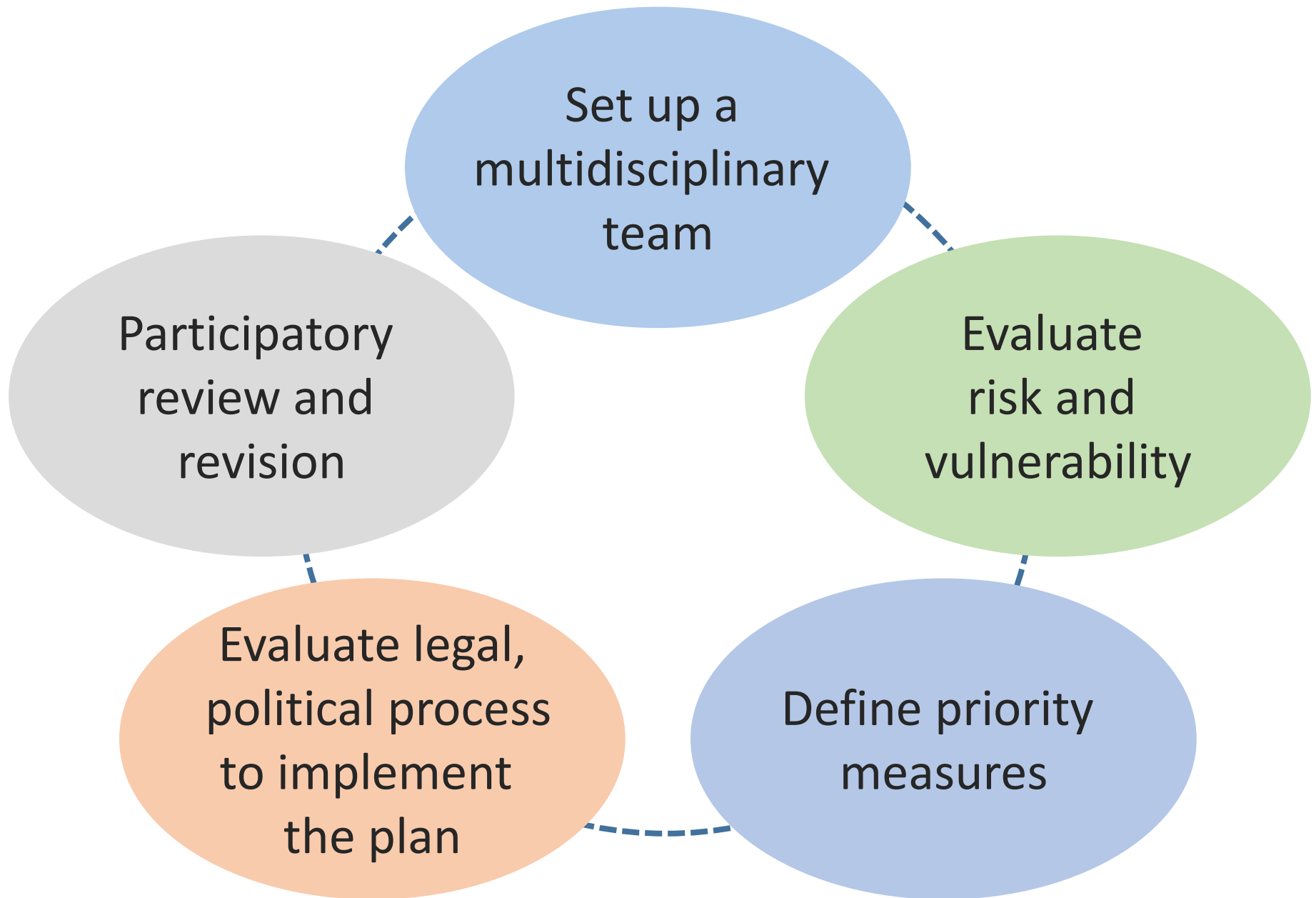
- Low cost, indirect, voluntary
- Non structural
- Directed to avoid worse situations
- Focus on communication

ALERT actions

- Overcome future situation without reaching the emergency stage
- Changes in water management, land use

EMERGENCY actions

- Minimise impacts and reduce damage



Some examples in water management

- **Technology** (desalinisation, reuse, efficiency, in-site monitoring linked to earth observations, ...)
- **Early** warning systems
- **Cultural** change (governance, cooperation, ...)
- **Nature** based solutions (restored or constructed wetlands, grasslands, forests, ...)
- **Water management** changes (irrigation, water exchange rights, ...)
- **Risk management** (insurance, markets, ...)
- **Policy** design and implementation

Figure | The same field with sections under tillage (right) and conservation agriculture/no tillage (left) immediately after a heavy rainstorm







The
Economist

Priceless

A survey of water | July 19th 2003



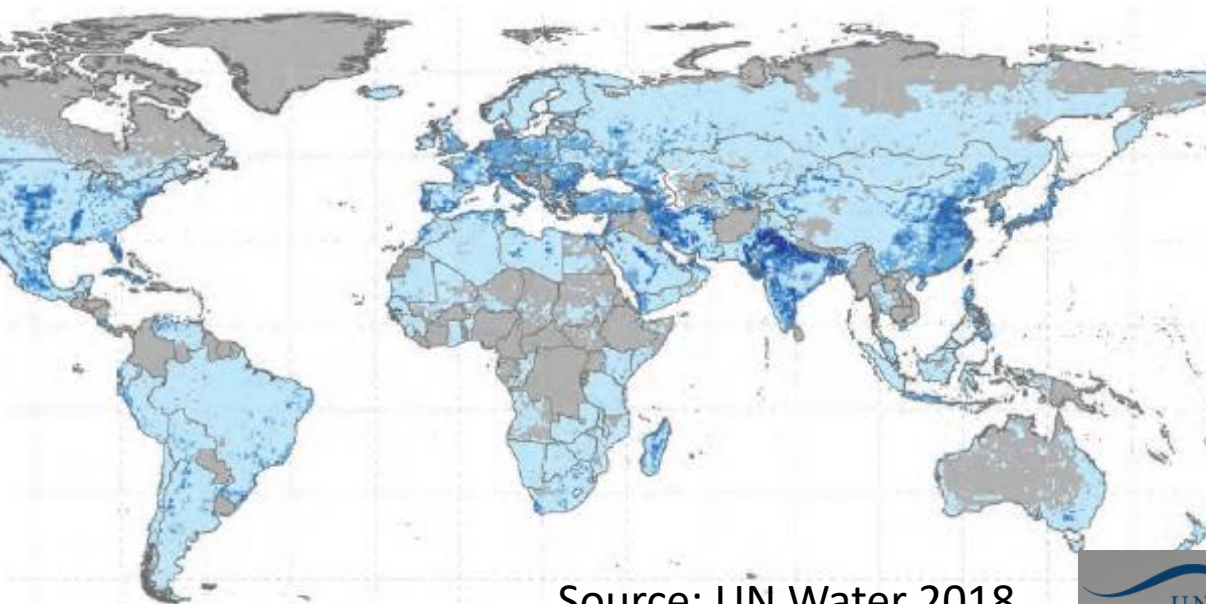
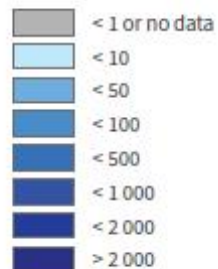


Groundwater abstraction

2010

Groundwater abstraction
2010

[km³/year]



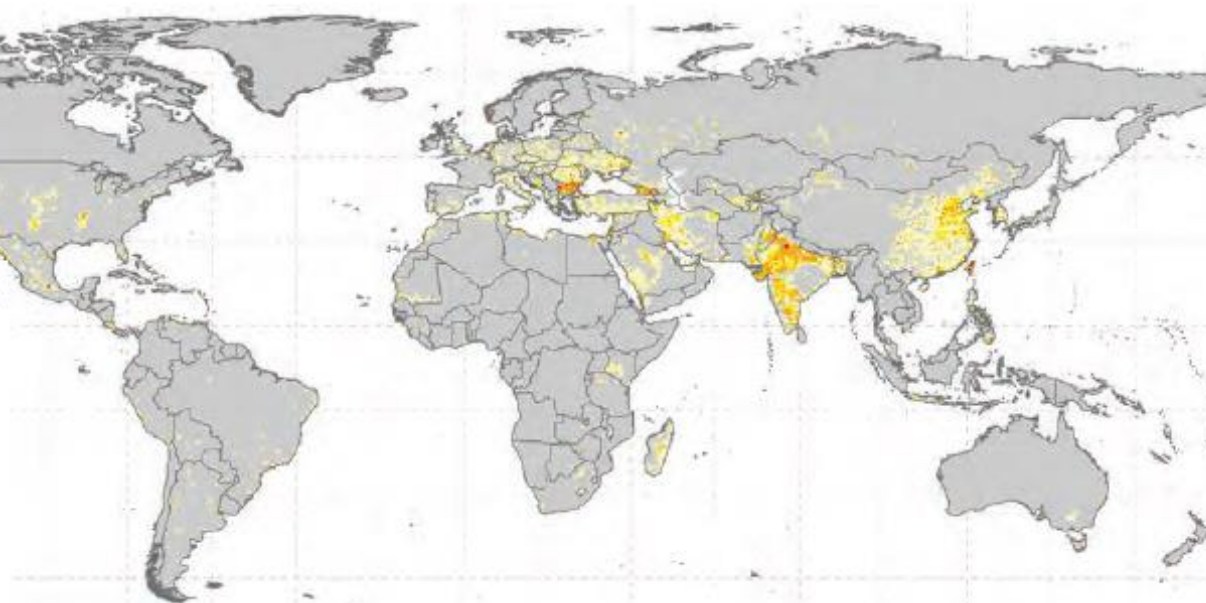
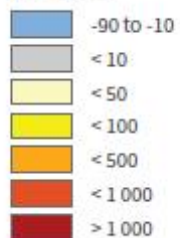
Source: UN Water 2018



2050

Groundwater abstraction
increase from 2010 to 2050

[km³/year]



Linking knowledge with action in the pursuit of sustainable water-resources management

Katharine Jacobs^{a,1}, Louis Lebel^b, James Buizer^c, Lee Addams^{d,2}, Pamela Matson^e, Ellen McCullough^f, Po Garden^{b,9}, George Saliba^{h,3}, and Timothy Finanⁱ

^aDepartment of Soil, Water and Environmental Science, Institute of the Environment, University of Arizona, Tucson, AZ 85721; ^bUnit for Social and Environmental Research, Faculty of Social Science, Chiang Mai University, Chiang Mai 50200, Thailand; ^cOffice of the President, Arizona State University, Tempe, AZ 85287; ^dEarth Institute, Columbia University, New York, NY 10027; ^eDean's Office, School of Earth Sciences, Stanford University, Stanford, CA 94305; ^fBill & Melinda Gates Foundation, Seattle, WA 98102; ^gInternews Network, Chiang Mai University, Chiang Mai 50202, Thailand; ^hDepartment of Geography, University of Arizona, Tucson, AZ 85721; and ⁱBureau of Applied Research in Anthropology, University of Arizona, Tucson, AZ 85721

Edited by William C. Clark, Harvard University, Cambridge, MA, and approved December 2, 2009 (received for review December 26, 2008)

In all basins there is an increasing need for

- better integration of planning
- expansion of interests beyond single uses and narrowly defined objectives
- maintaining water policy into development policy

China: The sponge city, reuse of grey water



Source: UN Water 2018

- Climate change increases inequalities
- Climate change is a challenge to SDGs and environmental justice

