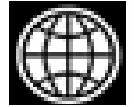


# SUBSIDIES TO GROUNDWATER PUMPING IN MEXICO: PERVERSE EFFECTS & OPTIONS FOR DECOUPLING

Carlos Muñoz-Piña, Sara Ávila, Luis Jaramillo,  
Alejandro Guevara and Iván Islas

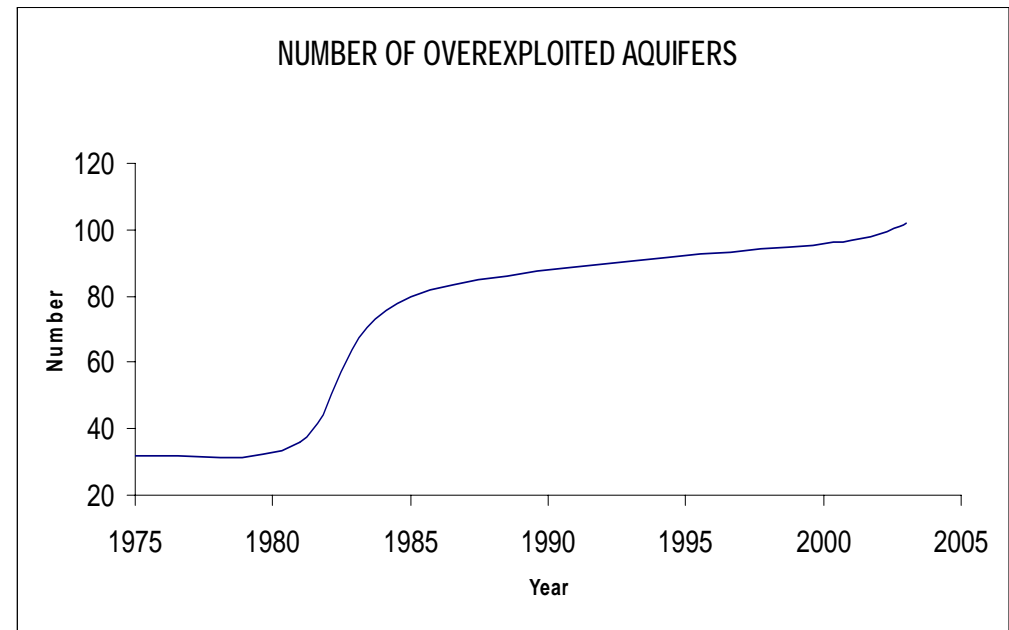
# Mexico has a severe crisis of aquifer overexploitation



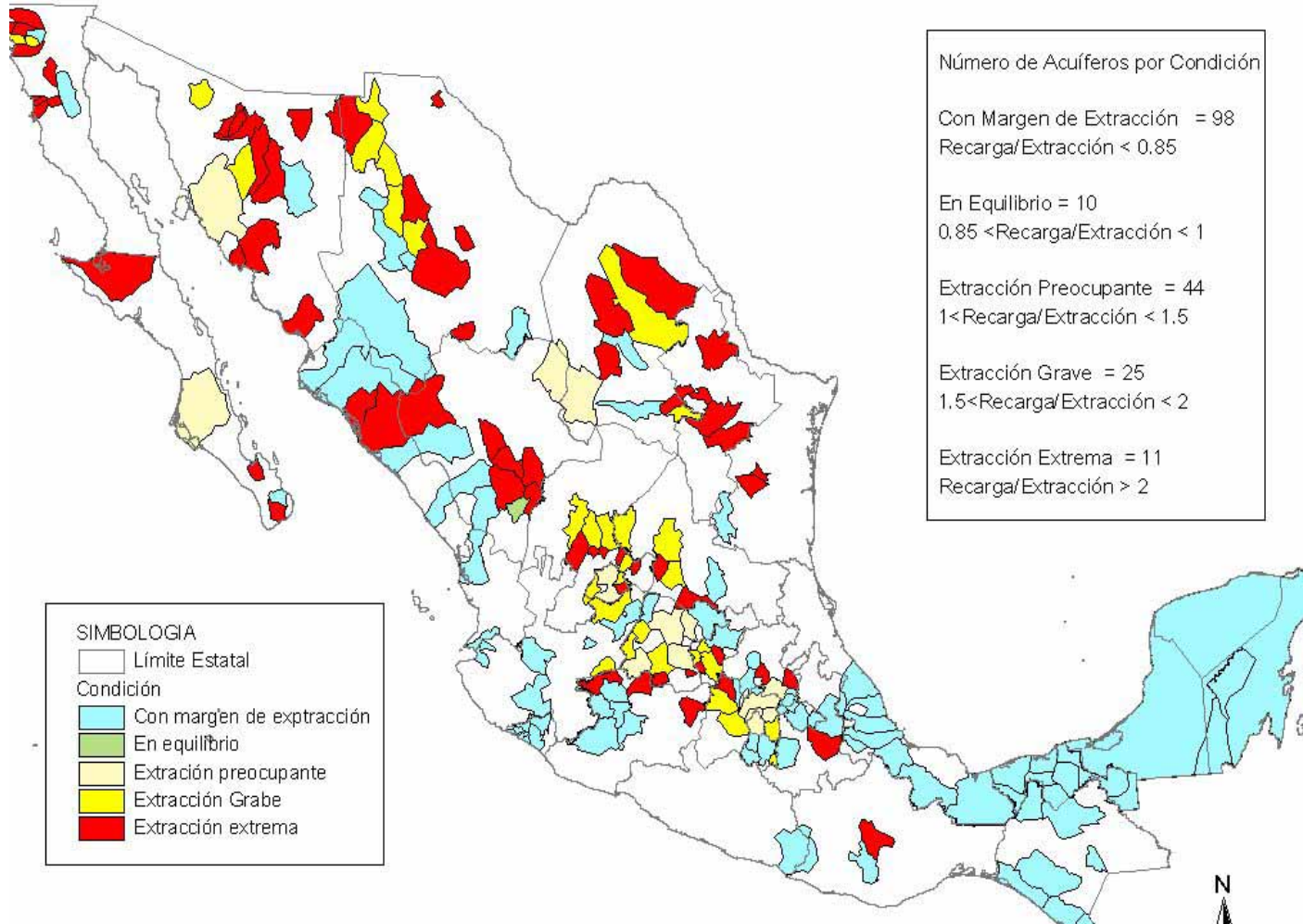
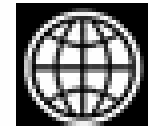
World Bank

💧 100 of the 188 most important aquifers are overexploited

- Present and future generations of farmers will face higher costs for pumping water
- Scarcity hinders urban economic growth and supply to households.
- Threshold crisis: saline intrusion, heavy metals



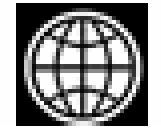
# LOCATION OF OVEREXPLOITED AQUIFERS



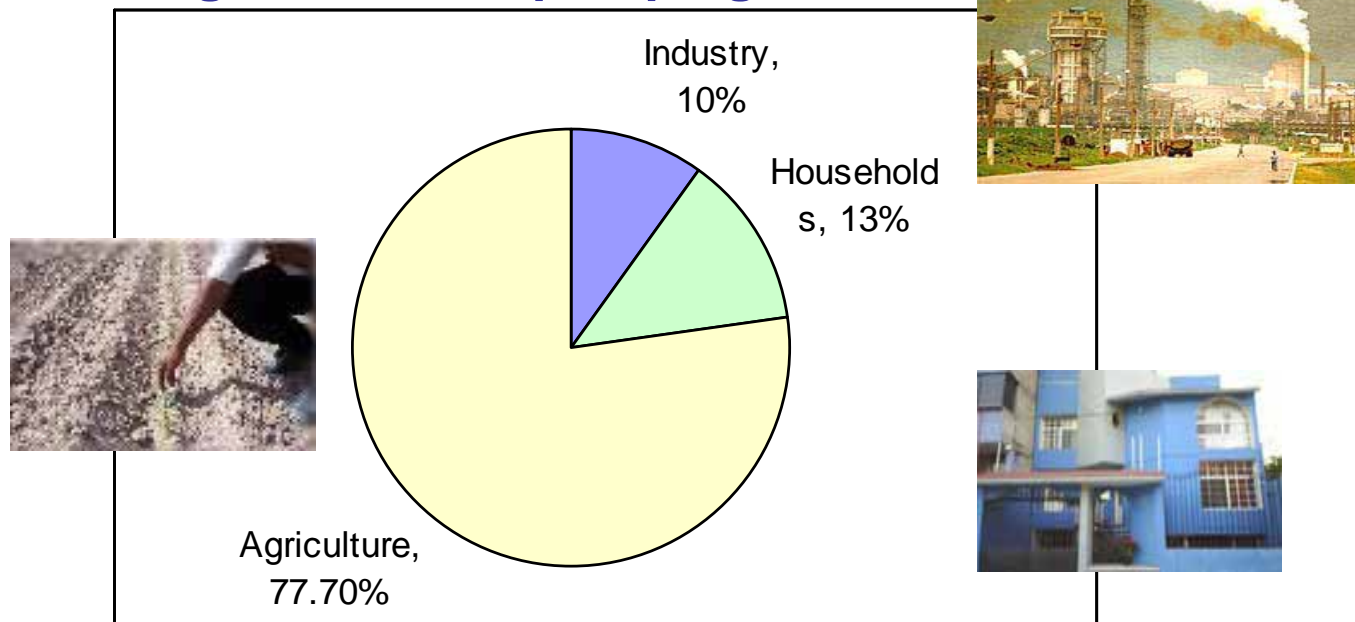
Aquifers in red, yellow and green are overexploited



# SUBSIDIES GIVE INCENTIVES TO OVEREXPLOITATION



- Agriculture uses 77% of all underground water.
- Concessions are poorly enforced
- Excess demand is encouraged by the subsidy to electricity used for groundwater pumping



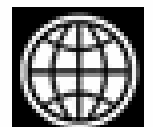
**Farmers pay less than 1/5 of the cost of generating and distributing electricity.**

# THE SUBSIDY FOR PUMPING WATER IS UNEVEN

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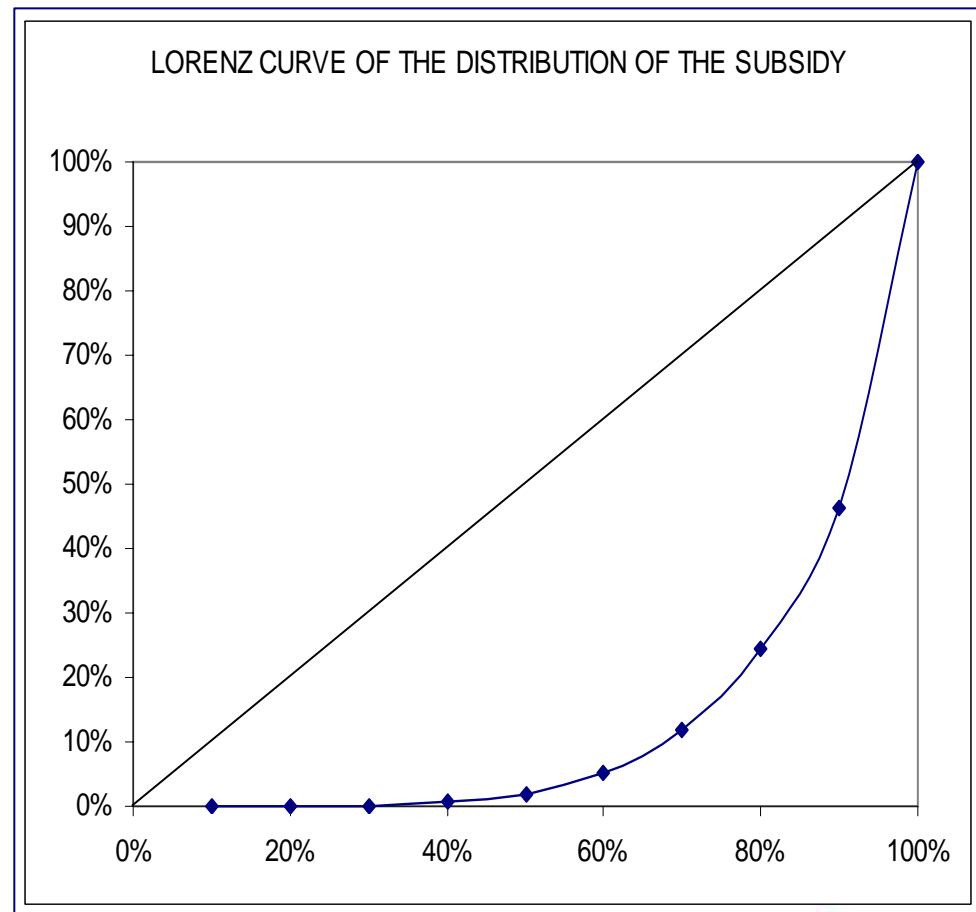


- ☑ The subsidy given to farmers through the electricity fees for pumping water is more than US\$ 670 million per year.
- ☑ Only 30% of all farmers in Mexico have any type of irrigation system which implies that more than 70% of all *campesinos* (peasants) receive none of this subsidy.
- ☑ Just a few farmers receive most of the subsidy. We estimate a Gini coefficient of 0.91 (1.00 would be total inequality)



# A SUBSIDY CAPTURED BY THE RICHEST FARMERS

DECILES	PERCENTAGE OF THE SUBSIDY THAT EACH DECILE RECEIVES
I	0.00%
II	0.02%
III	0.15%
IV	0.47%
V	1.3%
VI	3.3%
VII	6.8%
VIII	12.5%
IX	21.8%
X	53.7%



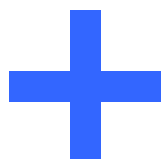
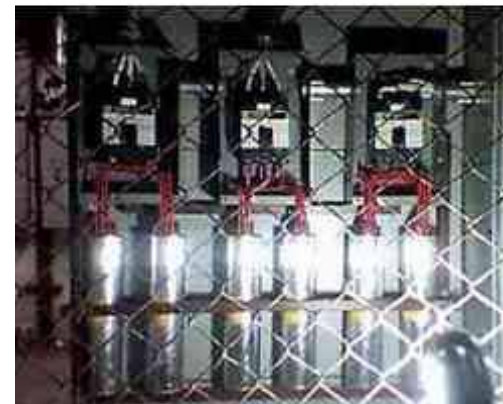
## COSTS OF THE SUBSIDY



World Bank

Average cost of	generating 1 kwh	⇒	0.63
	transmitting 1 kwh	⇒	0.81
Average total cost of 1 kwh		⇒	1.44

670 million US dollars per year



Costs of:

- ✓ Diminished water quality
- ✓ Harm inflicted upon aquatic ecosystems
- ✓ Saline intrusion in aquifers
- ✓ Lower volume for industry and households



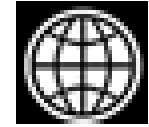
# THE SOLUTION IS DECOUPLING



World Bank

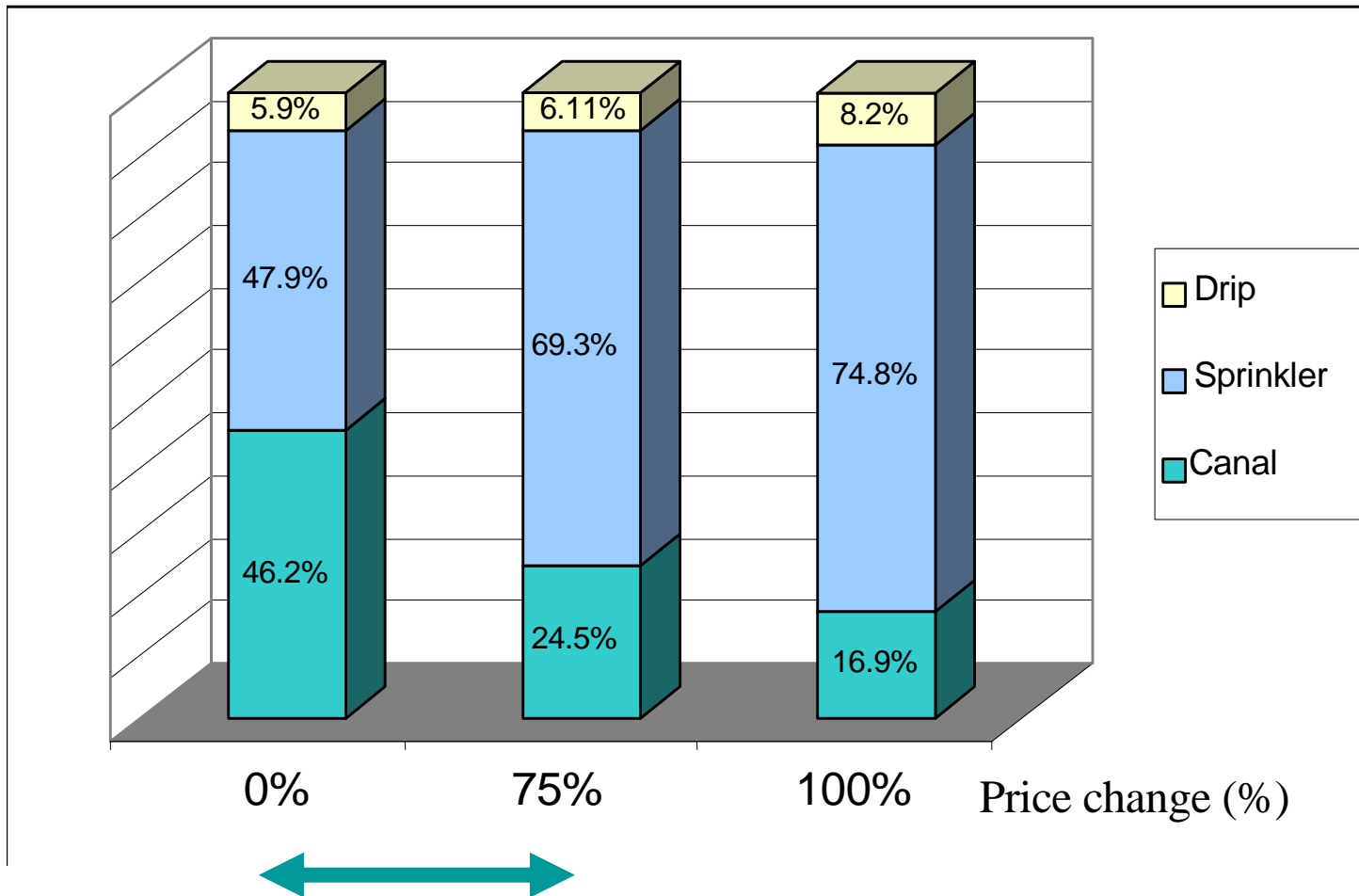
- ◆ Decoupling means increasing the price of electricity while giving the farmers the same amount of money through a direct transfer (i.e. in cash or debit card)
- ◆ The new price gives incentives to save: change crop patterns, reduce area, adopt water-saving technologies
- ◆ The transfer keeps farmer's welfare the same, plus some liquidity to undertake the necessary changes

# RESULTS FROM DECOUPLING



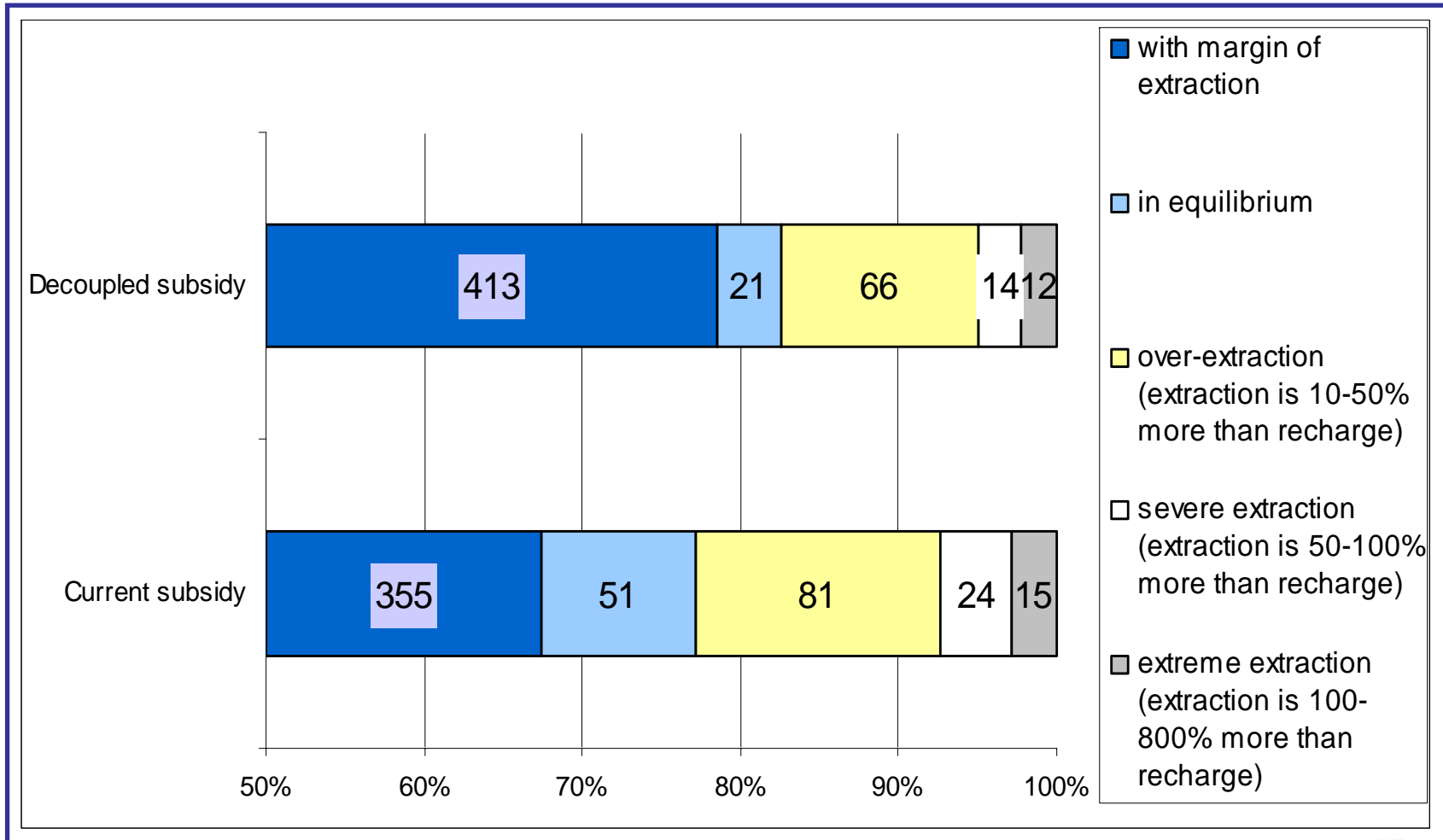
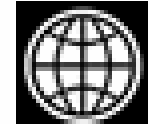
World Bank

## RESULT 1: INCENTIVES TO USE MORE EFFICIENT TECHNOLOGIES



# RESULTS FROM DECOUPLING

## RESULT 2: AQUIFERS WOULD BE RESCUED



# POLICY OPTIONS FOR DECOUPLING

## WHERE

is the measure undertaken

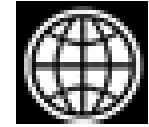
## TO WHOM

is the subsidy given to

## HOW MUCH

is transferred to each farmer

## POLICY OPTIONS - **WHERE**



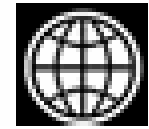
1. In all aquifers
2. Only in overexploited aquifers
3. Only in the extremely overexploited aquifers

Each 10% increase in price reduces water extraction by 1.5%

Differentiating sends the correct political signal

Slight reaction but no other way to curb demand

## POLICY OPTIONS – TO WHOM



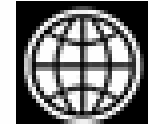
1. All irrigation farmers (1/5 are “irregular”)
2. Only to those with concessions

Discourage illegal extraction

Political opposition by illegal users, some sort of compensation needed

Illegal ones are gradually receiving less subsidy (shh! don't tell)

## POLICY OPTIONS – HOW MUCH



1. Average transfer per m<sup>3</sup> of concession (better/worse off)
2. Historical transfer to each farmer (makes inequality evident)

Where the water table is lowest farmers loose and vice versa

Transparency makes rain-fed farmers aware of the inequality

Actually, enough data to calculate both

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**THANK YOU !**

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