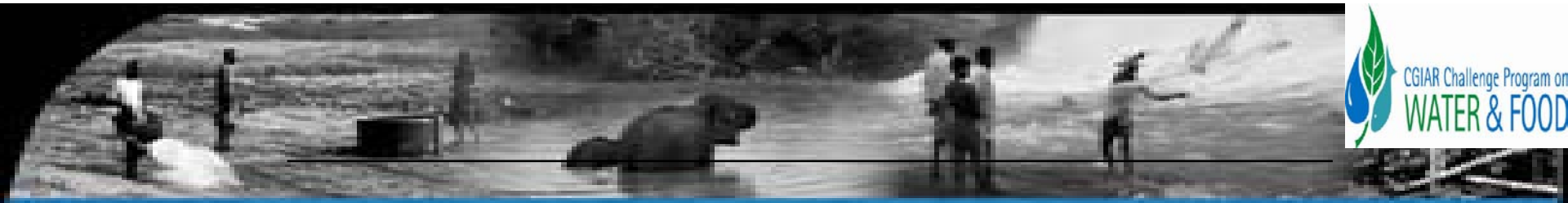

CGIAR Challenge Program on WATER & FOOD

Towards Sustainable Groundwater in Agriculture:
An International Conference Linking Science and Policy
June 15-17, 2010, San Fransisco

Groundwater a n Livelihoods:
South As ence and
Implications f Africa (SSA)

Internatio Institute

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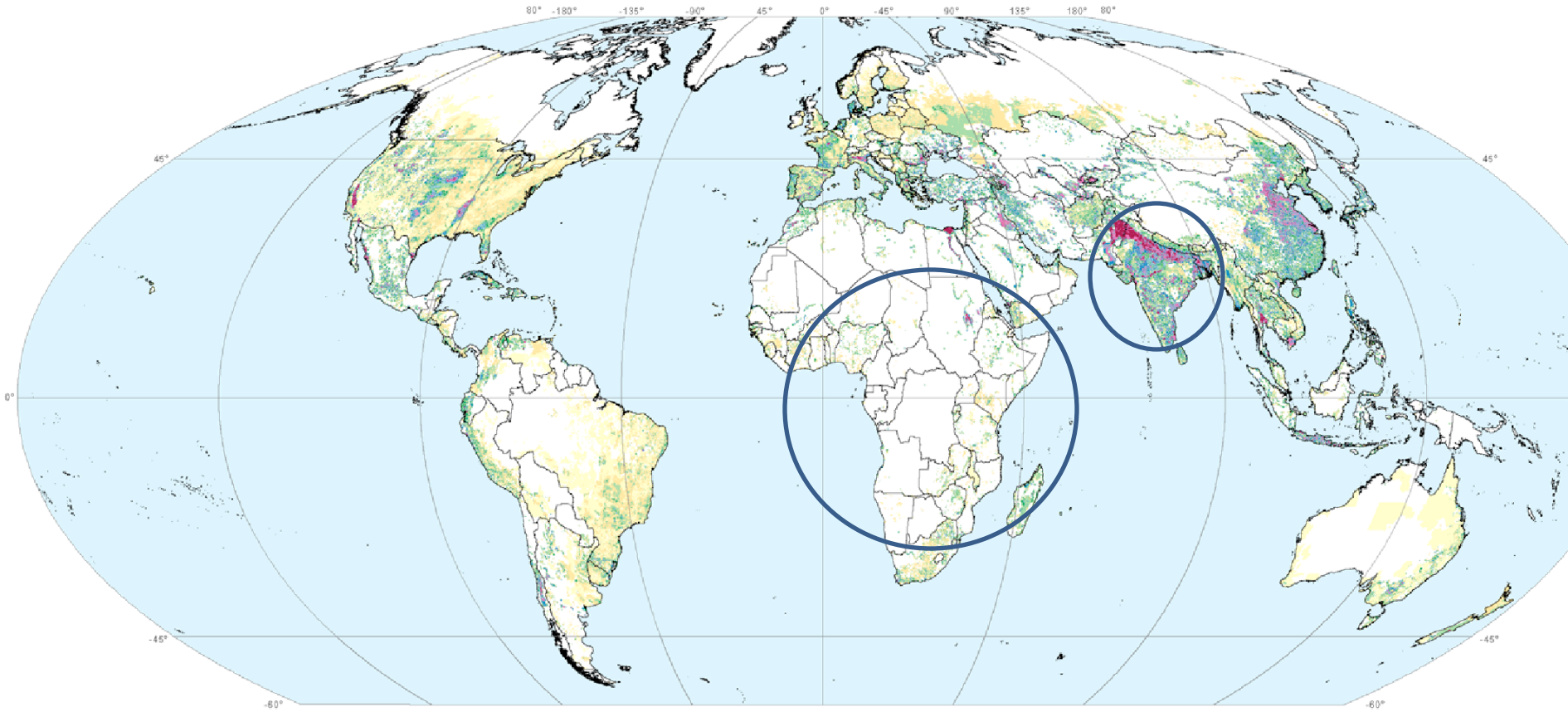
www.iwmi.org

Opium for one, elixir for another



Area under irrigation in percentage of land area

0	10 - 20
<0.1	20 - 35
0.1 - 1	35 - 50
1 - 5	50 - 75
5 - 10	75 - 100

The map depicts the area equipped for irrigation in percentage of cell area.
For the majority of countries the base year of statistics is in the period 1997 - 2002.

Projection: Mo

http://www.fao.org/ag/agl/aglw/aquastat/irrigationmap/index.stm

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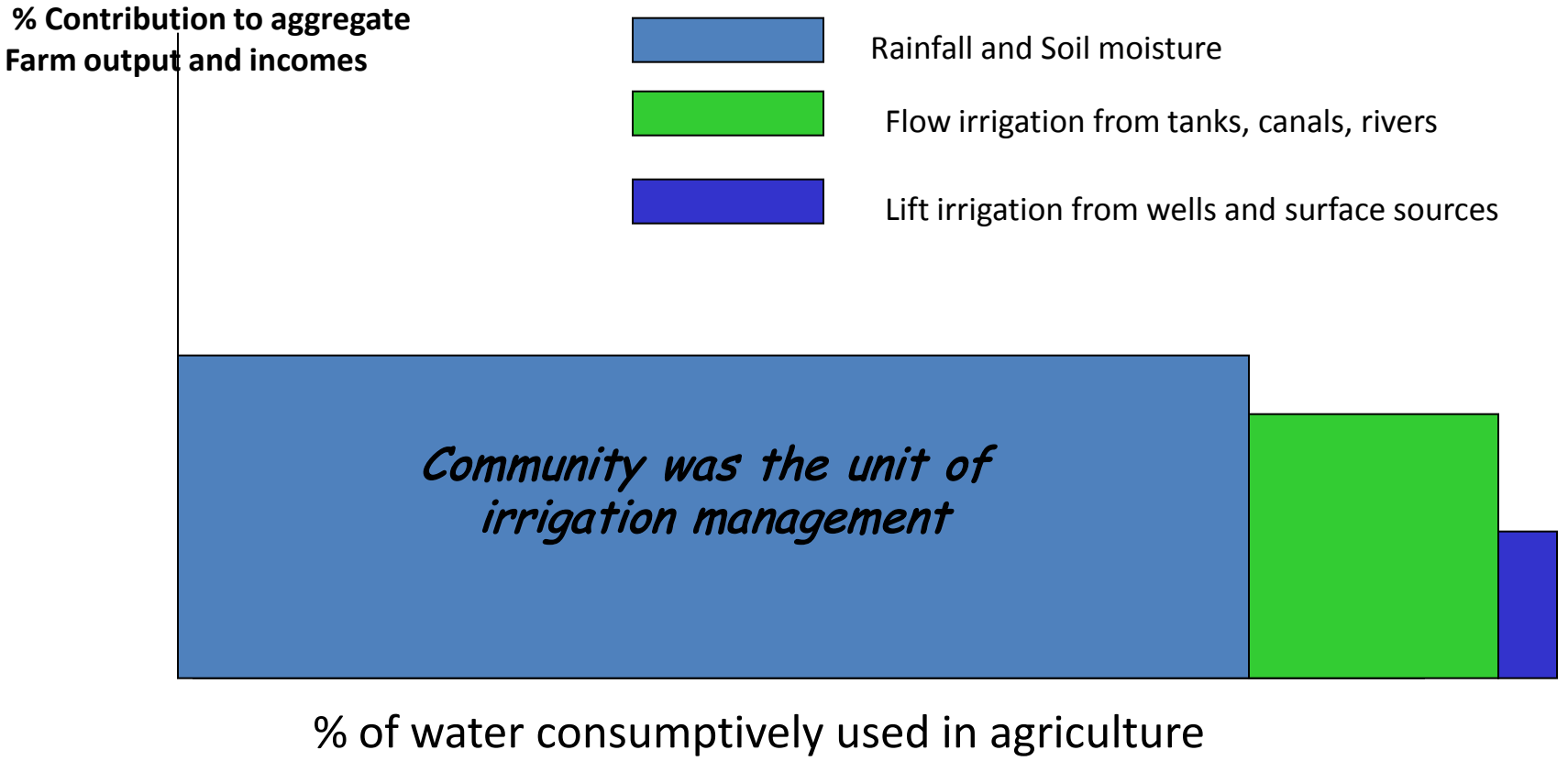
Highlights

- South Asia's groundwater boom threatened the resource but liberated the small farmer and made famines history.
- SSA remains vulnerable to famines. A SA-style groundwater boom can unleash a Green Revolution in SSA.
- Small holder groundwater boom in SSA promises all benefits but poses little threat to the resource.
- The challenge is how to catalyze SSA's groundwater revolution in the absence of SA's 'scope economies'.
- Present model based on promotion of treadle pumps and small motor pumps is unlikely to work.
- SSA needs a business model for groundwater irrigation industry . SA offers some lessons.

South Asia : Era of adaptive irrigation-up to 1830



South Asia: Era of Large-scale canal irrigation-1830-1970

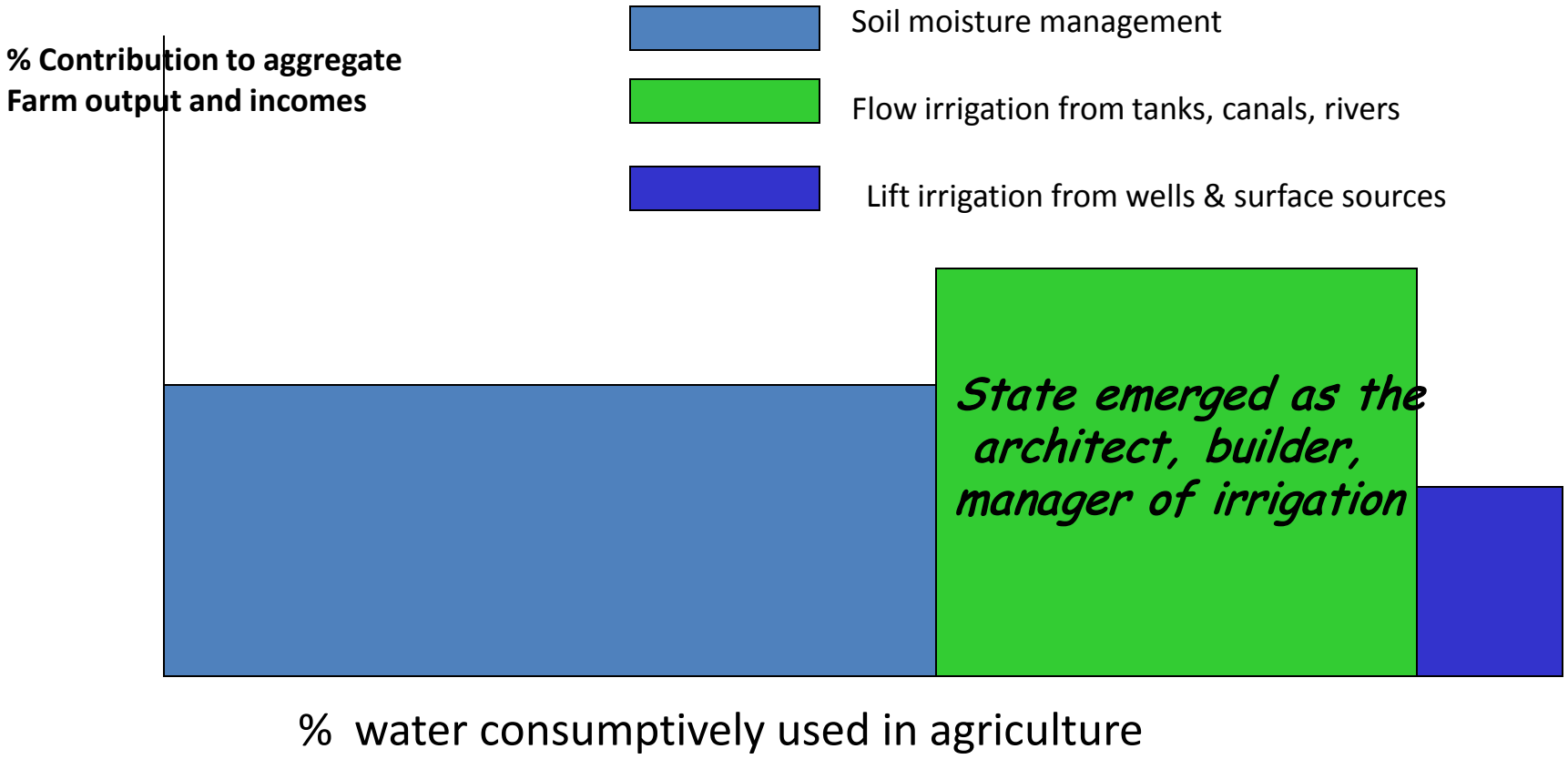
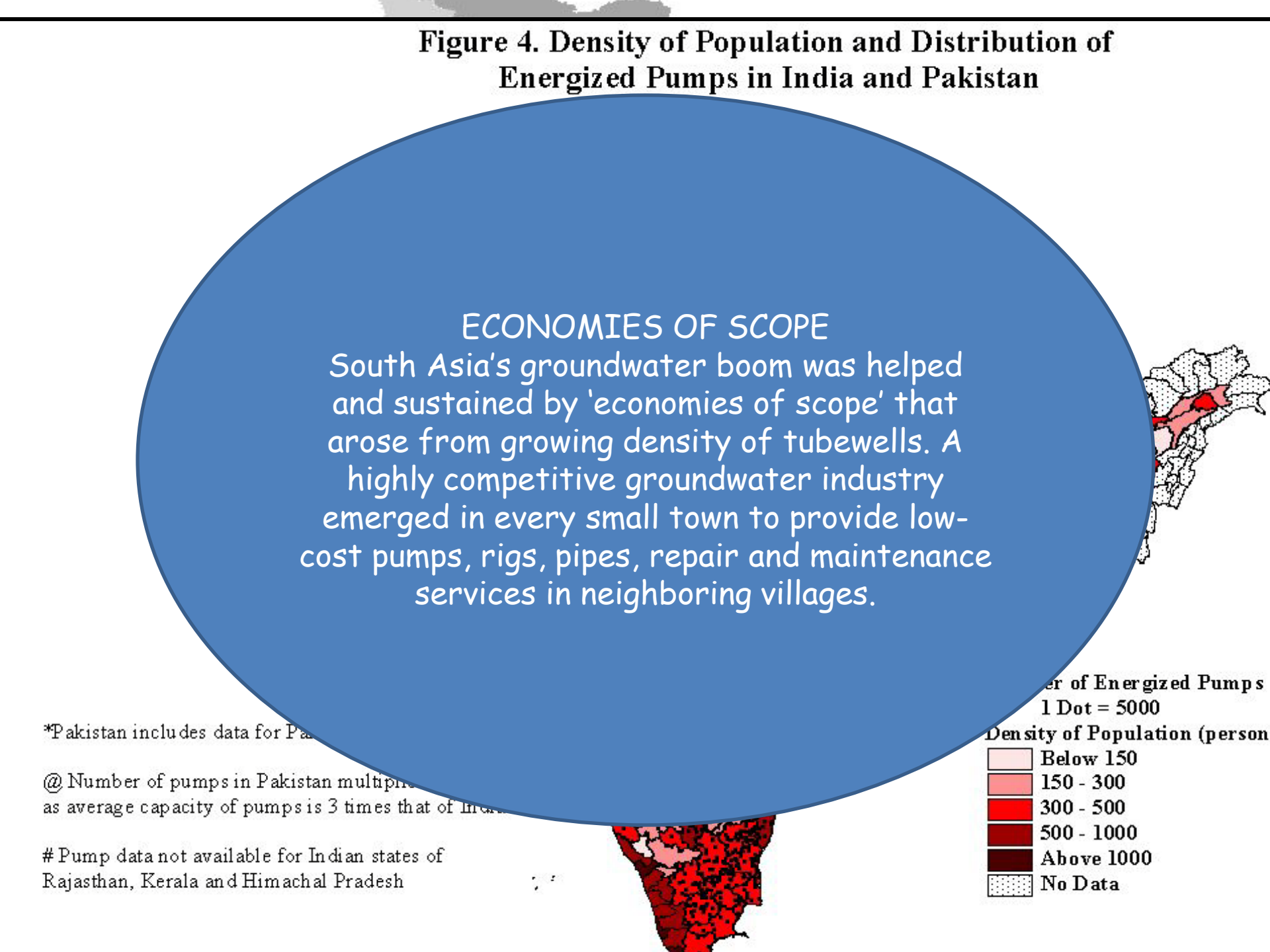


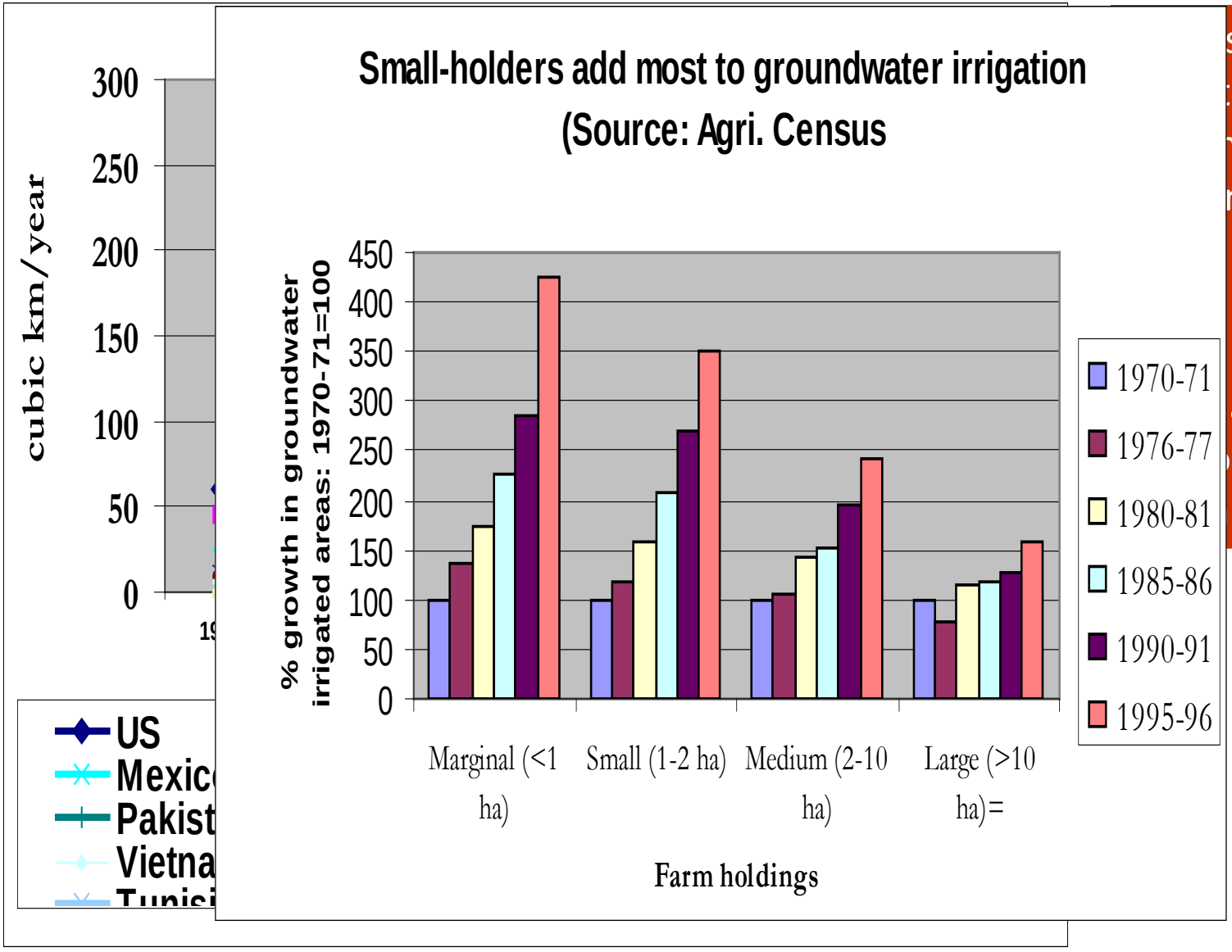
Figure 4. Density of Population and Distribution of Energized Pumps in India and Pakistan



ECONOMIES OF SCOPE

South Asia's groundwater boom was helped and sustained by 'economies of scope' that arose from growing density of tubewells. A highly competitive groundwater industry emerged in every small town to provide low-cost pumps, rigs, pipes, repair and maintenance services in neighboring villages.

South Asia is the world's largest user of groundwater in agriculture in the world.



s over 25 million
tion wells. The
n adds 0.8
n/year.

fourth cultivator
an irrigation well;
wners depend on
dwater markets.

Pros and Cons of Groundwater Revolution

- Negatives

- *SUSTAINABILITY?*
- *Resource depletion and quality deterioration*
- *Chaotic, unplanned*
- *Informal*
- *Govt. has little control*
- *Role of science indeterminate*
- *Role of state indeterminate*

- Positives
- *Biggest livelihood and food security promoter*
- *Pro-poor; it made irrigation democratic & spatially equitable*
- *On-demand irrigation*
- *Intensification+diversification*
- *High water productivity*
- *Private capital & enterprise*
- *Helped confront pop. pressure*
- *Some for all than all for some.*

Famines were endemic to South Asia; Bengal famine of 1942 killed more people than the Holocaust

- But
- boo

South Asia uses >280 km^3 of GW in irrigation every year. But..

Ethiopia likely needs only 3-5 km^3 of GW Irrigation to Draught-proof Its agriculture.

Era	# & severity of famines
	XXX
330-	XXXXX
istic irrigation-1970-today	X

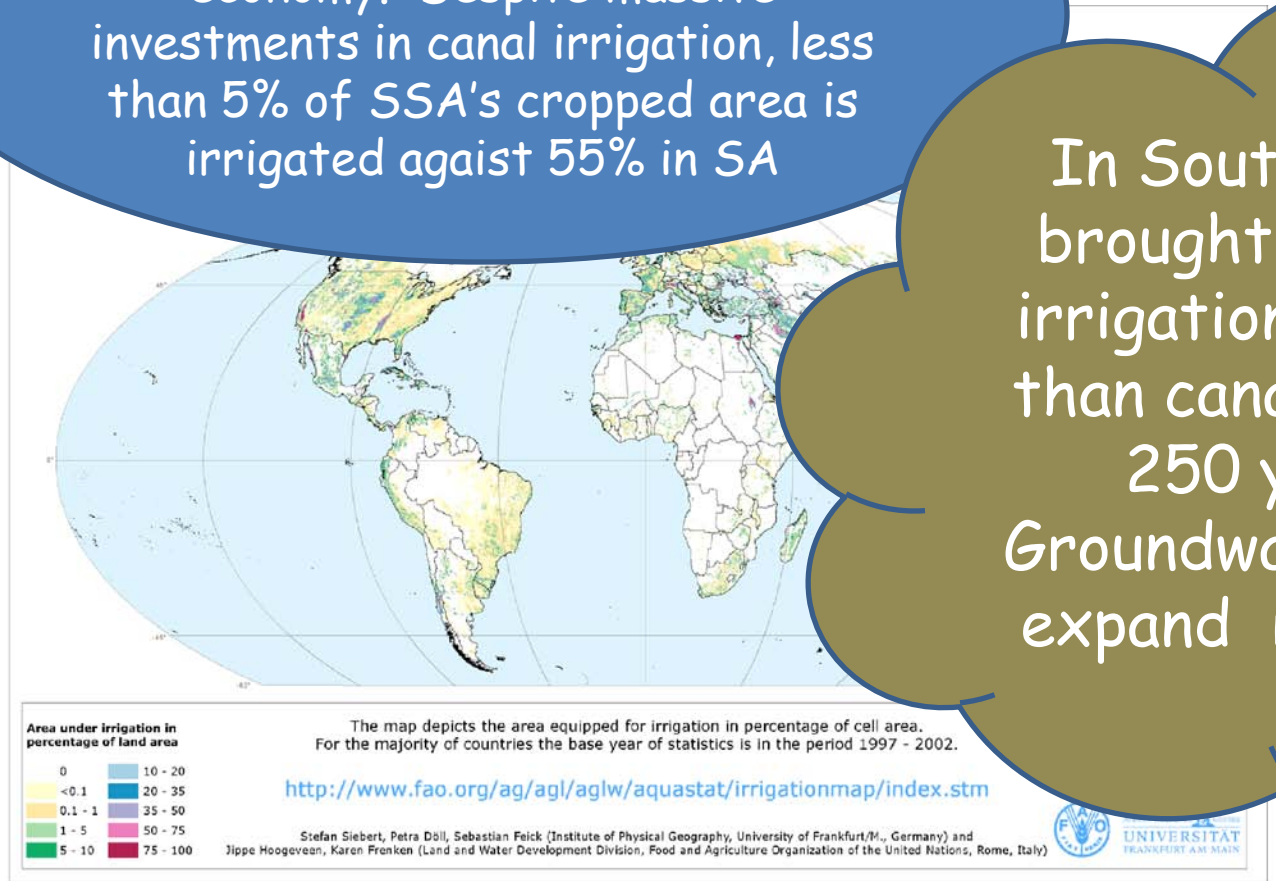
Is Indian Experience Relevant to Sub-Saharan Africa?

	India	Sub-Saharan Africa
Is rural poverty a major challenge?	Yes	Yes
Is small h… fa…		
Hyd…		…drock
Groundwater use … farming	…	Very low
Drought risks? Risks of famines?	Very low now	High
Productivity of small holder farming?	Moderate but rising	low

Why has SSA not witnessed a groundwater revolution? Can it? Would it help? Can SSA reap the benefits while avoiding the environmental costs?

Can a groundwater revolution help SSA small holders?

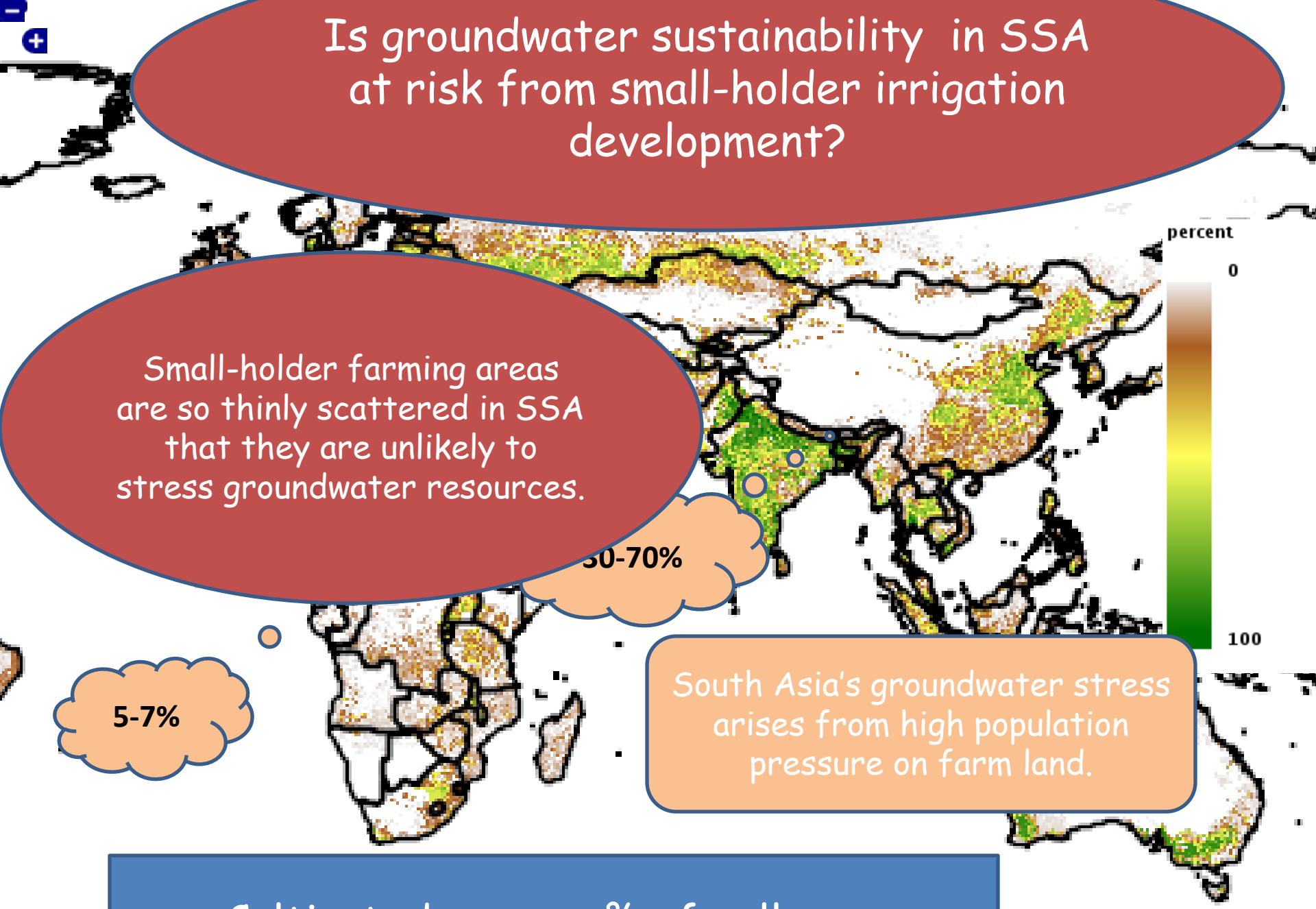
SSA's food security remains vulnerable to famines, as does its economy. Despite massive investments in canal irrigation, less than 5% of SSA's cropped area is irrigated agaist 55% in SA



In South Asia GW wells brought more land under irrigation in past 40 years than canal irrigation did in 250 years before . Groundwater can help SSA expand irrigation quickly.

Is groundwater sustainability in SSA at risk from small-holder irrigation development?

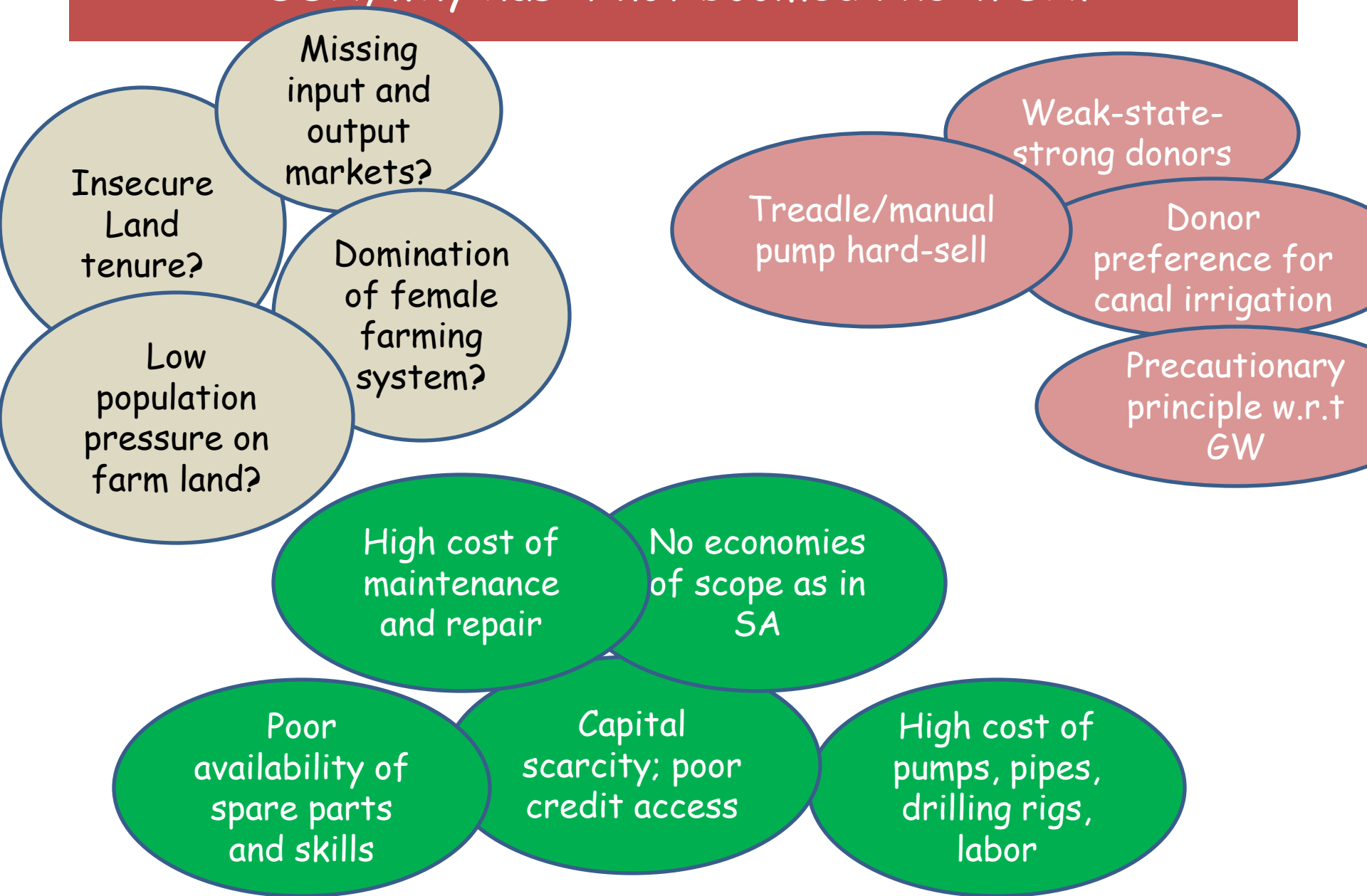
Small-holder farming areas are so thinly scattered in SSA that they are unlikely to stress groundwater resources.



South Asia's groundwater stress arises from high population pressure on farm land.

Cultivated area as % of cell area

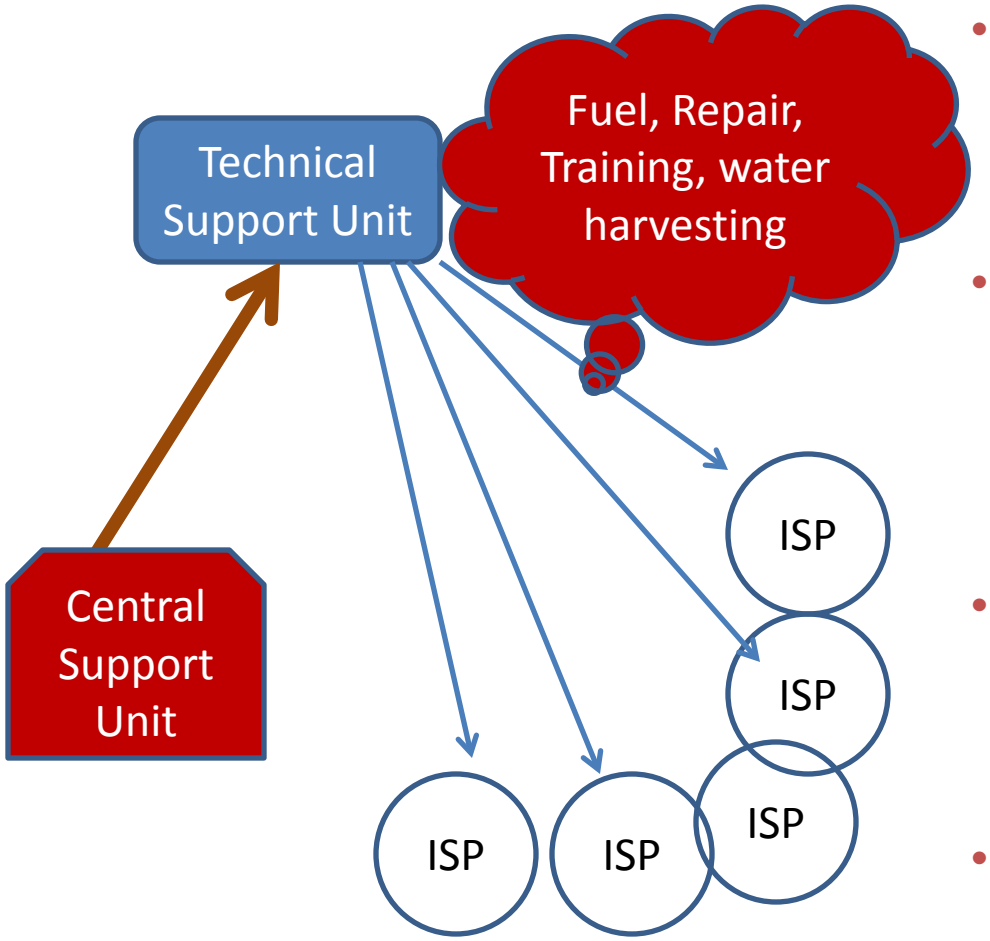
If small-holder groundwater irrigation is so good for SSA, why has it not boomed like in SA?



Groundwater Irrigation Business Model for SSA

- Following brief success of treadle pumps in Bangladesh, all NGOs have been promoting manual irrigation for 15 years.
- But this has not succeeded; TPs are disadopted even in Bangladesh in favor of cheap Chinese motor pumps.
- In SSA, promoting motor pumps too will not help because of the absence of scope economies and low pump utilization factors. Pump use costs in SSA are higher than in SA.
- What will work best in SSA are Assisted Pump Irrigation Markets (APIMs) that mimic groundwater markets in SA.

Assisted Pump Irrigation Service Markets (APIMs) for SSA



- In each community,train 6-8 young women to operate as Irrigation Service Providers (ISPs)
- Set them up with a borehole, light-weight motor pump and 250 m of rubber pipes on LEASE BASIS;
- They sell irrigation to small holders at rates that cover fuel and service charge
- ISPs are supported by a Technical Support Unit

Assisted ISM's can kickstart small-holder irrigation in SSA

- Assisted ISMs overcome small-holders' constraints of: [a] land tenure insecurity; [b] high cost of pumps, pipes and rigs; [c] capital scarcity and poor access to irrigation credit; [d] high maintenance and repair cost; [e] non-availability of spares and skills.
- The ownership cost may be high but the use cost is low
- Women are pitchforked into centre-stage of small holder economy;
- Poor women earn significant supplemental income as ISP's;
- Central and Technical Support Units can motivate and assist in local groundwater resource and recharge management.
- 3-5 million ISPs can be set up at a capital investment of US $ 1-1.5 billion, which is the cost of a mid-sized government irrigation system.

This was a policy talk focusing on the groundwater revolution in South Asia and its lessons for Sub-Saharan Africa .

The Key Breakthroughs needed to drought-proof Sub-Saharan Africa are two: [a] a robust assessment of the regions groundwater resources and hydro-geologic conditions; and [b] a business model for groundwater irrigation industry that is appropriate to the SSA's small-holder agrarian context.

THANK YOU.