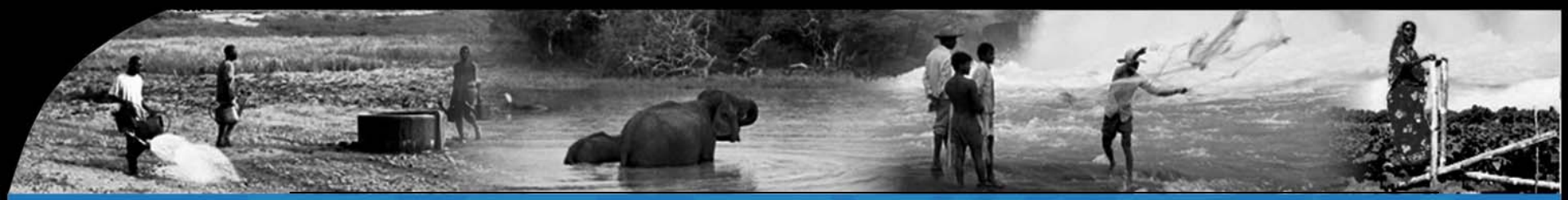

Enabling the ‘Blue Revolution’

Colin Chartres*
Director General

International Water Management Institute

* With acknowledgements to Samyuktha Varma

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Water availability has changed, but our habits have not

- Water a basic human right / free good *irrespective of use*
- Water allocations based on riparian or prior appropriation systems with *limited opportunities for change*
- Water scarcity not factored into water pricing
- Water governed and managed on a sectoral basis
- Groundwater use anarchic in some countries
- Environmental water needs seldom heeded, to our peril
- Water and crop productivity stagnated since the green revolution, which generally by-passed Africa
- Gender issues ignored with respect to water governance

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The Paradox and the Challenge

Feeding another 2.5 billion people with less water for agriculture than we have now

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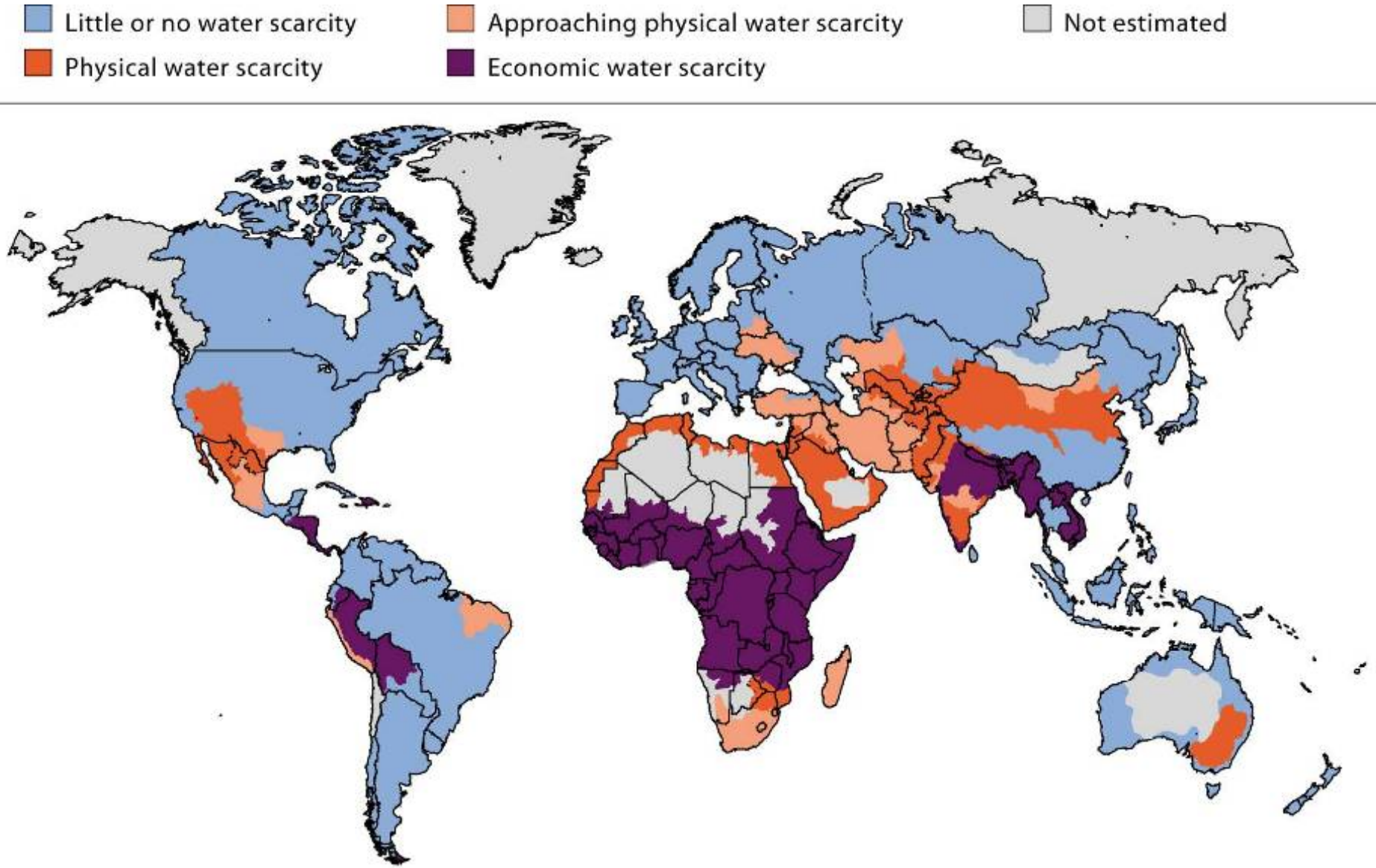
The world is currently water scarce



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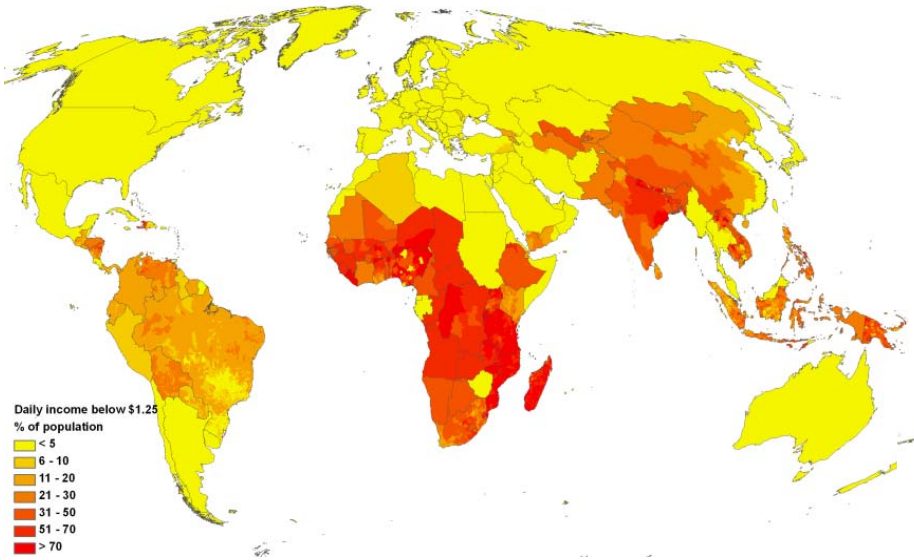
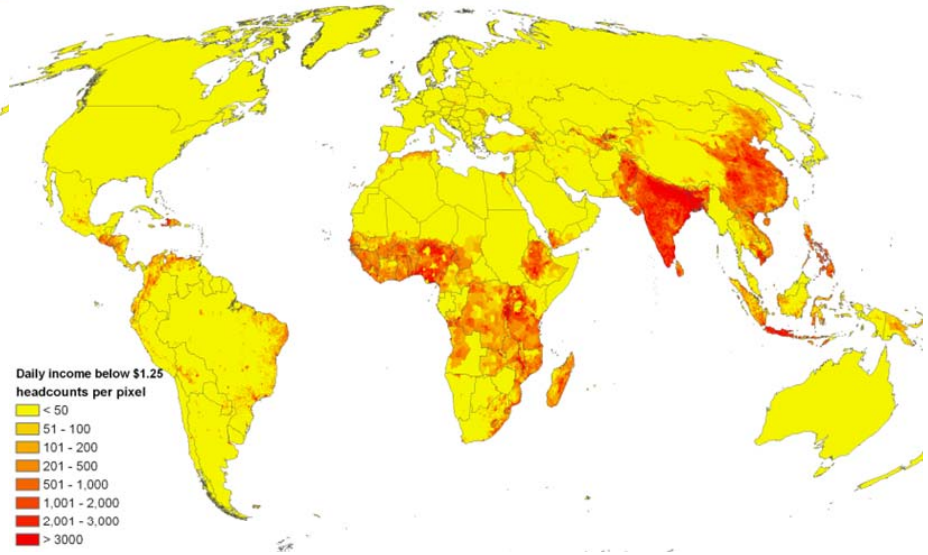
Focus has to be on providing drinking water, sanitation and water for agriculture to the poor

Prevalence



Number



Source: Stan Wood et al. (IFPRI) 2009.

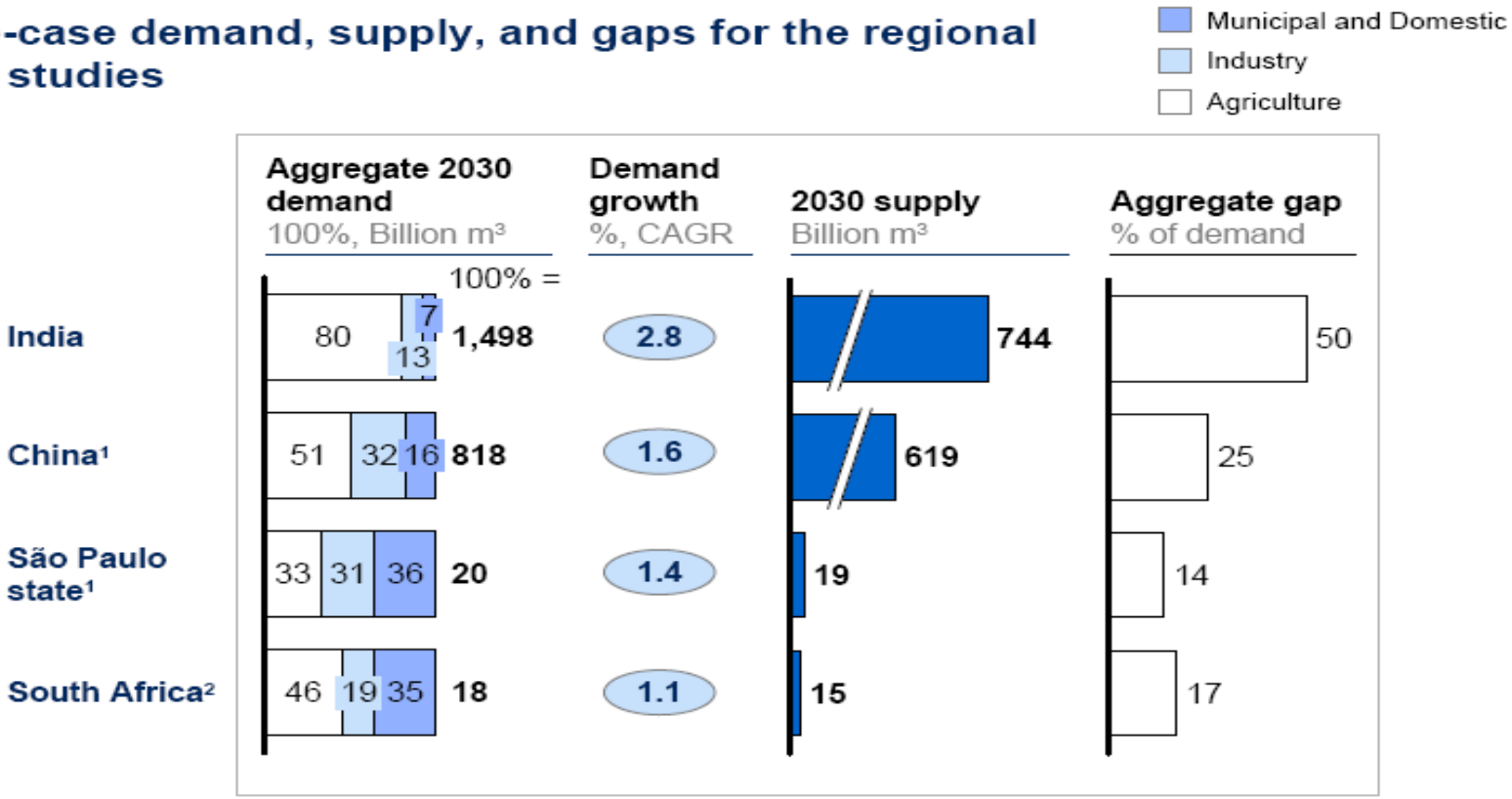
Solutions will depend on governance reform investment and science

If we are to tackle the worlds water and food problems we need to do this via:

- *improving water availability to all via more effective and efficient governance including equitable allocation, institutional overhaul, valuing and pricing water appropriately etc*
- *increasing water productivity at basin to field scales*
- *reducing health and environmental risks from contaminated waters*

Water is fundamental to producing more food but there is a supply-demand imbalance

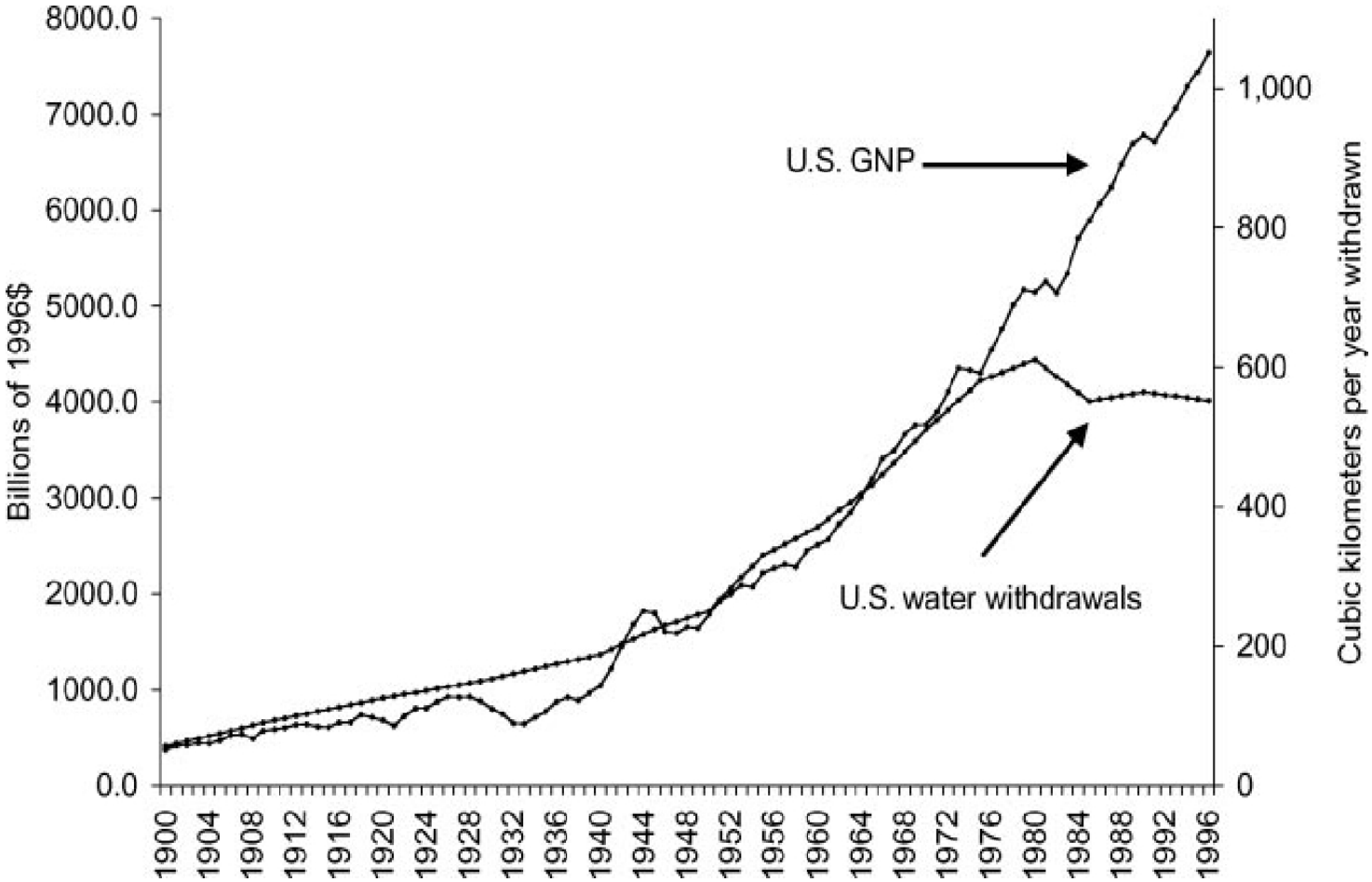
Base-case demand, supply, and gaps for the regional case studies



1 Gap greater than demand-supply difference due to mismatch between supply and demand at basin level
2 South Africa agricultural demand includes a 3% contribution from afforestation

SOURCE: 2030 Water Resources Group

There is, however, potential to address the water gap



SOURCE: Gleick 2003

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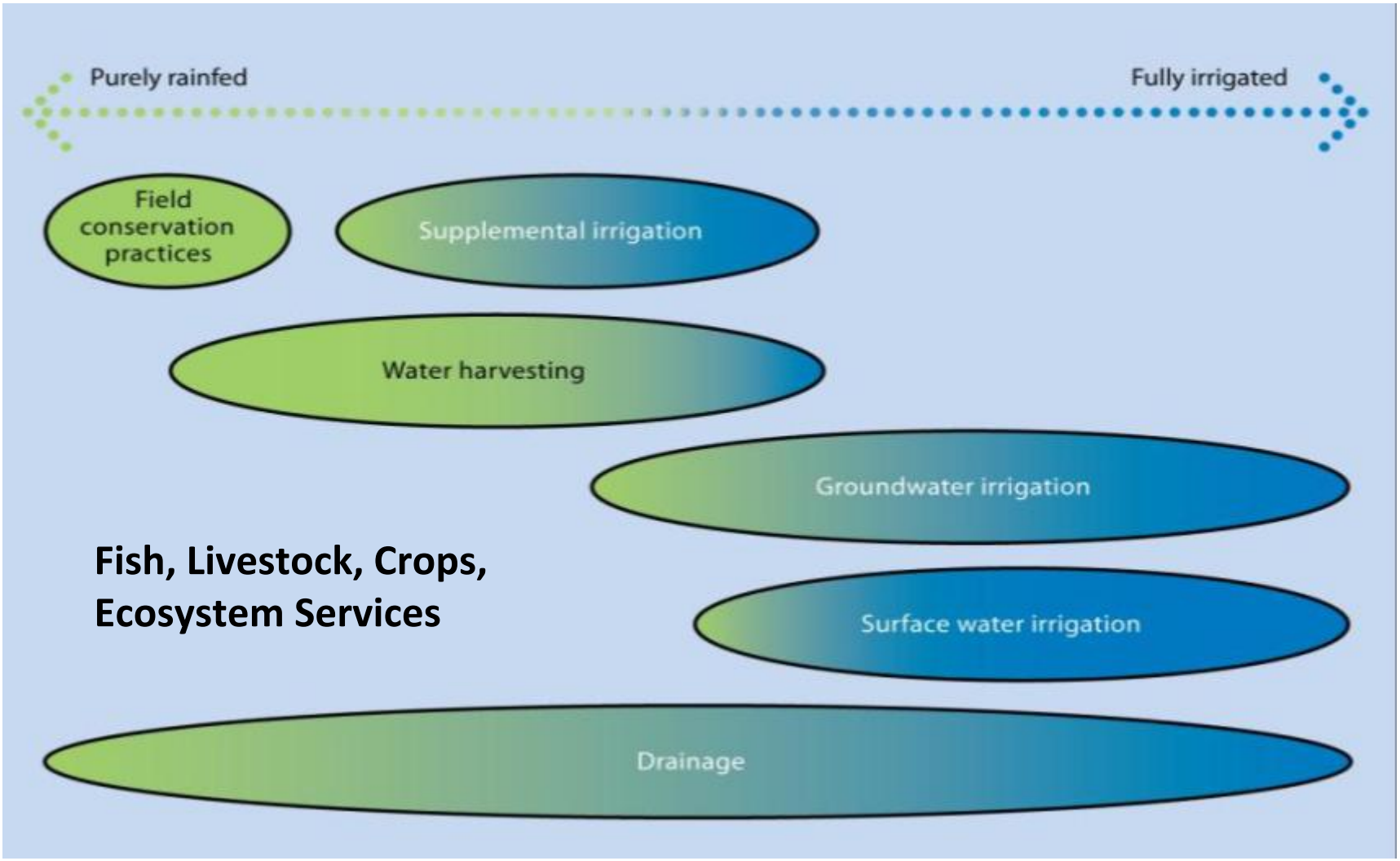
Solutions - Think Differently About Water
What are theAgricultural Water Management Options?



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Adapting yesterday's systems to tomorrow's needs: What can be done?

Policies needed to adapt infrastructure to current and future needs.

Agricultural strategy and stage of development	Agricultural and economic situation	Most appropriate strategy
Focus outside agriculture Developed economies	• Highly diversified agriculture • Competition for water and land • High environmental awareness • Rapid urbanization and shifts in diets • Assuring minimum food self-sufficiency is still a stated goal	• Adapt large-scale systems originally designed for cereal production to high-value farming • Encourage private investments and conjunctive use • Improve water productivity • Ensure full cost recovery • Invest in reuse of wastewater
Export-oriented agriculture Intermediate/ transition economies	• On the way to diversification, though cereal crops still dominate • Quick demographic transition • Export earnings from agriculture a major source of revenue	• Stabilization of area under cereal cultivation • Emphasis on smaller schemes dedicated to producing high-value crops • Emphasis on financial viability of schemes • Adopt water-saving technologies
Agriculture dependent Developing economies	• Alleviating poverty and achieving food security are stated goals • Few alternative livelihood options • High population pressure	• Concentrate on producing cereals • Develop new infrastructure through strong government support • Source external funding for developing new infrastructure and modernizing existing schemes

Major pathways to meet future food demand in Asia

- Invest in irrigation
  - ✓ Improve productivity of existing systems (How?)
  - ✓ Expand irrigation (Where and of what type?)
- Reform irrigation and unlock value
- Invest in rainfed agriculture
- Promote trade from water rich highly productive areas
- Invest in and share data

Water development in Africa

- There is huge potential to affect poverty in Africa through irrigation development.

- Water infrastructure in Sub-Saharan Africa needs to be developed as a range of agricultural water management interventions – from full, to supplemental, on-farm and basin-wide options.

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Potential of interventions Sub-Saharan Africa

All Sub-Saharan Africa	Full irrigation (IP-1)	Supple-mental irrigation (IP-2)	Soil Moisture Mgmt (IP-3)	Watershed Mgmt (IP-4)	Total**
No. of rural beneficiaries (millions)	18.6	30	125.8	240.7	279.3
Of which considered poor (millions)	4.6	7.2	27.9	57.2	65.7
No. of hectares (millions ha)	9.4	15.2	63.6	422.8	458.8

** Totals do not add up as watershed management cuts across and partly overlaps with other IPs.

Costs summary table Sub-Saharan Africa

All Sub-Saharan Africa	Full irrigation (IP-1)	Supple-mental irrigation (IP-2)	Soil Moisture Mgmt (IP-3)	Watershed Mgmt (IP-4)	Totals
Investments per ha (US$/ha)	4276	3815	175	156	252
'Soft' components (US$/ha/yr)	428	382	18	16	25
Recurrent cost (US$/ha/yr)	128	114	5.3	2.3	7.6
Total Investments (billions US$)	40	58	11	66	115

Cost Benefit Analysis for SSA: conclusions

- DON'T FORGET RAINFED AGRICULTURE: Better soil moisture management has the greatest potential in terms of number of beneficiaries and across wide areas is highest Also investment costs per hectare and beneficiary is lowest.

- Under the current cropping pattern only interventions under better soil moisture management are economically feasible (even with high market access) because of the high initial investment costs of full and supplemental irrigation.

- BUT if cropping patterns shift to higher value crops and if these crops can be marketed (this assumes marketing infrastructure!) irrigation becomes the most interesting option: number of beneficiaries, the NPV and hectares are highest under IP 1

- Investments in poor countries in SSA may not be immediately profitable because of lack of infrastructure. The availability of developed markets is a factor in the profitability of investments. AWM strategies must always be combined with interventions focussed on market strategies.

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Investing in the blue revolution

- A range of small-scale AWM interventions exist across the purely rainfed (‘green’ water) to fully irrigated (‘blue’ water) continuum.
- To support poverty alleviation we need to be highly sensitive to biophysical, social, economic and institutional settings.
- Looking across scales - AWM interventions require a basket of ‘hard’ (technologies) and ‘soft’ (community mobilization, knowledge transfer) components at both field and watershed scales.
- Watershed management with high community participation is associated with larger benefit-cost ratios and increased sustainability compared with purely technical interventions.
- *We can’t achieve much of this without appropriate governance frameworks and these are often rudimentary*

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What kind of difference can we make?

- Potentially **benefit** 65 million rural poor in SSA and 70 million rural poor in India (outside formal irrigation districts), with respective **increases in agricultural production** estimated at 30% and 50%.

- Total **investment cost** - $115 billion in SSA and $156 billion in India.

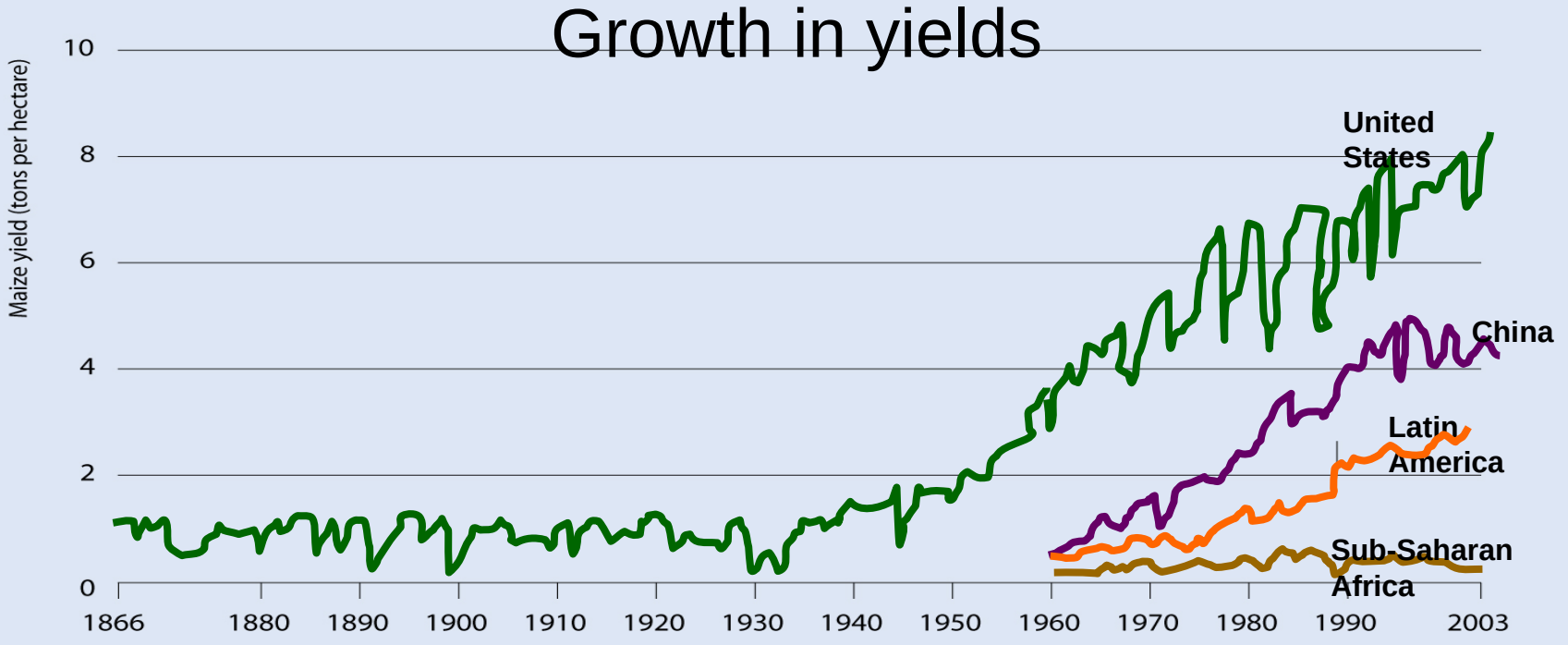
- For SSA, Many full/supplementary irrigation interventions for the current crop portfolio only become profitable if at **least 50% of initial investment costs are provided as subsidies by donors/governments**.

Next steps - The Reform Agenda

We will not be able to double food production over the next 40 years if we continue as we are. We need:

- **science to increase awareness of severity of issues amongst politicians and policy makers**
- **options for water reform to be shared, presented and discussed openly**
- **water data, information and knowledge to be shared**
- **the true value of water to be recognized.**
- **to protect the rights of the poor while considering the economic value of water**
- **looking out for the security aspect; people need water; social aspect; resilience**

Solutions - We have to close the productivity gap in Africa



Source: U.S. data, U.S. Department of Agriculture's National Agricultural Statistics Service; all other countries and regions, FAOStat.

Yields increases stagnant in Africa and beginning to reduce elsewhere largely because of declining investment in agriculture and agricultural R&D

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Required Investment in Agriculture

- Annual investment in agricultural development need to increase by **50% (from $142 -209 billion)** to meet food demands (FAO)

- The CGIAR suggests a 3 fold increase in total R&D from **($5 – 16 billion)** is needed to underpin this investment. (The CG's current budget is about $0.5 billion)

- **$270 billion dollars** of investment in agricultural water can significantly help almost a billion people in Africa and South Asia.

- **$16 billion per year** in agricultural R&D can turn around yield stagnation

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Conclusions

- Scientific evidence and underpinning R&D are the basis for investment
- There is compelling evidence that the decline in ODA expenditure on the agriculture sector has lead to declining rates of productivity increase. If this continues we will not be able to feed the world in another 30-40 years.
- The costs of preventing a global food and water crisis and its social consequences are small compared to that of the financial crisis bail out (estimated at >$10 trillion by the BBC).