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UNESCO Chair in
Water Economics and
Transboundary Water Governance



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Global Food and Water Gaps

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The Australian National University

Launch of Food Policy Institute

5 June 2013

“The growing threat to the world’s food supply deserves the urgent attention...No one country can cope with this problem.”

Henry Kissinger (US Secretary of State) on
24 September 1973

Overview

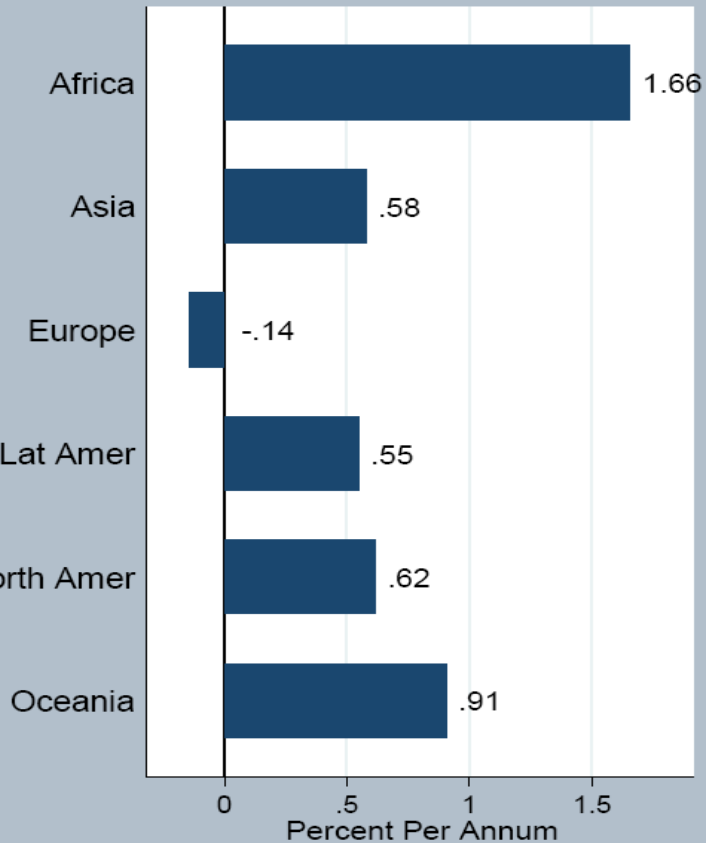
- I. Population and Food
- II. Food Production
- III. Water Threats
- IV. Bridging Food-Water Gaps
- V. Concluding Remarks



I. Population and Food

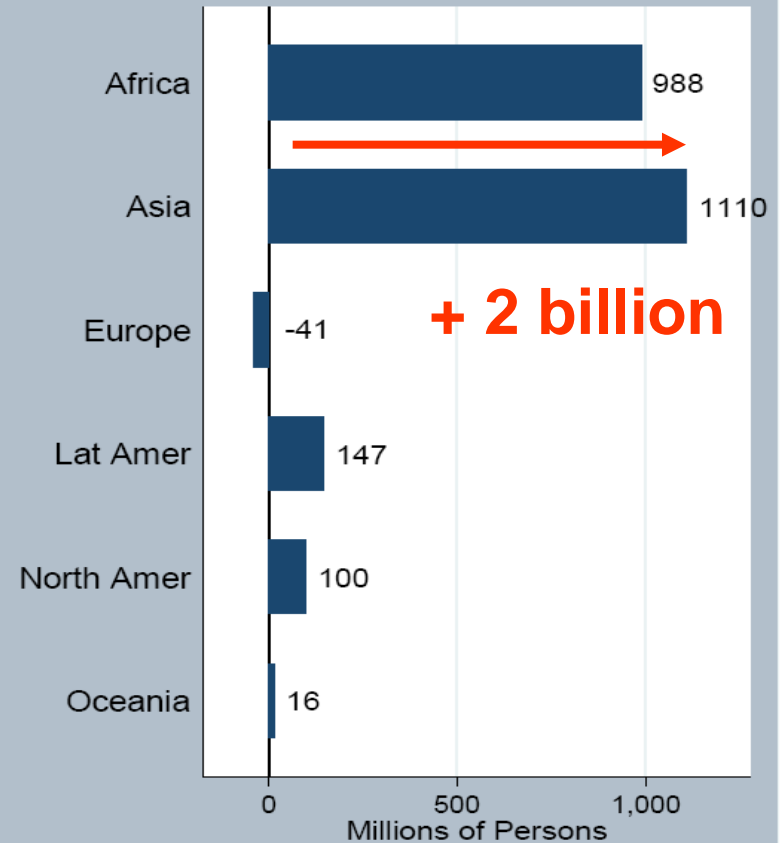
Population Growth

Population Growth Rate 2009-2050



Source: UN 2009

Population Growth 2009-2050



Source: UN 2009

Population and Food Demand

- Since 1960 world population more than doubled but cereal production tripled. Most of this increase due to increased crop yields.
- Currently about one billion people remain undernourished.
- To avoid further hunger world needs at least 30% increase in food supply to maintain current situation but this will require much more water and other inputs.



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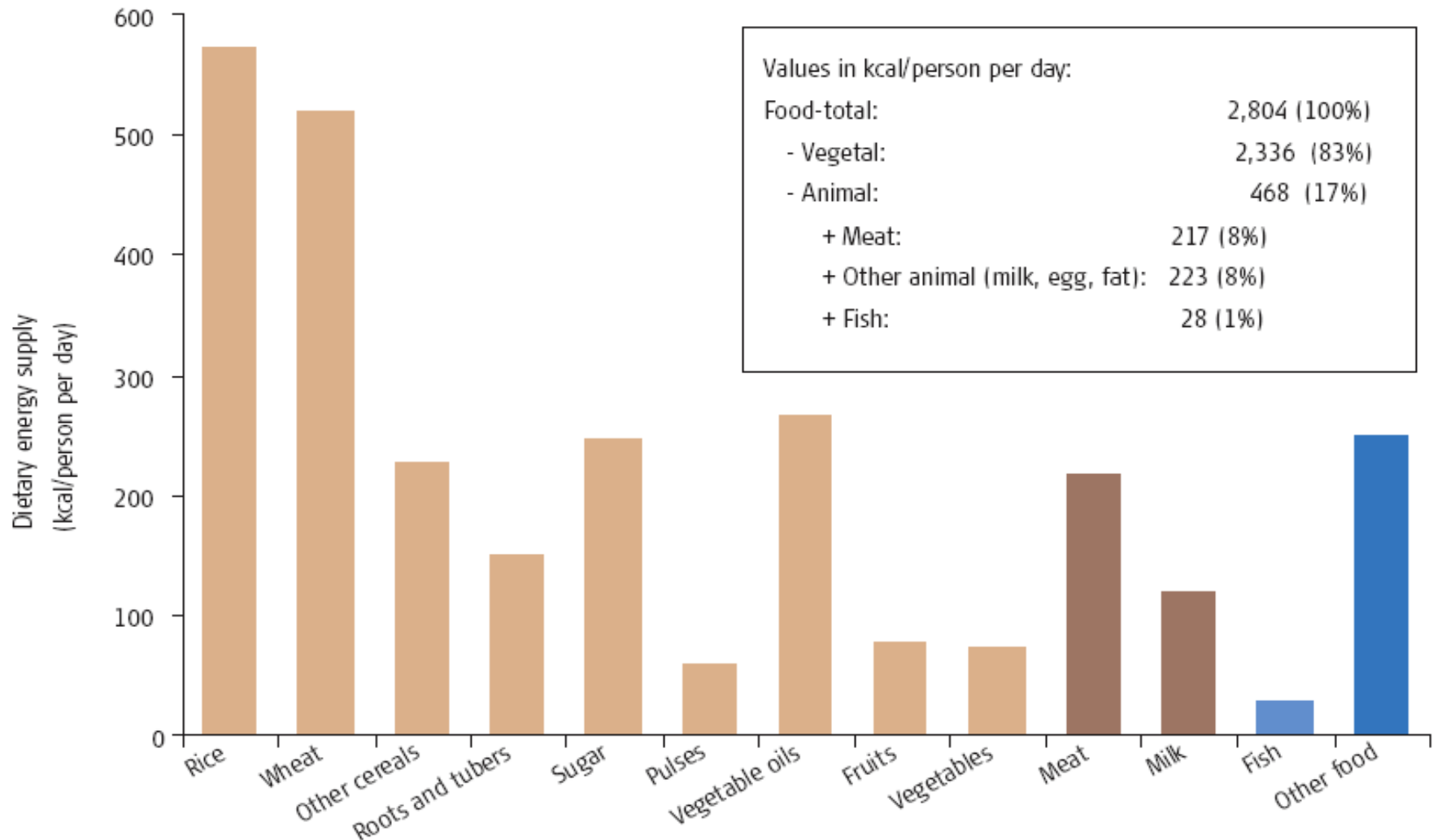


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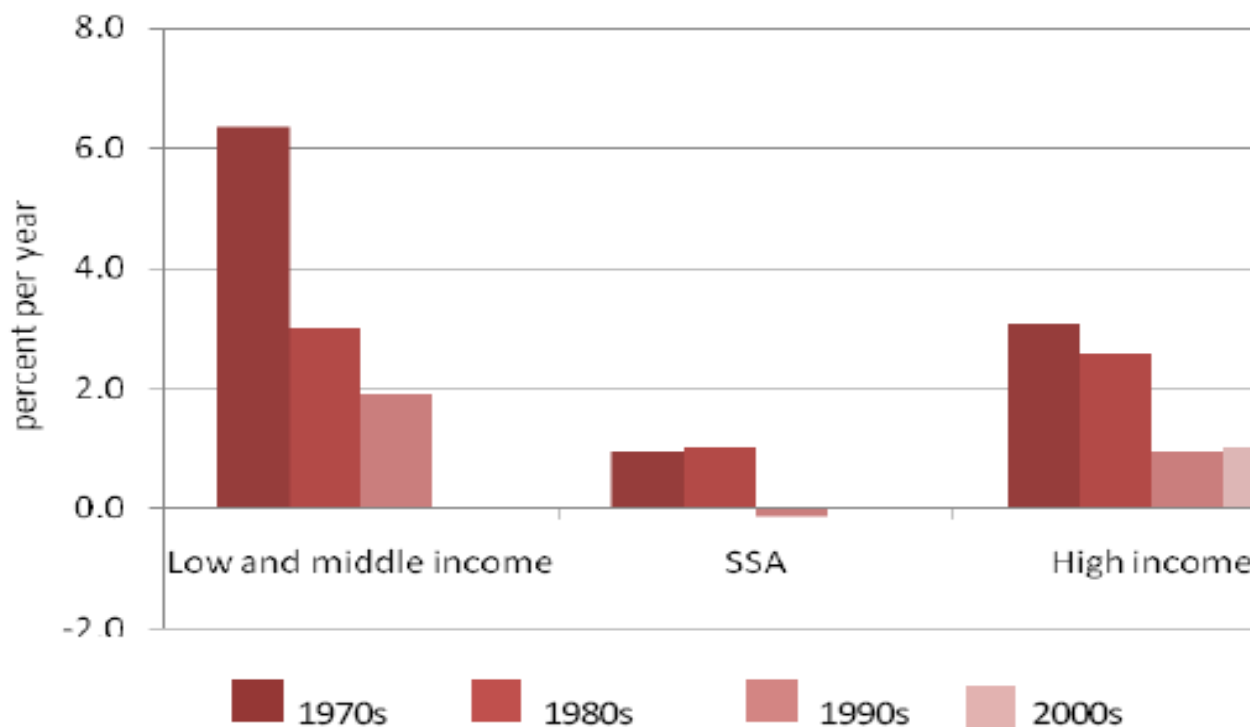
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II. Food Production

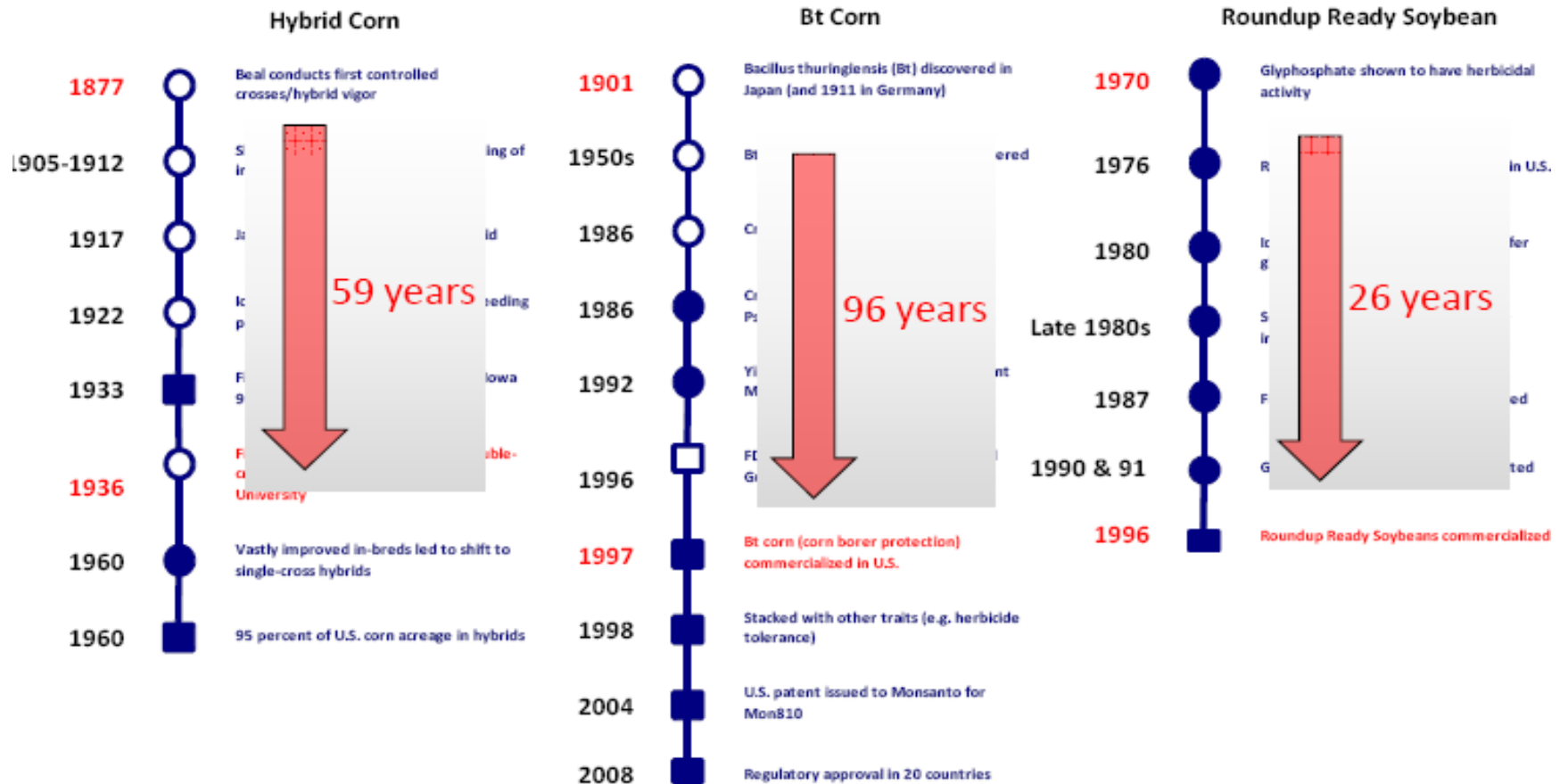
Sources of Global Food Supply



Growth in Ag/Food R&D



Ag. Technology Lags

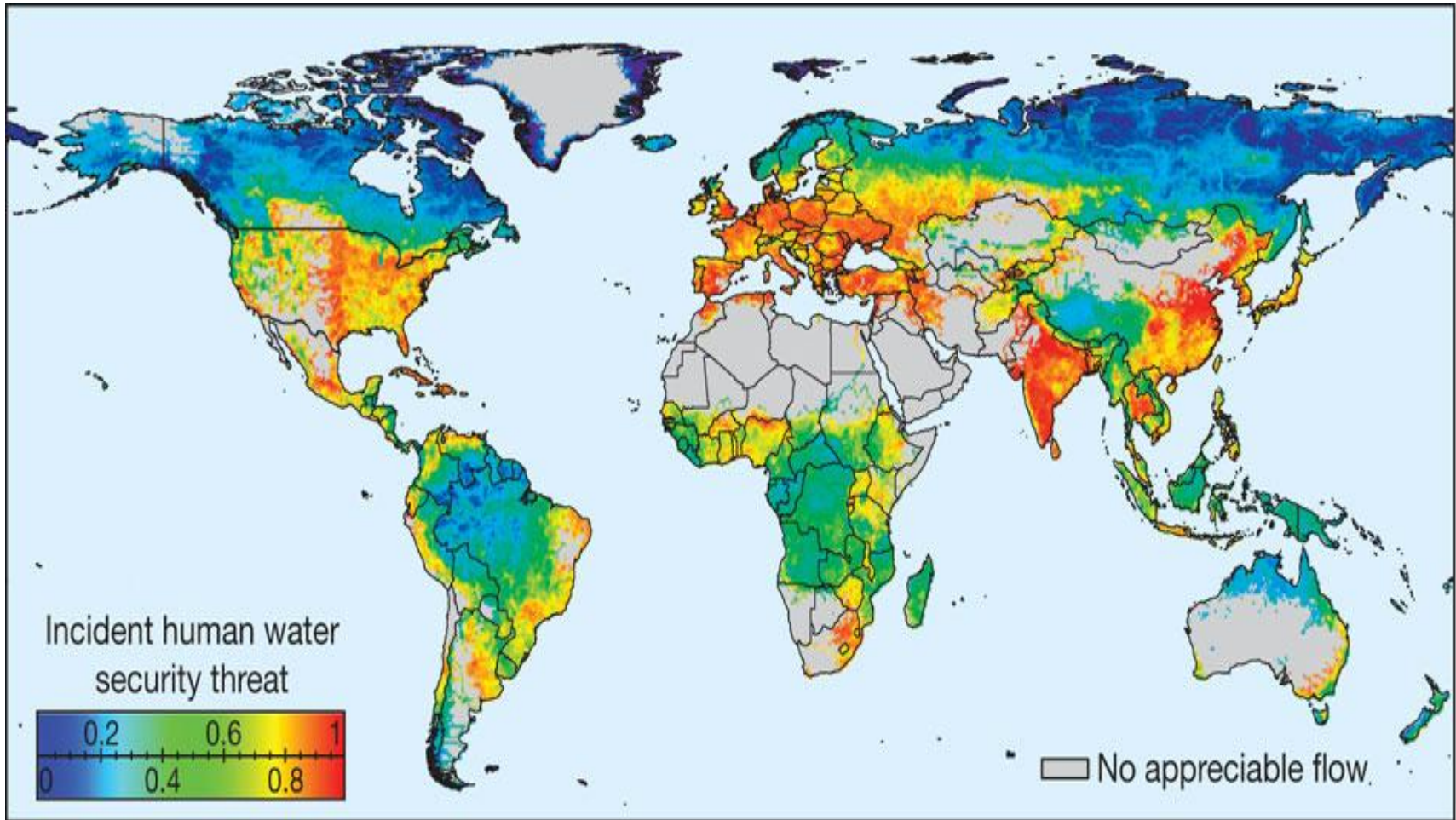


Source: Alston, Pardey and Ruttan (2008) and Alston et al. (2010)



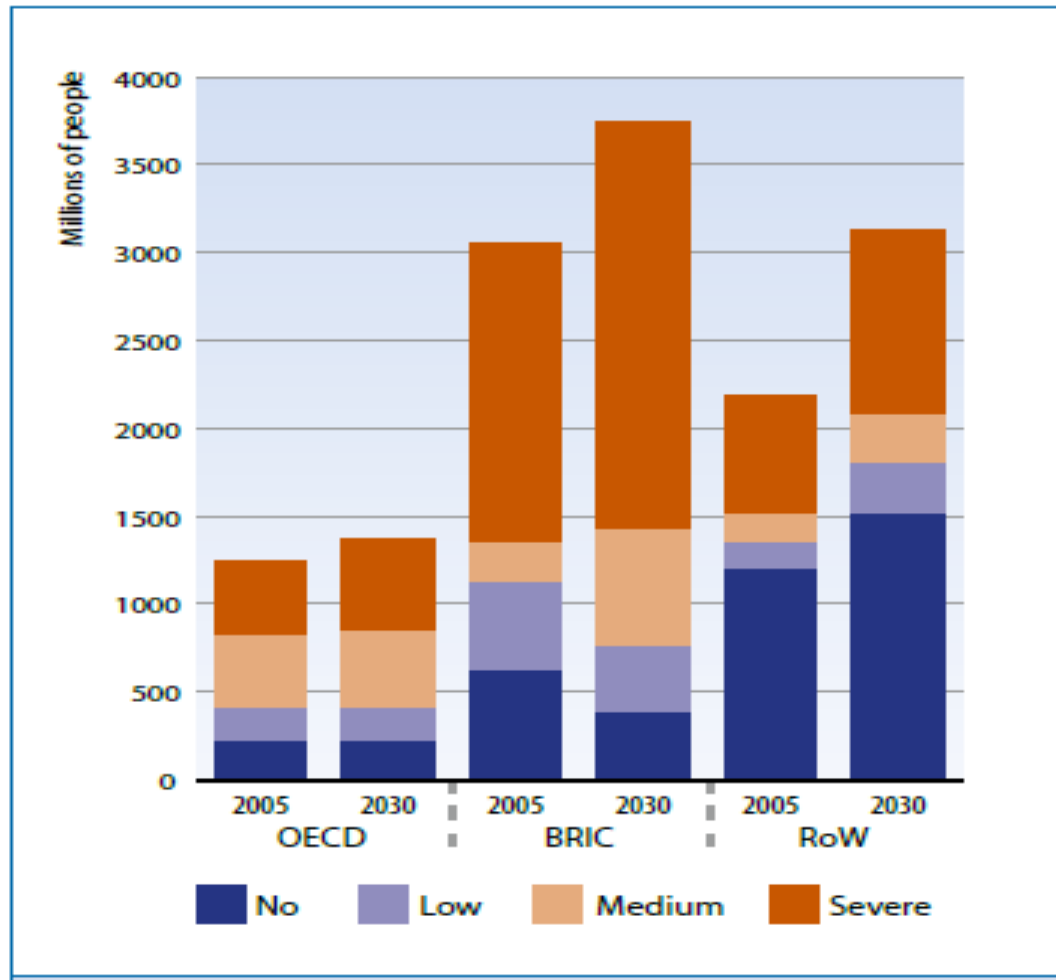
III. Water Threats

Water Security Threats



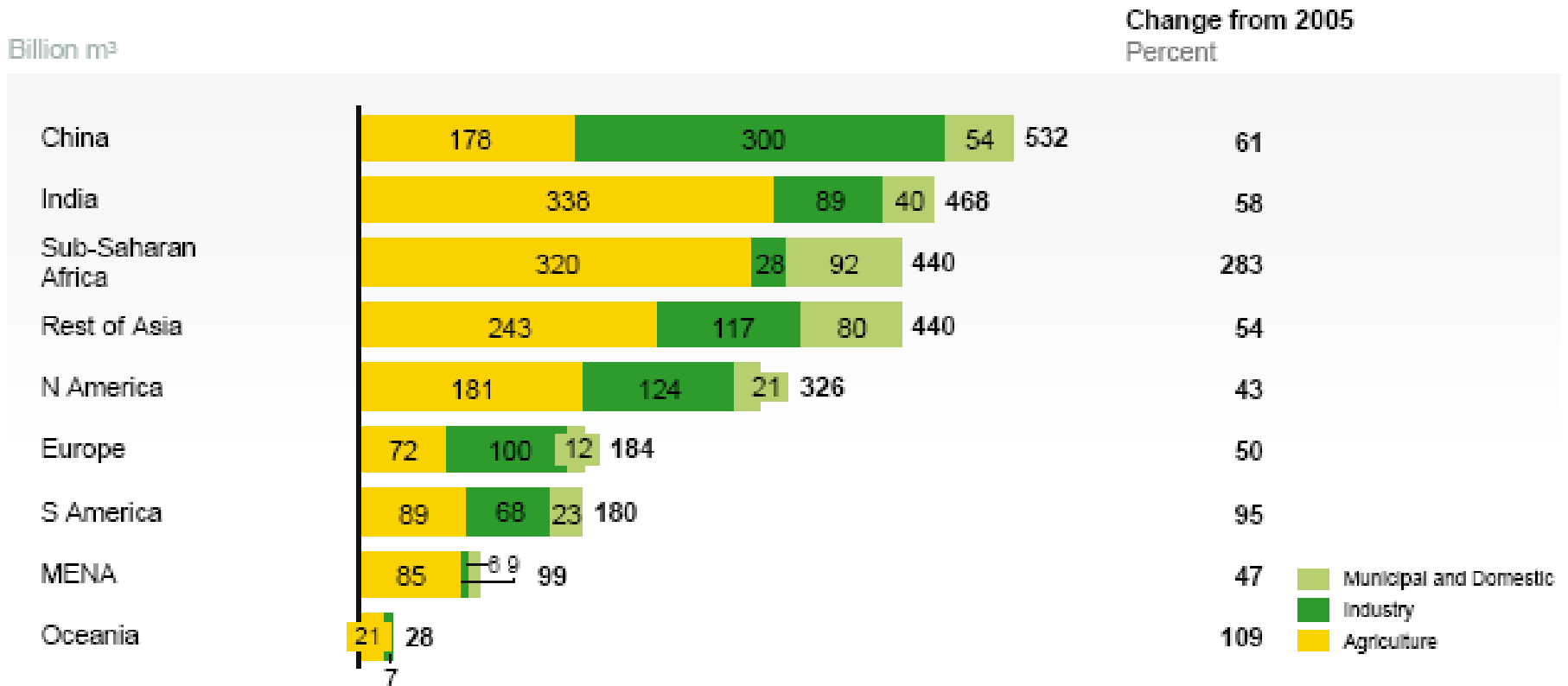
Source: Vorosmarty et al. (2010)

People in Water Stress (< 1,700 Cu.M per year)



BAU Water Demand Growth is Unsustainable

Predicted Increase in Annual Water Demand 2005-2030



Source: 2030 Water Resources Group (2009)

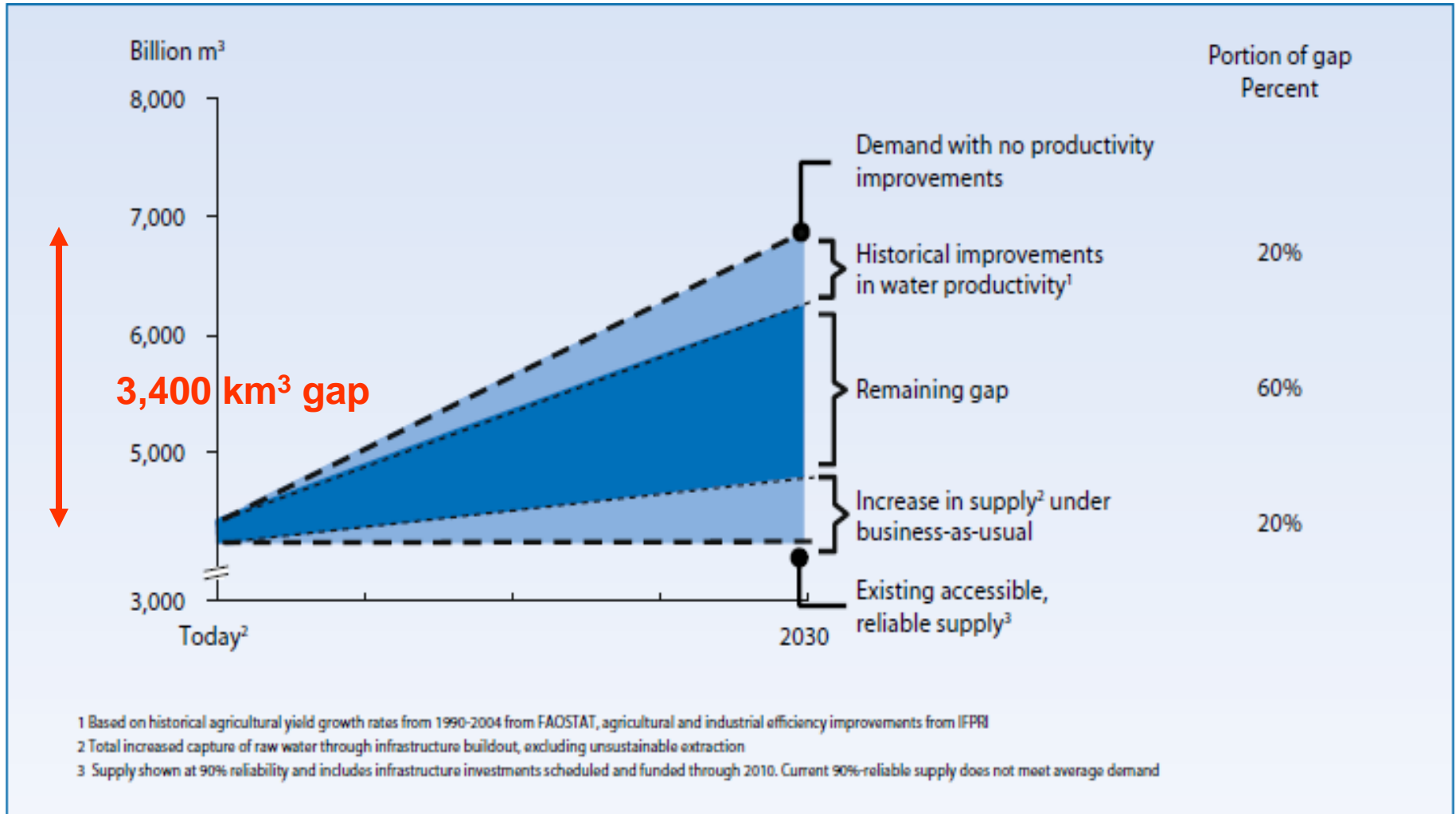
Climate Change & Water Availability

River Basin	Colorado	Yellow			Murray-Darling	
Time frame	2050	2020s	2050s	2080s	2030	
Forecast temperature change	2 °C	1.34 – 1.63 °C	2.60 – 2.78 °C	Up to 3.9 °C	0.45 °C – 1.60 °C	
Forecast hydrological impact	-4 to -18 % flow	- 9 % flow	-22% flow	-29 % flow	Water availability	Outflows
					-12 %	-24 %



IV. Bridging Food-Water Gaps

Bridging the Consumptive Water Gap



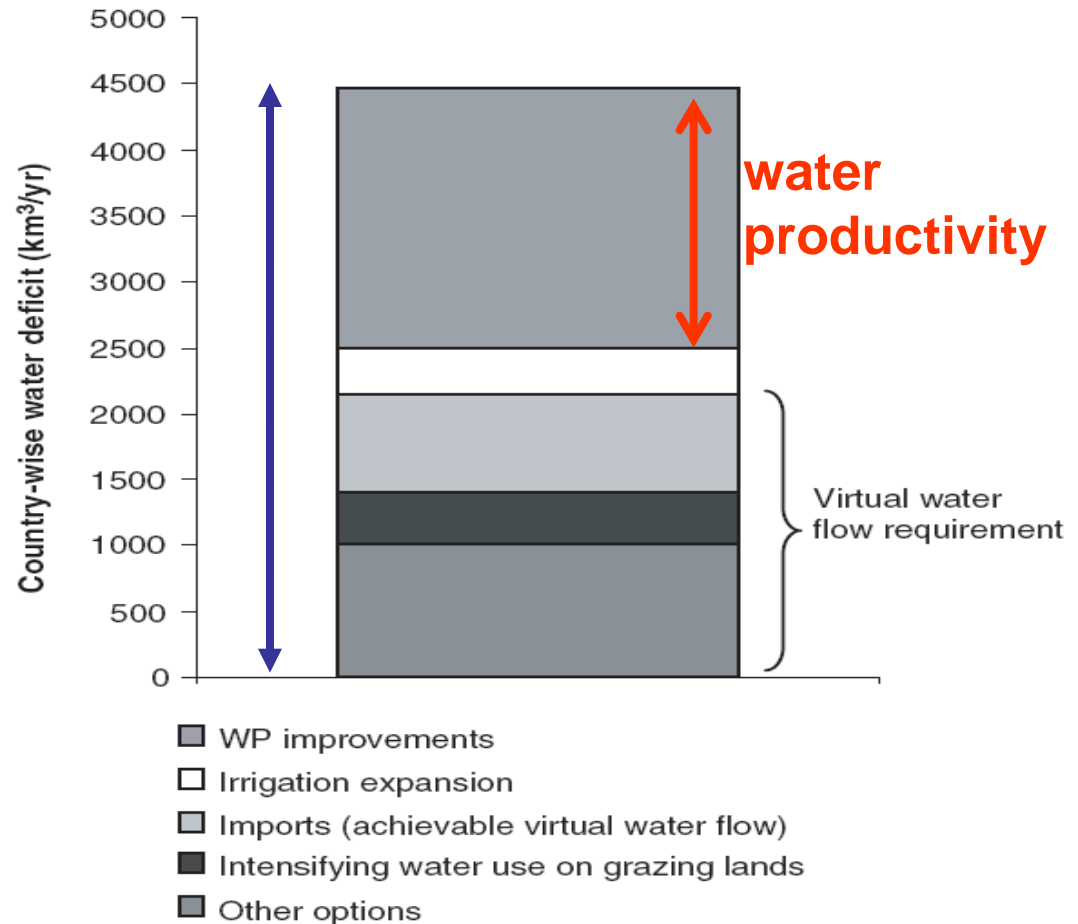
1 Based on historical agricultural yield growth rates from 1990-2004 from FAOSTAT, agricultural and industrial efficiency improvements from IFPRI

2 Total increased capture of raw water through infrastructure buildout, excluding unsustainable extraction

3 Supply shown at 90% reliability and includes infrastructure investments scheduled and funded through 2010. Current 90%-reliable supply does not meet average demand

Meeting the 2050 Water-Food Deficit

Under business as usual water demand is expected to exceed available blue water by 40% in 2030



V. Concluding Remarks

- Increase in world population to over 9 billion by 2050 along with expected growth in per capita incomes will result in 30-50% increase in food demand.
- Bridging of global food-water gaps requires:
 - (1) Food trade;
 - (2) Improved water efficiency;
 - (3) Increased crop yields while sustaining soil fertility;
 - (4) Overcoming carbon leakage ('table to tank')