# Key Linkages Between Agriculture & Sanitation: New Opportunities

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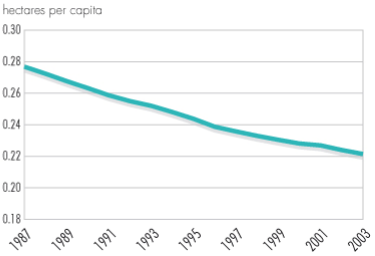
## The Agriculture Challenge

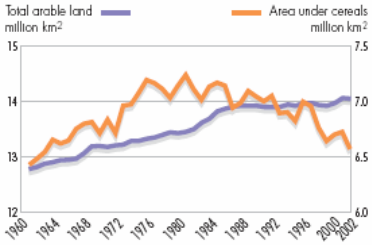
- 800 million people in 46 countries malnourished
- each day 40,000 die of hunger and hunger-related diseases
- famine threatens 9 African countries, 20 million lives at risk
- 75-80% of Africa's farmland is degraded
- Africa loses 30-60kg of nutrients/ha/yr - highest rate in world
- the highest rates of depletion: Guinea, Congo, Angola, Rwanda, Burundi and Uganda at 60kg/ha
- 2002/03 Sub-Saharan Africa used 8kg fertiliser/ha
- compared to South America (80kg), North America (98kg), Western Europe (175kg), East Asia (202kg), South Africa (61 kg) & North Africa (69kg)
- cost of fertiliser was US $150/t in 2006 and is now 3-5 times higher
- in landlocked African countries it was $600/t in 2006 due to poor transport infrastructure - rail & road and is now 4-5 times higher

Figure 6.8 Per capita arable land




*Sources: GEO Data Portal, compiled from UNPD 2007 and FAOSTAT 2006*

Figure 3.11 Arable land and area under cereals



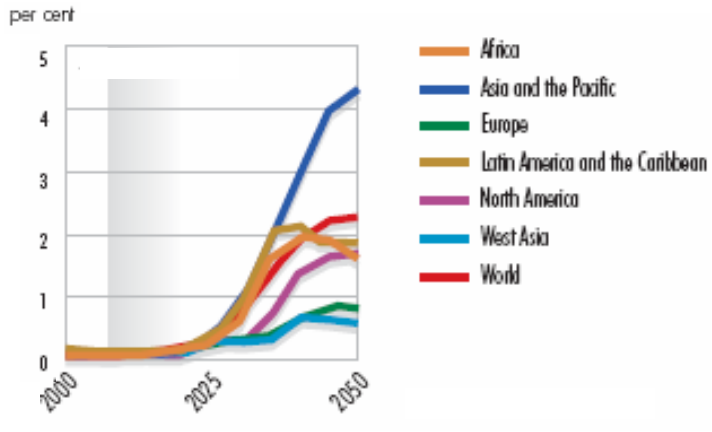

*Source: FAOSTAT 2006*

**Geo-4 UNEP, 2007**

## Biofuels: Start of A New Green Revolution?

- of the 50 poorest countries in the world, 38 are net importers of petroleum & 25 import all their petroleum
- some spend up to six times as much on fuel as they do on health
- biofuels will become a primary cash crop occupying the most fertile soils while cereals and subsistence crops will occupy low-productivity soils
- Biofuels still only occupy a small percentage of arable lands but they have affected the world prices for feriliser
  - increases in costs for NPK
  - increase in food prices

Figure 9.18 Modern biofuel plantations as percentage of total land cover by region




Geo-4 UNEP, 2007

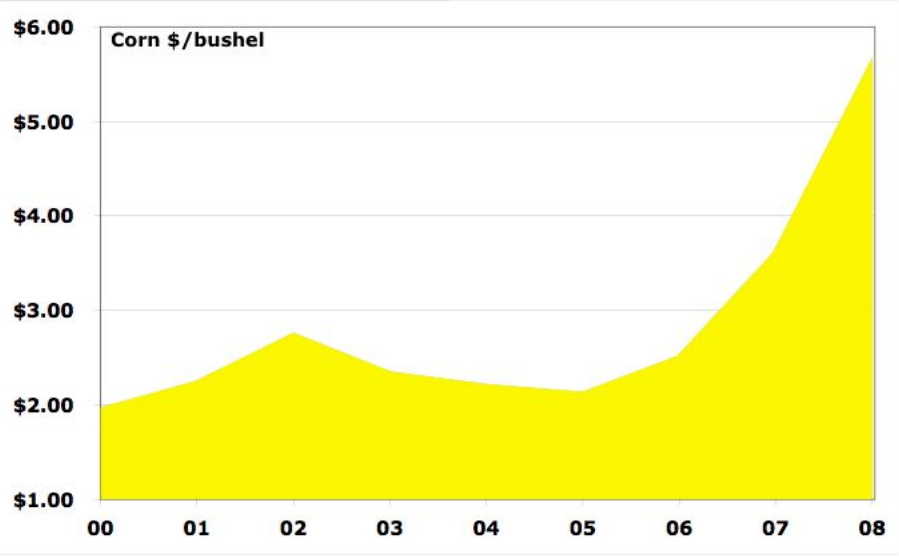
# Mega Biofuel Projects

- Ethanol
  - Brazil - 30 yrs experience & 1.5 million farmers grow sugar cane for fuel and increasing ethanol exports to 9.4 megatons by 2010 from 2 megatons in 2005
  - new processing plants in Europe (UK, Holland, France, Spain, Germany, etc.) and US
  - SEKAB (Sweden) proposed in Tanzania and Mozambique from bagasse (1 billion Euros investment)
- Biodiesel
  - Jatropha plantations in Indonesia, Laos, Vietnam, Myanmar, Brazil, India, Africa, Peru, Nepal, Saudi Arabia (8 T/ha; 37% oil)
  - Castorseed (1 T/ha; 35-55% oil)
  - Camelina seed (1-2 T/ha; 30-37% oil)
  - Palm oil (5 T oil/ha)
  - Malaysia: leading oil palm planters building two refineries in Rotterdam to process >1 million tonnes of palm oil/yr
  - Rapeseed (3 T/ha)

## Biofuels in Africa - Following Brazil's Example?

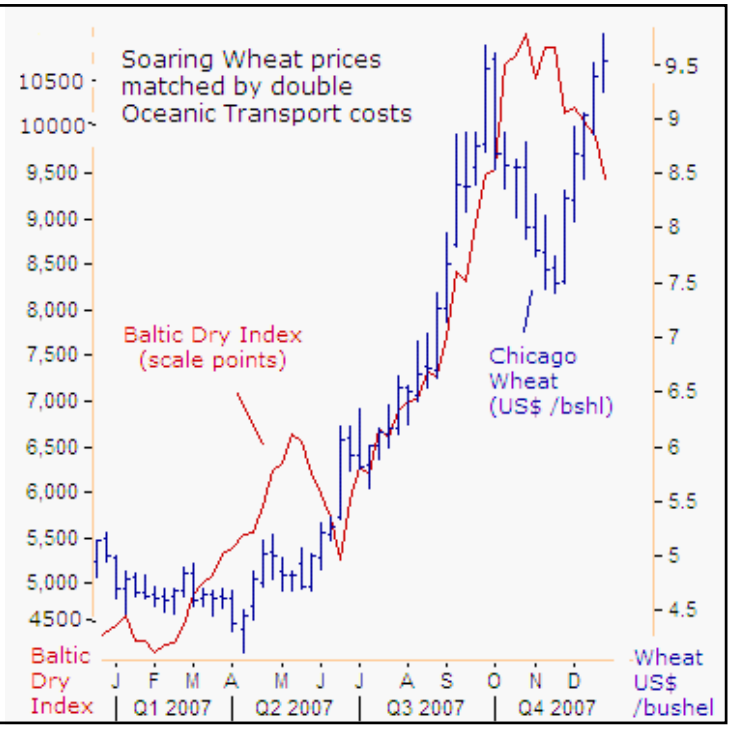
- Mozambique in 2007 increased ethanol production by 60% to 170 million gallons
  - $400 million in new investments from Brazil
- Tanzania - British Sun Biofuels - $20 million invested in 9,000 ha jatropha
- West African Development Bank (BOAD) - Indian Gov - $250 million for biofuels
- Nigeria building >24 ethanol plants by 2010 - Brazil assistance
- South Africa's biofuel strategy 2013 4.5% of liquid road transport fuels
- South Africa Regional Hunger and Vulnerability Program
  - 2006 rural price for foodstuffs linked to biofuel production (grain, oils, sugar) rose in price by 12%
- 15 African countries formed the Pan-African Non-Petroleum Producers Association (led in Senegal) (2006)

## Corn Prices

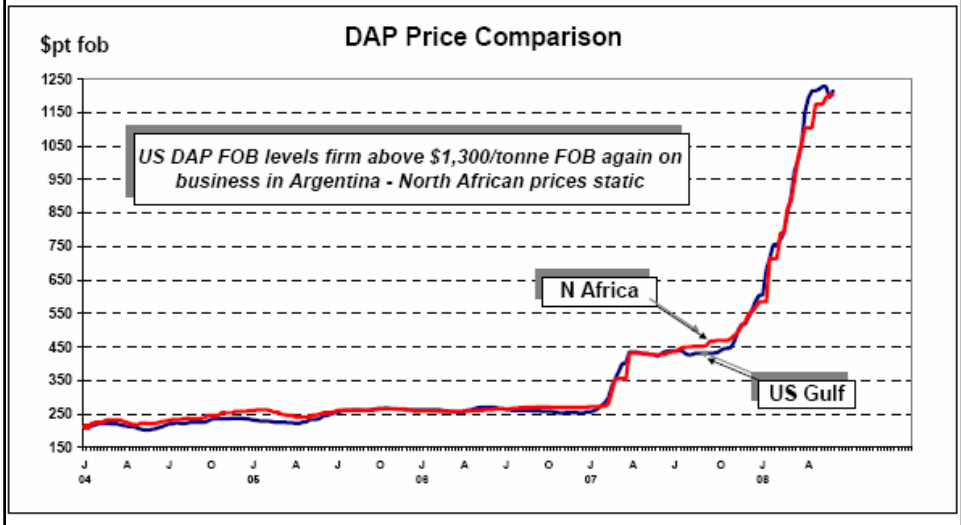



Source: U.S. Department of Agriculture, Bloomberg

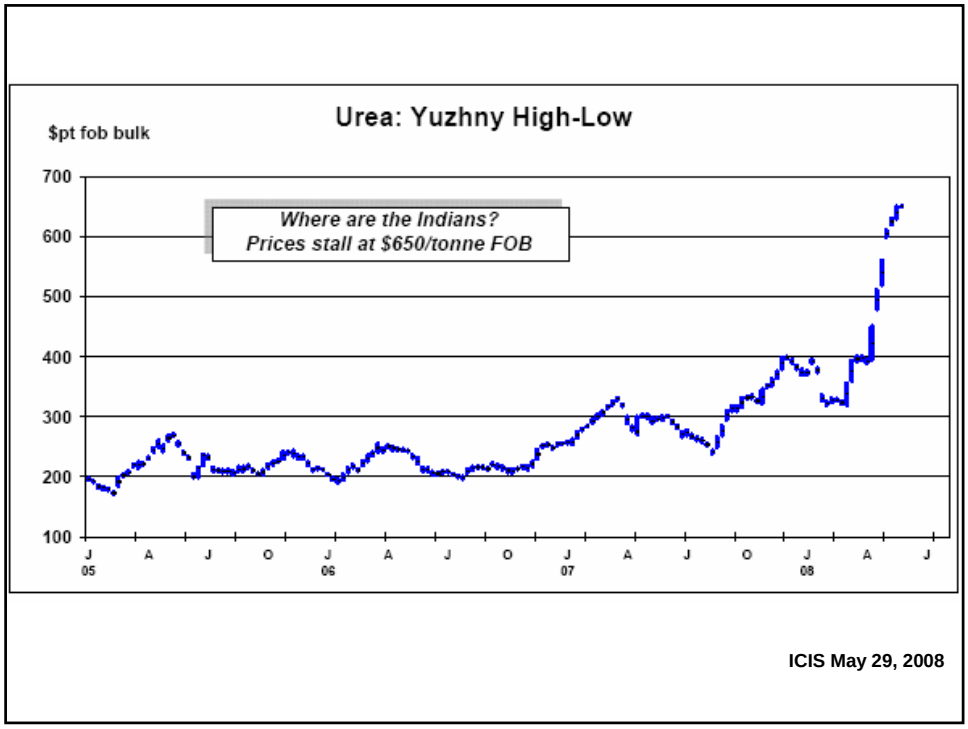
BDI
transport index




**Diammonium Phosphate**




**ICIS May 29, 2008**

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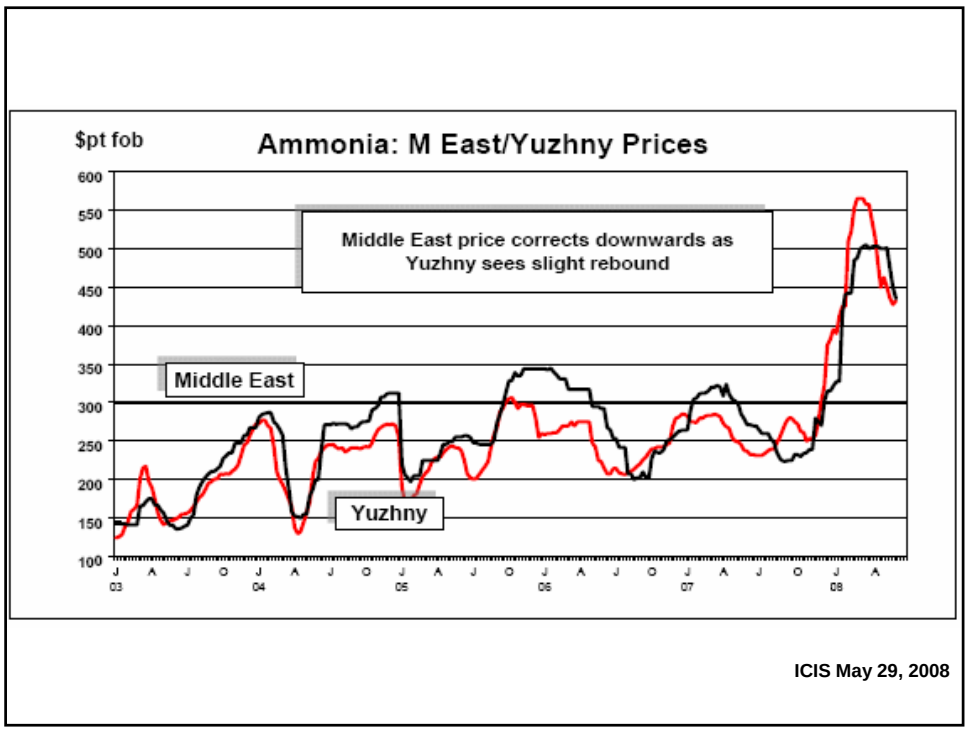


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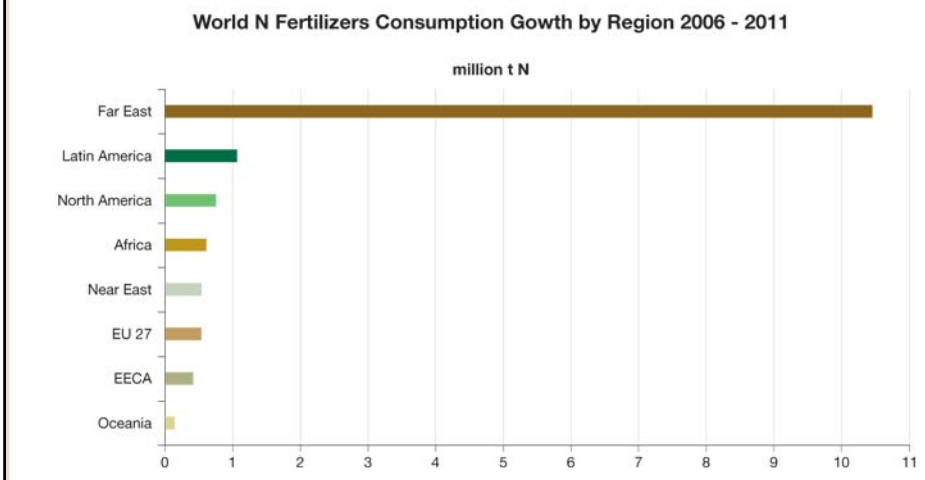
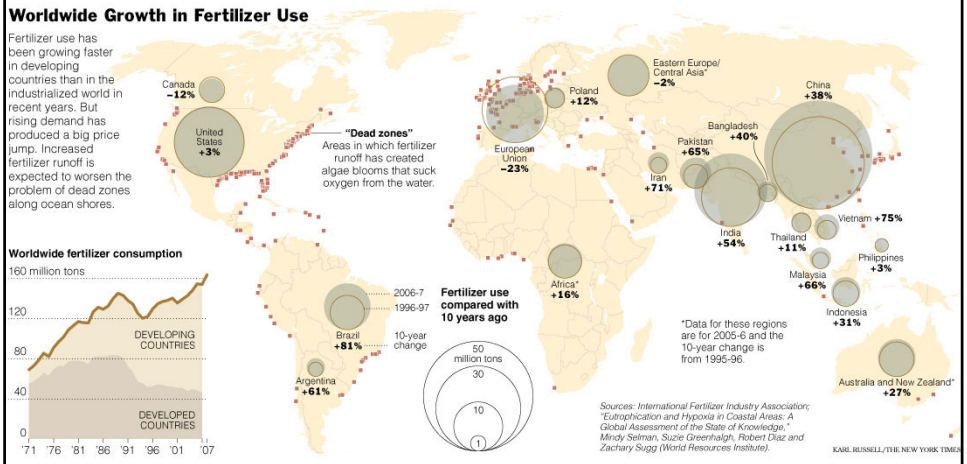
# Trends in Global Fertiliser Consumption

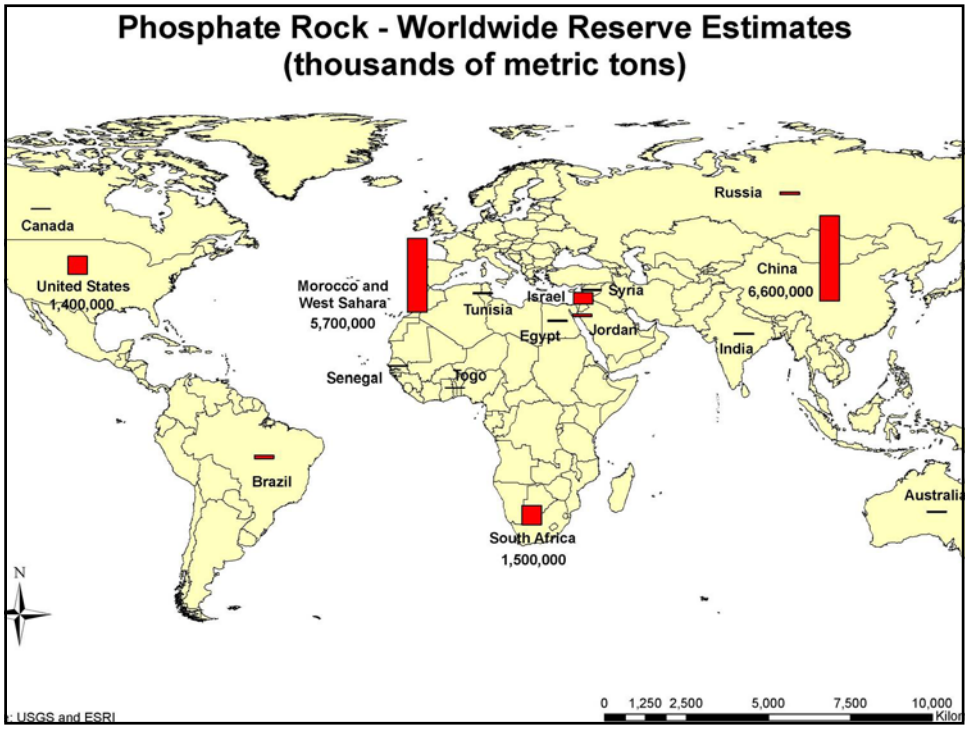


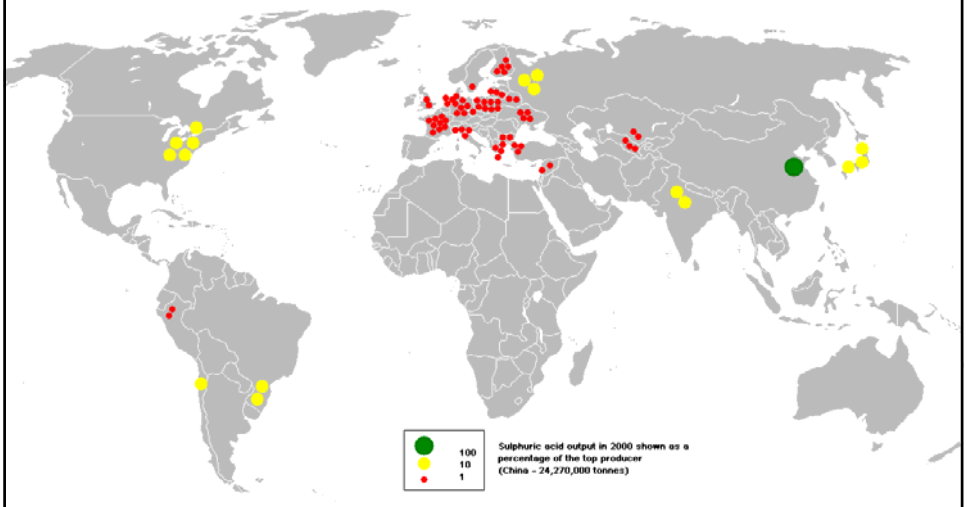

**NY Times May 2008**

## Geopolitical Perils: Global Fertiliser Supply is Controlled by Just 8 Countries

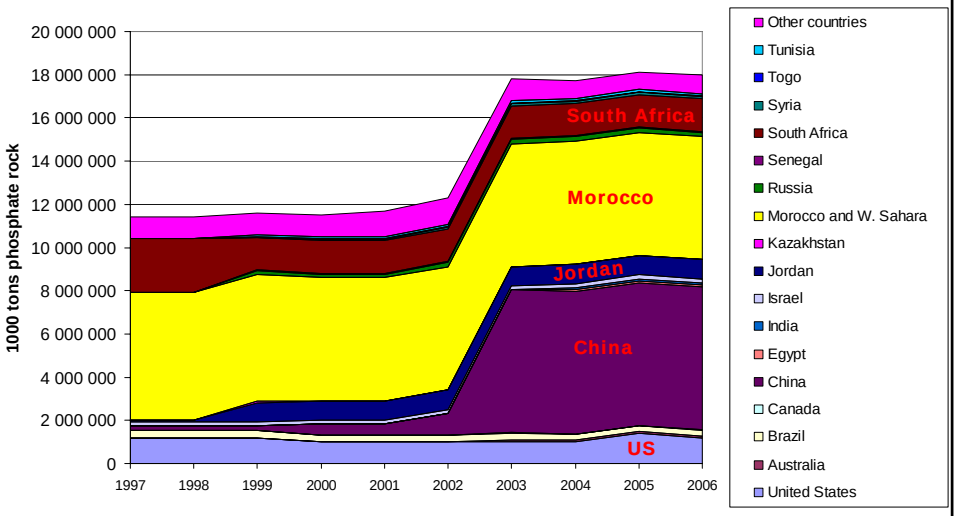
- **Nitrogen:**
  - 97% of nitrogen fertilisers are from ammonia produced from methane
  - natural gas available in >**60 countries** produce these fertilisers
- **Phosphate:**
  - from mined phosphate rock
  - **3 countries** extract 77% of the world's product: Morocco & Western Sahara, China and USA
- **Potassium:**
  - from mined potassium salts
  - global potassium supply is limited to **5 countries** – Canada, Russia, Germany, Belarus and Brazil



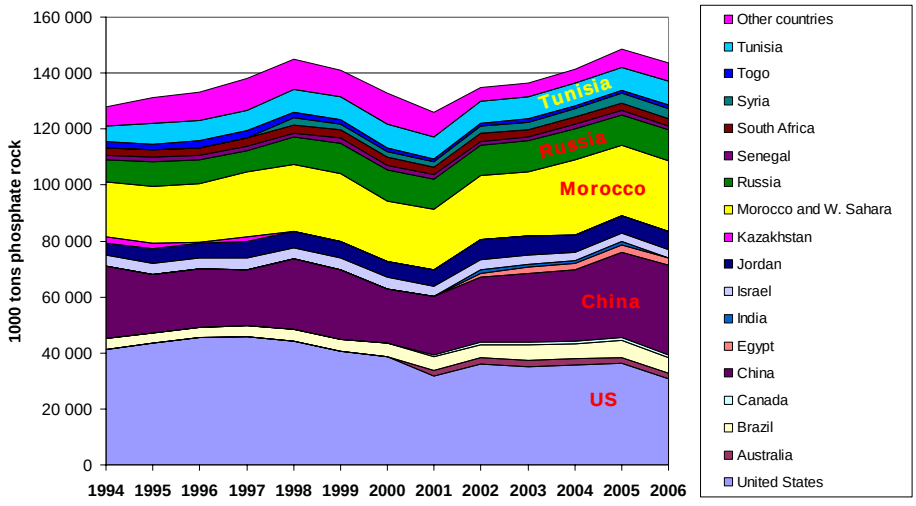
## Sulfuric Acid Relative Production Distribution



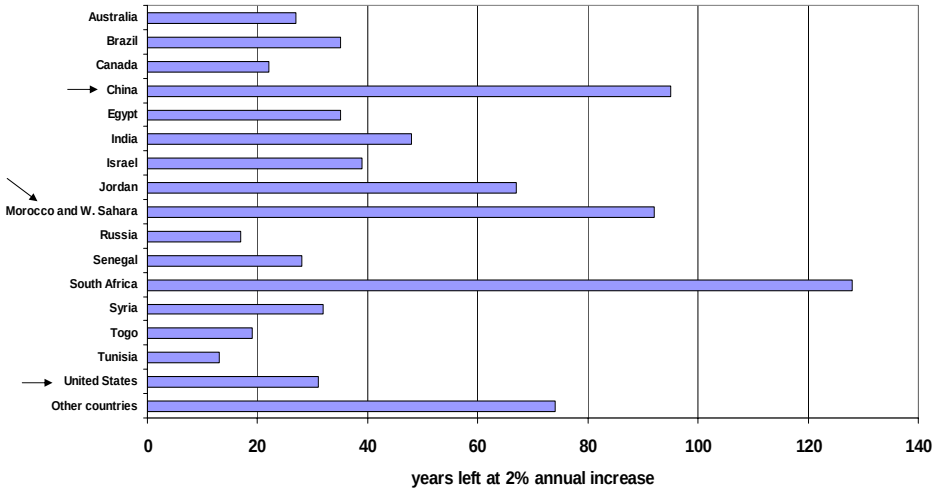

## Phosphate Rock Reserves, 1997-2006 (from USGS summaries)



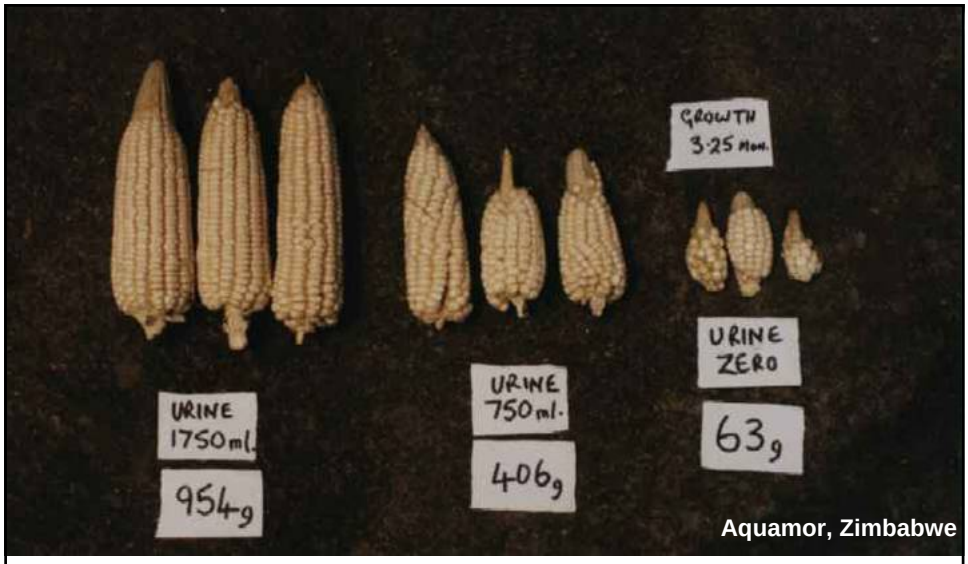
## Mine Production of Phosphate Rock, 1994-2006 (from USGS)




## Phosphate Rock - Years of Extraction Remaining Based on Current Economic Reserves from 2006 (2% annual increase)



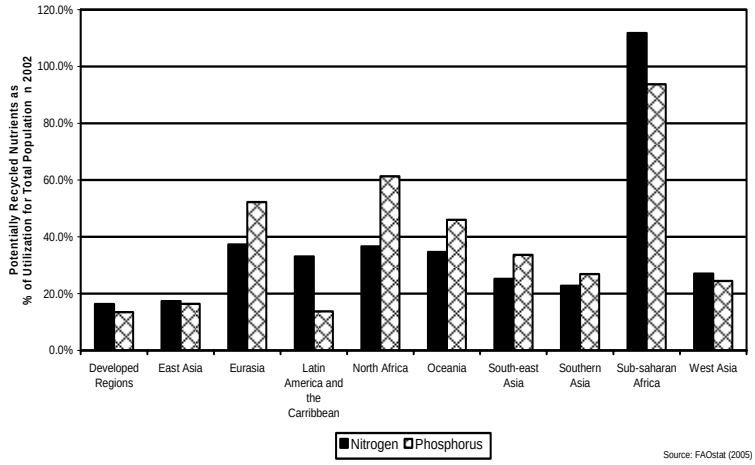

Source: USGS




One day's urine from an adult produces a kilo of food
One year's urine is enough to fertilise 300-400m$^2$ of crop

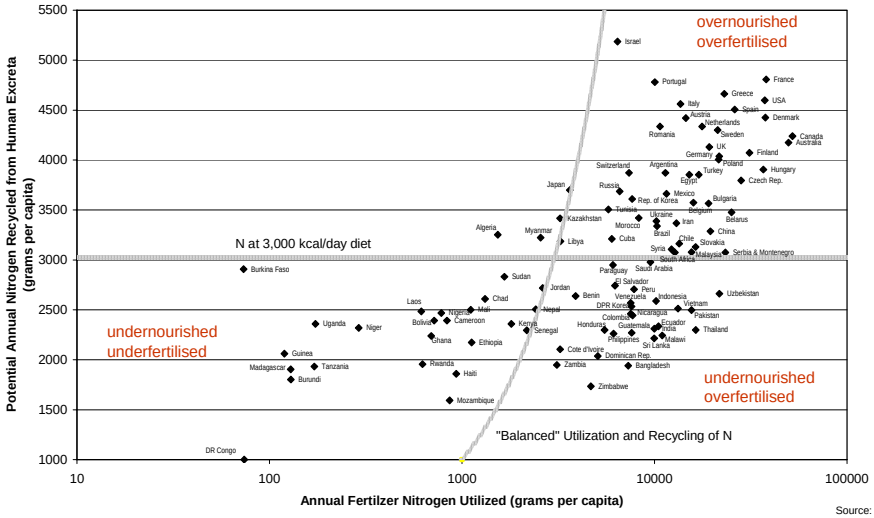
**Maize crop 31 Jan 2005, Epworth (Harare)**
**untreated maize (left-side)**
**urine-treated maize (right-side)**

# Sub-Saharan Africa
# Self-Sufficient Fertiliser Supply




Source: FAOstat (2005)

**Nitrogen chemical fertiliser utilized and potential recycled using ecological sanitation (2002)**
(countries with population greater than five million)




Source: FAOstat (2005)

## Shift from Commodity-Based to Resource-Based Agro-planning in Developing Countries

- need to educate and encourage farmers to adopt resource-based planning
- based on principles of economics, employment and ecology
- how the available land and water resources can best be utilized to achieve maximum and sustainable economic
- diversification into commercial crops (eg fruits and vegetables)
- generate increases in on-farm employment and incomes
- stimulus to downstream agro-industries
- central is the empowerment of rural women
- skill development in seed production, horticulture, vegetables & poultry
- promotion of micro-credit and savings programmes to generate capital to establish small rural enterprises
- **it is within this context that the alternative fertiliser sources need to be placed**
- **productive sanitation can provide a resilient, readily available and cheap source of nutrients for this large stakeholder group**

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**www.ecosanres.org**

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