Water Management

Irrigated Land
Laser Leveling

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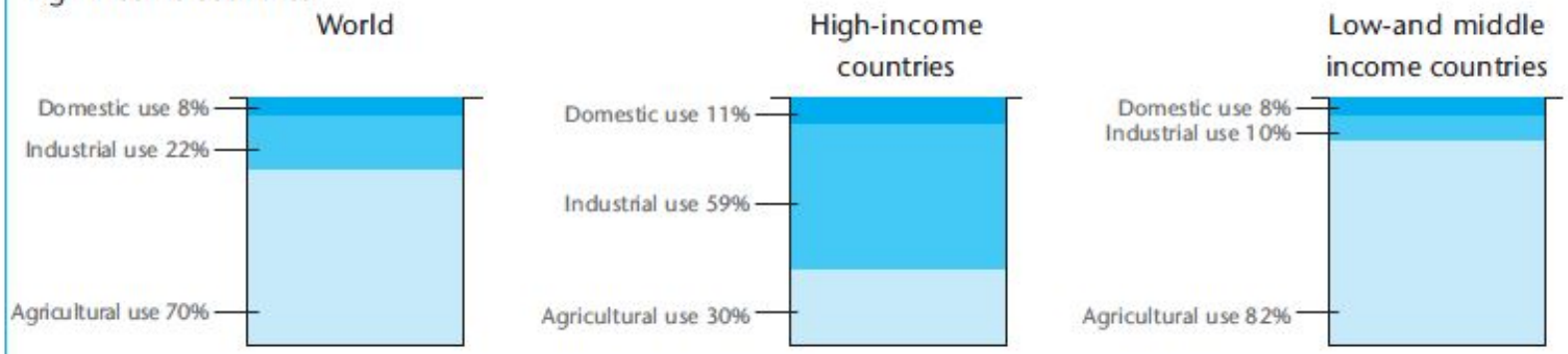
Agriculture uses 70% of the world's fresh water

- High income countries
  - Large proportion – 59%
- Low income countries
  - Very large proportion – 82%

Competing water uses for main income groups of countries[6]

Industrial use of water increases with country income, going from 10% for low- and middle- income countries to 59% for high-income countries.



Ref. 6: UNESCO, "Water for People, Water for Life", United Nations World Water Development Report, 2003.

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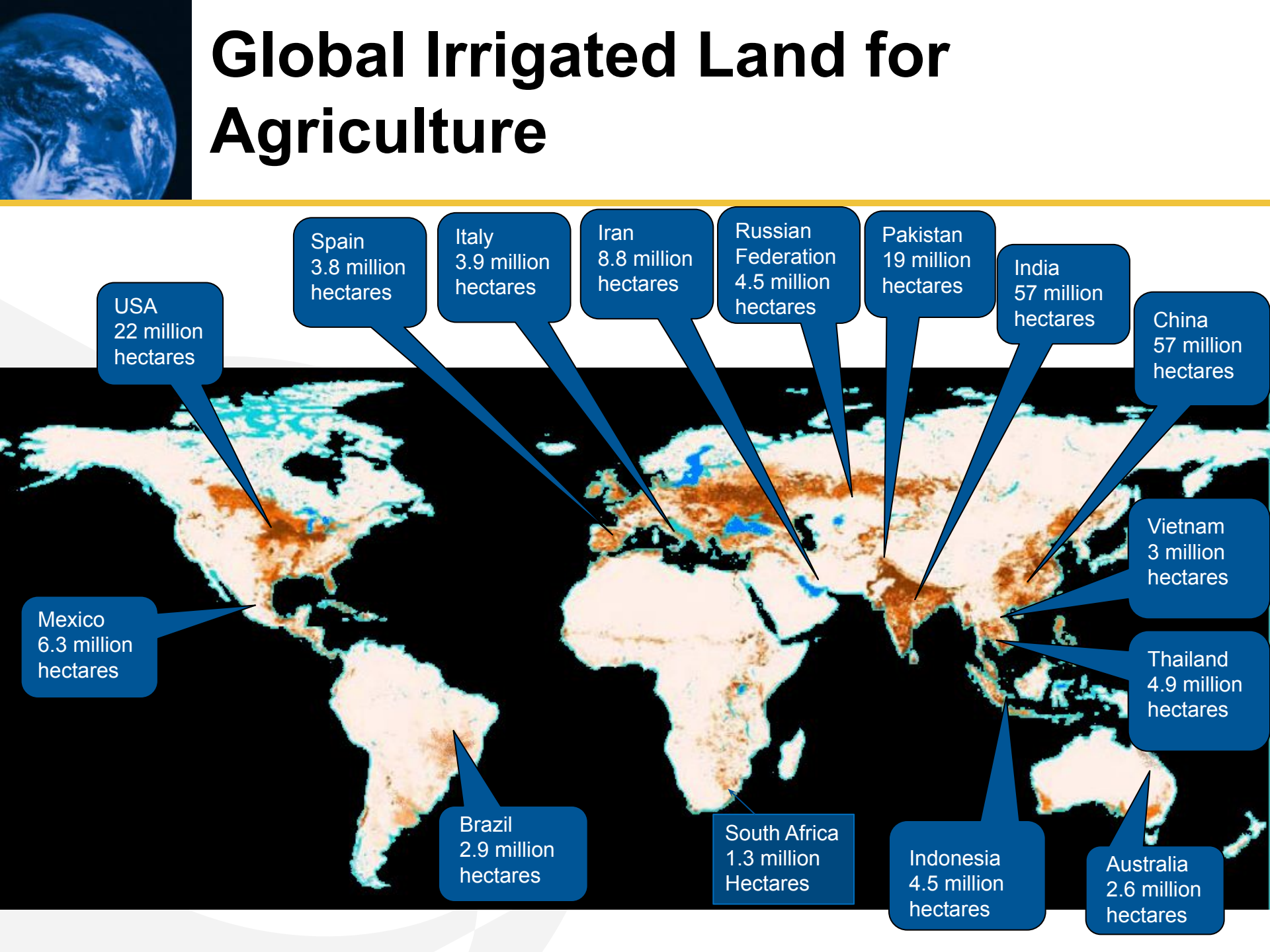
Global Irrigated Land for Agriculture



Unsustainable Water Withdrawals

- World population = 6.8 billion, of which more than half depend on rice
- Rice is flood irrigated
- Expect another 3 billion people worldwide in next 40 years
- We need more efficient ways of conserving water use for Agriculture

Innovations for Water Efficiency

- Water efficient crops
- Cropping patterns
  - Yield gain without increasing water
- Managing inconsistent rainfall
  - Reservoirs
- Policy
- Farm practices
  - Land Leveling

Photo credit - CGIAR

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Laser Land Leveling

- Leveling a farmers field
  - Provides a uniform soil moisture distribution
  - Controls ponding
  - Ensures even depth for flood irrigation
- Which provides these benefits
  - Reduction in water usage
  - Increased crop yields
  - Reduction in weeds
  - Increase in effective farmable land
  - Reduces environmental impact

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How it works

Laser transmitter

Laser plane of light

Laser detector

Control box

Hydraulic cylinder

Scraper bucket

Hydraulic valve

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The Philippines

- **IRRI (International Rice Research Institute) experiment**
  - Decrease in water required 50%
  - Increase in rice yield by 16%
  - 70% labor decrease for weeding
  - Increase of land area by 5-7%

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Vietnam

- **Nong-Lam University experiment (Ho-Chi-Minh City)**

	2006 (unleveled field)	2007 (leveled field)	Improvement
Water pumped into field, cubic meters*	1600	800	50% decrease in water
Labor for weeding, US$	375	125	67% decrease in labor
Seeds, kg/ha	114	114	0%
Pumping cost, liters of diesel	80	30	63% decrease in diesel costs
Yield, ton/ha	6.9	8.4	22% increase in yield
Provincial average yield, ton/ha	6.8	7.2	6% increase in yield

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*Interpreted from different data set in Vietnam

India

- IWMI (International Water Management Institute)
  - If precision land leveling was applied across entire Uttar Pradesh it would save 5.5 billion cubic meters of water
  - Farmers in India report 15-20% higher yields with precision land leveling
  - Precision land leveling is now widely practiced in the Indian Punjab

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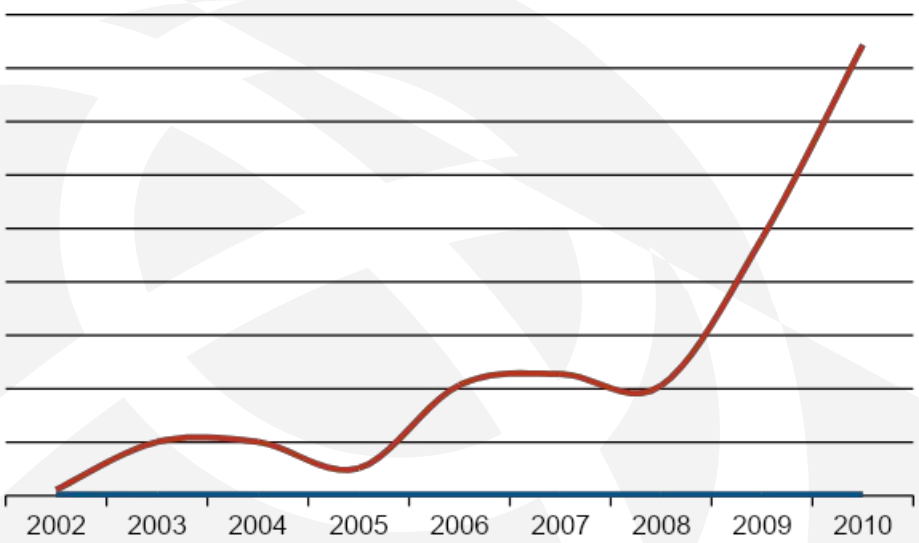
China

- Data point from Trimble customers
  - 1500 RMB (223 US$) profit increase per hectare
- Laser leveling technology is being adopted



Laser leveling technology adoption in China

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Trimble Land Leveling System for Developing Regions

AG401 Laser Transmitter

- Designed for small sized tractors common in these regions
- Designed for regional weather conditions
- System often purchased co-operatively amongst farmers

GCS100 Grade Control System

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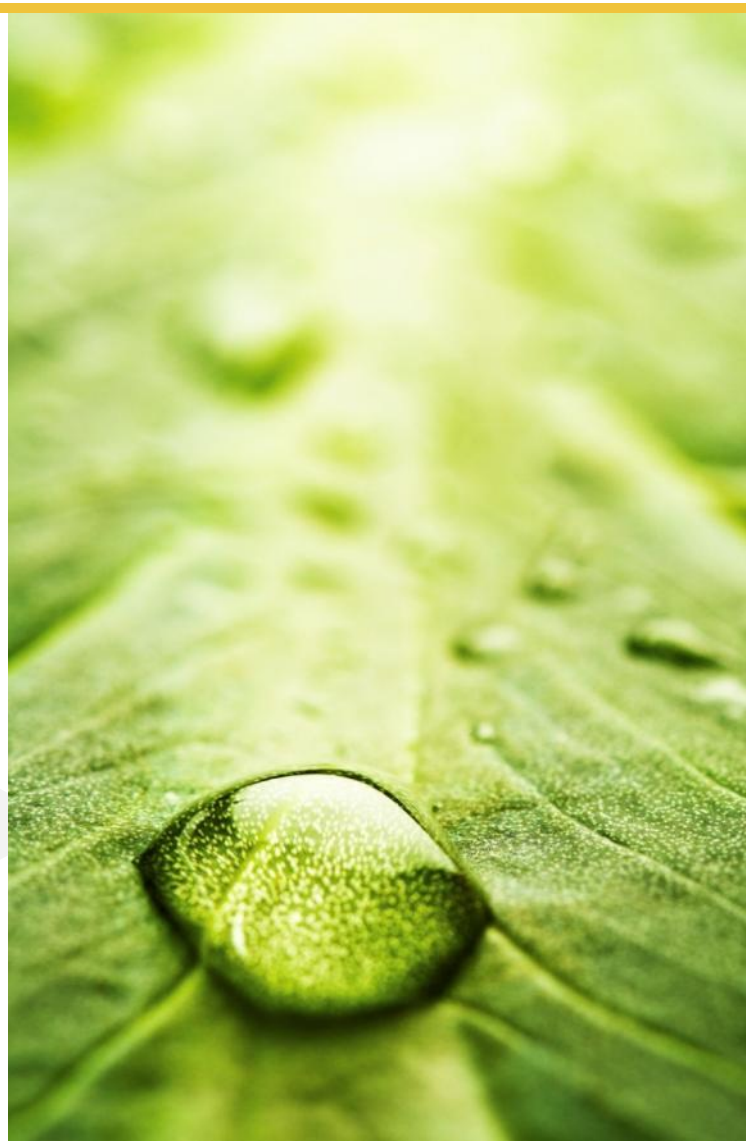
In Summary

- Developing countries face extreme water sustainability pressure
- Agriculture is the biggest user of fresh water in developing countries, particularly for flooding rice fields
- Land leveling is one tool for
  - Decreasing water use for flood irrigation by 50%
  - Increasing rice yield by 15-20%
  - Decreasing diesel fuel costs for pumping irrigation water
  - Decreasing labor for weed extraction
  - Increasing effective land area by eliminating unnecessary rice levees



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