



# ***Water Management***

**Irrigated Land  
Laser Leveling**



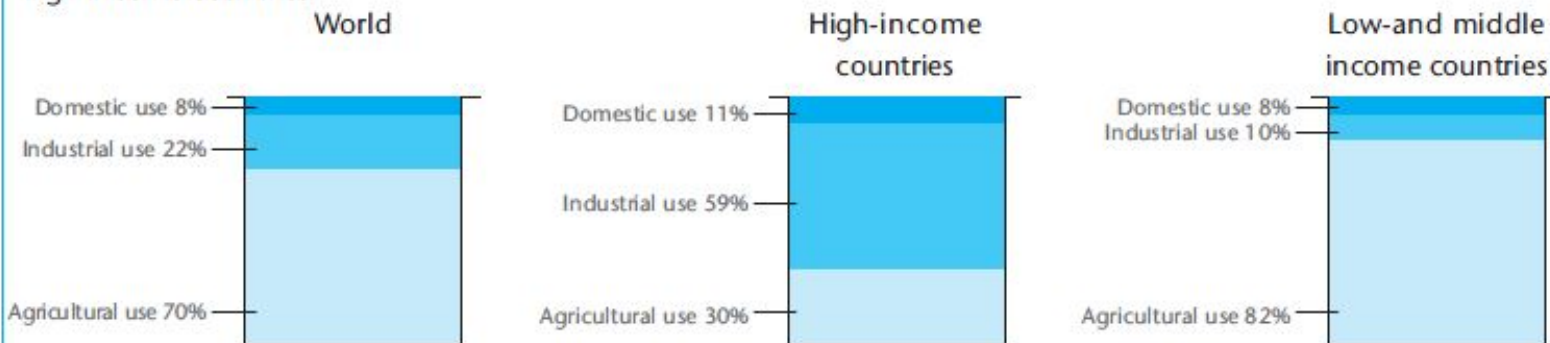
# Agriculture uses 70% of the world's fresh water

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



## Competing water uses for main income groups of countries<sup>6</sup>

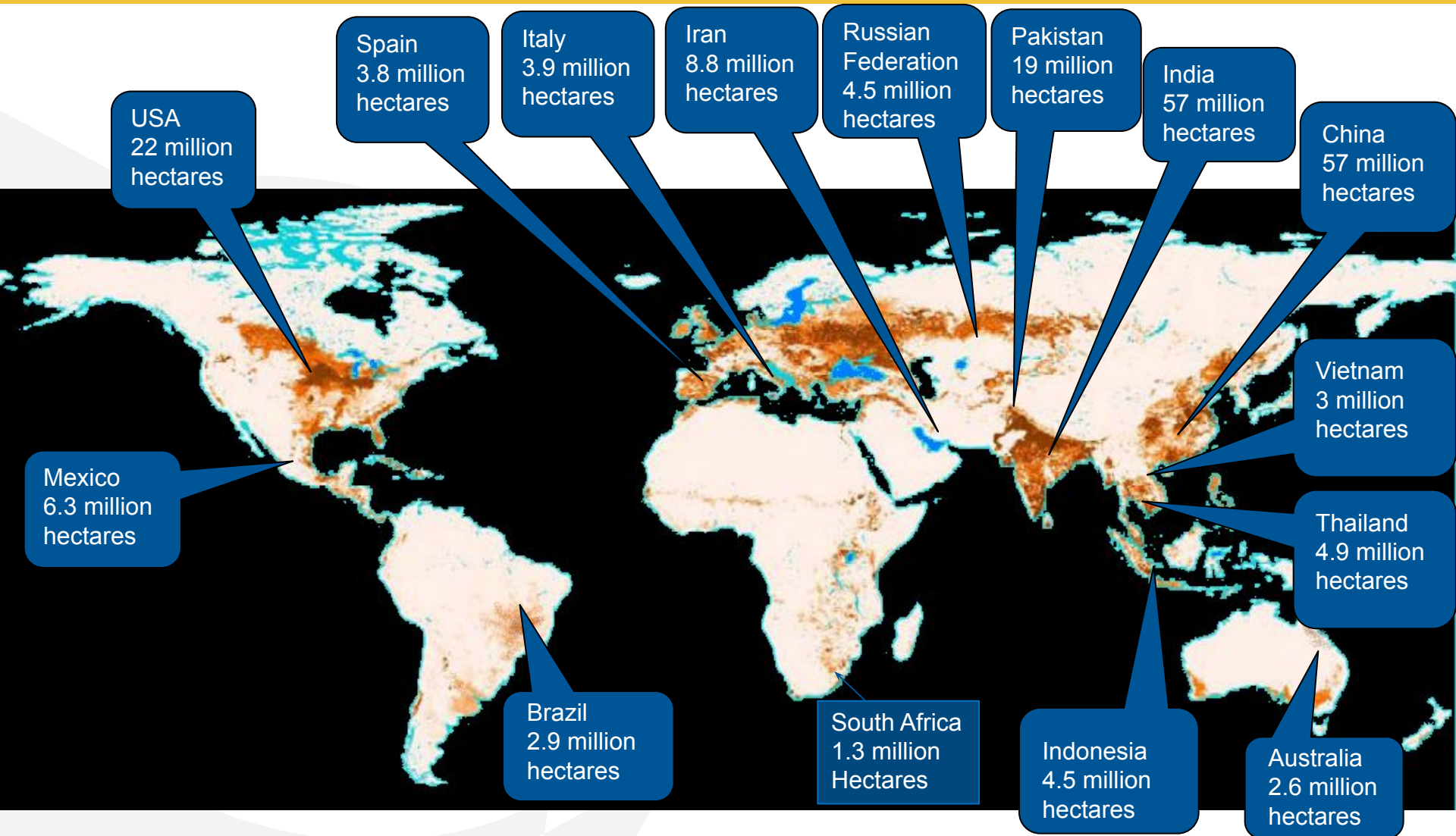
Industrial use of water increases with country income, going from 10% for low- and middle- income countries to 59% for high-income countries.



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



# 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



# Laser Land Leveling

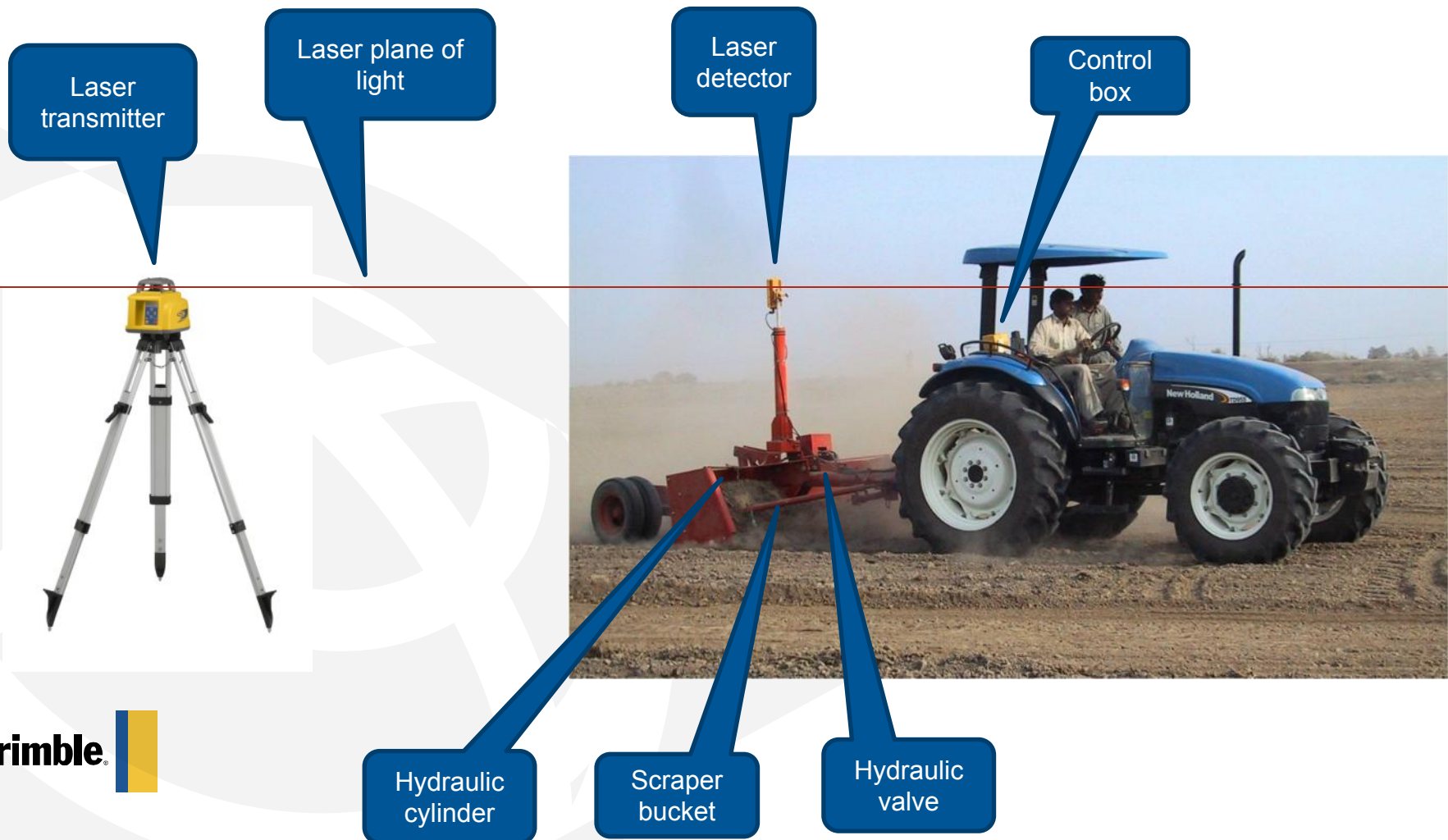
- **Leveling a farmers field**
  - Provides a uniform soil moisture distribution
  - Controls ponding
  - Ensures even depth for flood irrigation
- **Which provides these benefits**
  - Reduction in water usage
  - Increased crop yields
  - Reduction in weeds
  - Increase in effective farmable land
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







# How it works





# 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%







# 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



\*Interpreted from different data set in Vietnam



# India

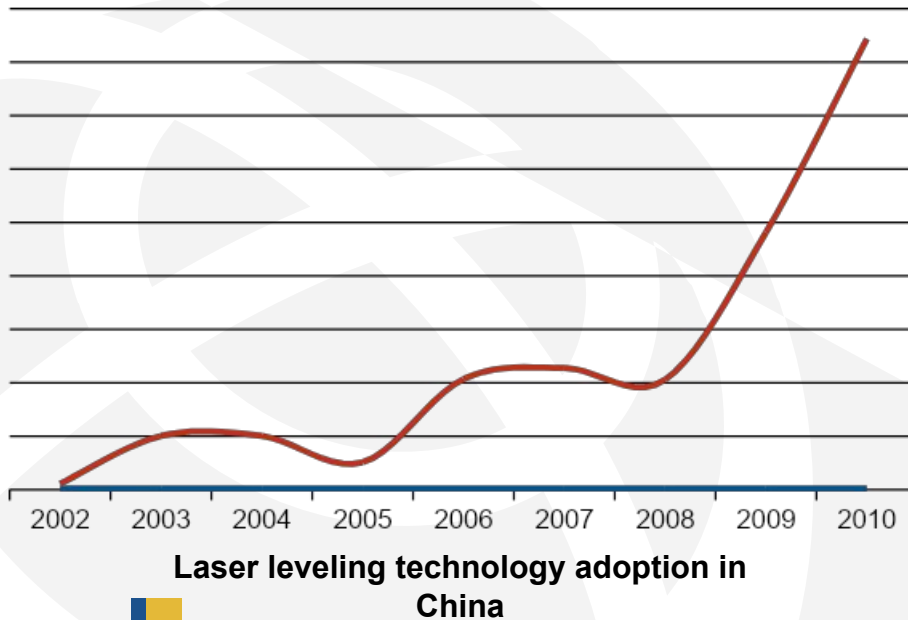
- **IWMI (International Water Management Institute)**
  - If precision land leveling was applied across entire Uttar Pradesh it would save 5.5 billion cubic meters of water
  - Farmers in India report 15-20% higher yields with precision land leveling
  - Precision land leveling is now widely practiced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





# China

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







# 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





# 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**

