Innovative, Low-cost, Water Control Technologies for Smallholder Farmer Income Generation

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Smallholder farmers

- Of world’s poorest
  - 800 million live on tiny farms
  - Subsist with rainfed cropping earning < $1/day
- Average farm size
  - Ethiopia ~ 1 ha
  - China < 0.5 ha
  - Nepal < 1 ha
- Farm land is fragmented with multiple parcels often less than 1000 m²
Small farmer’s assets

- Land
- Knowledge about climate and soils
- Family labor with low management cost
Focus on increasing income

• Build on small farmers’ assets
• Shift from subsistence to labor-intensive, high-value crops for the market
• This requires:
  – accessible markets
  – access to and control over water
  – information, fertilizer, pest management
Subsistence to market crops
Equipment for small farms and resource poor farmers must be:

- Suitable for small plots and marginal land
- Divisible and flexible
- Simple to operate and easy to maintain
- Affordable with rapid capital return
Surface and groundwater storage
Rainwater harvesting
farm pond NE Thailand
Low-cost water bags
• $35 investment in well and treadle pump
• dry season rice crop
• Net increased annual income about $100
• Higher value crop
• Net increased annual income about $500
Micro diesel

- Small, fuel efficient diesel engine, suitable for small scale irrigation
- ~7 hr/liter fuel consumption
- Also runs well on bio diesel
- ~$100 ex-factory (plus pump)
- ~¾ hp power output
Low-cost drip irrigation

- unlocks the benefits of drip irrigation for small farmers
- operates at low inlet pressure (0.5 to 3 m)
- very affordable - installed cost $0.04 to $0.08/m\(^2\) ($400 to $800/hectare)
- up to 50% more yield per drop consumed or per unit area
- available in small packages (20 to 100 m\(^2\)) and expandable for large plots (10,000 m\(^2\))
40-m² garden drip kits with water bag head tanks
Drip system serving 1500 m² tomato field
Reducing poverty

Where do we get the best return on dollar invested?

• Rehabilitating underperforming irrigation systems? or

• Helping small farmers link to markets using affordable water control technologies?