

## Executive Summary

### 1. Background

### 2. Findings: Poverty impacts

### 3. Findings: Incremental costs and benefits

### 4. Findings: Market Mapping

### 5. Opportunity Action Areas

### 6. Strategic considerations for implementation

- 4.1 Overview and Key Findings
- 4.2 Domestic+—market mapping
- 4.3 Irrigation+—market mapping

A key knowledge gap has been lack of information on potential markets for multiple-use approaches. Based on observed widespread uses of domestic and irrigation systems for unplanned domestic and productive uses and low rates of coverage for basic access, some sector experts have suggested the potential market for multiple-use approaches is large.

To test this hypothesis for domestic+ services, the study estimated:

- The number of estimated rural populations by service level in South Asia and sub-Saharan Africa (see 1.3.3 and 1.3.4 for service level definitions) disaggregated by technology/water source.
- Markets with the highest potential based on results of cost-benefit analysis for different technologies and service levels.
- The socioeconomic characteristics of households in these markets to determine if they could benefit from domestic+ multiple-use services.

For irrigation+, the study estimated:

- The number of people living in irrigation command areas, and of those, the number without access to basic domestic water services.
- Markets with highest potential based on results of cost-benefit analysis for different service levels.
- The socioeconomic characteristics of households in these markets.

***See background section for details on methodology (1.3.7) and study limitations (1.4).***

### Key Findings

**The potential market for multiple-use approaches is large (> 1 billion):** Based on an analysis of current service levels, technologies, benefits and costs, a number of high potential markets (opportunity action areas) have been identified in South Asia and sub-Saharan Africa:

#### Domestic+ market:

- **New piped multiple-use water services—137 million**, South Asia (56m) and sub-Saharan Africa (81m)
- **Upgrading existing services—539 million**, South Asia (450m) and sub-Saharan Africa (89m)
  - upgrading services for those relying on piped systems—public standpipes (185m)
  - upgrading household dug wells through protection and improved lifting devices (74m)
  - in situ add-ons for those relying on boreholes, which are mostly fitted with hand pumps (280m).

#### Irrigation+ market:

- **Upgrading existing services—447 million**, South Asia (443m) and sub-Saharan Africa (4m)
  - incremental add-ons to support livestock (290m)
  - communal water storage, home water treatment to support domestic uses (112-225m)

**Achieving potential at scale will depend on an enabling environment**, including adequate water resources, political willingness reflected in enabling policies and potential investments, entry points for implementation approaches to scale-up, and institutional readiness at local, intermediate and national levels.

**Key Findings:**

- The potential market for domestic+ multiple use approaches is substantial—over 800 million.
- In sub-Saharan Africa, the largest potential domestic+ market is for rural populations currently without services—267 million. The potential market for upgrading existing services is also substantial—111 million.
- In South Asia, the largest potential domestic+ market is for rural populations with water services at the domestic/basic multiple-uses level—328 million. The market for those currently without services is substantial—184 million, offering opportunities for significant impact at scale.

**Estimated population (millions) by current water service levels**

Region	Highest MUS	Intermediate MUS	Domestic/ Basic MUS*	No Services	Total
South Asia	81	453	328	184	1,047
Sub-Saharan Africa	20	60	111	267	458
<b>Total</b>	<b>101</b>	<b>513</b>	<b>439</b>	<b>451</b>	<b>1,505</b>

Estimated using JMP (2004) and WHO Health Survey (2003) data.

\*Note: Due to data limitations we were not able to disaggregate those with water services at the domestic vs. basic multiple-uses service levels



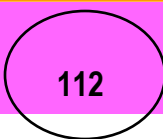
### Key Findings:

- Potential is significant for new domestic+ services, which will likely follow existing technology trends. Piped systems serve the largest rural populations in sub-Saharan Africa (37% from public standpipes and 10% from household connections), followed by boreholes (31%) and protected dug wells and springs (21%).<sup>1</sup>
- Potential is also significant for upgrading existing domestic services to the intermediate multiple-use service level (and higher), including: domestic piped systems (41 million), nearby protected dug wells/springs (14 million),<sup>2</sup> and boreholes (60 million) from the basic domestic/basic multiple-use service level to the intermediate multiple-uses service level.

Estimated population (millions) by service level and technology/source: sub-Saharan Africa

Service level	Piped water to house/yard	Public standpipe	Protected tube well or borehole	Protected dug well or spring	Unprotected dug well or spring	Rainwater (into tank or cistern)	Water from pond or stream	Tanker-truck, vendor	Total
Highest MUS	20								20
Intermediate MUS		29	17	14					60
Basic Domestic/Basic MUS		41	43	27					111
No Services		19	11	10	112	13	83	19	268
Total	20	89	71	51	112	13	83	19	458

An estimated 25% of this population—28 million—relies on unprotected household dug wells, which could be upgraded through well-protection and improved lifting devices such as treadle and rope pumps.



Estimated using JMP (2004) and WHO Health Survey (2003) data.

### Key Findings:

- Potential is significant for upgrading existing domestic services to the intermediate multiple-uses service level (and higher), including piped systems (144 million), boreholes (407 million), and nearby protected dug wells/springs (94 million).<sup>3</sup> Significant potential also exists to upgrade services from household hand-dug wells through well protection and improved lifting.
- Potential is significant for new services, which will likely follow existing technology trends. Boreholes serve the largest rural populations in South Asia (47%), followed by piped systems (32% from public standpipes<sup>4</sup> and 9% from household connections) and protected dug wells and springs (11%).

**Table 8. Estimated population (millions) by service level and technology/source : South Asia**

Service level	Piped water to house/ yard	Public standpipe	Protected tube well or borehole	Protected dug well or spring	Unprotected dug well or spring	Rainwater (into tank or cistern)	Water from pond or stream	Tanker-truck, vendor	Total
Highest MUS	81								81
Intermediate MUS		136	263	54					453
Basic Domestic/ Basic MUS		144	144	40					328
No Services		28	20	7	68	17	35	9	184
Total	81	308	427	101	68	17	35	9	1,047

An estimated 25% of this population—17 million—relies on unprotected household dug wells, which could be upgraded through well-protection and improved lifting devices such as treadle and rope pumps.

Estimated using JMP (2004) and WHO Health Survey (2003) data.

**Key Findings: Linking cost and benefit analysis with populations by technology and service level reveals 4 high-potential domestic+ markets:**

- 1) Providing new piped services at the intermediate multiple-uses service level for those with “no services”—137 million**  
(sub-Saharan Africa—81 million, South Asia—56 million).
  - Based on current technology trends, we estimate 30% of the those currently without services will receive new piped services.
- 2) Upgrading existing piped systems at the basic domestic/basic multiple-uses level to the intermediate multiple-uses service level—185 million**  
(sub-Saharan Africa—41 million, South Asia—144 million)
- 3) Upgrading boreholes w/ hand pumps w/ in situ add-ons to basic multiple-uses service level—280 million**  
(sub-Saharan Africa—17 million and South Asia—263 million)<sup>5</sup>
- 4) Upgrading hand-dug wells to the intermediate multiple-uses service level —74 million**  
(sub-Saharan Africa—31 million, South Asia—43 million)
  - Based on WHO Health Survey data, which contain information on proximity to source, we estimated that 25% (14 million) of the population in the “protected dug well or spring” at the intermediate multiple-use service level, and 25% of the population (17 million) in the “unprotected dug well or spring” at the “no service” level, have household/multi-household wells that could be upgraded to the intermediate service level through improved lifting and well-protection.

*Maps with estimates of populations by country are presented in the Opportunities for Action section*

### Key Findings

- **Wealth – Households in potential markets tend to be in the lower wealth quintiles.**
  - Poorer households are more likely to have no water services or to rely on communal shared sources compared to wealthier households. Countries with very low safe drinking water coverage rates, such as Ethiopia, are exceptions--here reliance on public standpipes is positively correlated with wealth.
- **Assets – Poor households do have the assets (land and livestock) to make productive use of domestic+ water services**
  - Households in the lower wealth quintiles are more likely to have livestock and either own or have access to land, suggesting they are able to benefit from productive water. This data corroborated evidence from global poverty surveys and case studies that ~70 percent of rural poor own livestock or have access to small cultivable plots, often near the homestead, that could be used for productive activities.
- **Health – Poor households especially can benefit from improved food security and nutrition**
  - Lower wealth quintiles were associated with higher food insecurity and greater deficiencies of protein, vitamins A and C, suggesting that home gardens and livestock could positively impact these households.

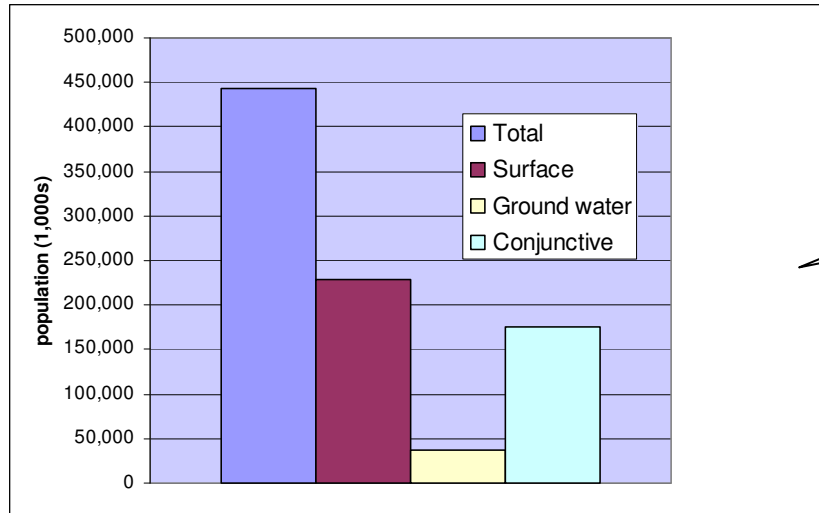
## 4.3 Irrigation+: Key Findings



### Key Findings:

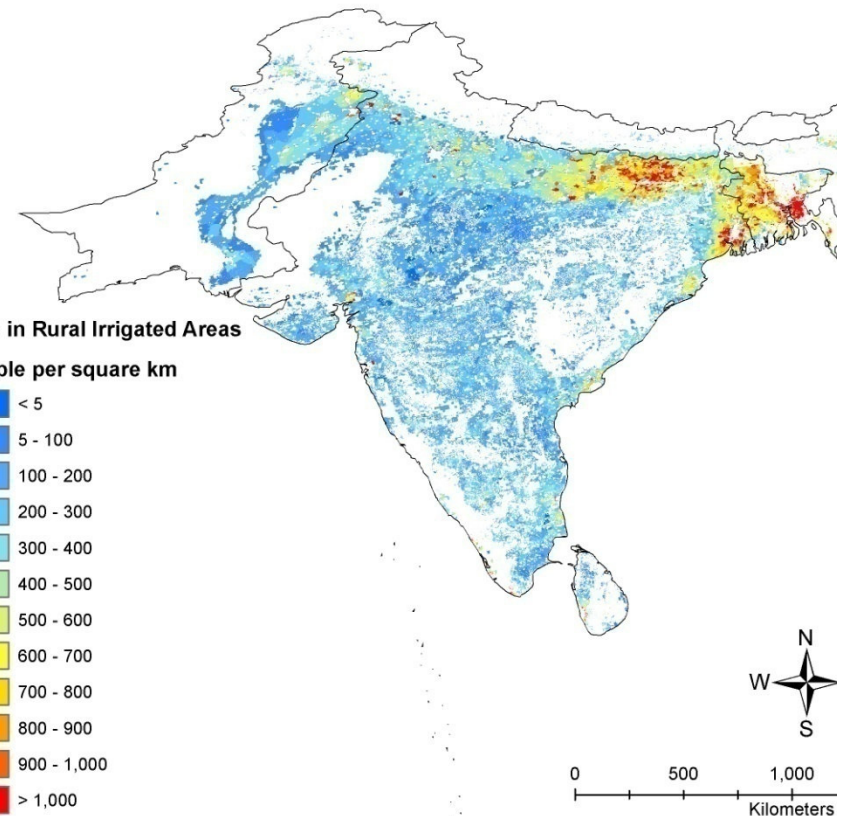
- **The potential irrigation+ market for multiple uses is substantial (~ 450 million)**
- The largest potential market is in **South Asia**, where an **estimated 447 million** people live within irrigation command areas.
- In **sub-Saharan Africa, the numbers are much smaller—3.5 million**. However, these numbers do not capture small-scale systems, which are much more prevalent in sub-Saharan Africa.
- For large-scale irrigation systems, there is greater potential for multiple-use approaches based on total number of potential beneficiaries living in areas with irrigation facilities and relatively easy access to centrally managed large systems.

**South Asia: Estimated Population in Irrigation Areas**

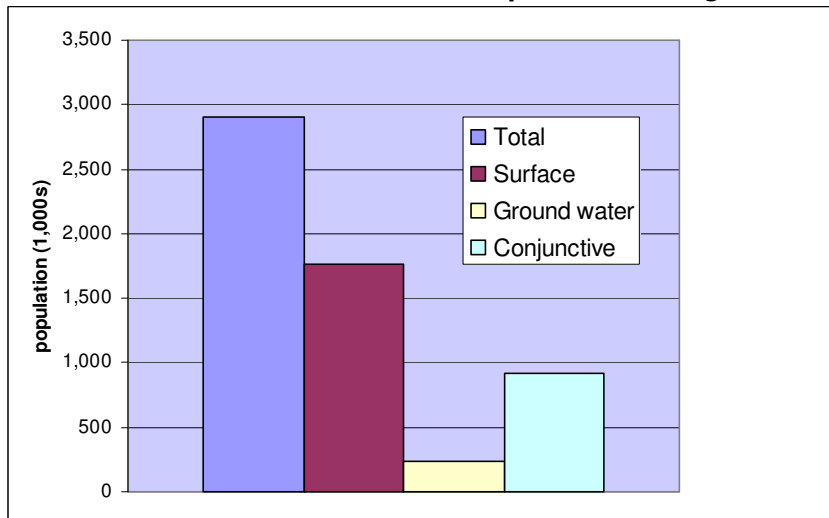


The largest potential market for irrigation+ is in South Asia

**Spatial distribution of estimated rural populations living in irrigated areas in South Asia**



**Sub-Saharan Africa: Estimated Population in Irrigation Areas**



Source: IWMI, 2006 and CIESIN, 2004.

Source: IWMI, 2006 and CIESIN, 2004.

## 4.3.2 Irrigation+ Market Based on Economic Feasibility

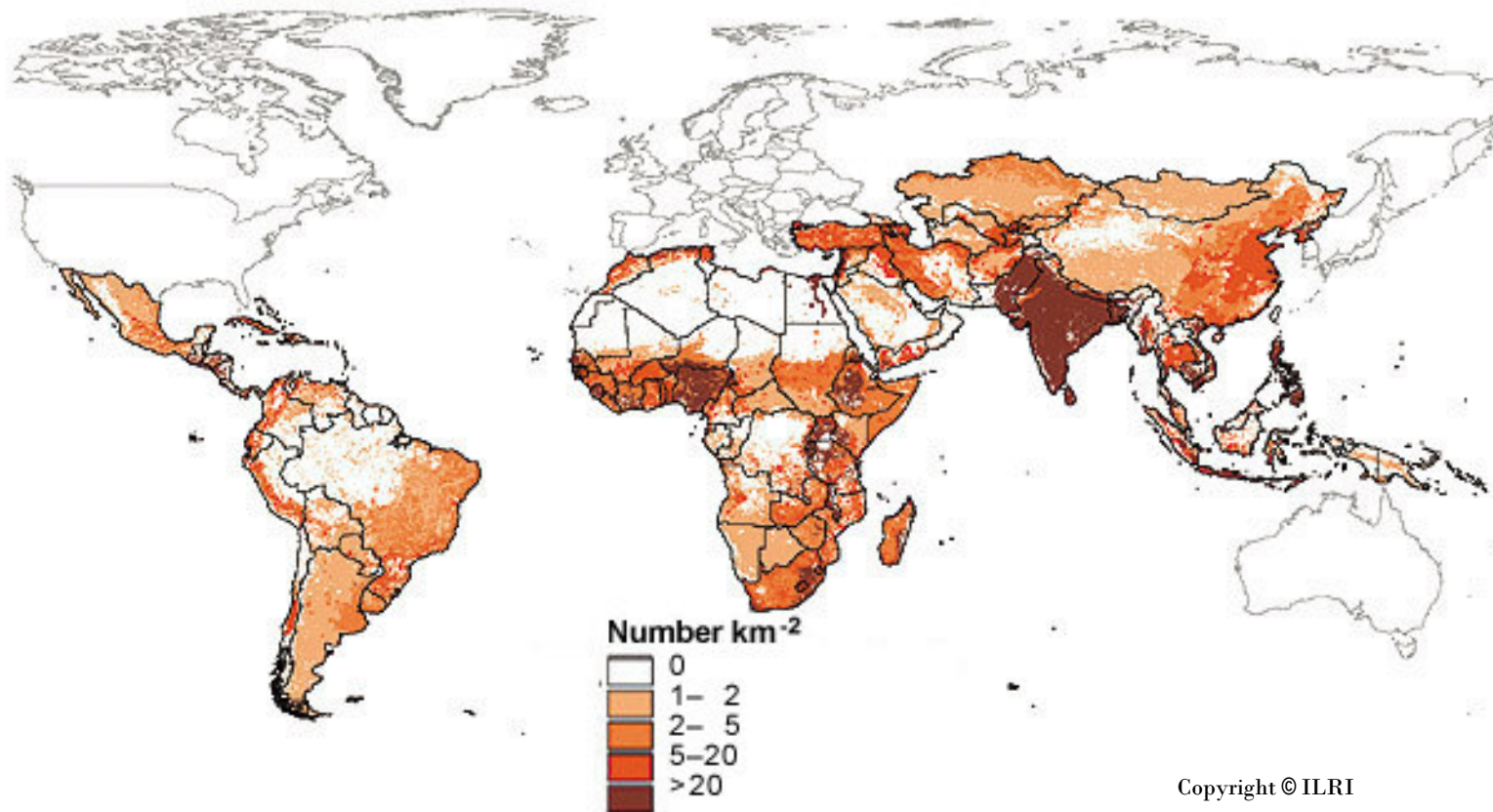


**Key Findings:** Linking cost and benefit analysis with populations in irrigated areas reveals 2 high potential markets that are concentrated in South Asia:

- 1) **Upgrading existing basic irrigation services to the basic multiple-use service level through communal add-ons to support livestock—290 million (mostly South Asia)**
  - An estimated 60-70% of households in rural areas have livestock holdings. Within irrigation command areas, the density of livestock holdings is higher (Molden et al., 2007; Peden et al., 2007). In this study, we estimate that 65% of those living in irrigated areas have livestock and can benefit from formal allocations of irrigation water for livestock drinking needs, including technical improvements to facilitate use.
  
- 2) **Upgrading existing basic irrigation services to the intermediate multiple-uses service level through improved communal and home water storage to support domestic and non-irrigation productive uses—112-225 million (mostly South Asia).**
  - An estimated 25-50% of the population in irrigation command areas could benefit from improved communal and household water storage. Further research is needed to refine this estimate. Of this population, an estimated 81 million could benefit from home water treatment and hygiene education. The latter estimate is based on current rural water supply coverage rates in South Asia, where an estimated 18% of the population living in irrigation command areas lack access to safe drinking water. Although specific evidence is lacking, irrigation+ case studies reviewed in this study suggest that health benefits are significant in formal allocation of surface irrigation water for domestic purposes, especially in areas where ground water quality or quantity is a key constraint.

**Key Finding:** In addition to the data on socioeconomic characteristics of the potential markets based on the Demographic Health Survey Wealth Indices above, data on density of poor livestock holders (those living on less than \$1/day) shows very high concentrations poor livestock holders in irrigated areas of South Asia who could potentially benefit from multiple use services.

**Population densities of poor livestock holders**



- 1) For the purposes of the analysis, we assumed that approximately 30% of those without services (81 million) will receive new piped services based on current trends in technology for improved services.
- 2) Based on WHO Health Survey data, which contains information on proximity to source, we estimated that 25% of the population (3.5 million) in the “protected dug well or spring” at the intermediate multiple use service level and 25% of population (28 million) in the “unprotected dug well or spring” at the “no service” level, are household wells that could be upgraded to the intermediate service level through improved lifting and well-protection.
- 3) For the purposes of the analysis, we assumed that approximately 30% of those without services (56 million) will receive new piped services based on current trends in technology for improved services.
- 4) Based on WHO Health Survey data, which contains information on proximity to source, we estimated that 25% (14 million) of the population in the “protected dug well or spring” at the intermediate multiple use service level and 25% of population (17 million) in the “unprotected dug well or spring” at the “no service” level, are household wells that could be upgraded to the intermediate service level through improved lifting and well-protection.
- 5) To estimate populations who could benefit from upgrades to existing boreholes with hand pumps we used populations estimated at the “intermediate multiple –use service level”. We opted for nearby boreholes (those less than 150 m from point of use) because more distant boreholes are frequently face high demands on usage and may be unable to support productive uses. As a result, these population estimates should be considered as conservative as they likely under-estimate the total population who could potentially benefit.