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Assessing Economy-wide Effects:

An Application of the Methods Paper Recommendations for Uganda's Ministry of Water and Environment

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Uganda's Interest in Economy-Wide Effects Assessment

- The need to have an analytical report to provide increased understanding of the contribution of water resources development and environmental management to economic growth and development in Uganda
- To determine the value of the water and environmental resources in relation to Uganda's GDP equation
- The give the sector a basis for bargaining for funds during the resource allocation
- To show management the future negative effects/costs of doing business as usual in terms of investment and policy actions to the economy and the environment at large.
- To influence and advocate for preparation and use of water and environment accounts in the country's GDP calculation and CGE model

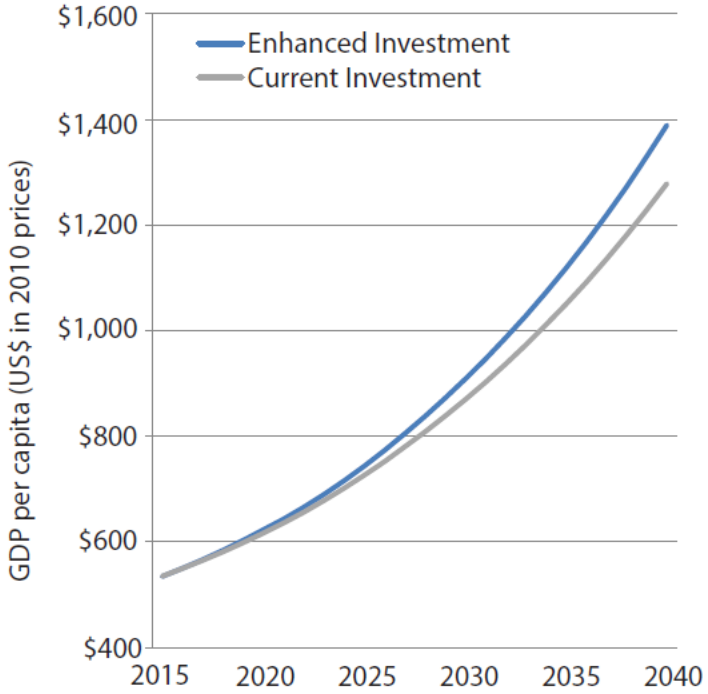
The Result

9%

GDP per capita is 9% higher in 2040 under enhanced investment in rural and urban water supply and sanitation, sustainable wetlands, and forest and catchment management. That is equivalent to an extra $111 per person in that year.

ECONOMIC GROWTH, 2015-2040

The lower line in the figure shows the modeled trajectory of per capita GDP growth under Vision 2040 conditions, but with Water and Environmental investments at lower, current growth rates. The upper line shows the same trajectory, but with MWE's Vision 2040 Water and Environmental investment scenario. The difference is 9% increase in per capita GDP by 2040.

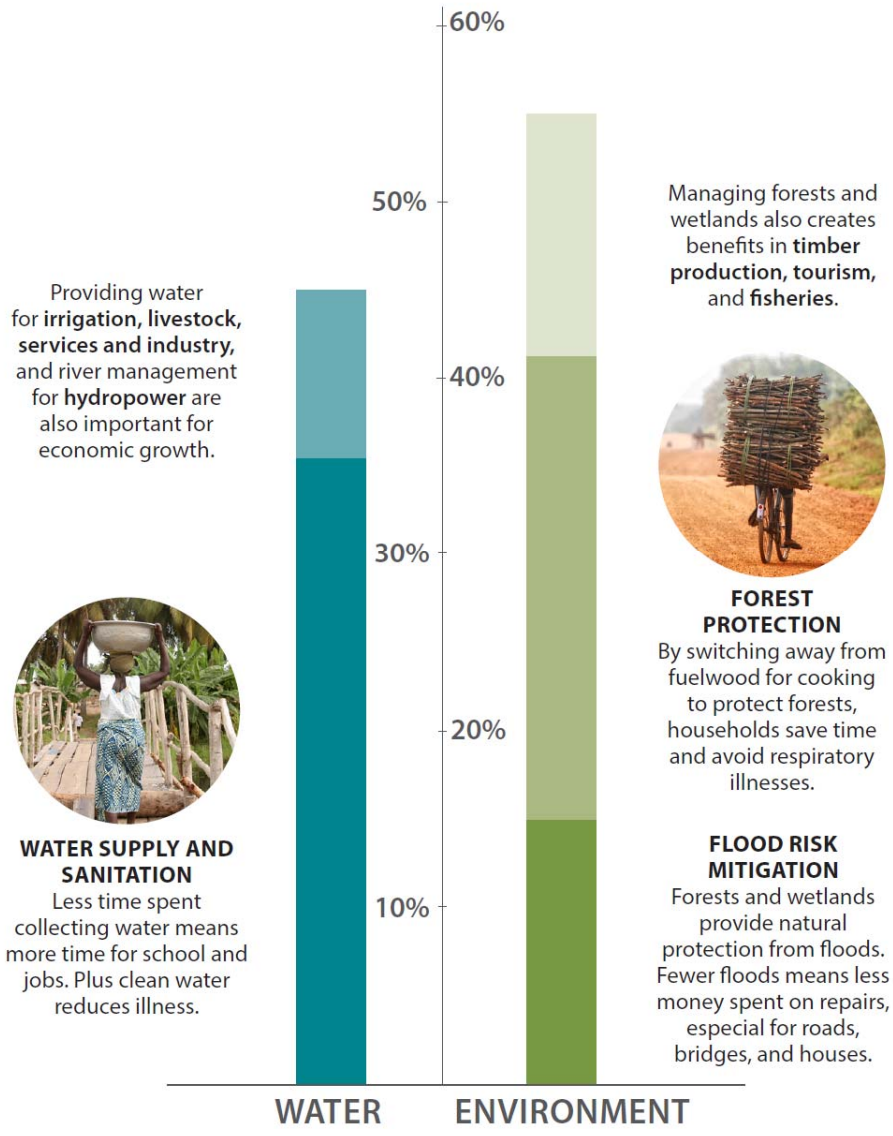


MWE's Use of the Economy-Wide Effects Assessment

- The ministry has used the results so far to inform the decision budget process by Ministry of Finance.
- The Ministry is using the results to negotiate for increased funding to the sector from the development partners
- Using findings to lobby for increased support from the development partners (though this is at limited scale) and expect to intensify it

How did we do it ?

MWE's Contributions to Economic Growth



BCA and Economy-wide models

Starting point for assessing economy-wide effects of health and environmental interventions in support of benefit-cost analysis stated by Varian (1989):

"We start from a simple methodological premise: there is only one correct way to do cost-benefit analysis. *First, formulate an economic model that determines the entire list of prices and incomes in an economy.* Next, forecast the impact of some proposed change on this list of prices and incomes. *Finally, use the utility functions of the individual agents to value the pre- and post-change equilibria.* The resulting list of utility changes can then be summarized in various ways and presented to decision-makers."

BCA and Economy-wide Models

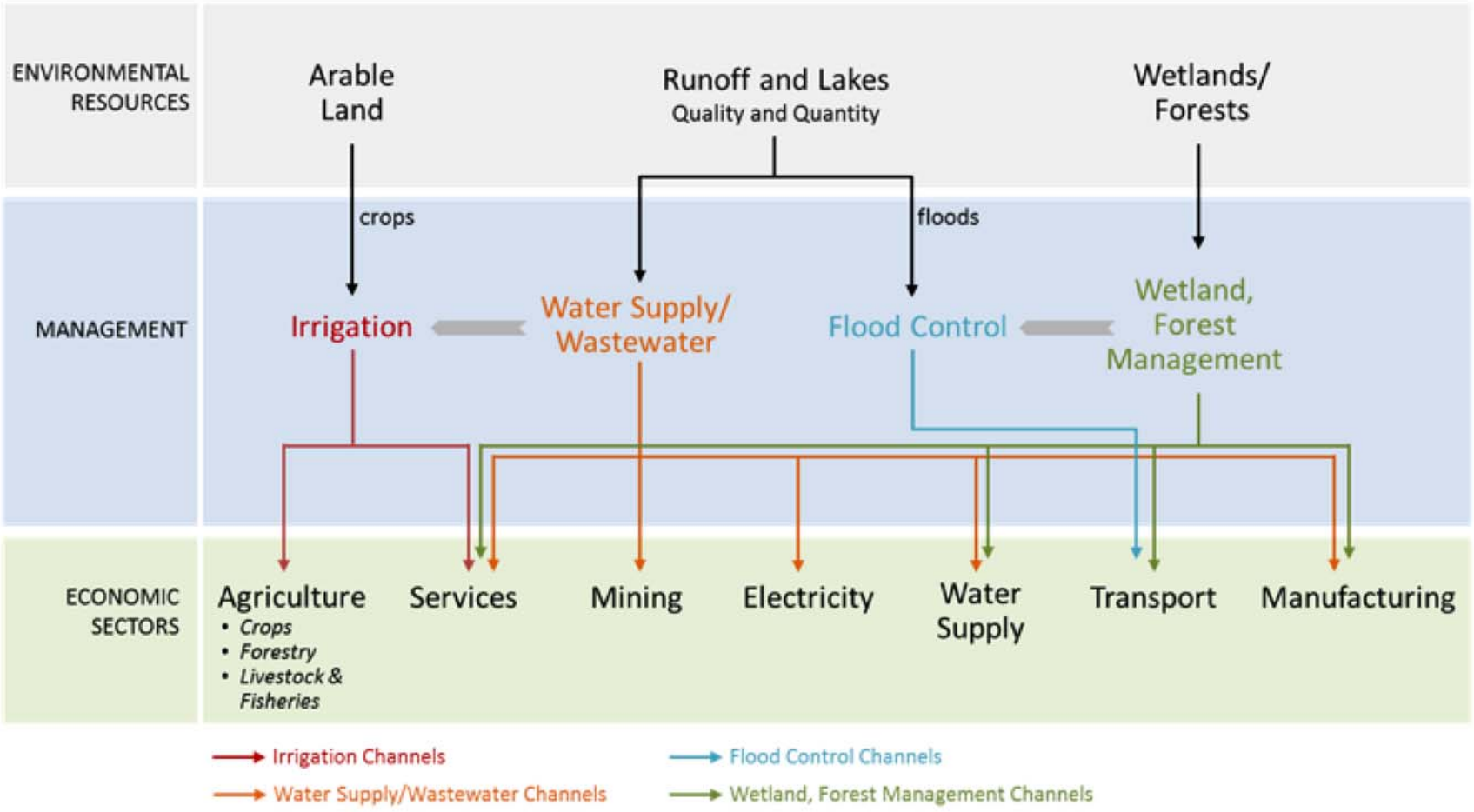
Varian's statement omits some elements of the current state of the art in BCA which reflects consideration of non-market inputs to individuals' welfare deriving from health and environmental quality improvements.

Varian nonetheless provides a compelling rationale for consideration of economy-wide tools as increasingly essential for robust benefit-cost analysis.

What Approach have we taken and Why

CATEGORY	DESCRIPTION	ENVIRONMENTAL GOOD (EXAMPLES)	EVALUTION METHODS	HOOK TO CGE
Ecosystem Services Reflected in GDP	Service flows provided by ecosystems with outcomes measured in traditional GDP accounts.	- Flood protection - Reduced sediment loads - Improved water quality	- Cost to replace lost service with infrastructure - Damage of losing service	Impact on productivity of capital, labor, and land
Water and Environment Inclusive GDP	Service flows provided by ecosystems that are not captured in traditional National accounts.	- Irrigation Water - Household farms - Industrial and Livestock self-supplied water - Biomass collected locally from forests	-Determine economy-wide the shadow price for env. resource - Determine sector-specific shadow price for env. resource	Env resources shows up directly in GDP by resources as intermediate or Factor in SAM
Existence or other non-market values	Service flows that improve human welfare, but do not directly produce GDP.	- Biodiversity - Cultural value - Aesthetics - Sense of place	Stated and revealed preference methods	None
Inclusive Wealth	An accounting system that considers the value of natural resource and environment stocks as well as their extraction values.	Stocks of forest, groundwater, water quality, soil quality, and other environmental resources	Shadow prices, otherwise market values	None

Channels of Impact via of Biophysical Models



"Hooks" to the CGE via Production

Biophysical Hooks for Water Impacts on Economy

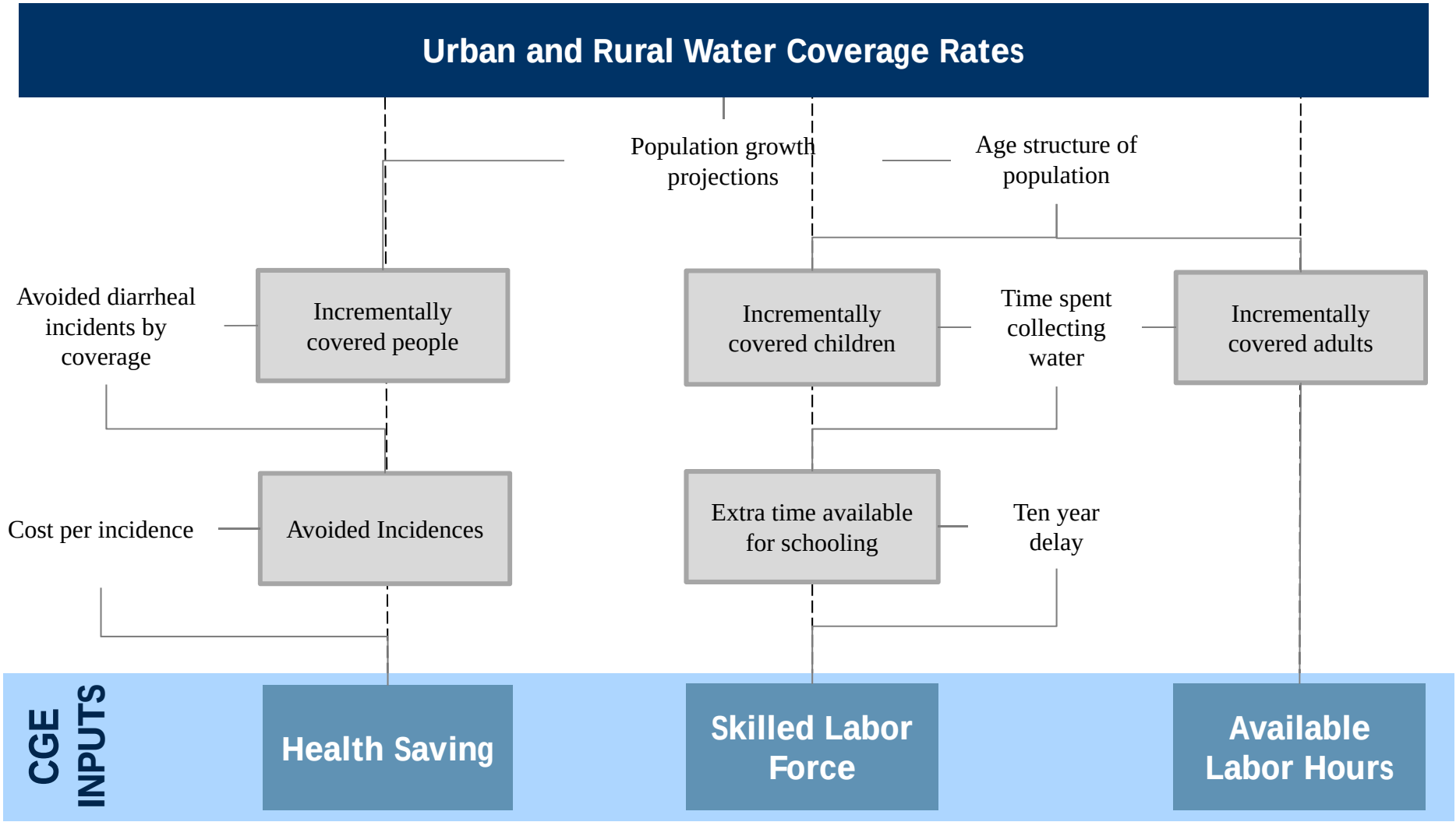
Production Function $Y_t = \bar{A} K_t^{1/3} \bar{L}^{2/3}$

Net Investment $= \bar{s} Y_t - \bar{d} K_t$

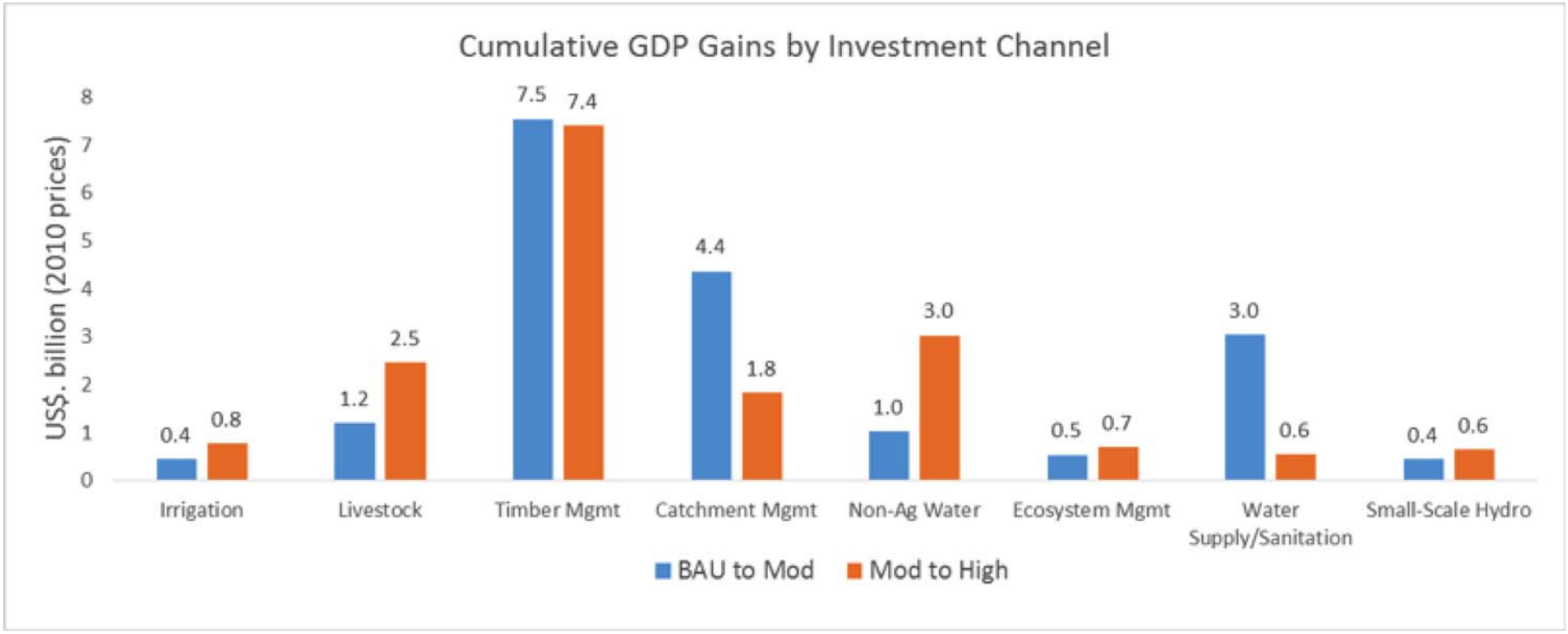
- Flood Protection >>> K (Capital) Increase Depreciation
- WASH >>> L (Labor supply)
- WASH >>> Reduced Health Costs, More Investment $\bar{s} Y_t$
- Irrigation >>> A (Crops)
- Water Quality >>> A (Fish, Livestock)

The impacts are channeled to the CGE in a similar fashion as air pollution health impacts (that affect labor supply and health services)

Example Channel: WASH



Contribution by MWE Impact Channel



WHEN NOT TO USE CGE MODELS

In general, economy-wide models are likely to provide small incremental insights, compared to partial equilibrium or static approaches, when:

1) the policy or investment is a small marginal change relative to the size of the economy;

2) when benefits are largely confined to a short-term time horizon; and

3) when the costs and/or the benefits are largely confined to a single economic sector.

WHEN TO USE CGE MODELS

- By extension, the literature summarized suggests that economy wide-modeling tools are best applied when the following conditions are in place:

- *Sufficient data exist.*
- *Effects are large.*
- *Effects have a cumulative nature over time*
- *Inter-sectoral implications are likely*

Recommendations to Improve Application of CGE

1. **Improve the sub-national collection of economic, social, public health, natural resource and civil infrastructure data**

2. **Conduct a major effort to quantify and develop mathematical relationships for the impacts between health-based interventions/projects/programs and their outcomes on human activities (e.g. number of reduced diarrheal events per capita for increased clean water supply.)**

3. **Develop within governments the required interdisciplinary analytical teams to bring economy-wide assessments to bear on crucial public policy questions. This may be the largest challenge in the way of greater adoption of these tools, faced equally in developed and developing country settings.**

THANK YOU

WATER SUPPLY AND SANITATION

Less time spent collecting water means more time for school and jobs. Plus clean water reduces illness.

FOREST PROTECTION

By switching away from fuelwood for cooking to protect forests, households save time and avoid respiratory illnesses.

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