

FIFTH BOTIN FOUNDATION WATER WORKSHOP

**WATER AND FOOD CONFLICTS VERSUS
COOPERATION IN A GLOBALIZED WORLD**

Venue: Marcelino Botin Foundation Headquarters. Santander,
Spain

Date: 28-29 October 2010

**Water Technology to Protect Poor Farmers:
Improving Access and Water Use Efficiency**

Peter Rogers
Harvard University

Millennium Development Goals

Indicator of the magnitude of the
problem

Goal 1: Eradicate Extreme Poverty and Hunger

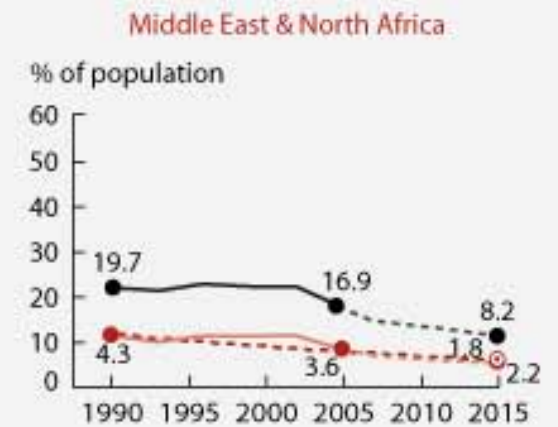
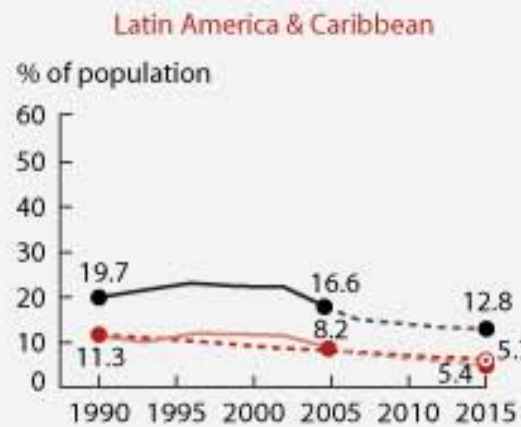
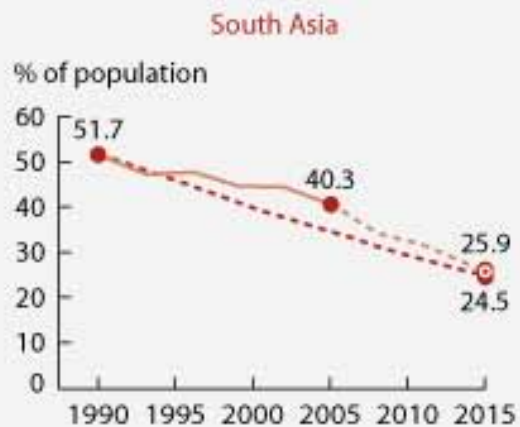
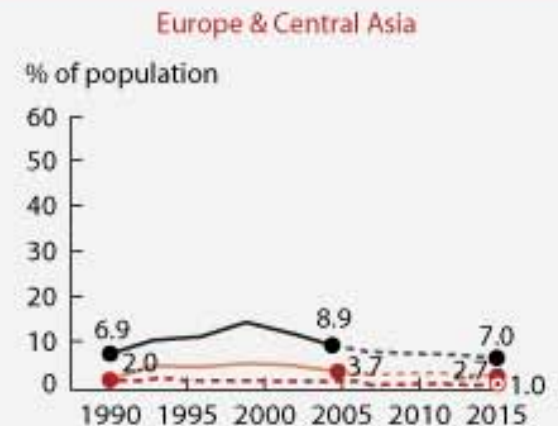
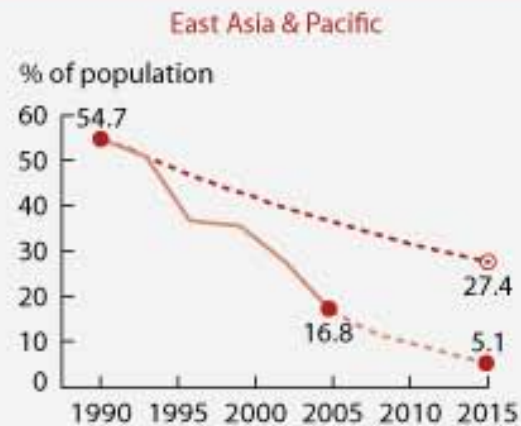
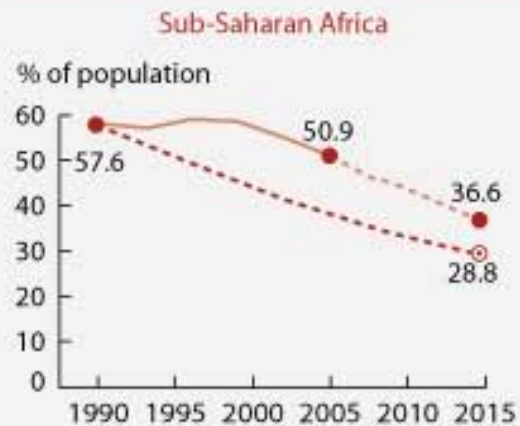
[<< Return to all MDGs](#)

Targets:

- Halve, between 1990 and 2015, the proportion of people whose income is less than \$1.25 a day
- Achieve full and productive employment and decent work for all, including women and young people
- Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Global Monitoring Report 2009: A Development Emergency, World Bank, 2009

Poverty rates by region, based on new PPPs



— Actual \$1.25/day - - - - Projected \$1.25/day ○ 2015 target - - - - Path to goal — Actual \$2/day - - - - Projected \$2/day

Source: World Development Indicators.

Goal 7: Ensure Environmental Sustainability

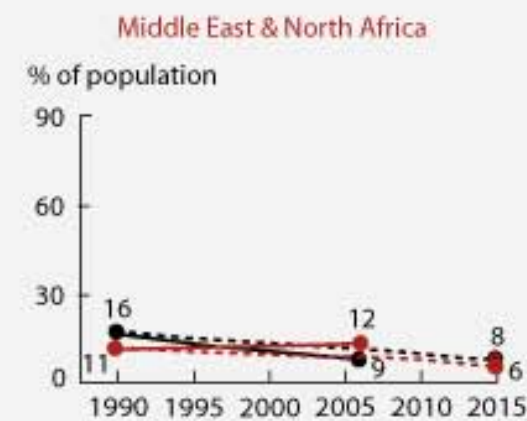
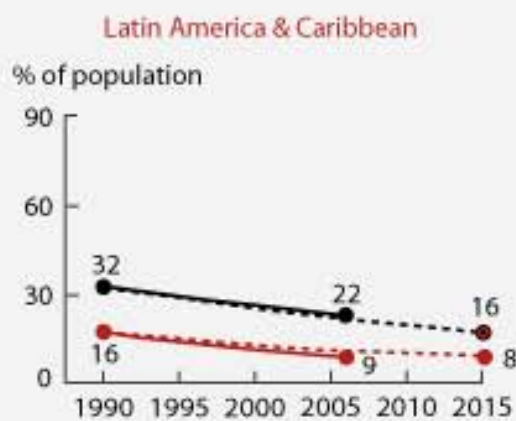
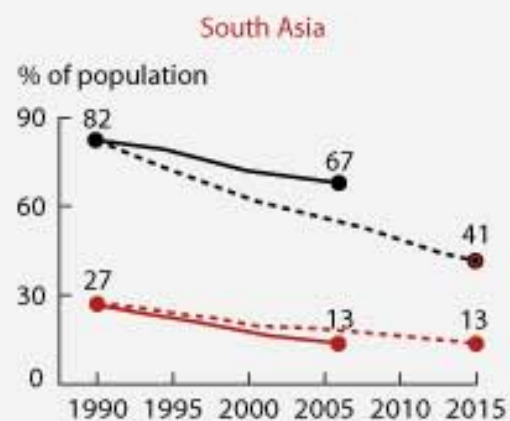
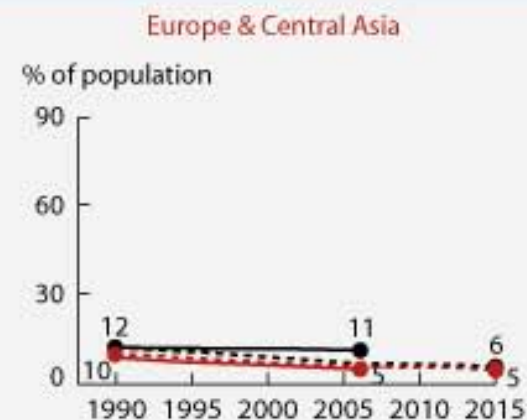
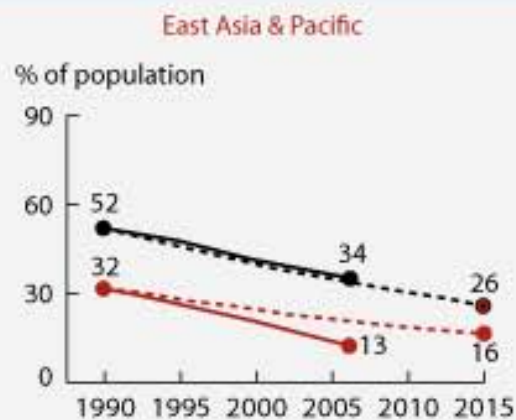
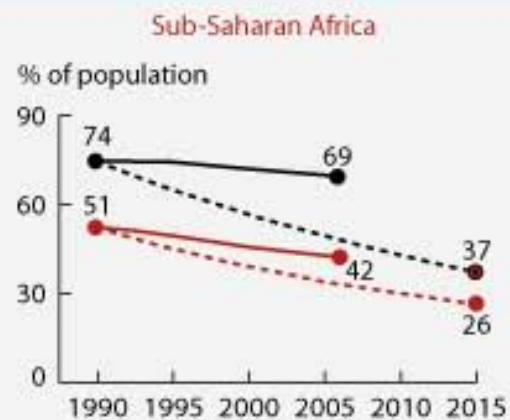
Global Monitoring Report 2009: A Development Emergency

[<< Return to all MDGs](#)

Targets:

- Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources
- Reduce biodiversity loss, achieving by 2010 a significant reduction in the rate of loss
- Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation
- Have achieved a significant improvement by 2020 in the lives of at least 100 million slum dwellers

Population without access to an improved water source or sanitation facilities



—●— Without water access actual - - - Path to water access goal ● 2015 target
—●— Without sanitation access actual - - - Path to sanitation access goal ● 2015 target

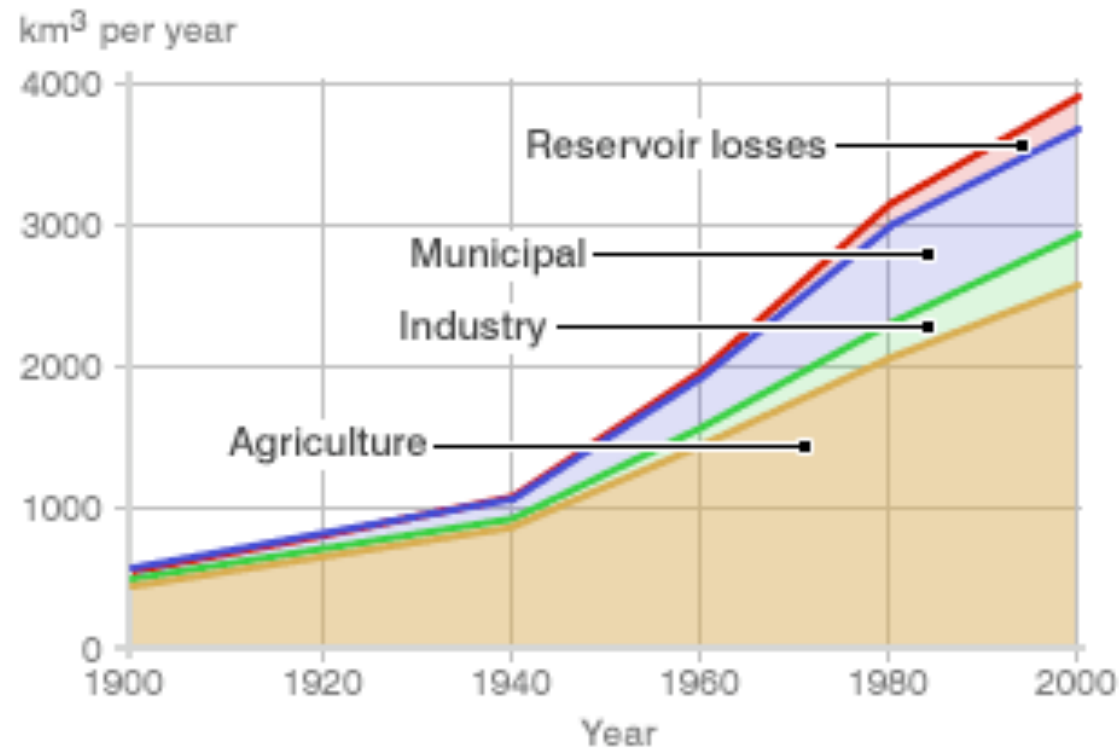
Source: World Development Indicators.

Conventional View of Increasing Demand Meeting Fixed Supply

- Since 1900 global population has tripled
- Water use has increased more than six-fold

Source. FAO Aquastat, Water and Food Security, 2009.

Estimated annual world water use



SOURCE: FAO Aquastat

Economic Theory of Poverty

- Definition and identification
 - Income, consumption, non-economic factors
- Poverty as a personal failing
 - Developed country mode
- Poverty as a structural failure
 - Anti neo-liberal modality
- Poverty as cultural characteristics
 - Value systems, patterns of thought, frugality
- Poverty as a label
 - Lack of social, economic, and political capital
- Poverty as a restriction of opportunities
 - Knowledge, transport, water, credit, etc.

Discourse on Water and Poverty

- Narrative patterns
- Premised on water scarcity
- Price and value
- Locking the poor into everlasting poverty
- Whose viewpoint, the poor or government
- The absence or presence of variables considered
- View from human/nature or social/politico standpoint

Water and Poverty: The Connection

- People are poor because they have constrained access to water,
 - or
- Because people are poor they have limited access to water
 - Or
- Because their water has been expropriated they become poor

How is Irrigation Defined?

- Surface or Groundwater
 - Groundwater requires motive force for lifting
 - Surface water mainly by gravity
- Human and animal powered:
 - Buckets
 - Treadle pump
 - Shadouf
 - Persian wheels
 - Archimedes screw pumps
- Electricity, petroleum, wind and solar
 - Low lift suction, high lift centrifugal
 - Wind suction and electricity
 - Photovoltaics small systems
 - Electrical and petroleum high speed deep centrifugal pumps

Each has a different impact on
the poor

Expected Benefits from Irrigation

- For poor net food producers
 - More intensive cropping pattern
 - Higher yielding varieties
 - Higher agricultural output
- Rural poor
 - More food available at lower prices
 - New wage employment in agriculture, construction, and increased demand for local goods and services

It is generally recognized that access to water for the poor in most countries is severely constrained by social and economic barriers.

This applies both to the urban and the rural poor. In all countries and settings the wealthy have been able to arrange for favorable allocations of water either because of superior economic power or by being friends of the political powers running their countries.

This is observed in developed and developing countries alike. Too often, as we see in Europe and the USA, a lobby of wealthy farmers is able to secure large subsidies for the water used to produce food and subsidies on its sales price.

In the developing countries this set of relationships is more complex, with the larger, wealthier farmers being assured timely water deliveries and often heavily subsidized energy for pumping.

Most governments, however, try to hold the market prices for food low. This puts poor farmers at a great disadvantage. With inadequate access water they are unable to compete with their wealthier domestic producers, let alone with the highly subsidized farmers from the developed world.

This presentation looks at the relative success of water technologies targeting the rural poor compared with straightforward technological development.

For food production we can contrast the technologies adopted by large corporate farms of North America, Brazil and Argentina who are in the forefront of producing cheap foodstuffs, with small-scale supplemental irrigation technologies increasingly being adapted in Asia and Africa.

Under which conditions do these different approaches have for mobilizing economic improvement for the rural poor?

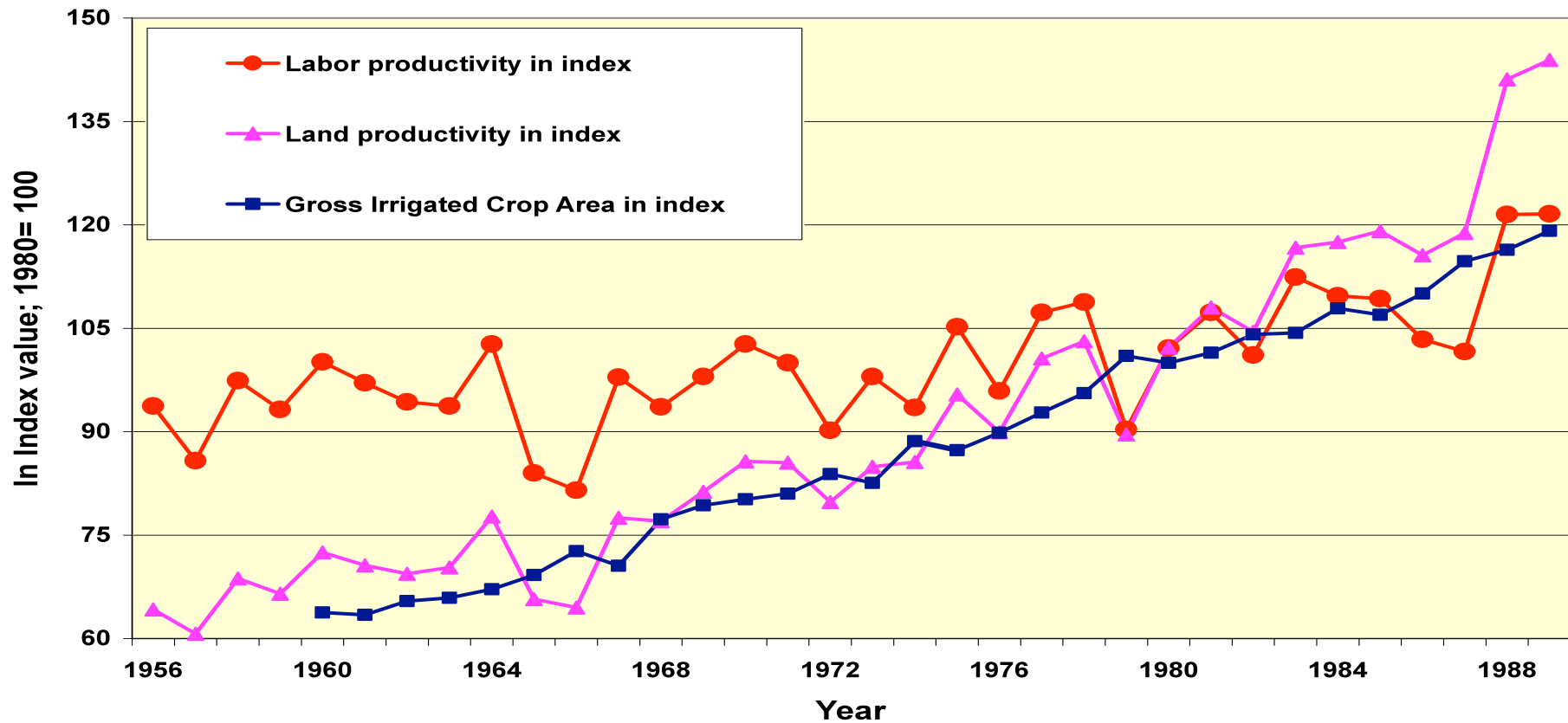
Some Evidence

India, Africa, and Mexico

Low income elasticity and high price elasticity of cereals, together dictate that future agricultural growth for smallholders needs to diversify beyond its current cereals emphasis.

Smallholder farmers in India: food security and agricultural policy. Regional Office for Asia and the Pacific, FAO, 200X)

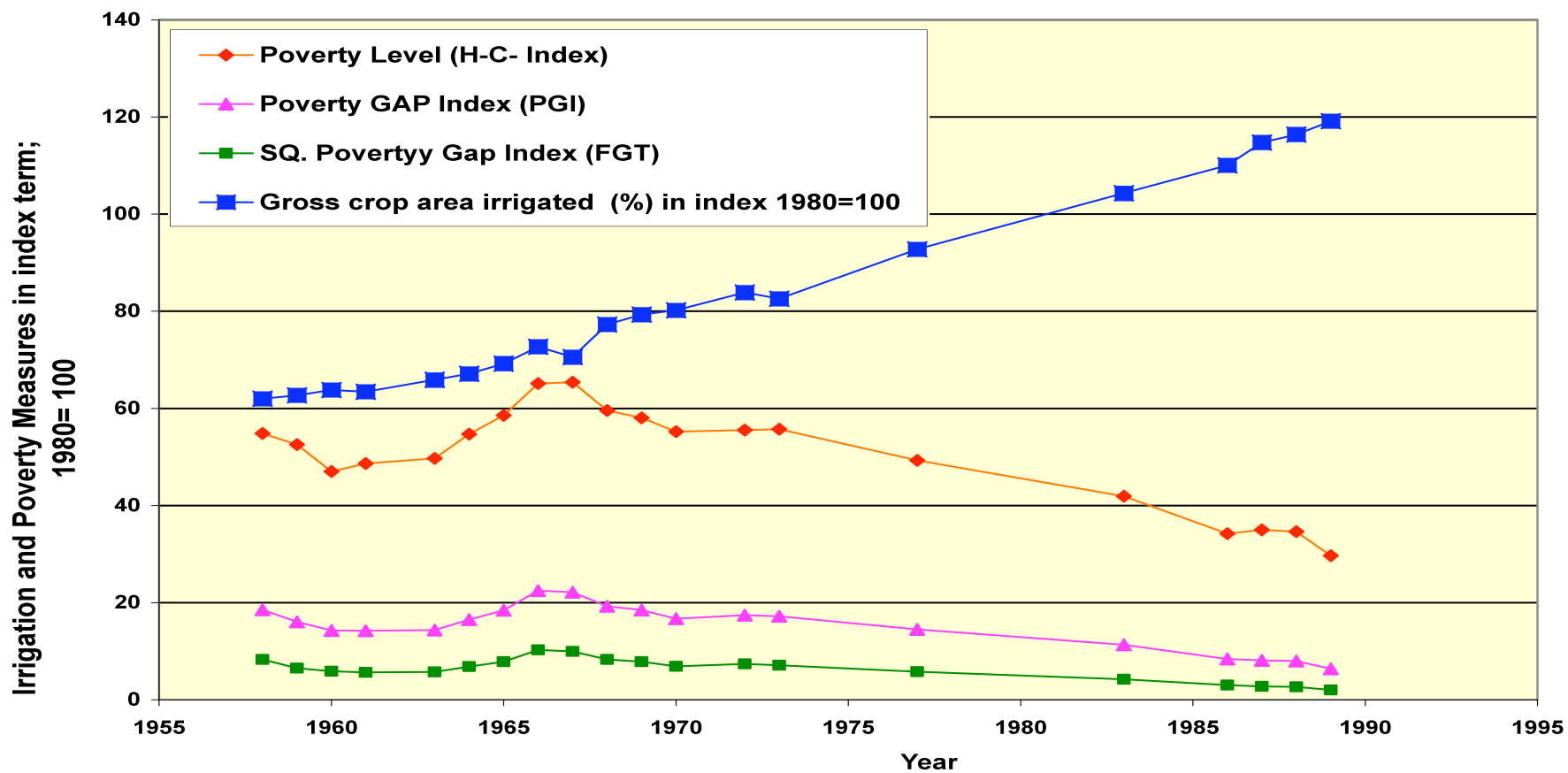
Figure 1 Land and labour productivity change along with gross irrigated cropped area at all India level, 1956-1989.



Irrigation Impact on Agricultural Growth and Poverty Alleviation: Macro Level Impact Analyses in India

Madhusudan Bhattarai and A. Narayanamoorthy

Figure 2 Relationship between in Irrigation and Poverty Measures at all India level, 1952- 1989.



Marginal impact of irrigation factor on growth of productivity of all inputs is positive and significant with elasticity of 0.32, which is larger compared to the impact of other factors such as, fertilizers, HYV adoption rate, and road infrastructure selected in the analysis.

This means that one percent increase in irrigated area has increased about 0.32 percent in the productivity of all inputs (TFP) in India during 1970-1994. This is a very high impact on agricultural productivity when compared to the impact of other factors such as fertilizers, HYV and road infrastructure, where the elasticity varies only from 0.04 to 0.09.

Significant changes in the agricultural sector in northern Mali suggest that irrigation has made a large contribution to welfare increases over the past eight years. This study estimates the impact of access to irrigation on poverty, production, and nutrient intakes. The findings suggest that gains in agricultural production value do not transfer uniquely to household consumption. Two aspects of the distribution of agricultural gains: (1) the gains in agricultural production induced by irrigation yield higher household savings, or (2) intra-village transfers from irrigators to non-irrigators contribute to informal social insurance.

The paper provides evidence of both saving and sharing within villages as complimentary strategies for consuming gains in agricultural production. This finding suggests that estimating the effects of a program, relying solely on household consumption, may underestimate the welfare gains of irrigation investment by ignoring the household's savings and informal insurance network.

Dillon, Andrew, "Access to irrigation and the escape from poverty," International Food Policy Research Institute (IFPRI), Working paper, 2008.

Morocco Labor Potential

Huge potential job creation benefits from diversification from cereals to horticulture, could be used to justify desalination for small scale agriculture

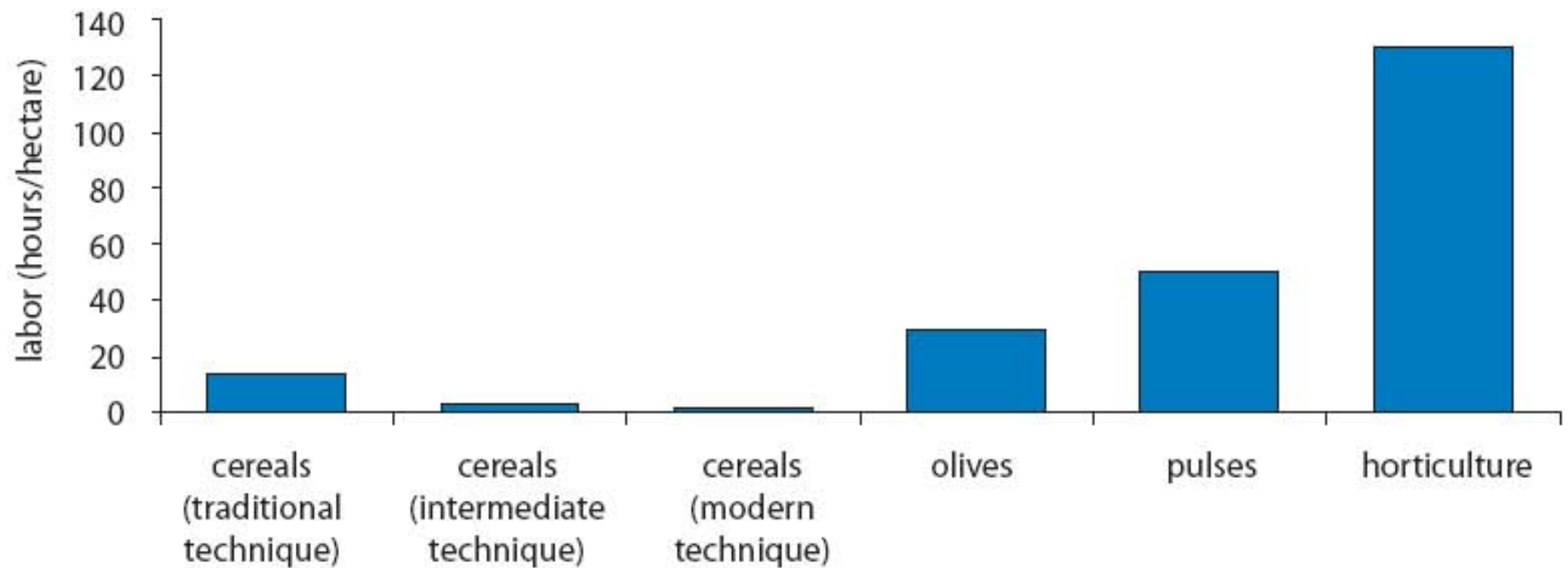
TABLE 3.1**Returns to Water Use in the MENA Region, by Crop**

Product	Water (m ³ /ton)	Revenue (US\$/ton)	Return to water use (US\$/m ³ water)
Vegetables	1,000	500	0.50
Wheat	1,450	120	0.08
Beef	42,500	2,150	0.05

Source: World Bank 2003d.

FIGURE 3.2

Labor Requirements of Moroccan Agriculture



Source: Ministry of Agriculture, Rural Development and Fisheries.

Reproduced from the World Bank Mena Region (2003). Labor requirements are in person days/hectare not as shown on figure

**Lack of Incentives for
Diversification some examples
from Mexico**

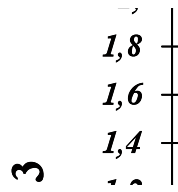


Figure 8-1. Comparison between shadow prices of water and water fees in various irrigation districts in México
 Mexican peso (\$) equaled US\$0.10 in 2000.
 Source: Ramirez-Vallejo (2003)

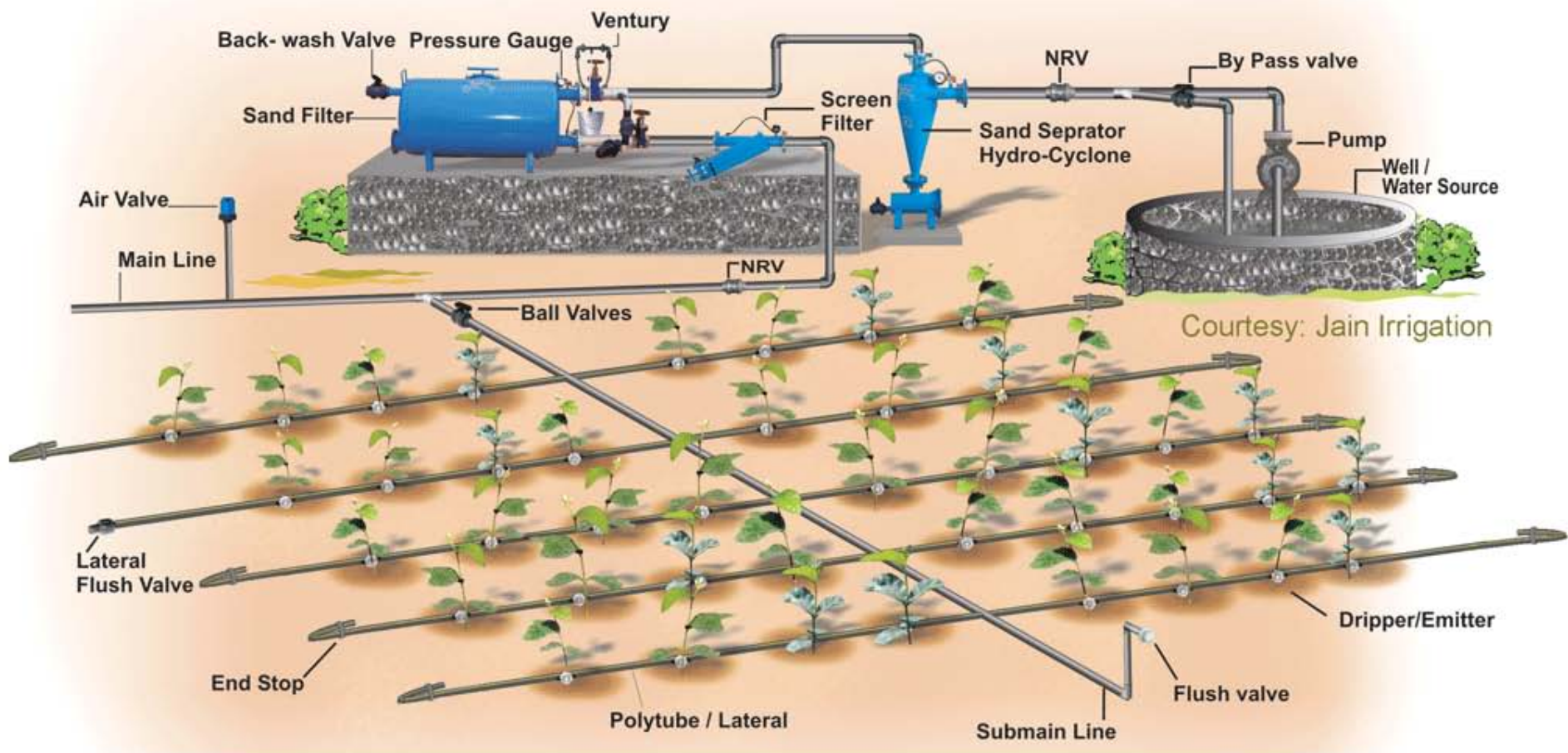








Center pivot in Kenya with different crops



Six key action areas to improve water security for the poor

- pro-poor water governance
- improved access to quality water services
- pro-poor economic growth and livelihood improvement
- community capacity building and empowerment
- disaster prevention and mitigation
- management of the environment

Technologies that Will Help the Rural Poor

- More storage of water (dams and groundwater)
 - Flood and drought risk reduction
- Introduction of smart irrigation systems for mixed cropping patterns and small farm holdings
 - Introduce modern computerized farm management
- New internationally competitive crops
- Farm to market roads and communications (regional trade and transit)

Solution does not lie in the water sector

The hard reality, it is that the application of all the good practices of appropriate technology, community based development, capacity building, private sector engagement, demand responsive approaches etc., small holder irrigated farming is unlikely to be sustainable in the long term. The only alternative is to encourage mass migration out of the rural areas.

This places the solution outside of the water sector - it relies on the urban-industrial sectors for the eradication of poverty. While there is large scale poverty at national, institutional, and individual levels, we will not make a significant reduction in rural poverty by relying on pro-poor irrigation schemes. At best it will remain a palliative for the short run—it will keep the rural poor in the chains of poverty.