Economic Development and Sustainable Use of Ground Water in India

Topic: Environmental IO models 6
Author: Mahua Dutta
Co-Authors: Shalini Singh Sharma, Shri Prakash

Economic Development and Sustainable Use of Ground Water in India

Shri Prakash*, Shalini Sharma** and Mahua Dutta***

Agricultural output, like output of manufacturing, may be raised either by (i) the use of more inputs of the same quality with invariant technology, or (ii) by raising the output per unit of input, including land, and advance technology. Under intensive cultivation, yield per hectare and productivity of other inputs do not change much. Fixity of land, its ever rising demand for meeting the (i) food requirements of rising population and its rising living standard, , and (ii) increasing demand for land for non-agricultural uses associated with rapid urbanisation and industrialisation limit the growth of output under this system. Intensive cultivation and adoption of advance technology, known as Green Revolution Technology in India, offer an effective option.

Advance technology involves the use of (i) HYV seeds, (ii) Chemical Fertilizers, insecticides/pesticides, (iii) raising of more than two crops per annum, leading to mechanisation, (iv)more water per unit of output and per hectare, and (v) improved cultural practices. All above factors put immense pressure on land and water resources of the country. New technology is highly water intensive but land extending (more yield per hectare). This raises concern about the long term sustainability of development.

Green Revolution technology is confined to selected parts of India due to various reasons, including agro-climatic factors and scarcity of capital. Several adverse effects of new technology, including environmental effects, depletion of natural nutrients of soil, and continuous lowering of ground water table, have already emerged as serious concerns for sustainable development. Balancing sustainability of development and food security for the masses, raising standard of living of the rising population, especially the poor across the length and breadth of the country poses razor edge problem and challenge.

Water plays an important pivotal role both in traditional and modern technology of farming. Agriculture productivity can be raised either by increasing the inputs for more production, or by changing the technology to increase the resource productivity. Water is needed in both cases, but water intensity of new technology is enormously high. The important source of irrigation is provided both by surface and ground water. But surface water is not distributed evenly over space. This enhances the importance of ground water. The renewable annual Ground Water Resource for the entire country is estimated to be 433billion cubic meter(bcm).But the overall contribution of rainfall to country's renewable ground water is only 67% and the remaining 33% is contributed by such other sources as canal water seepage, seepage from water bodies, return flow from irrigation etc. Tremendous fall in annual rainfall from previous years has been registered; it has also lowered the ground water level in many states of India. Demand for water emanates not only from irrigation but from industry, infrastructural facilities, provision of potable water for rising population, social forestry, etc.. This highlights the need for water conservation and prudent management of rising demand to take care of both current and future development and food security of the country.

The study focuses on above issues and problems of development. An input output model will be used to take account of both direct and indirect components of current and projected future final demand for agricultural commodities and its implications for water resources.

The study will focus on answers to the following research questions: (i) what is the current status of agricultural development relative to other sectors of the economy and accessibility and availability of food for the masses? What has been the extent and pattern of utilisation of water resources in the past during different plans of development? What is the current state of food security? Has there been any impact of use of new technology in agriculture on agro-climatic conditions of the country?

What are the implications of planned development under twelfth five year plan for food security, removal of malnutrition and impoverishment, and utilisation of water resources? The list is not comprehensive. Some more questions are likely to crop up in the course of detailed analysis of the data.

Data Base

CSO's I-O tables for the years 1983-84, 1988-89, 1993-04, 1998-99, 2003-04 and 2008-09 are proposed to be used as the main data base of input output model. But other sources of data, like Ministry of Rural Development, Directorate of Economics and Statistics, Department of Agriculture, etc. Will be explored for other data.

Keywords: Renewable Groundwater, Sustainability, Productivity, Food Security, Input-Output Model, Irrigation.

* Prof. of Eminence, BIMTECH, Greater Noida, shri.prakash@ bimtech.ac.in
** Professor, Sharda University, Greater Noida,
*** Associate Professor, I.M.S., Noida.