

# Water-Energy-Food Nexus Research Area: Mapping Institutions, Researchers and Funders in India

## Executive summary

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### Objectives

- To identify leading research institutions and universities working on Water-Energy-Food Nexus research area based on their publication matrix
- To identify leading and emerging researchers based on their publications matrix
- To identify research priorities for Indian funders in Water-Energy-Food Nexus Research Area

The challenges faced by the world in general and in India, specifically, in respect of energy, water, and food sectors are increasingly becoming interlinked. Subsequently, strategies for tackling one or the other aspect of this integrated challenge would require consideration of critical aspects of managing supply and demand for energy, water, and food in a manner that ensures security in each of these.

There is an increasing trend towards measuring research quality and effectiveness through publication-based metrics and their effects on scholarly communication. Publication metrics exercise a strong influence on science communication and directly affect the different actors of the process (mainly authors, readers, funding agencies, and institutions).

The [study](#) maps the research publication outputs, from 2005 to 2014, of the increasingly critical interface of water, energy, and food, and their intertwined relationship in Indian research. The report also examines the research and development priorities on these areas for Indian funding organisations and the existing international collaborations. The leading institutions and researchers in the nexus areas were identified based on the scientometric methodology of measuring and analysing research papers published in the Water-Energy-Food (WEF) Nexus research areas as given below.

### WEF Nexus Research areas

Sectors	Research areas
<b>Water</b>	<ul style="list-style-type: none"><li>▪ Ecohydrological systems</li><li>▪ Ground water</li><li>▪ Surface water</li><li>▪ Water governance</li><li>▪ Water security</li><li>▪ Water use efficiency</li></ul>
<b>Energy</b>	<ul style="list-style-type: none"><li>▪ Battery storage</li><li>▪ Bioenergy and biomass application</li><li>▪ Energy demand and consumption</li><li>▪ Energy efficient measures</li><li>▪ Energy pricing and subsidies</li><li>▪ Mini/off-grid renewable energy applications</li><li>▪ Organic Rankine Cycle</li></ul>

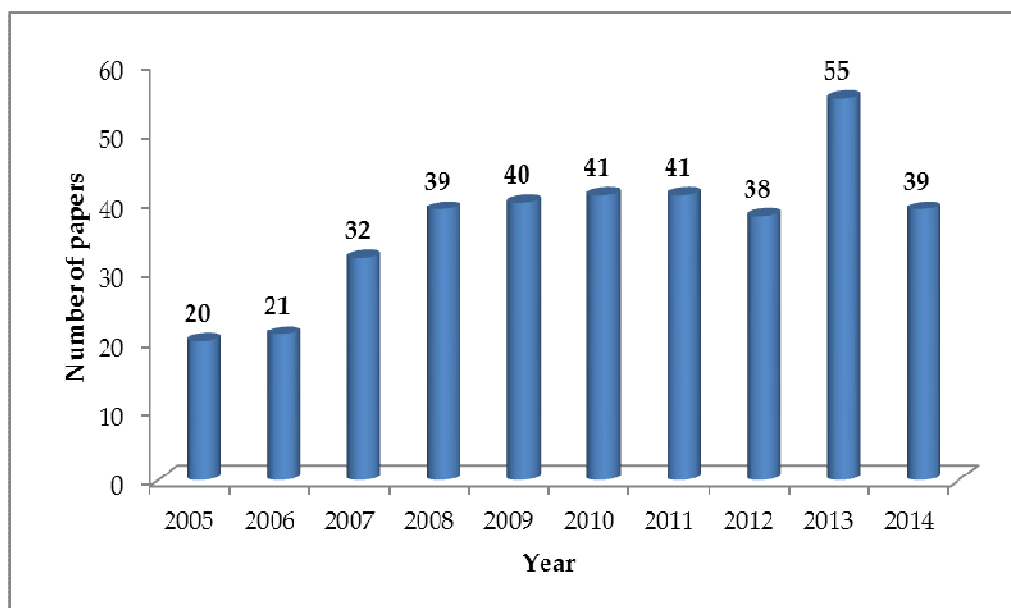
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| <b>Food</b> | <ul style="list-style-type: none"> <li>▪ Agricultural productivity</li> <li>▪ Food production and processing</li> <li>▪ Food security</li> <li>▪ Irrigation technologies</li> <li>▪ Nutritional value</li> <li>▪ Sustainable agriculture</li> </ul> |
|-------------|---|

The publication matrix was developed based on the weightage assigned to following indicators of research output:

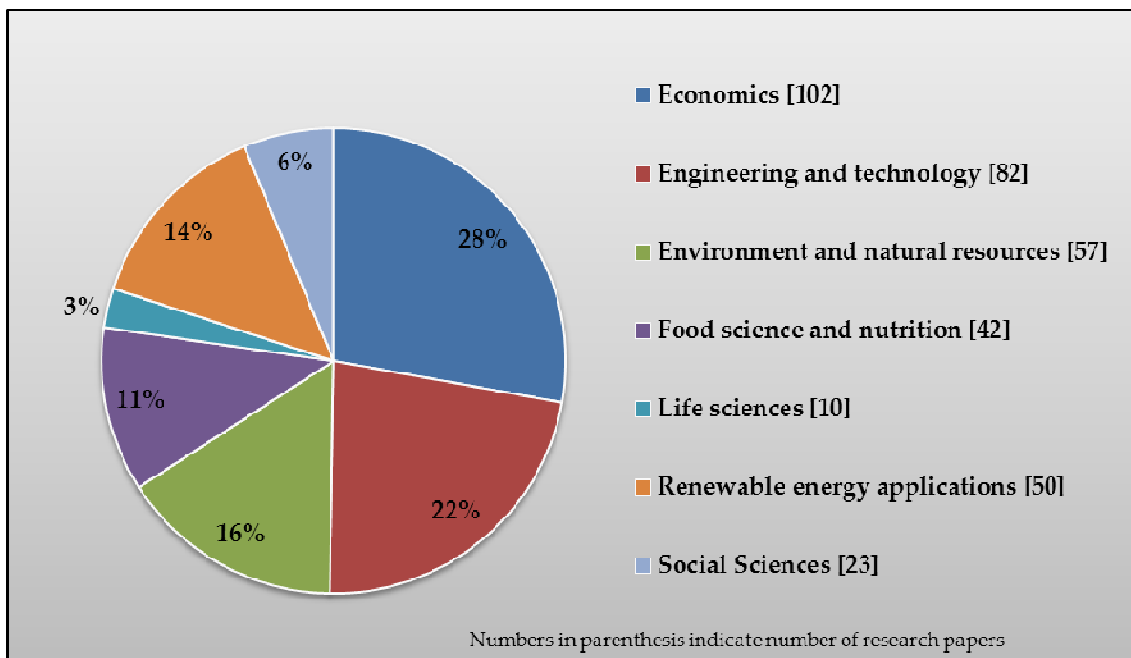
- **Total papers by researchers and institutes:** The volume of research papers produced by an individual or a research organisation is considered as an indicator of research activity.
- **Citations of papers:** Citation counts are recognised as a measure of impact, which can be used to index the excellence of a research paper.
- **Journal (publication) standing:** The databases that index journal/research papers follow certain criteria to ensure the quality of research papers indexed. Parameters like peer-review, impact factor, and timeliness of the publication are pointers to the publication quality.

In the publication matrix, a total of 848 Indian authors/researchers contributed 366 papers in different capacities (primary authors and co-authors), originating from 272 Indian and several centres of Consultative Group on International Agricultural Research located in India and overseas institutions. An increasing trend of the number of research papers is noticed since 2007 and this trend reached the peak in 2013; i.e. during the 11th and 12th Five-Year Plans when the Government started according due priorities in these areas.

**Number of papers published during study period**



### Discipline-wise papers published during study period



The subject disciplines of *Economics* and *Engineering and technology* together constitute more than 50% of the total number of the research papers. While majority of the impactful research in the Nexus areas are being conducted in universities comprising agricultural and multidisciplinary universities, research institutions, and IITs also enhance the country’s research impact.

### Research dispersion of leading researchers in WEF Nexus areas

The research dispersion of the leading researchers shows a greater inclination towards research in topics related to agricultural productivity, water use efficiency, and water security. Some Nexus research areas, like emerging efficient technologies, need more attention by the Indian research community to meet the challenges faced by the interlinked components of the Nexus. In the Nexus areas, agriculture sector receives most government funding and dominates research and development as this sector plays a vital role in the Indian economy. Most of the research is focussed on interventions in the water and energy sectors to augment the food production and supply situation.

