

**Food Security:
The Big Question of Resources**

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About *trialogue 2047*

trialogue 2047 is a series of discussions organised by Development Alternatives, to explore how India can achieve its vision of becoming a green, inclusive and resilient nation by 2047, i.e. after 100 years as an independent nation. *trialogue 2047* brings together distinguished speakers to address issues like poverty alleviation, participatory policymaking, resource efficiency etc. The discussion held on 30 April 2015 addressed the theme of “Food Security: The Big Question of Resources”.

Speakers at *trialogue 2047* on “Food Security: The Big Question of Resources”

Dr Ashok Khosla. Chairman, Development Alternatives

Dr Biksham Gujja. Chairman, AgSri Agricultural Services

Dr David Dror. Chairman, Micro Insurance Academy

Mr J M Mauskar. Advisor, Observer Research Foundation

Dr S P Sharma. Director, Minor Irrigation – Ministry of Water Resources

Dr S R Hashim. Chairman, Indian Institute of Social Science Institutions

Brief Overview

India’s population is projected to reach 1.6 billion by 2050, thus requiring India to produce more food, water, energy and shelter. It is of highest priority for India to ensure secure access to food by every one of its citizens, now and for the future. Climate change, resource constraints, distribution and storage are some concerns that threaten India’s food security. With increasing population and socio-economic developmental needs, access and availability of resources for food production shall be constrained. Water-Energy-Food Nexus is an interesting way of making judicious decisions for resource distribution. It provides an integrated view and comprehensive information on relative resource scarcity and productivity, and on the potential for resource intensification in different regions. It also points to the opportunities and synergies for increasing total resource use efficiency, and possibly also substitutions between resources. Through this *trialogue 2047* we explored the implications of this nexus in context to India and what are the synergies or trade-offs India can make with respect to resource use to ensure food security for all.

Introduction

Agriculture, the soul of food security, is a highly resource-intensive sector. It accounts for 70% of global freshwater withdrawals and 30% of global energy consumption (FAO, 2011). However, increasing population and socio-economic development needs threaten the availability of and access to key resources for food production.

Water, energy and food are inextricably linked in food production. Water is an input for producing agricultural goods in the fields and along the entire agro-food supply chain. Energy is required to harness and utilise water, and to produce and distribute food. It is impossible to talk of security of one of the aforementioned resources without taking into consideration the other two. Therefore, this session of *trialogue 2047* explores the nexus between Water-Energy-Food in understanding food security.

Six speakers led the discussion and together explored ways to manage trade-offs and look for synergies with respect to sustainable resource use in agriculture, to ensure food security for all. The next six sections of this document address the following aspects of food security and W-E-F Nexus: i) policy interventions needed to address resource conflicts, ii) technology solutions for attaining optimum utilisation of resources, iii) coherence of macro policies with local needs, iv) changes needed in consumer choices, v) strategies that farmers can adopt to ensure resource efficiency, and vi) facilitating synergies between policies in different sectors.

The six speakers came from diverse and relevant areas of food security. Dr Biksham Gujja, Founder and Chairman of AgSri Agricultural Services, is an expert in water resource management and a former water policy advisor at the WWF-International. His organisation is a social enterprise which aims to develop technologies to produce more food with less water. Dr David Dror, Chairman of the Micro Insurance Academy, is a former advisor to various international agencies such as World Bank and World Health Organisation, and has been instrumental in setting up the world's largest technical advisory in micro-insurance. Dr S R Hashim, Chairman of the Indian Institute of Social Science Institutions, is a former academician and diplomat. He was a member in the Draft Committee constituted by the Ministry of Water Resources, Government of India in 2011 to prepare India's new Water Policy. Dr Ashok Khosla, Chairman of Development Alternatives, is one of the world's leading experts on the environment and sustainable development, and has taken an active role in policy and decision-making processes of many international environmental organisations. Mr J M Mauskar, Advisor to the Observer Research Foundation, is a former bureaucrat and currently a member of the Prime Minister's Council on Climate Change. He is closely associated with major policy and regulatory initiatives in the domain of trade, energy and environment. Dr S P Sharma, Director, Minor Irrigation – Ministry of Water Resources was an advisor to the Ministry of Environment and Forests in 2007 and has also dealt with international trade matters in Doha Round, WTO as a Director in Ministry of Agriculture. He has worked as Commissioner and Economic Advisor in Government of Madhya Pradesh, handling economic and statistical planning.

Policy Interventions Needed to Address Resource Conflicts

The first question that this **trialogue 2047** attempted to address is, “*What are the policy interventions needed to build co-ordination among water, energy and food sectors to address the issue of resource conflicts?*”

Dr Hashim highlighted the prognosis for India in terms of availability of essential resources. Water is a case in point. Projections indicate that the availability of water in 2050 will roughly equal our need. On the surface, it appears that we do not have a big problem on our hands. However, present estimations assume a particular pattern of rainfall and its timely distribution, but these things are observably becoming more and more unpredictable and erratic over time. Climate change will make rainfall erratic. With heavy rainfall comes heavy run-off of water and limited retention, thereby reducing availability of water. Similarly, one can expect the energy available per capita to reduce with time due to finite energy reservoir and increasing demand with newer technologies and lifestyles. As Dr Dror highlighted, the average farm size has been decreasing steadily over the years. Smaller farm size coupled with extensive land degradation has led to higher and higher capital-output ratios. Less water, less energy and smaller farm size: this is the scenario of shrinking resource availability in which we want food production to increase. Policy will play a crucial role in determining allocation of resources between sectors. While there may be more, three areas emerged as requiring policy thrust: removing environmentally harmful subsidies, incentivising investment in innovative agricultural technologies, and curbing wastage.

Some argue that the subsidisation of fuel and electricity for farmers has done more harm than good. We are no longer in an era of free and abundant energy and water, but due to cheap availability of these resources, farmers prioritise resource-intensive crops such as wheat and rice. Dr Sharma highlighted the fact that many farmers in Vidarbha, a fairly dry region, are growing rice, an extremely water-intensive crop. In fact, as Dr Hashim pointed out, India exports a considerable amount of water in the form of rice. Dr Hashim and Dr Sharma expressed that such subsidies, in addition to encouraging sub-optimal production decisions, also lead to overuse and wastage of scarce resources.

Dr Gujja argued that policies should encourage investment in agricultural technologies. Resource efficiency and consequently, food security, rely on innovations in agriculture to produce more with less. Yet, finance for agricultural innovations is hard to come by. This is ironical because today, a mere idea for an IT start-up is capable of raising thousands for prototype development or seed funding, yet finances to secure humanity’s basic necessities have become hard to obtain. The government must invest and incentivise investment in agricultural technologies, disseminate these technologies and encourage public discourse about them. Mr Mauskar provided the example of solar energy. “Jawaharlal Nehru envisioned India to be a global leader in solar energy. During his time, scientists were thinking along the lines of lamps and other small appliances that can run on solar energy. A few decades later, we are thinking of producing solar energy on a massive scale unthinkable during Nehru’s time; Prime Minister Modi is targeting a 100 GW capacity by 2022 (Das et al, 2015). Huge opportunities are available and innovations will create more of them. Policies must recognise and leverage these opportunities”, he remarked.

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The discussants unanimously agreed that food grain wastage in India is unacceptably high. A quick scan of the literature indicates that between 30 to 40% of foodgrains produced are wasted each year (The New Indian Express, 2013). An interesting comment from the audience puts these figures in perspective: “India produced 263 million tonnes of food grains in 2014 and wasted an additional 40 million tonnes (The Hindu, 2014). If 263 million tonnes of food are enough to feed a population of 1.2 billion people, then by saving the 40 million tonnes of food that is otherwise wasted, we can feed an additional 182 million people! The government must invest in infrastructure to ensure safe storage, and limit damage and loss during transit.”

Technology Solutions for Attaining Optimum Utilisation of Resources

The second question that this **trialogue 2047** attempted to address is, “*What are the technology solutions in agriculture that can support in attaining optimum efficiency and utilisation of resources along with the balance in the nexus? Are market mechanisms required to mainstream such technologies?*”

To start with, Dr Gujja highlighted the need for innovating, packaging, implementing, and scaling farm-based technologies that are inherently farmer friendly and ecologically sustainable. For instance, the Sustainable Sugarcane Initiative (SSI) and System of Rice Intensification (SRI) have both successfully demonstrated their potential to increase yields per acre by 10 percent. They are affordable to farmers and use less fertiliser, less water and less seed or planting material than conventional cultivation. Dr Gujja threw light on various crop and water management technologies developed by AgSri that impact soil fertility, water saving and carbon emissions without any extra investments.

Dr Gujja also indicated that technologies which produce more with less and simultaneously not compromise livelihood security are readily available and have good potential for profits to the farmers. However, a very small percentage of people are willing to invest in agriculture, making not the lack of technology but the lack of investment and imagination the real problem. Lack of investments in such small-scale but crucial technologies and the simultaneous investment in larger projects like genetically modified crops is also a concern that was raised in the discussion. Dr Gujja stated that “our institutions are intent on wasting money on technologies that we will never be able to use”.

Dr Dror substantiated Dr Gujja by indicating that technologies to deal with water and energy scarcity in agriculture are currently available, and he has faith in science and research to find more technological solutions for projected scarcity of resources. What he emphasised as the present need to worry about is the farmers and their concerns. Increasingly, fewer and fewer farmers want to remain in agriculture. The technological innovations of the present and the future must ensure that they do not displace farmers but support them in their agricultural practices.

Coherence of Macro Policies with Local Needs

The third question that the **trialogue 2047** attempted to address is, “*What are the strategies needed to prevent incoherence of macro policies with local needs of resource availability and usage?*” The discussants generally agreed that the poorest and most vulnerable farmers more often than not get excluded from welfare schemes and benefits intended for them.

Consider the case of finance in agriculture. Dr Dror painted a rather bleak picture when he spoke about how despite the legal abolishment of indentured labour in India almost two centuries ago, indentured labour still manifests itself in the bondage of poor farmers to moneylenders, who charge exorbitantly high rates of interest. Only the better-off farmers have access to modern channels of credit and insurance. Many smaller farmers face difficulties in practicing agriculture because of their lack of access to modern financial institutions and the difficulties of dealing with moneylenders. Agriculture has been an extremely risky enterprise for marginal, small and landless farmers due to these constraints, and has of late become even more so due to the vagaries of climate change. The present status of rural-financial markets disincentives farmers from practicing agriculture. This is due to the high risks involved and the absence of support and insurance mechanisms. Policy must dismantle this system wherein debt and the money lender control the entire rural financial system. Mutual aid societies are a viable alternative. Farmers can pool funds and share risk – this is a huge opportunity that India could capitalise on, but is currently wasting.

Other policies that address resource efficiency, scarcity etc. in agriculture must be mindful of not displacing farmers, propounded Dr Gujja. India cannot emulate the West in having only around 4% of its population working in agriculture. A large percentage of India’s population will continue to rely on agriculture, and policies and technological interventions must achieve their objectives without endangering the livelihood security of farmers. India must learn to produce its food while simultaneously employing a large number of people.

Dr Hashim had a slightly different viewpoint from Dr Gujja about employment in agriculture. A few decades back, agriculture was contributing about 50% to India’s GDP while around 70% of the workforce was employed in agriculture. Today, agriculture contributes barely 18% to the GDP while still accounting for 50% of the workforce (Planning Commission, 2014). There is therefore tremendous inequality in incomes of people. Dr Hashim felt that the phenomenon of farmer suicides is a consequence not only of farmers’ poverty and indebtedness in absolute terms, but also of the falling economic status of farmers relative to other people in society, or in other words, the increasing inequality in Indian society that benefits the rich at the cost of the poor. In this current era of communication, farmers are able to see and feel the inequality much more than before, and this creates a sense of frustration and helplessness. It is important to reduce inequities in agriculture by assisting the transition of some people away from agriculture and providing them with alternative employment. The solution for agriculture may lie in the exit of some people from agriculture.

Changes Needed in Consumer Choices

The fourth question that this **trialogue 2047** attempted to address is, “*What changes in consumer choices of food consumption and other consumption of resources can ensure long term food security?*”

Food consumption patterns have undergone changes over time. A quick literature review indicates that despite the rapid economic growth during the past decades, India’s average per capita calorie and protein intake has grown only modestly. The share of fruits, vegetables and animal based foods in the Indian diet is increasing. Mr Mauskar reminisced that fruits were a luxury when he was young, but today even the poor consume fruits regularly. The diversification of the diet is a change to be encouraged, posited Dr Hashim, as demand for more varieties of food may compel farmers to shift away from singularly producing resource-intensive food grain crops and diversify into other kinds of foods.

But a caveat is necessary. A recent UNEP report (UNEP, 2010) warns that western tastes for diets rich in meat and dairy products are unsustainable. Around the mouth of the Missisipi River, a 20,000 square kilometre sized dead zone has been created in the sea due to the excessive presence of nitrates (Heinrich Böll Foundation, 2014). India, along with the rest of the world, should try to contain its meat demand. India currently appears to have one of the lowest rates of meat consumption in the world (FAO, 2007), but as Mr Mauskar opined, the truth is that most of the ‘vegetarians’ are actually non-vegetarians unable to afford non-vegetarian food.

Food distribution is also a resource intensive activity. Dr Khosla pointed out that (a) the food available in supermarkets uses more than 300 to 500 times as many calories in its production and distribution as what is obtained by the end consumer, which is not tenable as we are running out of energy; and (b) water is also a similarly scarce commodity but its scarcity is not taken into consideration in making choices about its use - water is exported from India in large quantities in the form of exports of water-intensive crops such as paddy and wheat, and that, too, is not tenable. Dr Sharma stressed on the need for consumers to consume locally produced food and not encourage the long distance transportation of items that can easily be produced locally.

Dr Hashim argued in favour of a diversification of the Indian diet to reduce pressures on resource-intensive crops such as wheat and rice, which he felt Indians consumed much more than was necessary for a balanced diet. In order to have Indians diversify their diets, Dr Hashim argued that farmers only need to make a greater variety of food available, as consumption decisions are driven not by socio-economic circumstances of individuals but by the availability of food. Mushrooms are an excellent example. Mushrooms were unheard of in India a few decades ago, but today, with increasing cultivation and production of mushrooms, consumption of mushrooms is also on the rise. Mushrooms are convenient to grow as they do not require open land and can be grown indoors in controlled environments.

Strategies that Farmers Can Adopt to Ensure Resource Efficiency

The fifth question that this **trialogue 2047** attempted to address is, “*How can farmers ensure efficient use of resources keeping the water-energy-food nexus in perspective?*”

Dr Sharma propounded that farmers should adopt community farming practices. Currently, the average plot size is too small to allow low capital-output ratios in production, a problem further exacerbated by the fact that even small farmers are now opting for capital-intensive infrastructure such as tube-wells to draw water which are inefficient. Community farming allows for cultivation on larger plot sizes and more efficient usage of tube, which can improve capital-output ratios.

Dr Sharma also argued that in our current distribution system, most products move from villages to the cities, and eventually move back to the villages. This double transportation leads to higher prices in villages than in cities. Decentralised production and consumption of food through community farming and distribution can reduce the pressures of transportation.

Facilitating Synergies between Policies in Different Sectors

The final question that this **trialogue 2047** attempted to address is, “*How do we facilitate synergies between sectoral policies (water, land, agriculture, energy) to avoid resource trade-offs and achieve resource efficiency?*”

Mr Mauskar advanced that between now and 2050, several transformations are expected to happen in India. There will be rapid urbanisation; we will cross the SDG paradigm and enter an SDG+ one; there will be increased variability and uncertainty of climate; youth democracy will gain traction; disruptive but transformative technologies will come up; food consumption patterns will change and become increasingly unsustainable and there will be more action plans to address energy, water and agriculture, which will all be facing serious resource scarcities. Without integrated policy-making that is informed by the inter-linkages among all the aforementioned sectors as well as an understanding impact of climate change, the Indian political and socio-economic system is likely to collapse.

Dr Khosla spoke about how many of our policies are in conflict with one another. Had India focused on eradicating poverty rather than getting rich, India could have contained its population to around 800 million people. Over the last 65 years, we have destroyed the resources that Mother Nature gave us; the quantity and quality of nature’s most bountiful resources – forests, rivers and soil – are on a downward trajectory. Resources and people are now on a collision course. It is important to introspect and understand the large number of interlinked factors that has led us to where we are. The landmark publication on the interactions between the planet and human activities, ‘The Limits to Growth’ published in 1972, illustrates how it is the combination of several variables that could lead to the overshoot and collapse of the global system. However, Dr Khosla said, it may not be too late and we may still be able to save ourselves. It is imperative to address this 'combination' in an integrated form by ensuring coherence of policies across sectors and with local problems of resource availability and usage.

Conclusion

Dr Gujja's closing remarks compel one to rethink the strategy that one must "give more (inputs) to produce more (food)". There are technologies available that can help produce "more with less". However, the lack of imagination in the minds of investors and the general populace that would lead them to believe in the availability and viability of such technologies is what poses a significant barrier to the large-scale emulation of such technologies on the ground. Dr Dror concluded by warning that no country has ever succeeded in controlling and alleviating agricultural crises using subsidies and top-down approaches. One must think bottom-up: starting from the vulnerabilities and risks that farmers face in agriculture, farmers' lack of access to modern channels of credit and consequent dependence on moneylenders, and the lack of proper targeting of subsidies that does not allow those truly in need to benefit from the scheme. Only by directly addressing farmer security can India ensure food security.

Mr Mauskar summarised the three needs of the hour: one, recognition of the opportunities that are available to combat climate change, ensure food security and achieve efficiency in the use of resources; two, urgency of action to leverage the available opportunities; and three, the creation of appropriate institutional arrangements in the form of policies, monitoring and regulatory mechanisms and the like to allow action to deliver the desired outcomes. Dr Sharma called for targeted interventions to improve the plight of the small, marginalised farmers who are normally unintentionally left out of mainstream policy interventions, particularly in the areas of finance and insurance. He also reiterated the need to consume products that are locally produced to encourage decentralised production.

Dr Hashim advanced three points in conclusion. Firstly, providing alternative employment to farmers and reducing the employment pressure on agriculture may be a possible solution. Secondly, the only certainty about the future is the uncertainty that climate change will bring, and it is therefore of utmost importance that we develop resilience. Human beings can, of course, biologically evolve and adapt to new climatic conditions, but such evolution takes hundreds of years. Therefore, the building of resilience must be accomplished in parallel. Thirdly, the subsidising of inputs in agriculture has led to suboptimal production decisions. More discourse is needed to rethink subsidies such that they encourage efficiency. Dr Khosla's closing remarks succinctly summarise the challenge we are facing today. India's ecological footprint today is 1.7 times its biocapacity, meaning that we are using India's natural resources about 70% faster than nature is capable of regenerating those resources. In another five years, we are using resources at a pace that would require 'two Indias' to regenerate those resources! "If you have a bank balance, and you take out twice as much as you put in, how long can you keep going? If your ecological footprint is twice the biocapacity, you don't have much time to go. The government does not even know the number of people outside the mainstream economy; estimates vary from 150 million to 700 million people. Today, there are more hungry and malnourished people in India than in any other time throughout history, and we cannot be proud of ourselves until every hungry person in India has been fed. All civilisations collapse if they do not live within their planetary boundaries of growth. Of course, we can save ourselves if we can bring our resource base into a level of health and we can reduce the population, *both of which are possible*," urged Dr Khosla.

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