

Rainfed agriculture: for an inclusive, sustainable and food secure India

India is increasingly focusing on its rainfed areas due to demand for food and nutrition security, and escalating farmer distress. But agricultural policy paralysis has meant that the familiar, external input-intensive, technological approaches of the Green Revolution are to be transferred to these rainfed areas – despite their diverse and highly integrated production systems that are better adapted to climatic variability. A new macro policy that articulates for decentralised, location-specific, integrated approaches in its rainfed areas is necessary for agriculture to be inclusive, climate-resilient and sustainable, and to provide the food and nutritional security that India needs.

Policy pointers

- **Unlocking the potential** of rainfed agriculture can contribute to food and nutrition security at local and national levels.
- **Government needs to** recognise the variability of the natural resource base in rainfed areas, and promote appropriate productivity-enhancing approaches that are better integrated with natural resource management.
- **The in-built adaptability of** diverse rainfed agriculture will be crucial in the face of increasing climate variability and change.
- **Knowledge-centric** interventions that invest in people to enhance their capabilities are needed, rather than technological approaches packaged through external inputs alone.

Expanding the green revolution

The Government of India's need to achieve national level food security led to the green and white revolutions. Both were targeted at generating surplus from intensive production in well-endowed irrigated areas; and used external, input-intensive, technological approaches directed mainly at rice and wheat. The dominant thinking came from an 'availability perspective': one that was concerned with the increasing number of mouths to feed; the importance of supplying food to its industrial and urban workforce; putting in place the science and technology to provide know-how for inputs; making inputs available cheaply by extending subsidies; and an administrative structure that could procure and distribute food.¹ With the dominance of the availability argument, access and affordability were tweaked, and met through welfare-related subsidies. Stability was seen from an output perspective, without considering the sustainability of the natural resource base.

The Prime Minister's Independence Day speech in 2005,² and several other policy statements later on, focused on the expansion of the green revolution to rainfed areas. A number of aspects were highlighted to justify the need to intensify agricultural production. These included a spate of farmers' suicides since the mid-1990s; the indebtedness that is a symptom of the larger

agricultural crisis;³ increasing uncertainty due to climate variability; a growing shortage of pulses and other food items; and the steep erosion of farmers' incomes. These concerns rekindled debates on inclusive growth and future food security. Climate change risks, as well as the mitigation potential of actions in rainfed areas, also came under discussion.

Emerging issues

1. Food and nutrition insecurity is on the rise. The availability of food grains (per capita per day) has reduced from 510 grams in 1991, to 439 grams in 2010.⁴ This reduction in the consumption of cereals and pulses is corroborated by the national sample survey estimates of 1993-94, 2004-05 and 2009-10. These surveys indicate that per capita calorie and protein intake has gone down, whilst fat intake has increased. India ranked 66 among 88 countries in the Global Hunger Index of 2010; and a related exercise in 17 major states identified the situation as 'serious' in four, 'alarming' in twelve and 'extremely alarming' in one.⁵

Another important concern is the agriculture and nutrition 'disconnect' in India, with rice and wheat replacing millet crops in the diets across the rainfed areas – partly as a result of the subsidised distribution of rice and wheat through the public distribution system. Nutritious crops

A multi-pronged complex challenge

are fading, both in terms of their area of coverage and in diets consumed. The coexistence of rotting food grains in the go-downs of the Food Corporation of India alongside large scale hunger is another paradox; and is the result of the geographical concentration of agricultural investments in irrigating about one-third of the districts to feed the 600 plus districts in the whole country.

Feeding India's future generations will be a multi-pronged complex challenge, and one that will involve the spread of incomes and production across poorer agricultural areas.

2. There is 'technology fatigue' and 'policy paralysis' in green revolution agriculture. The successive Five Year Plan documents widely acknowledge the setting in of 'technology fatigue' in the core of the green revolution areas. Decelerating yield of food grains against burgeoning fertiliser subsidies, and ever declining fertiliser use efficiency, is having expensive, wasteful, and environmentally damaging consequences. The fertilizer subsidy in 2011-12 was around Rs.75,000 crore,⁶ for instance, about 1.3 per cent of the gross domestic product.⁷ The packaging of a whole slew of subsidies around irrigated agriculture has also increased demand for water, with a greater reliance on ground-water leading to water tables plummeting.

To policymakers, rainfed areas have generally been perceived as drought prone, low productive, high risk, and backward; and to date they have received limited attention. An estimate by the Centre for Budget and Governance Accountability suggests that between 1997-98 and 2011-12, from the total expenditure on agricultural subsidies of about Rs. 11.5 lakh crore, only one per cent was on rainfed agriculture. The rest was on intensive agriculture – divided into price support/food (38 per cent), fertilizer (37 per cent), irrigation (21 per cent) and electricity (3 per cent). See Figure 1 below.

Government interest has now turned to the perceived 'under-performing' rainfed areas. Inherent policy paralysis has meant that the approach being taken is to try and replicate the green revolution, and transfer

the technologies and approaches to rainfed areas that were originally designed for intensive irrigated areas. This is partly because of an assumption that investment packages developed for irrigated areas are extendable to rainfed areas; but also because of a rigid top-down structure in which the propagation of technology comes from the scientific community, through the line departments, down to the farmers.

Why more of the same will not work

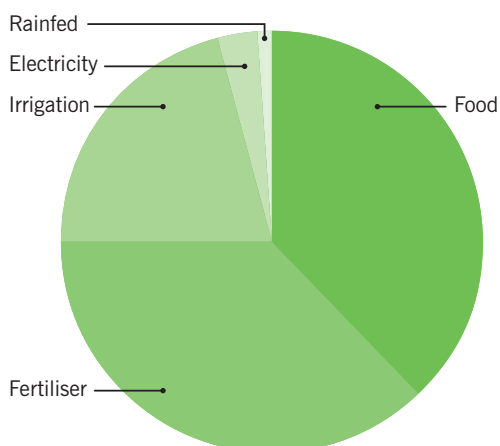
In his speech at the 57th meeting of the National Development Council, the Prime Minister stated that: *"We need to build on the success of the last Plan by increasing land productivity in agriculture so that we not only meet our rising demand for food, but also increase incomes of those dependent on agriculture."*⁸ The draft Twelfth Five Year Plan 2012-17 in its overview mentions that *"... faster growth in agriculture, and especially in rain-fed areas where most of the poor live, will be much more inclusive than a GDP growth that is driven entirely by mining or extraction of minerals for exports"* (§1.10, p.3).⁹

There is an increasing concern that the green revolution policy expansion to the rainfed areas, that is providing more of the same to these newer areas where the revolution has not yet had a major impact, will not work. The approach is underpinned by the belief that increased agricultural productivity is best achieved by focusing on single, high-performing (in terms of yields per unit) products; and that efficiency should be measured in terms of narrowly defined single crop/animal productivity rather than wider system level productivity.

Those in favour of the expansion of the green and white revolutions point to their relative successes, including in some rainfed areas, where agriculturalists and livestock keepers have followed a similar intensive approach and have succeeded in raising crop yields and milk productivity.¹⁰ What is not recognised is that such achievements have come at a high cost: of depletion of groundwater and soils, privatisation of the commons, usurpation of resources by a few, and enhanced future risk. In addition, the use of the external inputs driven, single crop/product focused, transfer of technology approach, does not build on the knowledge and experience of local understanding – knowledge that articulates in favour of an extensive method of integrated natural resource-crop-livestock production system, with in-built synergy and mutual dependence (see Table 1).

Critics also argue that the expansion programme is being propagated without due recognition of the rainfed areas' pronounced location specificities; that is, the variability of their natural resources and the diversity in production systems that characterise rainfed areas. Rainfed agriculture systems have also evolved over time to manage climate variability, and with traditional

Figure 1. Pie chart of agriculture related subsidies in India from 1997-98 to 2011-12



adaptation mechanisms such as diversity in crops sown and crop/commons-integrated livestock systems. With the expansion programme, the high degree of integration of these systems, and the diverse livelihood portfolios at household level will be forced to give way to mono-crops and specialisations exposing them to greater vulnerability. With the projections of an increasingly variable climate leading to more incidents of extreme events, rainfed areas need an integrated agricultural policy that can secure crops and livestock against increasing climate risks, while supporting inclusive and sustainable growth, and contributing to the mitigation of global warming.

The national importance of rainfed areas

The rainfed areas of India are critically important because:

1. They cover a large area of India – 62 per cent of the geographical area and 68 per cent of the gross cropped area; which includes 42 per cent of the area of major crops like rice, 77 per cent of the area for pulses, 66 per cent for oilseeds, and 85 per cent of coarse cereals. They also contain a large proportion of the livestock population (78 per cent of cattle, 64 per cent of sheep, and 75 per cent of goats).¹¹

2. Rainfed areas contain a large proportion of the population, and have a diverse agro-ecology – growing 34 varieties of predominant crops compared to three or four in irrigated tracts. Harnessing the full potential of these areas will contribute significantly to meeting India's rising food and nutrition requirements. And, in a context of increasing resource limitations (energy, water, land, and finances among others) and carbon footprint (see Box 1), these gains can be realised in a sustainable, ecological, economic and socially equitable manner.

3. Rainfed agriculture relies on knowledge and experience, based on local understanding, to facilitate an extensive system of production where there is synergy and mutual dependence. Output from one aspect becomes the input for another. For instance, crop residues are fed to livestock who produce manure, that when fed into the soil, increases productivity and soil health. Unfortunately local innovations, management and the knowledge-centric efforts of farmers are often outside the scope of subsidies or public support, and not packaged into external inputs (see Table 1).

So what are the options?

The business-as-usual approach – extending the dominant approach with all its attendant costs – will cost India dear economically, ecologically and socially. The alternative is to implement a locally specific approach with all its attendant benefits (see Box 2). This is more likely to ensure an inclusive, climate resilient growth, that is sustainable and provides food and nutrition security.

In summary, the two broad possibilities for expanding the

Box 1 The heavy footprint of irrigated agriculture

India wants growth with inclusiveness and sustainability. In the high input-intensive system, this growth is distorted by policies and investment structures biased towards irrigation.

- **Energy.** This is external and driven by subsidies that support a system that is energy intensive and produces a high carbon footprint.
- **Water.** The whole intensive system is based around water to raise productivity, which also demands energy and has a high carbon footprint.
- **Fiscal.** The high input system requires subsidies to function, which is very costly.
- **Inclusiveness.** Extra effort is needed to make the high input intensive system inclusive because it is expensive to support the costs for everyone. If everyone is to benefit it will require permanent subsidies (the European Union is an example).
- **Sustainability.** The high input system is top-down (seeds provided, energy provided, etc.) without respecting agro-ecological variability.

Table 1. Comparing cultivation practices using transfer of technology and knowledge-centric revitalisation

Issues	Transfer of technology	Knowledge-centric revitalisation
Technology/knowledge	Production gain in response to inputs/technology	Context specific and involves management of capacities including input management
Productivity	Single product – focus is on enhancing productivity	Product of a complex system – also focuses on reducing risk
Efficiency	Technical and economic – measured as output per unit of external input (water, fertilizer)	Cumulative value/output and efficiency of unit of natural resources
Intensive/extensive	Crop- or input-intensive - mainly in areas with better soils, water and others.	Crops-livestock system spread over a larger area – including marginal lands (extensive)
Specialised/integrated	Mono-crop	Mixed and multiple crops – diversified and location specific
Private/commons	Owner operated	Production in private lands is dependent on commons
Input dependence	Industrial input production and supply at high rates of subsidies	Farm based inputs on local networks of input production and distribution

production possibilities in rainfed areas are:

- Continue with the extension of the dominant approach, with input intensive mono-cropping, based on the green revolution in a 'transfer of technology' mode, characterised by high external inputs, high costs, high energy use and low diversity.
- Focus on a location-specific, decentralised, natural resources integrated, knowledge-centric approach to the revitalisation of rainfed agriculture. This will be characterised by low external but high internal inputs, multiple land use at farm and landscape level, and synergies with other land uses in which variability and diversity are pro-actively exploited for productivity. This option has by far the greater potential.

Box 2 Case Study



Farmers in Gorantlavandla Palli, in the arid district of Anantapur in Andhra Pradesh, pooled their 18 borewells in blocks of about 50 acres, and established a pipeline grid with sprinklers with support from a pilot programme of the government.

The Watershed Support Services and Activities Network (WASSAN) and the Federation of Self-help Groups (SHGs) facilitated the process. The farmers collectively decided to secure their rainfed groundnut crops from rainfall failures by creating an entitlement upto three protective irrigations, during the season, for all the farmers in the grid – irrespective of ownership of the bore-wells. To address falling groundwater tables and failing aquifers owing to unsustainable extraction of groundwater, farmers have decided that no new bore-wells are allowed in the village for the next 10 years. Of the 248 acres of rainfed lands in the village, 192 acres are now secure from climate risks. All the households, including 28 farmers who did not have access to bore-wells before, now have access to support irrigation. Crop productivity has increased from 175-220 kg per acre before the intervention to 350-440 kg per acre afterwards, i.e. near doubling of the productivity. This conditional public investment in the form of a pipeline grid for supportive irrigation for rainfed crops of all the farmers is a paradigm shift in 'irrigation', one that integrates natural resources governance and security of access to water to manage climate variability in an arid environment.

Source: A. Ravindra & Rajeswari S. Raina. (2012) Risk and trust: collectivising private groundwater borewells in Anantapur, Andhra Pradesh, India, *Innovation and Development*, Vol.2, No.1, pp.189-191.

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This brief is based on a longer report: *RRA Network (in draft, 2013) Persistence of dominant norms: policy discourse analysis of rainfed agriculture in India.*

Notes

■ ¹ RRA Network, *Persistence of dominant norms: policy discourse analysis of rainfed agriculture in India*, paper prepared for the global workshop on 'New Perspectives on Climate Resilient Dryland Development' being held by Ministry of State for Development of Northern Kenya and Other Arid Lands (MDNKOAL), Kenya and International Institute for Environment and Development, UK held in Kenya, 26-28 September 2012. ■ ² Government of India, Text of Prime Minister's Independence Day Address, Prime Minister's Office, 15 August 2005, <http://pib.nic.in/newsite/erelease.aspx?relid=29937> ■ ³ D. Narasimha Reddy and Srijit Mishra (eds.) 2009. *Agrarian Crisis in India*, Oxford University Press, New Delhi. www.oxfordscholarship.com/view/10.1093/acprof:oso/9780198069096.001.0001/acprof-9780198069096 ■ ⁴ Government of India, *State of Indian Agriculture 2011-12*, 2012, www.agricoop.nic.in/sia111213312.pdf ■ ⁵ Also see Srijit Mishra, *Hunger, ethics and the right to food*, Indian Journal of Medical Ethics, 2012, Vol.9, No.1, pp.32-37, www.ijme.in/2012co34.html ■ ⁶ Lakh and crore are units in the south Asian numbering system equivalent to 100,000 and 10,000,000 respectively. ■ ⁷ Government of India, *Economic Survey of India*, 2012-13, Ministry of Finance, New Delhi, 2012, <http://indiabudget.nic.in/survey.asp> ■ ⁸ Prime Minister of India, PM's opening remarks at the National Development Council Meeting, 27 December 2012, <http://pmindia.nic.in/speech-details.php?nodeid=1264> ■ ⁹ Planning Commission, 2013. *Twelfth Five Year Plan (2012-2017): Faster, More Inclusive and Sustainable Growth*, Volume I, Government of India, New Delhi. http://planningcommission.nic.in/plans/planrel/12thplan/pdf/vol_1.pdf ■ ¹⁰ The outstanding experiences, such as the case of Hiware Bazar in Maharashtra, came about through an integrated approach that married productivity growth with strong natural resource governance and human resource development. See <http://hiware-bazar.epanchayat.in/> ■ ¹¹ Planning Commission, 2011. *Report of the XII Plan Working Group on Natural Resource Management and Rainfed Farming*, Government of India, New Delhi. http://planningcommission.nic.in/aboutus/committee/wrkgrp12/agri/wg_NRM_Farming.pdf

About the project

IIED, in partnership with University of Peking in China, the Revitalising Rainfed Agriculture Network and Rainfed Livestock Network in India, and the Arid and Semi-Arid Lands Secretariat of the Ministry of State for Development of Northern Kenya and other Arid lands in Kenya, is implementing a one-year project entitled *New perspectives on climate resilient drylands development (2012/13)*. Funded by the Ford Foundation, the project is researching the assumptions, arguments and evidence that underpin national and global narratives on the drylands in order to formulate more progressive perspectives based on scientific evidence and traditional local knowledge and experience. The views expressed in this briefing, however, do not necessarily reflect the position of the Ford Foundation.

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