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BHOOCHETANA: Innovative Institutional Partnerships to Boost Productivity of Rainfed Agriculture in Karnataka, India



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Abstract

Although there has been a considerable development in public-private partnership in developing countries, there are very few examples of multi-institutional partnership for transferring agricultural technologies to smallholders. This paper discusses the example of innovative partnership in Karnataka, where the consortium of state and non-state actors helping to transform subsistence dryland agriculture into a sustainable business model through promoting pro-poor agricultural technologies for bridging the yield gaps. The paper demonstrated the usefulness of the partnership concept in guiding investments to support the development of agricultural technology and helping to halve the poverty. It also shows effective convergence of funds and various schemes of federal and state governments besides utilizing semi-skilled manpower as local extension agents. The paper concludes that with a strong partnership between global scientific organizations and state and non-state actors can offer a route to equitable growth in developing countries. This approach has enabled scale-up of this program to neighboring two states of South India.

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BHOOCHETANA: Innovative Institutional Partnerships to Boost Productivity of Rainfed Agriculture in Karnataka, India

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Bhoochetana Consortium Partners

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Background

Across the world, agriculture is a source of livelihood for estimated 85 per cent of rural poor. The vast majority of the farmers in the developing world are smallholders and an estimated 85 per cent of them are farming less than 2 hectares (World Bank 2008). Moreover, 75 per cent of poor people live in rural areas of which 2.1 billion live on less than 2 \$ a day and 880 million on less than 1 \$ a day, and most depend on agriculture for their livelihoods (World Bank 2009). Thus, promoting integrated sustainable agriculture farming system for them to meet their nutrition and food needs is imperative for meeting the Millennium Development Goals (MDGs) of halving poverty and hunger by 2015 (United Nations 1995).

India has explored several innovative ways of agricultural development to meet the growing food demand and nutritional security through public policy and institutional reforms (Gol 2011). The innovative path of agricultural development is attractive not only because it offers a holistic explanation of how knowledge is produced, diffused, and used but also because it emphasizes the actors and processes that have become increasingly important in agricultural development. Agricultural development plans are no longer concerned almost exclusively with staple food production but they now give far more attention to diversification into new crops, products, and markets and to adding value to serve new markets better (Gol 2007, 2011). The present Indian food security bill (2011) emphasizes the inclusion of all types of foodgrains to meet the nutritional demand of poor households in the country. This serves twin objectives of economic development, viz., appropriate market for food products as well as cater to the needs of nutritional security. As new markets for agricultural products and services change continuously, agricultural development depends more than ever on a process of continuous, incremental innovation. The scope of innovation includes not only technology and production but organizations, management, and marketing changes (World Bank 2006). Ways of producing and using knowledge must also adapt and change. The partnership concept emphasizes adaptive tendencies, convergence, and synergies to reach the common goal of technology dissemination and improving rural livelihoods.

Traditionally, public policy and donor assistance have focused on providing operational funds for research and technology transfer systems. However, desired impact on ground in terms of reducing poverty, achieving food security, and malnutrition are not realized to the desired extent. A recent policy review on food security stated the challenges ahead to reduce poverty, food insecurity, and malnutrition (Gol 2011). The reviewers neglected the integration and convergence of knowledge, management aspects, and socio-institutional components. The question is: how did these innovative solutions help to build sustainable agriculture development? This paper attempts to answer this question and identifies the needed changes to achieve the goal by analyzing a scaling-up model for increasing crop yields substantially on millions of smallholders' farms in drylands of Karnataka in India (Wani et al. 2012a). It assesses the usefulness of the innovation partnership concept in guiding investments to support the development of agricultural technology and helping to halve the poverty in a fragile environment.

Agriculture and Rural Livelihood

The World Development Report (2008) strongly advocates for innovations in agriculture and technology. It also reveals the fact that the knowledge divide between industrial and developing

countries is widening which is driven by rapidly growing private investment in research and development. Developing countries invest only a ninth of what industrial countries put into agricultural R&D as a share of agricultural gross domestic product (GDP) (World Bank 2008). The low investment on agricultural R&D is a matter of concern for developing countries such as India given the fact that India emerges as the hot spot of poverty and malnutrition and out of 852 million poor worldwide 221 million are in India (Hazell et al. 2007; Sanchez et al. 2005). In this context, there is an urgent need to improve the productivity, profitability, and sustainability of smallholder farming, which is the ultimate pathway out of poverty in using agriculture for development (Gol, 2007).

The role of small farms in development and poverty reduction is well recognized (Lipton, 2006). The global experience of growth and poverty reduction shows that GDP growth originating in agriculture is at least twice as effective in reducing poverty as GDP growth originating outside agriculture (World Bank 2008). Small holdings play an important role in raising agricultural development and poverty reduction. Small holdings also face new challenges on integration of value chains, liberalization and globalization effects, market volatility and other risks and vulnerability, adaptation of climate change, etc. (Thapa and Gaiha 2011). Therefore, support is needed for small holdings in the context of these worldwide processes of farm change. There are also high returns from investments in agricultural R&D, rural roads and other infrastructure, and knowledge generation.

It may be noted that agricultural technologies are *scale neutral* but not *resource neutral* (Singh et al. 2002). Small holder-oriented research and extension should give importance to cost reduction without reduction in yields (Wani et al. 2003). Therefore, new technological innovations are needed. These include low external input and sustainable agriculture approaches, enhancing use efficiencies of natural resources such as rainwater, land, and nutrients based on ecological principles but without the use of imbalanced use of chemical fertilizers and pesticides (Wani et al. 2003, 2009; Sahrawat et al. 2008, 2010; Thapa and Gaiha, 2011). Long-term research on station and participatory research on farmers' fields in Asia by adopting integrated genetic natural resource management (IGNRM) approach by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Andhra Pradesh, India and partners revealed that persistent yield increases are achieved through improved land, water, and nutrient management in rainfed agriculture through participatory watershed management (Wani et al. 2003, 2012b).

The need for adopting the methods of an evergreen revolution has become very urgent now. As Swaminathan (2010) argues, there are two major pathways, among other things, to foster an evergreen revolution. Firstly, productive organic farming needs considerable research support, particularly in the areas of soil fertility replenishment and plant protection. The other pathway to an evergreen revolution is green agriculture. In this context, ecologically sound practices like conservation farming, integrated pest management, integrated nutrient supply, and natural resources conservation are promoted (Wani et al. 2003, 2009; Sahrawat et al. 2010; Rao et al. 2010).

Need for Building Partnerships with Global Scientific Research Organizations

The rainfed region is a complex system which needs inputs and expertise from many partners. Thus, partnership between the state, non-state actors (private sector) and global scientific research organizations is essential to achieve dissemination of new technologies to the end-users and to achieve faster progress. Also, there is a need to know as to how best to link these actors to have their activities complemented in a partnership mode for better R&D endeavors. Sustainable agriculture

offers innovative ways to improve both productivity and quality of the agricultural produce while ensuring better income for the resource-poor farmers through reduced cost. Partnership between these actors is critical to let cost-efficient technologies disseminate to the end-users. However, technologies alone cannot make desired impacts unless enabling policies and institutional mechanisms are in place. Both the public and private sector organizations have their own strengths and could complement each other's efforts in taking research from lab to field with new institutional mechanism as well as enabling policies. Partnership with global scientific organizations could lead to faster progress as well as behavioral/attitude (work ethics as well as commitment) changes among state actors (bureaucrats and policy makers). However, there is a need to understand the intricacies and required logistics to build these partnerships to be strong and realistic. Also local actors fail to converge and resist for new interventions, and to bring change in mindset to adopt science-led development an honest external facilitator is needed. Moreover, neutral forum to act as facilitator is critical to bring key partners together to get engaged in research, development, commercialization, and public awareness of agricultural innovation for the benefit of larger society.

Karnataka

Over 60 per cent of the population of Karnataka state (Fig. 1) in India depends on agriculture for its livelihood. A majority of these are small and marginal farmers with landholding of <2 ha, responsible for nearly half the food production in the state (GoK 2011). Inappropriate soil, water, and crop management practices are depleting soil nutrient reserves and further degrading land resources which results in low crop productivity (GoK 2006).

The share of agriculture in total employment has come down from 65 to 61 per cent while contribution to GDP has decreased by half, ie., 36 to 18 per cent (GoK 2011). Rice and sugarcane are cultivated on the coastal plain, and coffee and tea are grown in the hilly region. Much of Karnataka's land resources are assigned to agriculture and forests. A key feature of the land use system in Karnataka is the control on the conversion of agricultural land to non-agricultural use. Economically, Karnataka is one of the fastest growing states in India.

Diverse agroclimatic conditions afford excellent opportunities for the production of a number of cereal crops, such as paddy, wheat, maize, finger millet and horticultural and cash crops such as banana, grapes, arecanut, coconut, etc. Annual average rainfall varies from 3085 mm in the coastal region to 593 mm in the northern dry region of the state. Nearly half of the total rainfall is received during the monsoon season. The role of smallholders is extremely significant in overall agricultural sector and economic progress of the state at large, ie., in terms of food, labor, and foreign exchange contributions (GoK 2006, 2011).

Key Issues for Yield Improvements

The increasing rate of farmers' suicides in the state is reportedly fuelled among others, by increasing input costs, crop failure, and accumulating debt (Vasavi 1999; GoK 2007; Deshpande and Prabhu 2005). This triggered several policy measures, intended to improve the sustainability of farm livelihoods. Large area under dryland farming, poor production practices, and poor living standard of the large farming community including farmers and farm laborers are the leading problems in the state. Soils in general are highly degraded in the state due to heavy mining and an unscientific management. Considering this, Karnataka state paid high attention and resources to design and

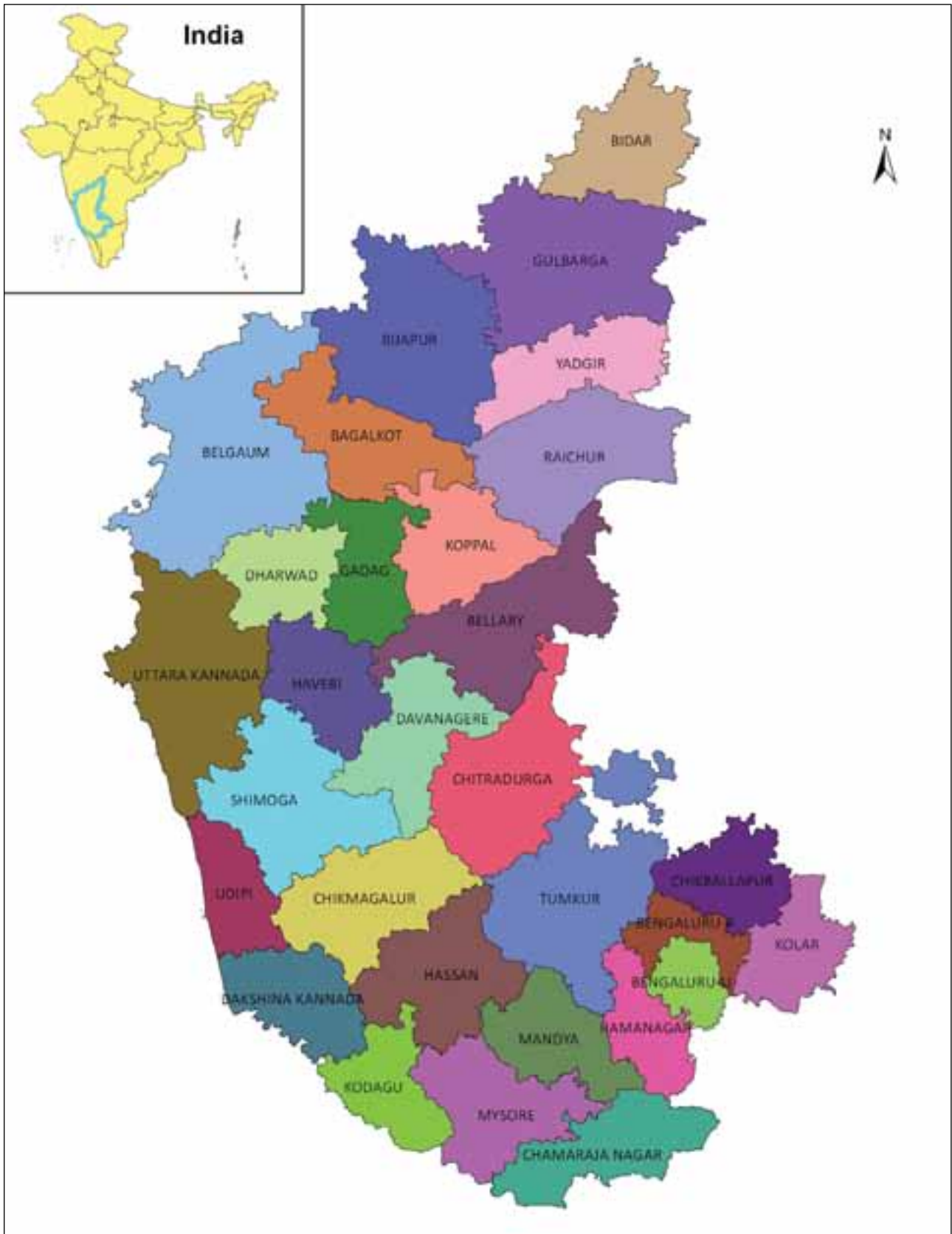


Figure 1. Map of Karnataka state in southern India.

executing a soil-test based fertilization strategy to address the varying soil fertility needs through a stratified soil sampling technique (Sahrawat et al. 2008)¹.

Following stratified soil sampling technique, a total of 92,904 soil samples were collected from 30 districts [16 districts by ICRISAT and 14 districts by the Department of Agriculture (DoA), Government of Karnataka] and analyzed for pH, electrical conductivity (EC) as a measure of salts, organic carbon (C) (as a proxy for available nitrogen), and available phosphorus (P), potassium (K), sulfur (S), boron (B) and zinc (Zn). The analysis results of the sampled soils were most revealing (Figs. 2a and 2b) (Wani et al. 2011). The results showed throughout Karnataka state, majority of the farmers' fields (52%) were low in C. As regards phosphorus (P) in Karnataka as a whole 41% farms were deficient indicating majority of farms were rather sufficient in P and had opportunity through site specific nutrient management to cut cost on current recommendations. Potassium (K) as such was not a problem in the state. Across the state only 23% sampled fields tested low and a science-led approach calls for a cut on recommended K. Interestingly, the diagnosis revealed in most farms in Karnataka widespread deficiencies of ignored secondary and micronutrients to the tune of 52% in S, 55% in Zn, and 62% in B. The S, B and Zn deficiencies are even more widespread than mostly focused macronutrients P and K and apparently the reason behind holding back the productivity potential in the semi-arid tropics.

This holds back the potential yield of major dryland crops. The major dryland crop yields in the rainfed areas of the state is ranging from 1 t ha⁻¹ to 1.5 t ha⁻¹, which is two to five times less than those on research farms. Only 35 per cent to 45 per cent of rainwater is presently used to grow dryland crops in the state. Hence, there is huge scope for improving rainwater harvesting and efficient use of it for rainfed crops (Wani et al. 2009). Scientific technologies including better cultivars could unlock the vast potential of rainfed agriculture. According to a study carried out by the ICRISAT (Singh et al. 2009), a large gap exists between current farmers' crop yields and potential yields (Fig. 3). This is the case with all the major rainfed crops (finger millet, groundnut, maize, sorghum, and soybean) in the state. This resulted in stagnant agricultural growth rate over four years prior to 2009, which forced the government to work on this issue on priority basis.

¹ A large number of soil samples (92,000) were collected from farmers' fields across all districts in Karnataka through a stratified soil sampling technique. This technique considered all factors (like topography, soil color, cropping system etc.) that may lead to variable soil fertility and ensures representative sampling. But this brings in the scales of economy by sampling 20-25% villages in a target region and then same per cent farms within to represent a village (Sahrawat et al. 2008)

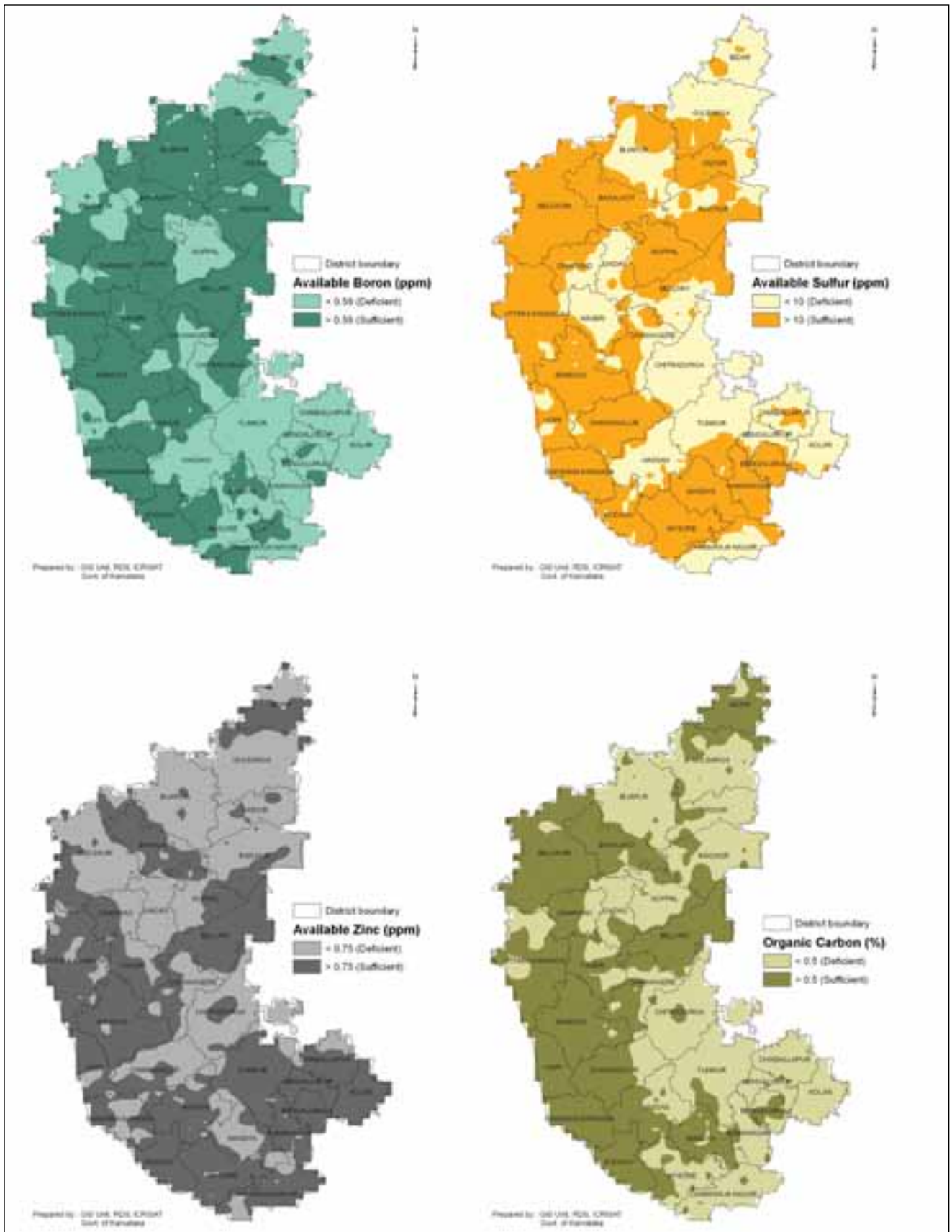


Figure 2a. Status of available B, S, Zn, and C in Karnataka.

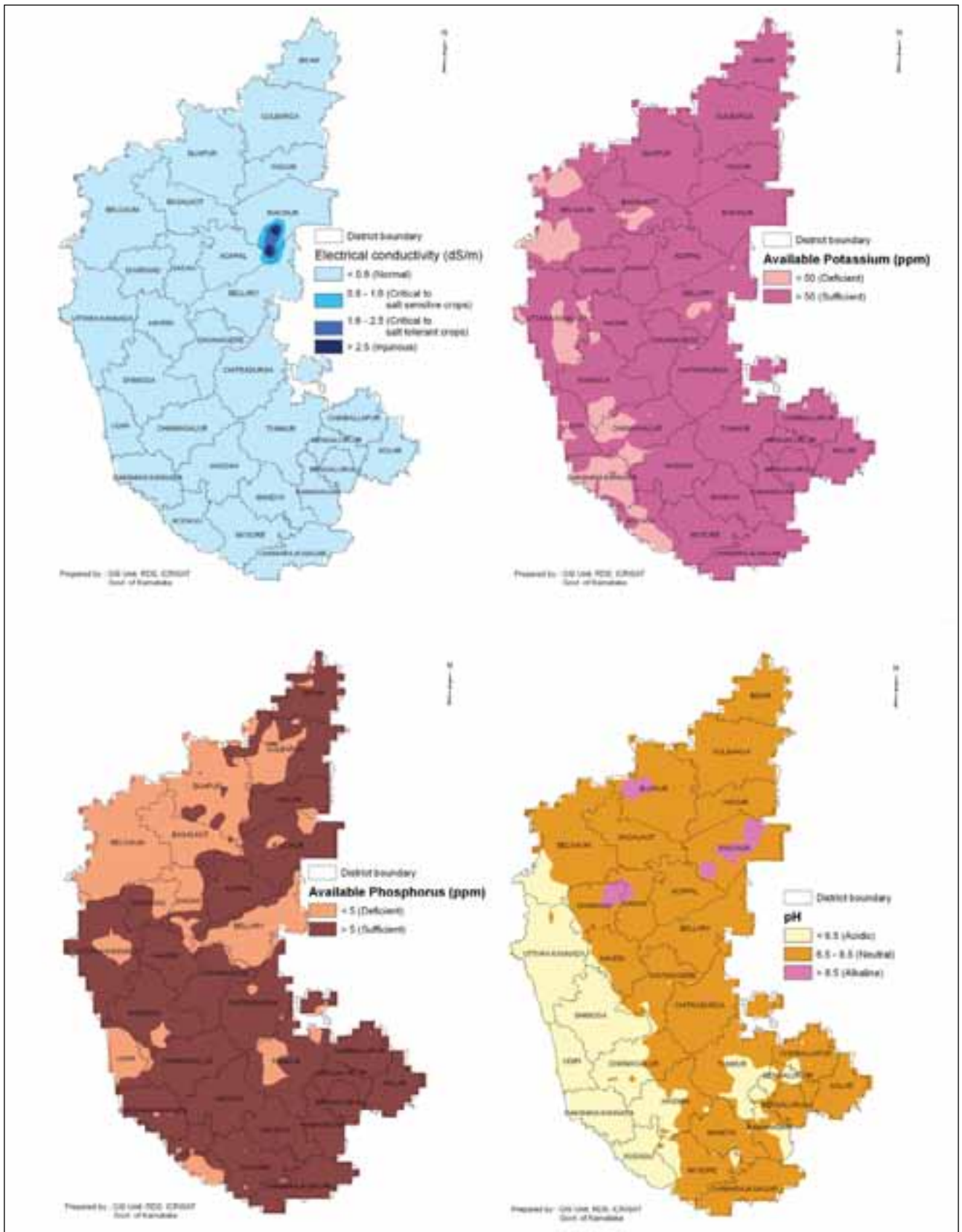


Figure 2b. Status of available EC, K, P, and pH in Karnataka.

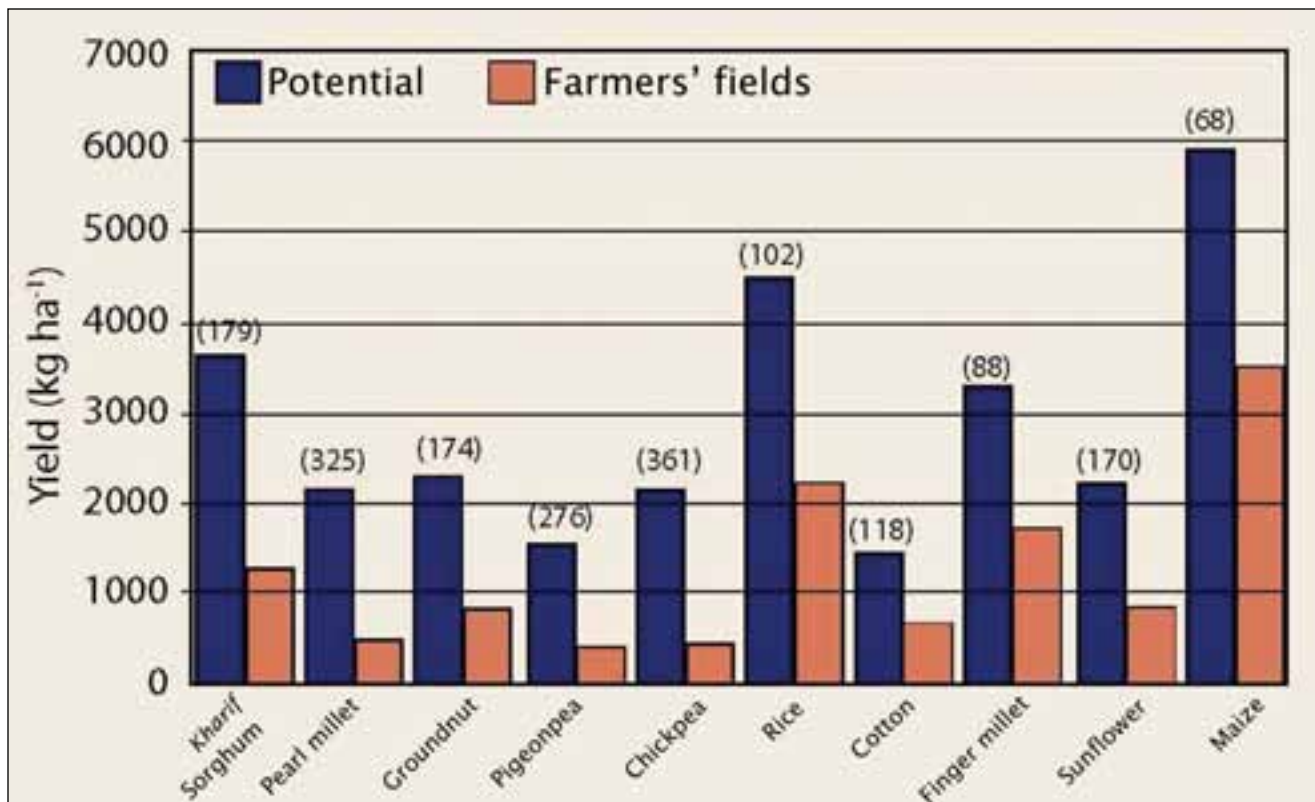


Figure 3. Yield gaps between farmers' field crop and potential yield of various dryland crops in Karnataka (Adopted from Wani et al. 2012a).

Institutional Partnership

Government of Karnataka (GoK) and ICRISAT

Partnership innovates new paths of development. An innovative partnership between the Government of Karnataka and ICRISAT has been built on a strong foundation laid during the Sujala-ICRISAT Initiative in 2005, for enhancing the impact by translating strategic research into research for development and impact. It is a holistic and end to end approach for scaling-up development; refined and scaled-up by the watershed consortium team by adopting research for development and Inclusive Market Oriented Development (IMOD) approach. During 2005, through the Sujala-ICRISAT initiative, the consortium demonstrated the power of science-led development to benefit a large number of small farmers through productivity enhancement, increasing profitability and sustainability in the micro-watersheds. The yields of crops increased by 33-58 per cent through the implementation of soil-test based balanced nutrient management, the use of improved cultivars, seed treatment, soil and water conservation measures and the use of improved machinery, translated the strategic knowledge into farmer-friendly information resulting in large-scale adoption in the target districts (ICRISAT, 2009). Based on this experience during 2009, the DoA, Government of Karnataka requested ICRISAT to provide technical support through a mission mode approach for increasing productivity of crops in rainfed areas which was christened *Bhoochetana*² for unlocking the potential of rainfed systems in the state. The partners in the consortium included the Departments of Agriculture, Watershed, and Horticulture, Universities of Agricultural Sciences,

² Bhoochetana in local Kannada language means rejuvenating soil strength

and Horticultural Sciences, and Directorate of Economics and Statistics (DES). By adopting a holistic mission approach by the consortium, convergence of schemes, capacity building of stakeholders, and collective action unlocked the potential of rainfed agriculture.

Designed Strategy

Rationale

For any large project, clarity on its strategy is very crucial. The project adopted mission approach through convergence of various government programs and scheme implemented by a consortium consisting of different line departments of Government of Karnataka along with academic institutions like University of Agricultural Sciences located in Bengaluru, Dharwad, and Raichur and the



Figure 4. Dr L Shantha Kumari Sunder IAS, Additional Chief Secretary and Development Commissioner visited ICRISAT and nurtured seedling of Bhoochetana.



Figure 5. Project launching at Haveri by Hon'ble Chief Minister, Government of Karnataka.

international institution working in the area of dryland agriculture worldwide. For better planning, execution and monitoring, Government of Karnataka constituted a high-powered committee chaired by the Additional Chief Secretary and Development Commissioner. The committee reviews the performance of the project every fortnight. It also played a crucial role in making this project successful in the state.

The most important factors of the strategy are soil-test based nutrient management with a major thrust on micronutrients application, supply, and distribution of inputs at 50 per cent incentive at *hobli* and cluster village level, services of farm facilitators (FFs) and lead farmers for sharing of technology and disseminating knowledge, enabling policies to fill the gaps in a timely manner, wide publicity through wall writings, posters, village meetings, and mass media, and effective project monitoring and feedback³.

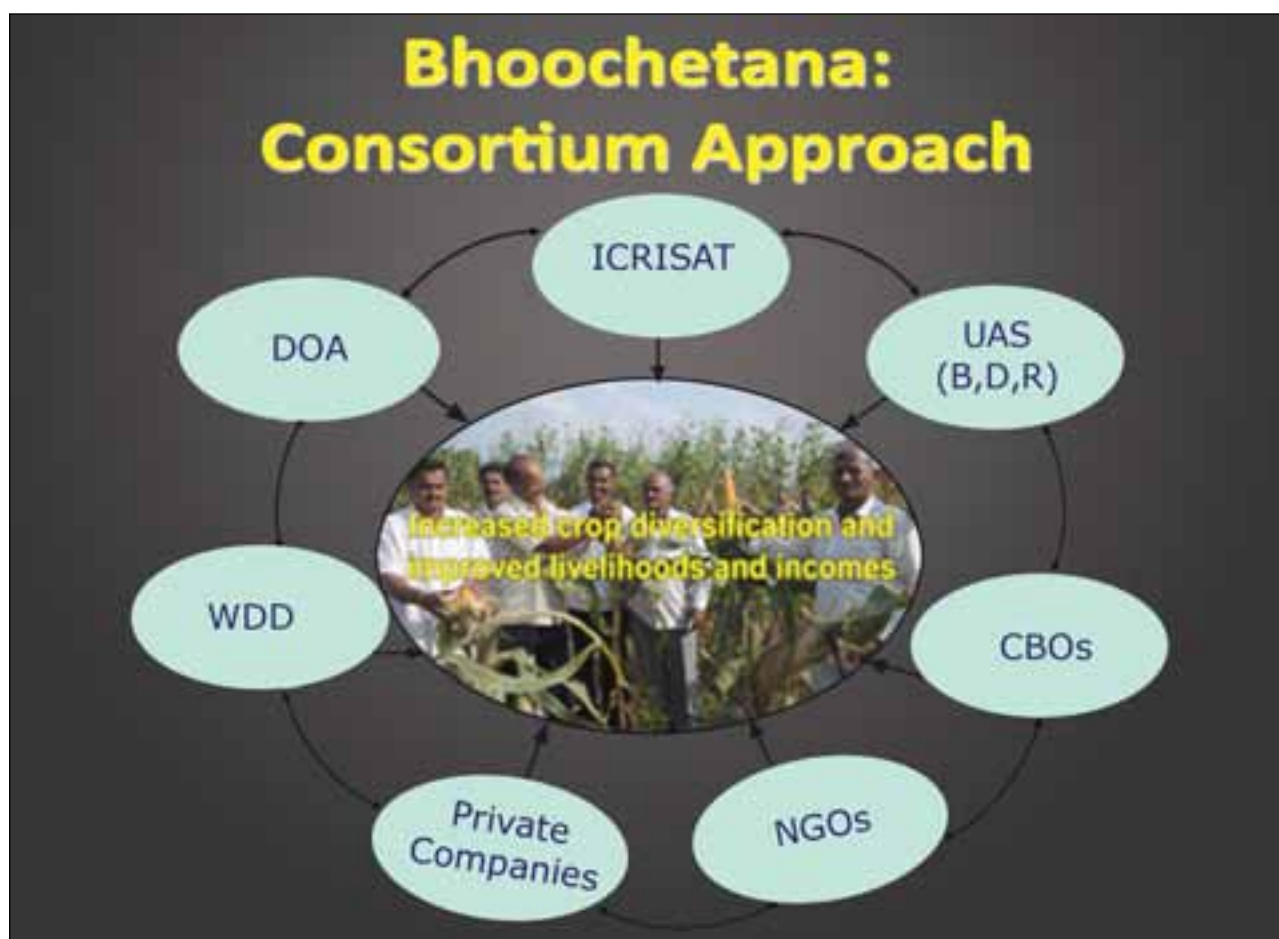


Figure 6. Consortium of partners for implementing Bhoochetana in Karnataka.

³ Farm Facilitators are local level para workers (extension agents) to act as link between farmers and DoA. Lead farmers are knowledgeable experienced local farmers for advising/sharing information with the farming community during peak period of a crop season.

Key Elements

- The Mission adopted the principle of four Cs, ie., Consortium, Convergence, Capacity building, and Collective action. The consortium of development agencies such as line departments of the state government and FF along with academic and research institutions that generate new technologies and knowledge for improving the livelihoods of the rural poor in dryland area is formed.
- Convergence of all schemes of DoA into *Bhoochetana*.
- Creation of *Bhoochetana* cell at DoA headquarter to deal with implementation, planning, and monitoring the activities.
- Demand driven approach – farmers to register and pay 50% of the cost on inputs.
- Develop capacity of DoA staff to adopt science-led development in the state and build the strong cadre of FFs through capacity building with the help of master trainers from State Agricultural Universities (SAUs).
- Address the Mission goal through four Es, ie., Efficiency, Economic gain, Equity, and Environmental protection, which are the important pillars of sustainable and inclusive development in the country.
- Ensure timely supply, availability, and access to the necessary vital inputs such as knowledge-based soil nutrient management options, acquire micronutrients, availability of good quality seed and other best practices, necessary financial incentive to undertake best-bet options for increasing agricultural productivity through *Raitha Samparka Kendras* (RSKs)⁴.
- Adopt improved best-bet management practices (BBMPs) on large scale and share knowledge through trained FFs and lead farmers.
- Map soil nutrient deficiencies in the remaining 30 districts which will be the starting point for scaling up the soil analysis based integrated nutrient management practices for sustainable growth in dryland areas of Karnataka.
- Demonstrate and popularize other BBMPs such as rainwater management, pest management options, and organic matter improvement practices to support the long-term sustainability and enhanced productivity.
- Establish village seed banks for crop cultivars by training the farmers to ensure timely supply of seeds at reasonable prices for the farmers.
- Well planned time-bound targets for covering productivity enhancement in 30 districts, soil sampling and nutrient analysis mapping, and capacity building of stakeholders during the project period as shown in Table 1.
- Crop cutting experiments for estimating crop yields were undertaken by a joint team of officials from DoA and DES and Scientists from University of Agricultural Sciences (UAS) along with ICRISAT Technicians and a uniform crop sampling procedure was adopted across all districts.
- Identify all farmers who are registered/took the inputs from RSKs and applied in their designated fields and sown selected major crop. This was ascertained through RSK bills and FFs who facilitated the farmer in the village to register/get the inputs. At taluk level, Assistant Director of Agriculture (ADA) or Agricultural Officer (AO) ensured in preparing the total list of those identified farmers along with ICRISAT Research Technician and FFs or lead farmers in the villages⁵.

⁴ Raitha Sampraka Kendra (Farmer Contact Center) is a local level administrative setup to facilitate farmers with inputs and information sharing.

⁵ Taluk is a lower level administrative setup consisting several hoblis or RSKs.

- Pool up the list of farmers at district level to facilitate further monitoring and evaluations.
- At taluk level, ICRISAT staff/AO/ADA made at least two field visits in the cropping season to randomly select farmers' fields having crops at the end of vegetative phase and flowering or maturity phase.
- In these phases, field photos showing crop growth differences in individual farmer's fields were obtained as a record for verification.
- At the time of crop harvest, the office of Joint Director of Agriculture (JDA) prepared farmers' list for crop sampling randomly selecting farmers' fields which also had farmers' management treatment in the same farmer's field⁶.

Execution Plan

Formation of coordination committees

The project has been implemented in a Mission mode and coordination at different levels starting with cluster of villages in each taluk linking-up with Taluk Coordination Committees, District Coordination Committees (DCCs) and State Coordination Committee (SCC). Communication was very regular and shared through email to speed up the processes at field level. The JDA was given special responsibility of overseeing *Bhoochetana* activities initially; this improved the process of implementation and decision-making process.

The SCC chaired by Additional Chief Secretary and Development Commissioner guided the mission and helped in deciding the targets and mechanisms to achieve the objectives⁷. The SCC deals with various issues. First, necessary convergence of different line departments and consortium partners through appropriate laws or bills. Second, guide the consortium partners for resources (human and financial) to achieve the targets; also periodical review and monitoring of the progress and close monitoring of the reports from the district and taluk level coordination committees through nodal officers. Third, identify suitable strategies for successful implementation of the mission project by mobilizing necessary support from the concerned line departments as well as policy makers and politicians to make the mission successful. For example budgetary provision for storage of inputs at field level, supply of inputs well in time. The high level committee played very effective role in implementation of the program.

Responsibilities of DoA

During the first year, the DoA identified two major rainfed crops in each of the districts where Sujala program has already implemented watershed program. During the subsequent years, additional area in each district was added accordingly to ensure that by the year four, 100 per cent of the area for the selected crops in the selected districts will be covered by the mission (Table 1). Director (Agriculture)⁸ served as the nodal officer and implemented the project in all the districts through appropriate staff from DoA with the help of FFs and lead farmers in each village to undertake mission

⁶ The Joint Director of Agriculture (JDA) is responsible for overall supervision of agricultural activities in the district. He/she is assisted with Assistant Directors of Agriculture (ADAs) and Agricultural Officers (AOs) at taluk level and Assistant Agricultural Officers (AAOs) at RSK level.

⁷ Development Commissioner is the overall in-charge of development activities in the state who acts on the advice and guidance of the Chief Secretary of the state.

⁸ Director (Agriculture) is the administrative head below the rank of Commissioner and the Principal Secretary (Agriculture).

project activities. DoA organized timely availability of necessary quality inputs (seeds, fertilizers including micronutrients, sowing machinery, pest control measures) for enhancing the agricultural productivity of the target crops.

Further, the department procured fertilizers particularly the micronutrients to ensure quality and economy directly from the manufacturers rather than from the suppliers. The necessary stocks of fertilizers and seeds were ensured at cluster level before the onset of monsoon as generally farmers procure the materials ahead of starting of the season. The department provided day-to-day supervision, timely supply of nutrients and ensured required target to be made to cover planned areas in the district. The Department staff along with other consortium partners undertook crop cutting experiments to record yield data. The nodal officer ensured timely implementation and organized meetings at different levels regularly to review the progress as well as undertake mid-course correction.

Table 1. Timeline for execution of activities in different districts in Karnataka

Activity	Year	% activity coverage in districts		
		Districts 1-6	Districts 7-15	Districts 16-30
Productivity enhancement	2009	25		
	2010	50	33	
	2011	75	66	50
	2012	100	100	100
Nutrient status mapping	2009	100		
	2010		100	
	2011			100
	2012			
Capacity building	2009	100		
	2010		100	
	2011			100

Source: Wani et al. 2012a.

Responsibilities of consortium partners

ICRISAT facilitated the mission project and provided guidance, strategy, and technical support for undertaking productivity enhancement activities in the selected districts of Karnataka. One of the major responsibilities included providing soil test-based nutrient recommendations based on the soil mapping done by adopting stratified sampling method in the districts and preparing GIS-based nutrient maps for the targeted districts. Training of trainers at district level was undertaken by ICRISAT with scientists of SAUs for implementing the mission project to enhance the productivity of agricultural crops in the districts.

The SAUs provided technical support by providing knowledge as well as guidance and local logistical support to share knowledge with the farmers. Within the district and taluk, a nodal staff to participate in the mission project for enhancing agricultural productivity at different levels was identified by the university. Universities assisted in identifying suitable high-yielding cultivars of the

identified crops as well as appropriate management practices including pest control measures at district level. Besides assisting ICRISAT in undertaking training programs for the FFs and lead farmers, scientists at district and taluk level regularly visited the project areas along with other partners and guided the project implementation accordingly.

Project Implementation and Monitoring

Top Level Interest and Monitoring

The Program management system was well developed and worked effectively. At state level, regular review meetings were organized. Initially the review meetings were held every fortnight and later at weekly intervals. The reviews were conducted at district and taluk level on every Tuesday. The reports were generated at taluk level office. Thus, first level review is conducted at taluk level and these review meetings help in preparing reports that are submitted to the district and later to the state on weekly basis.

The SCC is a high power committee constituted with state level senior administrators of Government of Karnataka, Economic Advisor to Chief Minister, directors of DoA and watershed development department, vice-chancellors of the three UAS in Bengaluru, Raichur, and Dharwad, and project coordinator from ICRISAT (Figure 7). The committee meetings were organized frequently during the beginning of the season to take stock of inputs procurement and distribution arrangements,

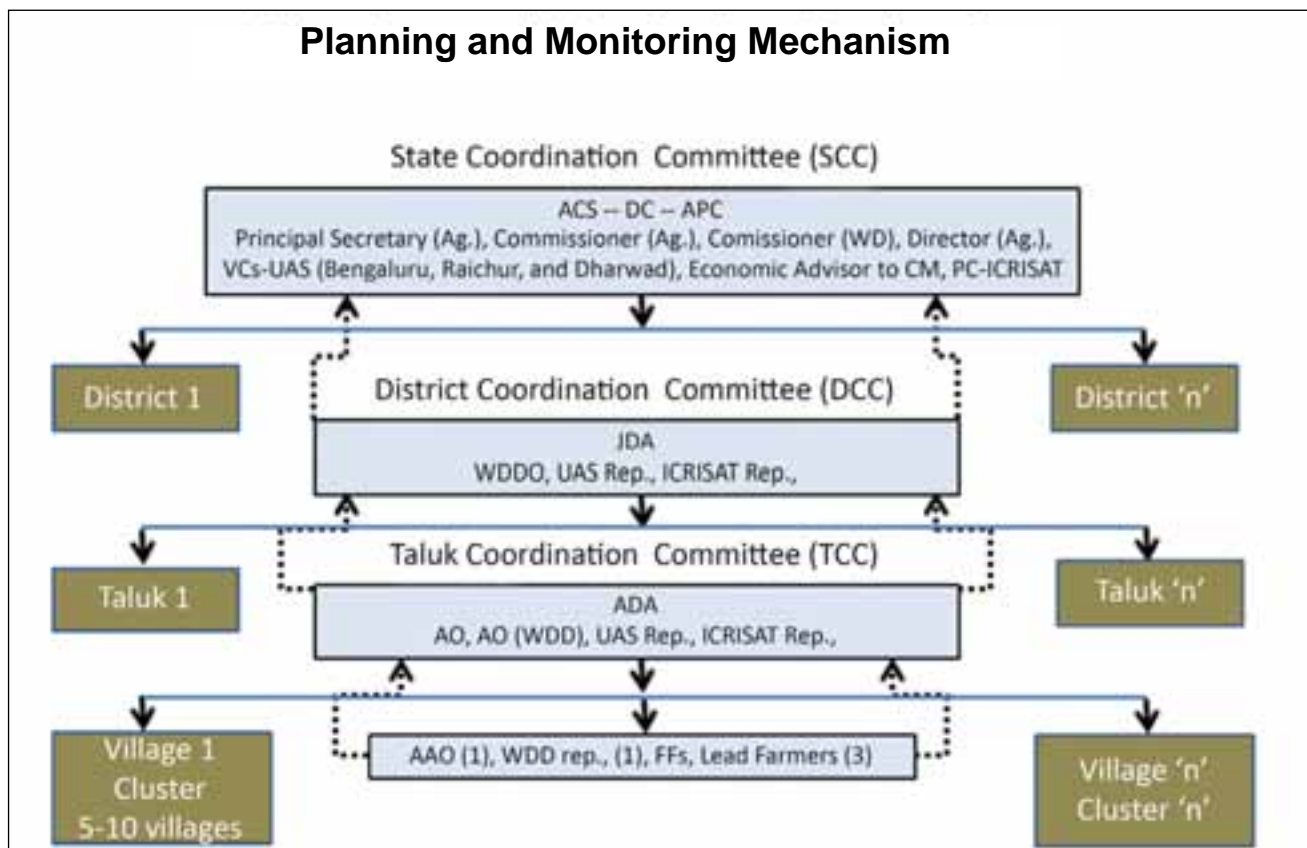


Figure 7. Planning and monitoring mechanism for implementing Bhoochetana mission mode project in Karnataka (Source: Wani et al. 2012a).

monsoon progression, and crop-sown statistics. To fetch complete information from cluster villages and taluks to district, ICRISAT prepared a checklist for weekly activity progress report and ensured follow-up weekly reporting synchronized from JDA office and ICRISAT.

Monitoring Indicators and Refinement over the Months

Performance assessment

Performance based ranking mechanism was adopted and every district was given a rank every month. It is a system for developing a competitive environment in the program. This helps in maintaining pace of the work at ground level. The management system ensured that inputs were stocked at RSKs and micronutrients were used on time. Cooperatives were involved for stocking of inputs at field level. Community to community exposure visits were planned at large scale for wider adoption of this concept. Now structured training programs are organized for lead farmers, field level officials, and FFs on regularly training to strengthen the program.

Regular review meetings

SCC reviews the progress of project activities and interacts with district level officials instantaneously through video-conferencing on every Wednesday and considers solutions to address problems arising in the field and issues directives for each district. This has become a regular feature and found effective in minimizing the transaction costs of administration. The Honorable Chief Minister reviewed the progress of *Bhoochetana* during the first year and Minister of Agriculture also attended a district level committee meeting and reviewed the progress and success achieved in enhancing the crop yields of finger millet and groundnut during *kharif* season. This gave additional boost to the staff involved in the program. In the first year of the program, SCC members adopted districts and attended District Coordination Committee meetings, and participated in field visits along with JDA of the district to monitor and provide guidance to problems in the district. High-level monitoring by senior officials helped in arranging timely inputs. This close monitoring also made this program effective at field level.

Monthly program implementation calendar (MPIC) guidelines were developed for better monitoring of the program. The MPIC aims at apportioning the budget allocation for a scheme based on physical activities during the twelve months of the financial year and thereby achieving satisfactory implementation of state plan and non-plan schemes. Spending the allocation in the last month of the financial year can be prevented and the developmental objectives of the schemes can be achieved. The MPIC includes state, district, taluk, and gram panchayat⁹ level activities. It also provides space for monthly planning of grant and its timely releases. The document has defined output and outcomes linked with the plan. It also helps in review of the program implementation at district level to the concerned Chief Executive Officer (CEO) of Zilla Panchayat¹⁰.

The program was reviewed in special meetings in its initial stage. These review meetings were mainly to rectify field problems and take policy decisions to implement the concept positively. The review

⁹. Gram Panchayat is local self-government at the village or small town level in India and the Sarpanch is in-charge of it. It is the agency for planning and executing the local development program.

¹⁰. Chief Executive Officer heads the administrative machinery of Zilla Parishad. He supervises the divisions of the Parishad and executes its development schemes.

mechanism also helped in building relationship between all consortium partners. Review meetings were initially conducted every fortnight but later on looking at the need it is now organized on weekly basis. In these review meetings, other departmental programs are also reviewed.

Funds are disbursed based on financial progress to each district and it is a forcing mechanism by peer review. Concept of vigilance was promoted based on learning of the program. This helps in maintaining quality of inputs at field level and checks whether the impacts reach the needy people or not. Review meetings served as a base for planning and monitoring the program at field level.

Progress review started from June 2009. Weekly review was based on the report against plan and task given in the last meeting and random check was compulsory for the nodal officers. Every Thursday, Principal Secretary (Agriculture) does thorough progress review of *Bhoochetana* at 3.00 pm. In the meeting, issues, which required policy or higher-level decision, were put forth to the Development Commissioner. Follow-up of progress mainly through email.

Video conference

The concept of video conference-based review is close monitoring and review of the program by the head office. This also saves time of field officials who were earlier visiting the head office just for the review meeting of higher frequency. The regular review through video conference is outcome of *Bhoochetana* program only. Earlier DoA used review by routine meetings either at district, divisional, or state level. In a meeting, it was decided to use the video conference technology for better monitoring and review. In the very first meeting, government realized its usefulness and it was decided to continue for review. Earlier this review was carried out every fortnight and later on it was conducted at weekly intervals.

The change in monitoring and review mechanism through video conferencing brought immediate change at field level. Plans were prepared on realistic basis, execution was more close to plans prepared, and reports were more realistically submitted to head office; other advantages were timely interaction with the field team, timely decision to address the field level issues, and one to one review, and time saved could be used in better execution of the program. Video conference is better use of technology that helps in strict monitoring of inputs at field level and forces officials to work at ground level to bring positive outputs. Field officials are forced to update their reports and follow-up activities closely as per plan. It helped in achieving the targets well in time. Issues are



Figure 8. Regular video conference

discussed in depth and if needed decisions are taken immediately. Issues are also taken up to higher level depending on the need and demand.

This helps in interacting with the field officials personally, which brings intimacy and helps in addressing issues and increases quality of communication across the state thus reducing administrative difficulties. Review of decisions and instructions given in the video conference in the next video conference helps in follow-up action at field level. Since senior officials of the department attend the video conference, it keeps them updated and well informed about decisions taken. In a routine video conference, the first half is communication from head office while in second half district officials were allowed to share their problems, concerns, and constraints. Every district put their queries in video conference and accordingly queries are clarified and orders are issued by the head of the department. Action points are prepared for every video conference. Funds are disbursed based on financial progress to each district and it is a forcing mechanism by peer review.

Scaling-Up over the Years and Refinements Adopted

Bhoochetana was implemented strategically over a four-year period to make essential gains in the struggle for improved agricultural productivity, rural incomes, and nutrition. The scaling-up process in this particular project adopted a multi-level ‘refinement strategy’ to increase the effectiveness of technologies and reach greater number of people. It is part of a broader process of innovation and learning. With effective monitoring and evaluation processes, the knowledge acquired from the initial year was used to scaling-up the model to create larger impacts in the entire state. The process occurred in an iterative and interactive cycle, as the experience from scaling-up feeds back into new ideas and learning.

The unique mechanism of scaling-up with comprehensive planning, review, and monitoring along with new institutions like FFs, lead farmers, RSKs, and supporting policies enabled the consortium to cover large rainfed areas in the state. In the first year (2009-10), the project was implemented in six districts covering 0.23 million ha, 1440 villages, and 0.2 million farmers. In this season, the crop yield increased between 32 and 66 per cent in different crops with greater financial benefits to farmers. The second year of the project was implemented during 2010-11 in 16 districts (including the six districts) covering 1.2 million ha, 5030 villages and 0.87 million farmers with an increase in yield level of dryland crops varying from 20 to 50 per cent. The third year of the project was implemented during 2011-12 in all 30 districts covering 2.85 million ha, 14017 villages, and 2.2 million farmers (Table 2). During this season, in spite of unfavorable rainfall situation in the state, farmers obtained an increase in crop yields by 21 to 43 per cent with improved management practices, contributing immensely to the economy of the state.

Table 2. Scaling up of *Bhoochetana* initiative in Karnataka

Year	Districts covered	Area covered (million ha)	Villages covered	Farmers (million)	No. of Farm Facilitators	No. of Lead Farmers
2009-10	6	0.23	1440	0.2	517	1867
2010-11	16	1.2	5030	0.87	2500	10500
2011-12	30	2.85	14014	2.2	5688	27299
2012-13	30	3.73	26293	4.39	9700	45000

Key Results

At Field Level

The baseline data on productivity of different crops and socioeconomic indicators have been collected and analyzed to identify the constraints and opportunities. The yield gap analysis of different rainfed crops revealed that there exists an opportunity to unlock the potential of the rainfed system in the state (Singh et al. 2009). As an entry point, soil samples were collected on a massive scale from farmers' fields in the districts to map nutrient status of soils using stratified sampling technique and the analysis was used to operationalize soil test-based taluk-wise fertilizer recommendations which is a novel initiative and one of its kind in the country. It has established a proof of concept by documenting benefit-cost ratios of 1.2 to 14.6 for additional income using market prices for the inputs. The grain production increase over farmers' practice was 18 per cent in finger millet in Tumkur district and was a highest (73 per cent) in maize in Chamaraja nagar district (Table 3) (Wani et al. 2012a). On the other hand, during 2011-12 *kharif* season, crop production increase was at a minimum of 21% for paddy in Kodagu to maximum of 63% for pearl millet in Koppal district.

The mission project has established good practices for knowledge dissemination, data recording, crop cutting, and recording yields for computing state statistics. It is piloting a new extension system on a large scale using FFs and consortium approach for capacity building by linking knowledge generating institutions with knowledge disseminating line departments.

Scientific approach and technical support enabled dryland farmers to enhance crop productivity significantly (32 to 66%) not only in the first year of implementation in 6 districts, but also continued and exceedingly well over larger areas in 16 districts with significant increase in crop productivity by 21 to 57 per cent and 12 to 52 per cent in all 30 districts during rainy season of 2011-12 for different crops.



Table 3. District-wise crop yield increase in farmers' fields with improved management compared to farmers' management under *Bhoochetana* project, 2010-11

Crop	District	Farmers' management (kg ha ⁻¹)		Improved management (kg ha ⁻¹)		% increase in production		Additional income at MSP (₹ ha ⁻¹)	Additional income per rupee invested
		Stalk	Grain	Stalk	Grain	Stalk	Grain		
Finger millet									
	Bengaluru R	4730	2040	6240	2760	32	35	9060	5.7
	Chikballapur	2090	2610	3290	3710	57	42	12300	7.8
	Chitradurga	2820	2050	3730	2680	32	31	7350	4.7
	Davangere	2970	1420	3970	1850	34	30	5550	3.5
	Hassan	4020	1650	5420	2290	35	39	8140	5.1
	Kolar	2720	1710	3820	2250	40	49	6750	4.3
	Tumkur	2890	830	3540	980	22	18	2360	1.5
	Chamaraja-nagar	1930	1331	2183	2093	13		7710	4.9
Maize									
	Bengaluru R	3460	4600	4450	6530	29	42	17550	11.1
	Bijapur	3160	5590	4130	7250	31	30	15160	9.6
	Chitradurga	2160	3840	2850	5340	32	39	13590	8.6
	Davangere	2170	5220	2860	6600	32	26	12540	7.9
	Gadag	3210	6300	4920	8340	53	32	18930	12.0
	Haveri	5940	7510	7370	9680	24	29	19910	12.6
	Chamaraja-nagar	5333	1776	9194	3078	72	73	13660	8.6
Pearl millet									
	Gulbarga	1600	1590	2060	2080	29	31	4580	2.9
	Bijapur	2020	1960	2730	2670	35	36	6650	4.2
	Yadgir	3270	1850	4220	2540	29	37	6620	4.2
	Raichur	1580	1260	2050	1530	30	21	2650	1.7
Sorghum									
	Bidar	1840	1630	2500	2290	36	40	6190	3.9
	Davangere	3420	1780	4230	2320	24	30	5220	3.3
	Chamaraja-nagar	2227	1428	3031	2215	36	55	7390	4.7
Black gram									
	Bidar	1690	930	2460	1260	46	35	9570	6.1

Continued

Continued

Table 3. District-wise crop yield increase in farmers' fields with improved management compared to farmers' management under *Bhoochetana* project, 2010-11

Crop	District	Farmers' management (kg ha ⁻¹)		Improved management (kg ha ⁻¹)		% increase in production		Additional income at MSP (₹ ha ⁻¹)	Additional income per rupee invested
		Stalk	Grain	Stalk	Grain	Stalk	Grain		
Green gram									
	Bidar	1310	870	1790	1200	37	38	10460	6.6
	Bijapur	460	330	620	480	35	45	4760	3.0
	Gadag	590	280	820	440	39	57	5070	3.2
	Gulburga	1520	460	2180	590	43	28	4120	2.6
	Yadgir	470	540	590	710	26	31	3800	2.4
Pigeonpea									
	Bidar	5990	1230	7950	1700	33	38	14100	8.9
	Bijapur	1870	920	2550	1160	36	26	7200	4.6
	Gulburga	5090	1380	6620	1870	30	36	14700	9.3
	Raichur	1470	960	1860	1280	27	33	9600	6.1
	Yadgir	8520	1630	11080	2230	30	37	18000	11.4
Groundnut									
	Bijapur	680	320	950	470	40	47	3990	2.5
	Chikballapur	1090	1350	1760	2010	61	49	16520	10.5
	Dharwad	1737	2062	2090	2906	20		20118	12.7
	Gadag	1750	1590	2580	2230	47	43	16380	10.4
	Haveri	3100	2680	3950	3610	27	35	23090	14.6
	Kolar	1900	1460	2560	1940	47	33	15780	10.0
	Tumkur	1049	899	1305	1120	27	25		
	Chamaraja-nagar	1105	1109	1553	1733	41	56	15248	9.7
Soybean									
	Bidar	890	2100	1260	2910	42	39	11660	7.4
	Haveri	900	1790	1540	2230	71	25	6340	4.0
	Dharwad	3033	1516	4810	2333	59	55	11770	7.4
Sunflower									
	Bijapur	1960	870	2470	1060	26	22	4470	2.8
	Yadgir	1950	410	2310	490	18	20	1880	1.2

Source: Adopted from Wani et al. (2012a).

Bhoochetana takes up the integrated genetic and natural resource management (IGNRM) through consortium of national and international research institutions to take care of the entire 'seed to food' chain, bringing improved agricultural technologies, seeds and other inputs at farmers' doorstep, besides building capacities of stakeholders. Intense monitoring by high-power SCC at regular intervals, helped with midcourse corrections, ensured project deliverables in time, and achieved the objectives with success.

Crop planning

Major crops were identified in the selected 30 target districts of Karnataka considering the annual crop statistics published by Government of Karnataka for enhancing productivity of major dryland crops in each selected district. Cropping targets for *kharif* and *rabi* seasons were scaled in a staggered manner annually as planned from 2009-10 to 2012-13 seasons (Table 4).

Table 4. Cropping planned and actual area sown during 2009-10 to 2012-13.

Crop season	District	Season	Crops	Target area crop-wise (million ha)	Total area sown (million ha)	% area sown
2009-10	6	<i>Kharif</i>	Finger millet, maize, groundnut, Soybean	0.188	0.16	84.6
	3	Rabi		0.6	0.05	81.2
2010-11	16	<i>Kharif</i>	Finger millet, maize, groundnut, soybean, cotton, pigeonpea, pearl millet, black gram, sorghum, green gram, chick pea	1.32	1.2	91.3
	10	Rabi		0.036	0.33	91.4
2011-12	30	<i>Kharif</i>	Finger millet, maize, groundnut, soybean, cotton, pigeonpea, pearl millet, black gram, sorghum, green gram, chick pea	2.95	2.66	90
	11	Rabi		0.79	0.64	81
2012-13	30	<i>Kharif</i>	Finger millet, groundnut, pegeonpea, soybean, cowpea, green gram, maize, pearl millet, sunflower, safflower, sorghum, cotton, rainfed paddy	5.0	3.73	75
	15	Rabi		4.0	2.7	68

Inputs management

Use of recommended fertilizers and micronutrients by farmers was low during the first year of *Bhoochetana* project in new districts owing to less familiarity of technologies and their advantage to farmers. In the older districts where *Bhoochetana* was operationalized in the previous year, farmers purchased inputs knowing the advantage of inputs for enhancing their crop productivity and income

(Table 5). Per hectare consumption of zinc sulfate ($ZnSO_4$) increase to double and boron consumption increased fivefold during third year of the project.

Table 5. Fertilizers (S, Zn and B nutrients) distributed to farmers in Bhoochetana project during four crop seasons from 2009-10 to 2012-13 in target districts

Crop season	Area covered (million ha)	Quantity consumed (t)			Nutrient used ($kg\ ha^{-1}$)		
		$ZnSO_4$	Gypsum	Borax	$ZnSO_4$	Gypsum	Borax
2009 (<i>Kharif</i>)	0.23	372	4309	53	1.65	19.15	0.23
2009-10 (<i>Rabi</i>)	0.06	-	-	-	-	-	-
2010 (<i>Kharif</i>)	1.27	2723	35376	389	2.27	29.50	0.32
2010-11 (<i>Rabi</i>)	0.37	362	5595	113	1.09	16.86	0.34
2011 (<i>Kharif</i>)	2.84	8775	96234	2781	3.46	37.90	1.10
2011-12 (<i>Rabi</i>)	0.66	1678	12475	432	2.94	21.87	0.76
2012 (<i>Kharif</i>)	3.57	6803	59935	3104	2.25	21.50	0.77
2012-13 (<i>Rabi</i>)	2.75	5109	36746	1494	1.89	14.85	0.55

In rainy season 2011-12, *Bhoochetana* activities were targeted to cover an area of 2.95 million hectares with improved management to enhance rainfed crop productivity in 30 districts. The project achieved a coverage of 2.66 million hectares, which was 90% of the target area with four major food grain cereals (finger millet, maize, sorghum, and pearl millet), four major grain legumes (pigeonpea, green gram, black gram, and cowpea) and four major oilseed crops (soybean, sunflower, cotton, and groundnut) of Karnataka.

At State Level

It is important to mention that the agricultural growth rate of the state prior to the implementation of *Bhoochetana* varied between negative and 0.5%. The vast volatility in agricultural growth rate was the worrying factors for planners and policy makers in the state. Considering these facts, the interventions in six districts, during the first year, were effectively planned and suitable monitoring and evaluation measures were adopted to show the impacts on the field. The top level (both people's representatives as well as bureaucrats) interest and commitment has helped to achieve the desired impact. It is highly satisfying that this initiative has shown a growth rate of 5.9 per cent during the second year itself. After many years this rate of agricultural growth has been possible because of several measures taken by the state. During 2009-10, 0.87 million farmers cultivating 1.2 million hectares of dry land in 16 districts have benefited from this scheme through increase in yield of 25 to 40 per cent. During the last 3 years, 2.17 million quintals of quality seeds have been distributed at subsidized rates to 8.1 million farmers for improving the productivity of crops.

Financial Expenditure, Source of Funds and Income Generated at Farmer Level and State Level

Sources of funds

The program was conceptualized of generating funds using state resources and central resource to achieve sustainable agriculture development. The proposal was developed based on this concept and funds were received under Rashtriya Krishi Vikas Yojana (RKVY), a scheme in operation in all the states of India, supported by the Government of India. It is an innovative approach to converge with the ongoing programs to address the larger issues in science-led approach. To implement this ambitious program state government made provision for 25 per cent of total program cost from state budget and rest 75 per cent from central schemes. Budget was created using funds of different central government schemes like Integrated Scheme of Oilseeds, Pulses, Oilpalm and Maize (ISOPOM), National Food Security Mission (NFSM), Skill Development Program (SDP), etc. additional funds required were met under RKVY by submitting special project.

The Government of Karnataka, in addition to mobilizing finance through convergence of central schemes, has made expenditure on FFs, rural storage facilities like godowns and transportation. The charge for the services of FF to provide technologies to farmers at village level was at the rate of one FF for an 500 ha for a maximum period of 120 to 160 days depending on the duration of the crop. An honorarium of ₹ 150 per day was paid to the FF. Along with each FF, 5 lead farmers and their services were obtained for 15 days at the time of sowing. An honorarium of ₹ 95 is paid to the lead farmers. About ₹ 350 million has been spent on FFs and lead farmers to obtain their services during the Bhoochetana initiative. During the presentation of first agricultural budget in 2011-12, the Honorable Chief Minister allocated ₹ 400 million and similarly during the general budget of 2012-13 ₹ 700 million was allocated to Bhoochetana initiative.

Innovative extension system

Bhoochetana has developed an innovative extension system as well as an institutional arrangement to empower farmers through RSKs and FFs and innovative supply chains, the missionary approach showed its benefit for 3.3 million farmer families since 2009 through increased productivity by 21 to 66% over farmers' practices; it translated for the Government of Karnataka into 5.9% annual agricultural growth rate during 2009-10 and 11.6% during 2010-11. During 2011, three million ha area was covered in the rainy season and the economic returns were estimated at ₹ 6460 million.

Awards and appreciation

The achievements were recognized by the Government of India through the award of Krishi Karman Award for highest productivity of coarse cereals given to the DoA, Government of Karnataka; and Agricultural Leadership Award by Agriculture Today during 2010-11. During 2012 *khariif* season, the *Bhoochetana* aimed to cover 5.5 million ha of rainfed and irrigated areas for enhancing productivity by increasing profitability and improving sustainability of agriculture in the state; however, due to severe drought it could cover 3.73 million ha.

Food and fodder security

Contribution through increased pulses grain production (black gram, green gram, cowpea, and field beans) at 0.22 million tons additionally in the state provide nutritional security in the rainfed districts as these pulses are important dietary items in rural and urban areas alike. Food grain production of cereals (maize, paddy, pearl millet, and sorghum) is estimated to have increased by 0.46 million tons additionally in the state during *kharif* 2011 as contribution of productivity enhancement initiative. Apart from food grain production, there is proportionate fodder production from cereals as a significant contribution for fodder security in the rainfed districts of Karnataka. Oilseed crops (soybean, sunflower, and groundnut) contributed to state edible oilseed requirements through 0.053 million tons of additional production by enhanced crop productivity under *Bhoochetana* initiative.

During 2010-11 *kharif* this program was implemented in 16 districts (including the 6 districts of 2009-10) in about 1.2 million hectares. About 0.87 million farmers of 5030 villages availed the benefits of the scheme. In 2009-10, enhancement in yield was observed in the treated areas in maize (44%), Finger millet (35 to 65%), groundnut (32 to 41%), and soybean (39%). Similarly, about 23-57% increase in yield was observed in treated plots as compared to non-treated plots during 2010-11.

Knowledge integration

Apart from productivity enhancement, knowledge generation has also taken place at the grassroots level through timely capacity building training for farmers, FFs and taluk and district level AOs. About 7500 district level officers and over 100,000 participants including taluk level officers, lead farmers, FFs and farmers have been trained on new technology till the end of 2012 crop season.





This impact oriented farmer-centric innovative and sustainable partnership has become an exemplar for other states. Consequently, the Government of Andhra Pradesh has also adopted *Bhoochetana* while the Government of Tamil Nadu will soon initiate a similar mission for rainfed agriculture. This partnership has linked knowledge generating institutions with knowledge transforming into action extension line departments for taking science-led development approach at the doorstep of the smallholder farmers in the semi-arid tropics.

Key Lessons

Developing Partnerships

The consortium of partners including knowledge-generating and knowledge-transforming institutions has helped millions of small and marginal farmers in Karnataka. This innovative partnership has its own merits in terms of reaching out to poor farmers and helping them to increase productivity through technology and institutional innovations. This partnership has generated a stimulated discussion among policy makers and researchers to follow the process of formation of similar partnership to improve the rural livelihoods of poor and vulnerable sections of the society. However, more transparent and clear communications need to be developed for a vibrant partnership even at grassroot levels such as district, taluk, and village.

This partnership has helped to create new institutional arrangements such as FFs, lead farmers, convergence, and creation of *Bhoochetana* cell in the state to deal with agricultural extension services. Since the inception of the initiative, FFs and lead farmers are the new extension agents who are effectively disseminating the knowledge to the community, which has made huge impacts on the state's agricultural scenario. After realizing the importance of FF in the extension system, this concept was adopted by other departments of Government of Karnataka like Departments

of Horticulture and Sericulture to implement other schemes such as Suvarna Bhoomi Yojane in the state. On the other hand, convergence and creation of exclusive *Bhoochetana* cell contributed to effective management of financial and administrative problems and smooth implementation, monitoring, and evaluation.

Dynamic and coordinated interaction among partners in a partnership system often was seen as the main driver of innovation for technology dissemination. The ability to respond quickly to change is an increasingly important element of strong partnership. For this reason, capacity-strengthening interventions require a major focus on measures that foster strong patterns of interaction and build coordinated action to respond to continuously changing competitive and other challenges. New types of skills must be developed and partners are to learn from their own and others' experiences of coping with change in a highly uncertain environment such as contingency plan during drought situations. This effort may involve new initiatives and organizational processes that can promote knowledge management, sharing, and learning to respond to change effectively. Moreover, this partnership provided time for each partner to find own place.

Role Clarity

The success of *Bhoochetana* is the culmination of variety of factors. First of all the coordination and cooperation of diverse institutions under the umbrella of the consortium provided a strong foundation for the partnership for implementation of *Bhoochetana* for bridging the large yield gaps that existed in the state. This has been accompanied by specific roles clarified and agreed by them to strengthen the process and for building the commitment towards the set goal. One of the features of effective partnership system is the way organizations beyond the state are playing a proactive role in the creation and development of opportunities. In addition, role flexibility is also important as highly compartmentalized and rigidly defined roles do not allow organizations to reconfigure and respond flexibly to changing circumstances. Often flexibility leads to innovations. However, minimum level of check is necessary to avoid overconfidence among partners.

Sharing Resources and Risks

This study originated with the proposition to explore new ways of thinking about interventions that could promote agricultural development by better enabling the partnership process. *Bhoochetana* provided a platform for better resource allocation with added responsibility among partners. The convergence of programs/schemes and knowledge was useful in allocating human as well as financial resources in this program. In *Bhoochetana*, all major programs in the department of Agriculture converged and treated as 'single file system'. The major chunk of resource is from central government (75%) and the remaining share is from the state government (25%). One lesson emerged out of which is that research and development practitioners, line departments, and non-state actors must be willing to work with emerging concepts and must recognize that the interventions that they are planning will evolve while they learn. The partnership concept provides a framework for inclusive, knowledge-intensive agricultural development, but more focused, committed efforts are required to accomplish the goal of disseminating pro-poor technologies for small and marginal farmers for better impact.

Governance Mechanism

The Monitoring and Evaluation (M&E) framework being used is one of the more thorough monitoring systems in place for agriculture service delivery in Karnataka and it should be further strengthened. One area which requires increased support involves further professionalizing FFs. The impact of regular review meetings conducted by DoA is visible and the top level officials have put good efforts which have contributed largely to the success as is evident from the results. To sustain this, planning and monitoring mechanisms need to be continued and further good practices to be evolved and adopted.

Conclusion

This paper has described the process of institutional partnership for the intensification of agricultural sector in Karnataka. This is part of innovative pathways of agricultural development in the state that began more than a decade ago with a strong foundation laid during the Sujala-ICRISAT Initiative in 2005. The aim of this strategic partnership was to enhance the impact by translating strategic research into research for development and impact. It is a holistic end to end approach for scaling-up development by adopting research for development and Inclusive Market Oriented Development (IMOD) approach.

This partnership has explored new ways of extension system which is unique in its composition and functioning. It is essential that the traditional extension system may be exchanged for this model where research supports innovation at the local level. The important lesson was support to research systems must focus more on developing the interface with other sectors to achieve desired growth in agriculture sector. Major attention must be given to how and why the research system is governed, and to the ability and the attitudes required for engaging in partnerships. Attention must also be given to putting public awareness strategies in place through print and mass media along with training and exposure activities. These types of changes are not necessarily expensive but they are preconditions for effective investment in research that can contribute to innovation. Similarly, extension investments should create the capacity to identify new, promising alternatives at the farm level and ensure that they are supported in the right way through engaging potential partners.

The successful partnership depends on the cooperation and collective decision-making power among the partners as well as necessary support from the facilitating agencies. In this case, the government should support investments that encourage heterogeneity in service providers and in organizations that have the attitude and the ability to find the right approach in different situations. An effective partnership also requires a cadre of professionals with a new skill and mindset. Thus, the government should re-engage in agricultural education investments to modernize support staff training and establish state of the art facilities to cater to the needs of the sector.

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