

Sustainable
AGRICULTURE
PART 2

TRANSFORMING

INDIA'S
FOOD SYSTEMS





INTRODUCTION

While states like Sikkim and Andhra Pradesh are leading the way on sustainable agriculture in India, the adoption remains on the margins at an all-India level. Likewise, the outcomes on the economic, social and environmental front are limited. With the projected 1.5-degree Celsius increase in the planet's average atmospheric temperature and the greater variability in summer monsoon precipitation, risks to food security, livelihoods, water supply, and human well-being are bound to increase. Thus, it is ripe time for India to recognise the critical role that sustainable agriculture could play to ensure India's nutritional security in a climate-constrained world and enable the transition to more sustainable, resilient food systems.



We understood in the previous document how sustainable agriculture is expected to play a central role in the world's response to climate change as well as meeting multiple other developmental goals. In this document, we will discuss the status of adoption of sustainable agriculture practices in India and challenges associated with their mainstream adoption. Further, potential solutions have been presented to scale up adoption of SAPSs in India.

WHAT IS THE CURRENT STATUS OF ADOPTION OF SUSTAINABLE AGRICULTURE PRACTICES IN INDIA?

Several states like Sikkim, Andhra Pradesh, Karnataka, Himachal Pradesh etc. have been pioneers in scaling up prominent sustainable agriculture practices like organic and natural farming. Although, barring a couple of exceptions, most SAPSs have less than 4% farmers practicing them. Crop rotation, agroforestry and rainwater harvesting are some sustainable practices that have been widely adopted across the country under various SAPSs. Some systems like natural farming and system of rice intensification (SRI) have witnessed a faster rate of adoption in the last few years.

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|  <p>Organic Farming</p> | <ul style="list-style-type: none"> ▶ Area under certified organic farming as of March 2020: 2.8 million ha (~2% of India's net sown area). ▶ India ranks 1st in number of organic farmers and 9th in terms of area under organic farming. ▶ India is a home to world's first fully organic state- Sikkim. ▶ Major organic exports from India: flax seeds, sesame, soybean, tea, medicinal plants, rice and pulses. |
|  <p>Natural Farming</p> | <ul style="list-style-type: none"> ▶ Area covered under natural farming: 4.09 lakh ha. ▶ 6,00,000 Farmers were enrolled alone in Andhra Pradesh state program for natural farming, as of November 2020. ▶ Andhra Pradesh has set a goal to become India's first 100 percent natural farming state by 2024. ▶ Predominantly adopted by Small, Marginal, Landless, Tribal Farmers. |
|  <p>Permaculture</p> | <ul style="list-style-type: none"> ▶ Area under permaculture in India: Less than 0.05 million ha ▶ Practiced mostly among small farmers growing horticulture (fruit and vegetables), floriculture, perennial and arable crops, poultry, dairy, and related activities. |
|  <p>Biodynamic Agriculture</p> | <ul style="list-style-type: none"> ▶ Certified biodynamic farms in India: 9,131 ha. ▶ Main crops cultivated under India's biodynamic farming: Herbs, spices, tea, and coffee. |
|  <p>(Partial) Conservation Agriculture (CA)</p> | <ul style="list-style-type: none"> ▶ Estimated area under CA in India: ~2 million ha, although the practice has only been partially adopted. ▶ Large farmers with better access to farm machinery tend to adopt CA more than the small and medium farmers. ▶ Rice, wheat, sugarcane, and maize-based cropping systems are the popular crops under CA in India. |
|  <p>Precision Farming (PF)</p> | <ul style="list-style-type: none"> ▶ 9.2 million ha has been covered under precise micro irrigation techniques - drip and sprinkler, the two most widespread PF techniques in India. ▶ High-value commercial and horticultural crops (fruit, vegetables, spices, flowers, medicinal and aromatic) are popular under PF. |
|  <p>Agroforestry</p> | <ul style="list-style-type: none"> ▶ Area under agroforestry: 25 million ha across 15 agroclimatic zones. ▶ But less than 5 million farmers, mostly large farmers, practise agroforestry across India. ▶ Popular trees integrated under agroforestry: Poplar, eucalyptus, melia, and casuarina. |
|  <p>System of Rice Intensification</p> | <ul style="list-style-type: none"> ▶ Beyond rice, the SRI principles are also being applied to wheat, sugarcane, and pulses. ▶ Area under SRI across different states in India: 3 million ha, with small and medium farmers being main adopters. |





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|  <p>Integrated Pest Management (IPM)</p> | <ul style="list-style-type: none"> ▶ Estimated area under IPM in India: 5 million ha. ▶ Commonly cultivated crops: Rice, cotton, pulses, oilseeds, and horticulture crops. |
|  <p>Integrated Farming System (IFS)</p> | <ul style="list-style-type: none"> ▶ Area cultivated under IFS in India: 0.1 million ha. ▶ Animal husbandry (camels, sheep and goat) with a moderate cultivation of crops such as pearl millet, pulses, oilseeds and fodder are the most popular models in the arid and desert regions. |

WHAT ARE THE CHALLENGES ASSOCIATED WITH MAINSTREAM ADOPTION OF SAPSs IN INDIA?

Despite rising popularity, the adoption of SAPSs in mainstream agricultural production remains limited. This can be attributed to factors like-

- ▶ **Hesitancy on the part of farmers:** Farmers in India, remain apprehensive to adopt SAPSs on a widescale due to concerns like-
 - ▶ **Initial decline in yields:** Adoption of SAPs like organic farming can lead to reduced crop yields in the initial 2-3 years. Lack of a safety-net among low-income farmers makes them hesitant to adopt SAPSs at scale.
 - ▶ **Labour intensiveness:** SAPSs require extensive manual work, which is costly and can be a barrier to adoption for medium to large farmers. Mechanization for various input preparations like vermicompost, weed removal, or mixed crop field harvesting is not yet mainstream.
 - ▶ Further, small farmers face increased drudgery in collecting materials for preparing natural nutrients, conducting diligent monitoring of farms for pests, hand weeding etc.
 - ▶ **Lack of assured market support:** It is found that before the beginning of the cultivation of sustainable crops, farmers seek assured premium price over the conventional produce. This needs extensive marketing or government support and well-functioning green markets and trade channels, often found lacking in Indian food markets.
 - ▶ **Cumbersome certification process:** The certification regime in India is marred with issues like presence of multiple certifications, complex and costly processes, inadequate number of third-party accreditation agencies, lack of monitoring of performance of certification agencies, low awareness among farmers regarding necessary requirements.
 - ▶ **Capital requirements:** Several SAPSs like setting up of micro irrigation units, vertical farming setups, etc. need capital for the initial investment which is a constraint for small and marginal farmers.
 - ▶ **Knowledge barrier and Lack of Awareness:** Many farmers in the country have only vague ideas about SAPSs, their associated principles and their advantages as against the conventional farming methods.
 - ▶ Further, several hi- tech SAPSs like precision agriculture and vertical farming techniques need knowledge exchange and capacity building among farmers to enable their successful adoption.
- ▶ **Policy and governance challenges:**
 - ▶ **Narrow focus and Skewed budgetary support:** Agricultural subsidies and incentives for fertiliser, seeds, and irrigation predominantly focus on conventional agriculture.
 - ▶ While the Central government spends about INR 71,309 crore annually on fertiliser subsidies, **merely 0.8% of the Ministry of Agriculture and Farmers Welfare (MoAFW) budget is allocated to National Mission for Sustainable Agriculture.**

CERTIFICATION REGIME IN INDIA

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|   | <ul style="list-style-type: none"> ▶ PGS Logo - Participatory Guarantee System (PGS) is a quality assurance initiative that is locally relevant, emphasize the participation of stakeholders, including producers and consumers and operate outside the frame of third party certification. ▶ PGS Organic - Farmers which have completed full conversion period without any major or serious non-compliance be declared as "PGS-Organic". ▶ PGS Green - Farmers which have one or more major noncompliance or are under conversion period will be declared as "PGS-Green". ▶ Implemented by: Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare. |
|  <p>National Programme for Organic Production</p> | <ul style="list-style-type: none"> ▶ It is an independent organization that reviews entire production, processing, handling, storage and transport etc to ensure the compliance of organic standards. ▶ The programme involves the accreditation of Certification Bodies, standards for organic production, promotion of organic farming and marketing etc. ▶ Managed and operated by: Agricultural and Processed Food Products Export Development Authority (APEDA) under Ministry of Commerce and Industry. ▶ NPOP certified products can be traded in export and in domestic market including imports. |
|  <p>Jaivik Bharat</p> | <ul style="list-style-type: none"> ▶ Introduced by: Food Safety and Standards Authority of India (FSSAI) ▶ The logo communicates adherence to the National Organic Standards. ▶ Organic food which is marketed through direct sales to the end consumer by the small original producer or producer organisation (annual turnover not exceeding Rs 12 Lakhs per annum) is exempted from the provisions of the certification. |



- ▶ **Conversion of agricultural land to urban uses:** Rapid growth and escalating land values threaten farming on prime soils. Such patterns further discourage SAPSs as they tend to a relatively lower land productivity in the short-run.
- ▶ **Prioritization of overall food sufficiency:** Balancing the need for basic food grain sufficiency in public policy while prioritising sustainable agriculture is a complex task, which hasn't been fully optimized yet.
- ▶ **Limited access to quality and affordable agricultural implements needed for SAPSs:** SAPSs need specific inputs like compost, vermicompost, biopesticides, biodynamic preparations, mulch, organic manure, local variety of seeds, bio stimulants etc. However, farmers in India face several issues in gaining access to these inputs because-
 - ▶ **Products are expensive due to limited demand and the niche nature of the market.**
 - ▶ **Preparation** of on-farm locally-made inputs, such as compost, vermicompost, biopesticides, BDA preparations, green manure, etc. **is time and labour intensive.**
 - ▶ **Market is dominated by subsidized chemical inputs** which are easily available and highly advertised.
 - ▶ **Absence of local seed markets:** The market of local varieties of seeds is small and has limited reach due to low production and poor marketing.
 - ▶ **Limited availability of skilled manpower and manuals** to prepare necessary formulations.
 - ▶ **Absence of Quality control:** Regulatory standards governing effectiveness and quality of organic inputs is missing in India.
- ▶ **Other challenges-**
 - ▶ **Research gaps** regarding studies focussed on long-term impact assessments, landscape-level studies, multi-dimensional analysis, and socio-economic outcomes associated with SAPSs.
 - ▶ **Low involvement of private sector:** Especially in high potential sectors like agri-tech, vertical farming, etc.
 - ▶ Infrastructural and technological deficiencies.
 - ▶ Small size of farm landholdings.

GOVERNMENT INTERVENTIONS TO ENCOURAGE AND PROMOTE SUSTAINABLE AGRICULTURE

- ▶ **National Mission for Sustainable Agriculture (NMSA):** It derives its mandate from Sustainable Agriculture Mission which is one of the eight Missions outlined under National Action Plan on Climate Change (NAPCC). Following are its components-
 - ▶ **Rainfed Area Development (RAD):** to adopt an area based approach for development and conservation of natural resources along with farming systems.
 - ▶▶ This component has been formulated in a 'watershed plus framework', i.e., to explore potential utilization of natural resources base/assets available/created through watershed development and soil conservation activities / interventions under MGNREGS, NWDPR, etc.
 - ▶ **Sub-Mission on Agroforestry (SMAF):** To encourage tree plantation on farm land "Har Medh Par Ped", along with crops/ cropping system.
 - ▶ **National Bamboo Mission (NBM):** To increase the area under bamboo plantation in non forest Government and private lands to supplement farm income and contribute towards resilience to climate change as well as availability of quality raw material requirements of industries.
 - ▶ **Soil Health Management (SHM):** For promoting location as well as crop specific sustainable soil health management including residue management, organic farming practices. Schemes launched under this component include-
 - ▶▶ **Paramparagat Krishi Vikas Yojana (PKVY)** promotes organic farming through adoption of organic villages by cluster approach and Participatory Guarantee System (PGS) certification.
 - ▶▶ **Bhartiya Prakritik Krishi Padhati (BPKP)** was introduced during 2020-21 as a sub scheme of PKVY for the promotion of traditional indigenous practices including Natural Farming to bring down the input costs.
 - ▶▶ **Capital Investment Subsidy Scheme (CISS)** for setting up of mechanized fruit/ vegetable market place, waste/ agro-waste compost production units.
 - ▶ **Climate Change and Sustainable Agriculture: Monitoring, Modeling and Networking (CCSAMMN):** To provide creation and bidirectional (land/farmers to research/scientific establishments and vice versa) dissemination of climate change related information and knowledge.
- ▶ **Policy support:**
 - ▶ In 2014, India became the first country to adopt a **national agroforestry policy.**
 - ▶ **Agriculture Export Policy** aims to promote novel, indigenous, organic, ethnic, traditional and non-traditional Agri products exports.



- ▶ **Pradhan Mantri Krishi Sinchai Yojana (PMKSY):** Promotes the adoption of precision-irrigation water-saving technologies such as micro-irrigation.
- ▶ **Integrated Watershed Management Programme:** It supports rainwater harvesting.
- ▶ **Zero budget Natural Farming:** Government is actively promoting Zero budget natural farming under various schemes like PKVY.
- ▶ **Pradhan Mantri Matsya Sampada Yojana (PMMSY):** It envisions an **ecologically healthy, economically viable and socially inclusive fisheries sector** that contributes towards economic prosperity and well-being of fishers, and fish farmers and other stakeholders, food and nutritional security of the country in a sustainable and responsible manner.
 - ▶ For instance, **River Ranching programme** has been launched under the scheme for augmenting and enhancing the fish production and productivity through expansion, intensification, diversification and productive utilization of land and water.
- ▶ **Agriculture Infrastructure Fund (AIF)** of Aatmanirbhar Bharat: It provides financing facility to State agencies, Primary Agricultural Credit Societies, FPOs, entrepreneurs etc. for setting up of organic input production units, community farming assets and post-harvest infrastructure for value addition to organic produce.
- ▶ **Mission Organic Value Chain Development for North East Region (MOVCD):** It is a Central Sector Scheme which aims to develop certified organic production in a value chain mode to link growers with consumers and to support the development of the entire value chain.

WHAT CAN BE THE POTENTIAL SOLUTIONS TO SCALE UP ADOPTION OF SAPSs IN INDIA?

Reforming policies and institutions:

- ▶ **Provision of transition support plans** in the form of financial support, assured market etc. to extend short-term transitional support farmers affected by declined yields while adopting sustainable agriculture.
 - ▶ This includes **amending marketing orders, food safety and cosmetic standards** etc. to encourage reduced pesticide use.
- ▶ **Strengthening green markets** by creating green product specific markets and trade channels, assisting farmers in marketing sustainable products, establishing fair price mechanisms etc.
- ▶ **Rethinking economic priorities:** Economic development policies are needed that encourage more diversified agricultural production on family farms as a foundation for healthy economies in rural communities.
- ▶ **Strengthening certification regime** by simplifying processes, handholding farmers to obtain certifications, enhancing the number and reach of certifying agencies, establishing measurable standards, building a cadre of ecologically skilled workforce etc.
- ▶ **Promoting sustainability post production:** This would need infrastructural and policy changes to reduce food wastage and sustainably manage food waste, enhance efficiency of food supply chains, ensure equitable distribution of food, etc.
- ▶ **Establishing dedicated financial, policy and institutional support to encourage production of quality and affordable sustainable inputs.** For instance, local seed banks and shops can be established to promote cultivation of indigenous varieties of seeds.

Challenging widely-held social values:

- ▶ **Broaden perspectives of stakeholders across the agriculture ecosystem to consider alternative approaches:** A suite of strategies spanning evidence-driven narratives to on-ground field visits would help.
- ▶ **Change consumer perspectives** through social media driven campaigns and good marketing strategies, so that environmental quality, resource use, and social equity issues are also considered in food shopping decisions.





- ▶ **Make sustainable agriculture visible** by integrating data and information collection on SAPSs in the prevailing agriculture data systems at the national and state level.
- ▶ **Collective action through public coalitions** among consumers, retailers, producers and other stakeholders.

Widening research and knowledge base:

- ▶ **Support rigorous evidence generation** through long-term comparative assessment (between resource-intensive and sustainable agriculture) in view of changing-climate to inform long-term resilient approaches to nutrition security. It would help enable an evidence backed and context-relevant scale up of SAPSs.
- ▶ **Government and university research policies** could be modified to emphasize the development of sustainable agriculture alternatives and associated technologies.
- ▶ **Creating publicly available repositories** of detailed guides and manuals on various SAPSs.
- ▶ **Promotion of entrepreneurship and innovation in Agri-tech** especially in the field of Data analytics and machine learning for Precision agriculture and farm management, Imaging and AI to monitor crop quality etc.

Empowering farmers and rural communities:

- ▶ **Focus on knowledge exchange and capacity building** among farmers and agriculture extension workers on SAPSs.
- ▶ **Conserving rural heritage and indigenous knowledge:** Many of the traditional farming practices across diverse agro-ecologies in India are already based on ecological principles.

TRADITIONAL SUSTAINABLE AGRICULTURAL PRACTICES IN INDIA

- ▶ **Use of locally built biofertilizers and biopesticides:** India is home to a wide variety of organically built, non-toxic fertilizers and pesticides like- Bijamrut, Sanjivak, Jivamrut, Amritpani Panchagavya, Neemastra, Khajara Khata etc.
- ▶ **Kuttanad Wetland Agriculture System:** It is a unique system in India that **favours rice cultivation below sea level** in the land created by draining delta swamps in brackish waters. As an approach to cope with the imminent climate impacts in coastal areas and evolve efficient methods it aims to deal with soil availability and floods issues in agriculture.
- ▶ **Koraput Traditional Agriculture:** Using their indigenous knowledge they take the viability test for seeds before sowing, maintain the soil fertility and conserve the landraces of rice and other crops.
- ▶ **Padu, Tamil Nadu:** It is a form of community-based fisheries management. The system enables equitable access to fish, collective social responsibility, and rule-making and conflict resolution.

STORY OF SIKKIM: HOW IT BECAME INDIA'S AND WORLD'S FIRST FULLY ORGANIC STATE?

In 2016, Sikkim won the prestigious **Future Policy Gold Award from the UN Food and Agriculture (FAO)**, after beating 51 nominations from around the world and became India's first "100 per cent organic" state. The achievement was a culmination of several efforts targeted towards transforming the entire agriculture ecosystem in the state-

- ▶ **Political will and commitment along with well-defined targets and implementation plans:**

2003

- ▶ Announced the vision for Sikkim to be India's first organic state.
- ▶ 'Sikkim State Organic Board' was created.
- ▶ Banned the imports of chemical fertilizers in the state.
- ▶ Government reduced subsidized synthetic inputs by 10% year by year.

2010

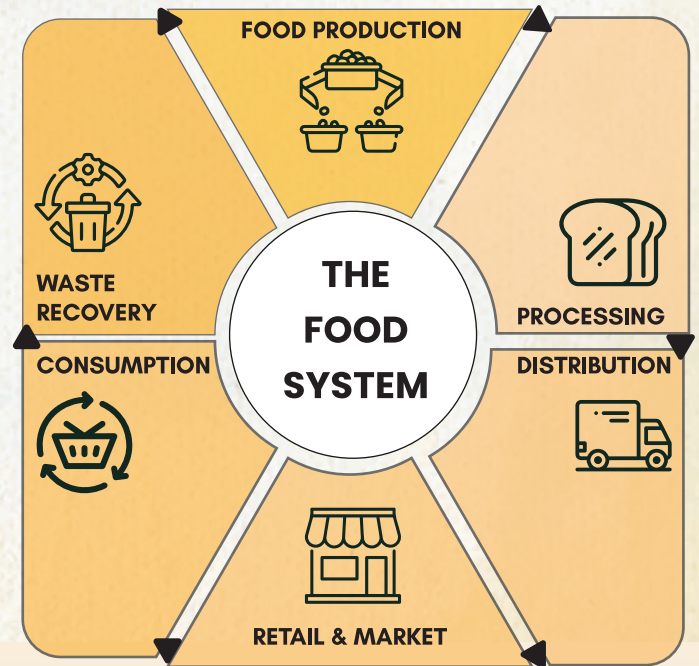
- ▶ The state launched the "Organic Mission", an action plan defining the measures to implement to reach the target of converting the entire state to organic.

- ▶ **Robust Certification regime:** 80% of the budget between 2010 and 2014 was used to build the capacity of farmers, rural service providers, and certification bodies and to support farmers in acquiring certification.
- ▶ **Supporting sustainable practices:** Measures were undertaken to-
 - ▶ **Supply farmers with quality organic seeds:** Local organic seed development and production was strengthened.

- ▶ **Improve soil health management:** The government provided support for farmers to perform 40,000 soil tests per year.
- ▶ **Train famers to scale up production of organic inputs** such as compost, vermicompost and organic pesticides using local plants.
- ▶ **Building knowledge and engaging young people:** Organic farming is included in the school curricula and a number of platforms for knowledge exchange have been established, including livelihood schools, two Organic Centres of Excellence and three Organic Farming Training Centres, which engage with unemployed youths.
- ▶ **'Sikkim organic brand', to target national and international markets:** Because of their unique climate and farming culture, Sikkim's marketing strategy focusses on specific crops such as cardamom, ginger, oranges, tea, kiwi fruit, passionfruit and mountain vegetables.



CONCLUSION

One of the main goals of mainstreaming SAPSs is to bring transformation in global food systems to make them more sustainable and resilient. This would require adoption of a **food systems approach** to bring reforms across all the elements (environment, people, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes.



TOPIC-AT-A-GLANCE

Current status of adoption of sustainable agriculture practices in India

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|---|---|---|
|  Organic Farming | <ul style="list-style-type: none">▶ India ranks 1st in number of organic farmers and 9th in terms of area under organic farming and is home to world's first fully organic state- Sikkim. | <ul style="list-style-type: none">▶ Most SAPSs like biodynamic farming, conservation farming and permaculture have less than 4% farmers practicing them.▶ Widely adopted sustainable practices include Crop rotation, agroforestry and rainwater harvesting.▶ SAPSs that have witnessed a faster rate of adoption in the last few years: Natural farming and system of rice intensification (SRI). |
|  Natural Farming | <ul style="list-style-type: none">▶ Area covered under natural farming: 4.09 lakh ha.▶ 6,00,000 Farmers enrolled alone in Andhra Pradesh state program. | |

Challenges associated with mainstream adoption of SAPSs in India

- ▶ **Hesitancy on the part of farmers:** due to concerns like initial decline in yields; requirement of extensive manual labour; lack of assured market support; cumbersome certification process; capital requirements; knowledge barrier and lack of awareness;
- ▶ **Policy and governance challenges:** Narrow focus and Skewed budgetary support towards conventional agriculture; Conversion of agricultural land to urban uses and importance of prioritizing of overall food sufficiency.
- ▶ **Limited access to quality and affordable agricultural implements needed for SAPSs:** Due to reasons like- Expensive Products; Market dominated by subsidized chemical inputs; Time and labour intensive preparation; Absence of local seed markets; Limited availability of skilled manpower and manuals; and Absence of Quality control.
- ▶ **Other challenges-** Research gaps; Low involvement of private sector; Infrastructural and technological deficiencies; and Small size of farm landholdings.

Government interventions

- ▶ **National Mission for Sustainable Agriculture (NMSA):** With components like- Rainfed Area Development (RAD); Sub-Mission on Agroforestry (SMAF); National Bamboo Mission (NBM); and schemes like Paramparagat Krishi Vikas Yojana (PKVY) and Bhartiya Prakritik Krishi Padhati (BPKP) under Soil Health Management (SHM).
- ▶ **Policy support** under National agroforestry policy and Agri export policy.
- ▶ **Integrated Watershed Management Programme.**
- ▶ **Promotion of Zero budget Natural Farming.**
- ▶ **Pradhan Mantri Matsya Sampada Yojana (PMMSY).**
- ▶ **Financial support under Agriculture Infrastructure Fund (AIF).**
- ▶ **Mission Organic Value Chain Development for North East Region (MOVCD).**

Potential solutions to scale up adoption of SAPSs in India

Reforming policies and institutions:

- ▶ Provision of transition support plans.
- ▶ Strengthening green markets.
- ▶ Rethinking economic priorities.
- ▶ Strengthening certification regime.
- ▶ Promoting sustainability post production.
- ▶ Establishing dedicated financial, policy and institutional support to encourage production of quality and affordable sustainable inputs.

Challenging widely-held social values:

- ▶ Broaden perspectives of stakeholders across the agriculture ecosystem to consider alternative approaches.
- ▶ Change consumer perspectives.
- ▶ Make sustainable agriculture visible.
- ▶ Collective action through public coalitions.

Widening research and knowledge base:

- ▶ Support rigorous evidence generation.
- ▶ Modifying Government and university research policies.
- ▶ Creating publicly available repositories on various SAPSs.
- ▶ Promotion of entrepreneurship and innovation in Agri-tech.

Empowering farmers and rural communities:

- ▶ By focussing on knowledge exchange and capacity building and conserving rural heritage and indigenous knowledge.