

# Gender-Responsive Agriculture:

Pathways to Sustainable  
Rural Development



*Editors:*

Venkteshwar Jallaraph  
Ayotunde Olayinka Owolabi  
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# **Gender-Responsive Agriculture: Pathways to Sustainable Rural Development**

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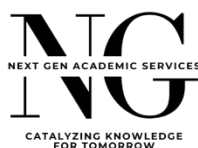
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## *Editors*



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## *Preface*

Agriculture remains the foundation of rural livelihoods, food security, employment, and economic development across much of the world. Women play indispensable roles in crop production, livestock rearing, seed management, post-harvest handling, household nutrition, natural-resource management, and rural enterprises. However, their contributions are often undervalued, inadequately recognized, and insufficiently reflected in agricultural policies, programmes, research agendas, and institutional decision-making processes.

Women farmers frequently face unequal access to land, credit, quality inputs, markets, agricultural machinery, extension services, education, digital technologies, and leadership opportunities. Such inequalities limit not only their individual potential but also the productivity, resilience, and sustainability of rural households and agricultural systems. Gender-responsive agriculture, therefore, is not merely a social-development concern; it is a strategic requirement for achieving inclusive agricultural growth, climate resilience, food and nutrition security, and sustainable rural development.

The book **Gender-Responsive Agriculture: Pathways to Sustainable Rural Development** has been prepared to examine the critical relationship between gender equity, agricultural transformation, and rural sustainability. It recognizes that farming households are not homogeneous units and that women, men, and rural youth experience agricultural opportunities, constraints, risks, and benefits differently. Effective agricultural development must therefore be designed with a clear understanding of these gendered realities.

Gender-responsive approaches place women at the centre of agricultural development as farmers, entrepreneurs, innovators, labourers, knowledge holders, and decision-makers. They emphasize equitable access to resources, technologies, information, institutions, and markets. They also call for agricultural extension systems, research organizations, value-chain actors, and policymakers to adopt interventions that respond to women's specific needs, priorities, and aspirations.

The book brings together conceptual perspectives, empirical insights, field experiences, and practical approaches related to gender and agriculture. It addresses important themes such as women's participation in farming systems, gender-sensitive extension and advisory services, access to productive resources, climate-smart agriculture, women-led

entrepreneurship, digital inclusion, Farmer Producer Organizations, nutrition-sensitive agriculture, rural institutions, capacity building, and policy support for women's empowerment. The chapters collectively demonstrate that sustainable rural development cannot be achieved without meaningful gender inclusion in agricultural planning, implementation, monitoring, and evaluation.

The book is intended for undergraduate and postgraduate students, researchers, teachers, agricultural extension professionals, development practitioners, policymakers, civil-society organizations, and stakeholders engaged in agriculture, rural development, gender studies, livelihood promotion, and natural-resource management. It is expected to serve as an academic reference as well as a practical guide for designing inclusive, equitable, and sustainable agricultural interventions.

We express our sincere gratitude to all contributors for sharing their knowledge, research experiences, and field-based perspectives. Their efforts have enriched the book and strengthened its relevance for contemporary agricultural and rural-development challenges. We also acknowledge the support of reviewers, academic colleagues, institutions, and all those who contributed directly or indirectly to the preparation of this book.

We hope that the ideas and evidence presented in the book will promote deeper reflection, stronger research, and more effective action towards agricultural systems in which women and men can participate equitably, benefit fairly, and contribute meaningfully to sustainable rural transformation.

*Editors*

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# Reimagining Agricultural Extension and Advisory Services for Women Farmers

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### 12.1 Introduction

Agricultural extension and advisory services (EAS) occupy a central position in the transformation of agriculture because they connect knowledge systems, technologies, institutions, markets and farmers' decision-making. For women farmers, however, conventional extension has often operated as an exclusionary system even when it claims to serve the farming household. The problem is not merely that women receive fewer visits from extension personnel or attend fewer trainings. The deeper problem is that many extension systems still treat the male household head as the default farmer, assume that information given to men will automatically reach women, schedule activities around male mobility patterns, and privilege crop, input and market decisions that are socially assigned to men. In gender-responsive agriculture, extension cannot remain an information-transfer mechanism. It must become a negotiated, accountable, and empowering service that recognises women as farmers, innovators, risk managers, seed and food system managers, livestock keepers, entrepreneurs, and ecological stewards (FAO, 2011, 2023; World Bank et al., 2009).

Reimagining EAS for women farmers is therefore both a technical and institutional challenge. It requires redesigning who the extension considers to be a client, what knowledge is considered useful, how advice is generated,

where and when services are delivered, how feedback is collected, and how outcomes are measured. The shift is also normative: extension must support women's agency rather than simply improve their labour productivity. A woman may adopt a technology, attend training, and increase output while still lacking control over income, mobility, decision-making, or recognition. A publication-ready understanding of gender-responsive EAS must therefore move beyond participation counts and ask whether advisory services change the conditions under which women access knowledge, negotiate resources and benefit from agriculture.

The need for this reorientation is well established. FAO's analysis of women in agriculture demonstrated that women face systematic constraints in access to land, credit, inputs, technology, education, markets and extension, and that closing such gaps would generate gains in productivity, food security and welfare (FAO, 2011). More recent evidence on agrifood systems shows that women remain central to farm and off-farm agrifood employment, but their returns, security, voice and access to services remain unequal (FAO, 2023). In India, policies and programmes such as the Mahila Kisan Sashaktikaran Pariyojana (MKSP), the National Gender Resource Centre in Agriculture, the Centre for Gender in Agriculture at MANAGE and ICAR-CIWA's research and capacity-building initiatives reflect increasing institutional recognition of women farmers, yet the field-level delivery architecture still requires deeper reform (Government of India, 2021, 2026).

This chapter develops a global and India-focused framework for reimagining agricultural extension and advisory services for women farmers. It integrates development practice, gendered barriers and empowerment outcomes, and digital innovation. The chapter argues that gender-responsive EAS should be pluralistic, intersectional, rights-aware, locally embedded, digitally inclusive and accountable to women users. It should combine public extension, community-based institutions, farmer organisations, women's collectives, private providers, digital platforms and research institutions without shifting costs and risks to women themselves. The chapter is organised around conceptual foundations, constraints, service redesign, institutional models, digital pathways, India-specific reforms, monitoring and future priorities.

## **12.2 Conceptual Foundations of Gender-Responsive Extension and Advisory Services**

Extension was historically defined as the transfer of improved agricultural knowledge from research systems to farmers. This linear model was criticised for ignoring farmer knowledge, local experimentation and the social

conditions of adoption. Contemporary EAS is broader: it includes facilitation, problem-solving, capacity development, innovation brokering, market linkage, climate adaptation, organisational strengthening, and feedback to research and policy (Anderson & Feder, 2007; Davis & Sulaiman, 2014). For women farmers, this broader definition is essential because their constraints are rarely solved by a single technical message. A woman who lacks secure land rights, faces mobility restrictions, has limited phone access, bears unpaid care work, and cannot attend a distant training may not benefit from a new crop recommendation, even if it is agronomically sound.

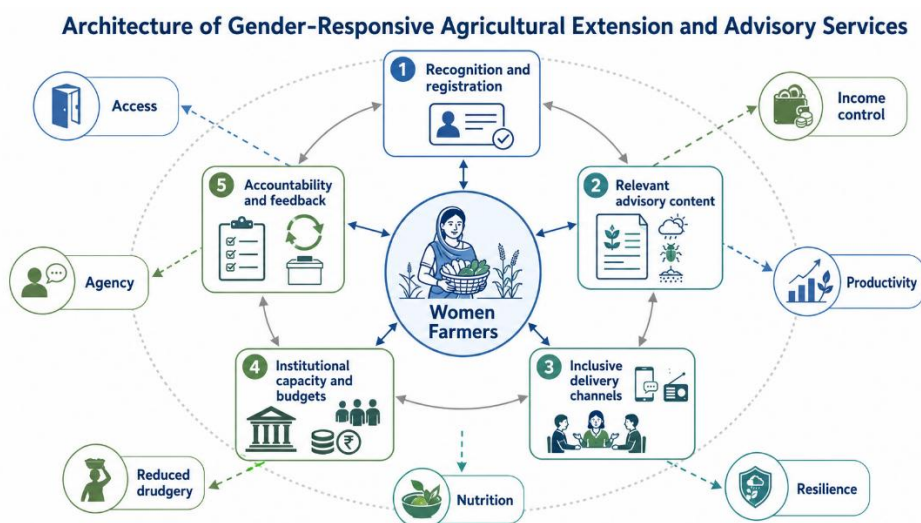
Gender-responsive EAS differs from women-only extension in important ways. Women-only programmes may be useful where social norms restrict mixed training or where women need safe spaces for confidence building. Yet a women-only approach can become narrow if it isolates women from markets, institutions, technologies and household decision processes. Gender-responsive EAS examines power relations between women and men, asks who controls resources and benefits, and designs services to improve equity without increasing women's unpaid burden. It also recognises diversity among women. Women farmers are not a homogeneous category; age, caste, tribe, class, ethnicity, marital status, land ownership, migration status, disability and digital literacy shape their access to extension and their ability to act on advice.

A gender-responsive extension system must therefore work with at least four linked concepts. First, access refers to women's ability to receive timely, relevant and understandable information through channels they can actually use. Second, agency refers to their ability to make or influence agricultural decisions, ask questions, challenge advice and adapt recommendations. Third, benefit refers to control over the material and non-material gains of extension, including income, nutrition, skills, confidence, time savings and social recognition. Fourth, accountability refers to whether providers are answerable to women farmers for service quality, inclusion, grievance redress and outcomes. These concepts transform EAS from a delivery system into a relational and institutional process.

The distinction between gender-accommodative and gender-transformative extension is particularly useful. Gender-accommodative approaches adapt to existing norms; for example, they schedule trainings at times convenient for women or recruit female facilitators. These changes matter, but they may not change underlying power relations. Gender-transformative approaches question and reshape restrictive norms, such as the belief that men are the real farmers or that women should not handle machinery, finance or marketing.

Transformative EAS may include couple-based decision training, community dialogues on women's land and technology access, leadership development, institutional quotas linked to real authority, and advisory content that addresses labour burden, nutrition, safety and control over income (FAO, 2023; Manfre et al., 2013).

Figure 12.1 presents the proposed architecture of gender-responsive EAS. It positions women farmers at the centre and connects advisory content, inclusive channels, institutional capacity, accountability and empowerment outcomes. The figure is not a decorative model; it is a design logic. If any one element is weak, the system may appear inclusive while remaining ineffective. For example, digital messages without women's phone access, demonstrations without control over plots, or training without market linkage may increase information exposure but not empowerment.



**Figure 12.1. Architecture of Gender-Responsive Agricultural Extension and Advisory Services**

### 12.3 Gendered Barriers in Conventional Extension Systems

Conventional extension often under-serves women because it is built around institutional assumptions that are rarely tested. One common assumption is that the household is a unified decision-making unit. In reality, households contain negotiated and sometimes unequal interests. Advice intended for men may not reach women, and even when it does, women may lack the authority to implement it. Another assumption is that extension participation reflects farmer interest. Low attendance by women is frequently interpreted as a lack

of interest or low capacity, whereas it may reflect time poverty, childcare responsibilities, mobility restrictions, unsuitable venues, absence of female trainers, language barriers, social norms, or the opportunity cost of leaving unpaid work.

The gender gap in extension is not only a matter of contact frequency. It is also a matter of content relevance. Many extension messages focus on input use, production intensification and market-oriented crops while neglecting activities where women are heavily involved, such as seed selection, post-harvest handling, kitchen gardens, livestock care, fodder management, small ruminants, poultry, fisheries support tasks, food processing and nutrition-sensitive production. Women are also heavily involved in labour-intensive operations such as transplanting, weeding, harvesting and processing. Advisory services that ignore drudgery, occupational health, ergonomic tools and labour-saving technologies can unintentionally reinforce women's workload.

Personnel composition is another structural issue. In many countries, the number of women extension agents is insufficient, and male extension agents may lack training or incentives to engage women farmers effectively. Recruiting more women staff is important but not sufficient. Female agents may themselves be constrained by institutional hierarchies, transport limitations, safety concerns, workload and lack of promotion pathways. A gender-responsive system therefore requires changes in staffing, training, supervision, transport, budgeting and performance indicators, not merely a request that existing staff include more women.

Social norms also regulate information flows. In some contexts, women may not speak freely in mixed meetings, travel alone to training centres or interact with male agents. In others, they may attend meetings but remain silent because public speech is associated with male authority. For unmarried, widowed, tribal, migrant or landless women, constraints may differ. Intersectionality is critical: the best-connected women in a village may participate in extension programmes while poorer, lower caste, tribal or tenant women remain outside. Counting the number of women participants without analysing which women participate can conceal elite capture.

Digital exclusion adds a new layer. Mobile phones, online advisories, WhatsApp groups, video-based extension and AI chatbots can expand reach, but they can also reproduce inequality if women lack phone ownership, privacy, data affordability, digital literacy or control over use. Digital services often assume that access to a household phone equals access for women. This is a weak assumption. A woman may use a shared phone only under

supervision, may lack confidence to navigate applications, or may avoid platforms where her questions become visible to men. Digital EAS must therefore be designed for gendered realities rather than technological optimism (Aker, 2011; FAO, 2023).

**Table 12.1. Gendered Barriers in Conventional Extension and Practical Redesign Responses**

| <b>Barrier</b>              | <b>How it affects women farmers</b>                                                                          | <b>Gender-responsive redesign response</b>                                                                         |
|-----------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Male household head bias    | Women cultivators, tenants and livestock keepers remain invisible in farmer lists and training invitations.  | Register women as farmers and users; collect sex-disaggregated and role-based data beyond land titles.             |
| Time poverty and care work  | Women cannot attend distant or long trainings due to farm, domestic and care responsibilities.               | Use local venues, modular sessions, repeated demonstrations, childcare support and labour-saving advisory content. |
| Mobility and social norms   | Women may be discouraged from travelling, speaking in mixed meetings or interacting with male agents.        | Use women facilitators, safe spaces, mixed household dialogues and community norm engagement.                      |
| Irrelevant advisory content | Messages overlook livestock, seed, post-harvest, nutrition, drudgery and homestead systems managed by women. | Co-design content through gender analysis and participatory priority setting.                                      |
| Low digital access          | Phone sharing, low literacy and limited privacy reduce use of digital advisories.                            | Use voice, local language, assisted digital services, community video and privacy-aware platforms.                 |
| Weak accountability         | Women may attend trainings but cannot report poor quality, exclusion or unsuitable advice.                   | Create feedback channels, grievance redress, community scorecards and women-led review meetings.                   |

Table 12.1 synthesises common barriers and redesign responses. The table is cited here because it clarifies a practical point: barriers are not isolated. A woman may face several constraints simultaneously; therefore, extension reform must use bundled solutions. Separate interventions, such as one training, one app, or one women-only meeting, rarely change outcomes unless they are embedded in a system of repeated contact, local facilitation, feedback, resource linkage, and institutional accountability.

#### **12.4 Reimagining the Client: Recognising Women as Farmers, Not Auxiliary Labour**

The first reform in gender-responsive EAS is conceptual: extension systems must recognise women as farmers in their own right. In many agrarian settings, women are described as helpers, family labourers, or beneficiaries, while men are described as farmers. This language shapes policy design, service targeting and data systems. When land titles, registration forms, training invitations and farmer databases list only male household heads, women become invisible to extension planning. Recognition is therefore not symbolic; it determines eligibility for services, access to subsidies, inclusion in contact databases, training certification, input demonstrations, credit linkage, and market programmes.

Recognition should begin with gender-responsive farmer registration and data systems. Extension departments, KVKs, NGOs, FPOs, SHGs and digital platforms should record women cultivators, livestock keepers, tenants, sharecroppers, fish workers, forest-dependent producers and value-chain workers even when they do not hold formal land titles. This requires careful safeguards because data collection without service delivery can become extractive. Women should know why information is collected, how it will be used, and how it can help them access advisory and institutional support. Sex-disaggregated data should be linked to planning, not stored as a compliance exercise.

The second reform is to move from household targeting to user targeting. A farming household may include multiple users with different information needs. Men may need advice on market negotiation; women may need information on seed storage, vegetable production, disease management in goats, safe pesticide handling, post-harvest processing or digital payments; youth may need enterprise and mechanisation training. Treating one person as the household representative weakens extension effectiveness. User segmentation allows advisory messages to match actual roles, responsibilities, constraints and aspirations.

The third reform is to broaden the advisory agenda. Women farmers require technical advice, but also institutional and economic advice: how to access schemes, form collectives, maintain records, negotiate leases, use custom hiring services, apply for credit, understand quality standards, reduce drudgery, manage climate risk, and improve nutrition outcomes. This expanded agenda is consistent with pluralistic EAS, where extension is not only a government message-delivery system but also a facilitation service connecting farmers with research, markets, finance, insurance, social protection, and local governance (Davis & Sulaiman, 2014; World Bank et al., 2009).

The fourth reform is to recognise unpaid care and domestic work as extension constraints. Women often combine farm labour with cooking, water collection, fuel collection, childcare, elder care and household management. Extension schedules that ignore this reality systematically exclude women. Gender-responsive scheduling, childcare support during trainings, local venues, shorter modular sessions, repeat demonstrations and household-level negotiation can improve participation. However, the objective should not be to fit more extension into women's already overloaded lives. Advisory services should also promote labour-saving infrastructure, shared household responsibilities and technologies that reduce drudgery.

## **12.5 Designing Inclusive Delivery Channels**

No single delivery channel can serve women farmers adequately. Effective EAS for women requires a pluralistic channel mix that combines interpersonal trust, group learning, digital reinforcement, demonstrations, peer networks and institutional linkage. The design question is not whether face-to-face or digital extension is better. The question is which combination of channels best supports women's access, confidence, decision-making and action in a specific context. A woman with low literacy may benefit from audio advisories and community video; a woman entrepreneur may need market intelligence and business mentoring; a tribal farmer may prefer local-language peer facilitation; a young woman may use smartphone-based advisories if privacy and affordability are addressed.

Community-based extension is particularly important. Local women facilitators, community resource persons, lead farmers, para-extension workers and SHG-based cadres can bridge trust and mobility barriers. They understand local social relations, dialects, cropping systems and gender norms. They can conduct repeated follow-up rather than one-time training. Yet community-based models must avoid exploiting women as unpaid or poorly paid volunteers. Professionalisation, honoraria, certification, supervision, technical backstopping and career pathways are necessary.

Otherwise, the system merely shifts extension labour to women without institutional recognition.

Group-based extension can support confidence and collective action. Women-only groups may create safe spaces for discussion, while mixed groups may be necessary for household and community-level norm change. The choice should be strategic rather than ideological. SHGs, producer groups, water user groups, dairy cooperatives, fisher groups and FPOs can serve as advisory platforms when they are technically supported. Group approaches also improve economies of scale in training, input purchasing, custom hiring, processing, and marketing. However, group membership does not automatically imply empowerment. The extension must ensure that women have a voice in agendas, leadership roles, financial decisions, and benefit-sharing.

Demonstrations remain essential but must be redesigned. Conventional demonstrations are often held on larger or better-connected farms, which are frequently controlled by men. Gender-responsive demonstrations should be located where women can attend, should address women-prioritised crops and enterprises, and should include hands-on practice. Demonstrations of drudgery-reducing tools, seed treatment, integrated pest management, livestock vaccination, fodder production, kitchen garden nutrition, climate-resilient varieties, irrigation scheduling and post-harvest technologies should include cost, labour, safety and control over benefits. Women should not only observe technologies; they should test, adapt and evaluate them.

Mass media and digital media can reinforce interpersonal extension. Radio, interactive voice response, community video, WhatsApp, mobile advisories, call centres and AI-enabled question-answer systems can reach women when designed around local language, literacy, privacy and trust. Digital messages should be short, actionable and timed to crop calendars and labour schedules. Video-based extension can be powerful when women see other women farmers explaining practices in familiar contexts. However, digital tools should not replace field facilitation where women face deep structural barriers. The best systems use digital channels to strengthen, not substitute, accountable human advisory relationships.

Figure 12.2 illustrates an inclusive channel ecosystem for women farmers. It shows that extension should not be imagined as a single pipeline from expert to farmer. Instead, it should function as a network in which public agencies, women facilitators, research institutions, SHGs, FPOs, private providers, digital platforms and local governance interact around women's priorities. The feedback loop is central: women farmers must be able to report whether advice is useful, affordable, safe and beneficial.

Pluralistic and Inclusive Extension Channel Ecosystem for Women Farmers

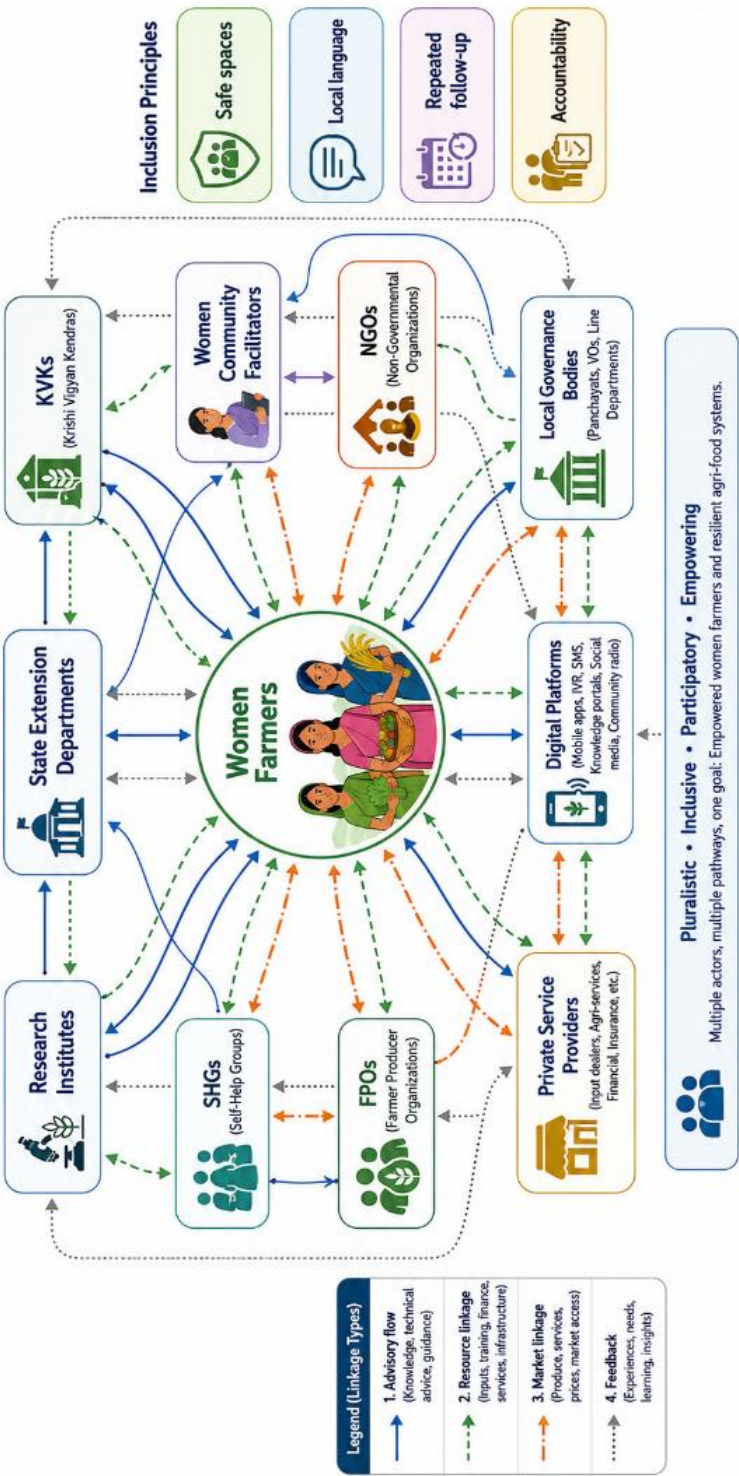


Figure 12.2. Pluralistic and Inclusive Extension Channel Ecosystem for Women Farmers

## 12.6 Content Priorities for Women-Centred Advisory Services

Gender-responsive EAS must revise advisory content, not merely delivery channels. The core principle is relevance to women's actual roles and strategic interests. Technical content should include production practices, but also labour burden, health risks, nutrition, climate resilience, enterprise development, market access and rights. In crop production, advisories should address seed selection, nursery management, transplanting, weeding, integrated nutrient management, pest surveillance, safe pesticide handling, harvesting and post-harvest management. In livestock, women-centred advisories should include animal nutrition, disease recognition, vaccination calendars, clean milk production, small ruminants, backyard poultry, fodder systems and value addition.

Drudgery reduction should be treated as a core extension outcome. Women often undertake repetitive, low-paid and physically demanding tasks. If extension promotes higher production without labour-saving measures, it may increase women's workload. Therefore, advisory content should include women-friendly tools, custom hiring models, ergonomic training, safety equipment and collective access to machinery. ICAR-CIWA's work on women-friendly tools and gender-responsive extension models in India provides a useful institutional example of how research and extension can address drudgery and productivity together (Government of India, 2026).

Climate advisory services must be gender-responsive because climate risks are mediated by unequal resources and responsibilities. Women may have less access to irrigation, credit, climate information, insurance, land titles and migration options. Climate advisories should therefore include risk communication, crop diversification, water-saving practices, seed banks, fodder reserves, livestock heat stress management, homestead nutrition gardens, local seed systems and emergency planning. Women should be involved in participatory climate risk assessment, not only as recipients of weather messages. Climate-smart agriculture becomes gender-responsive only when it reduces vulnerability and strengthens women's control over adaptation choices (World Bank et al., 2015).

Nutrition-sensitive extension is another priority. Women farmers often manage homestead food production, small livestock, food processing and household diets, yet extension and nutrition services are institutionally separated. EAS can bridge agriculture and nutrition by promoting diverse cropping systems, pulses, millets, vegetables, fruits, eggs, milk, fish, kitchen gardens, food safety, post-harvest preservation and intra-household nutrition

awareness. However, nutrition advice must avoid placing additional responsibility on women without addressing household resource allocation and men's roles. Gender-responsive nutrition extension should involve families and communities while respecting women's time and agency.

**Table 12.2. Advisory Content Matrix for Women-Centred Extension and Advisory Services**

| <b>Advisory domain</b>           | <b>Core content</b>                                                                                                                | <b>Expected gender-responsive outcome</b>                                |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Crop and soil management         | Seed selection, nursery, integrated nutrient management, IPM, water management and post-harvest handling.                          | Improved technical competence and recognition of women as crop managers. |
| Livestock and allied enterprises | Animal nutrition, disease prevention, vaccination, fodder, backyard poultry, small ruminants, dairy hygiene and fisheries support. | Higher productivity and income from enterprises where women are active.  |
| Drudgery and safety              | Ergonomic tools, custom hiring, safe pesticide handling, protective equipment and occupational health.                             | Reduced workload, fatigue and health risk.                               |
| Climate resilience               | Weather advisories, stress-tolerant varieties, water-saving practices, fodder reserves and risk planning.                          | Stronger adaptive capacity and reduced vulnerability.                    |
| Nutrition-sensitive agriculture  | Kitchen gardens, pulses, millets, fruits, eggs, milk, fish, food safety and household diet diversity.                              | Improved household nutrition without increasing women's unpaid burden.   |
| Finance, markets and enterprise  | Costing, records, credit, insurance, quality grading, branding, digital payments and collective marketing.                         | Greater control over income, market participation and entrepreneurship.  |
| Leadership and rights            | Scheme literacy, group governance, land and tenancy awareness, negotiation and public speaking.                                    | Increased agency, voice and institutional participation.                 |

Financial and market literacy must also be integrated. Women farmers need support in record keeping, costing, savings, credit, insurance, digital payments, quality grading, aggregation, branding, certification and negotiation. Extension that ends at production can leave women dependent on intermediaries or male relatives for marketing. Linking women to SHGs, FPOs, cooperatives and value-chain actors can improve market participation,

but only if women retain voice and control. Advisory systems should therefore include enterprise mentoring and post-training follow-up.

Table 12.2 presents a content matrix for women-centred EAS. It is cited here because it prevents a common design mistake: treating women's extension as a narrow home-science or welfare activity. Women-centred extension must include the full agricultural economy - production, climate, machinery, finance, markets, nutrition, leadership and rights.

## **12.7 Institutional Models and Global Lessons**

Global experience shows that gender-responsive EAS is strongest when it combines institutional mandates with local facilitation. Public extension remains important because it can pursue equity objectives, reach marginal areas and connect advisory services to schemes. However, public systems often face staff shortages, limited operating budgets and weak incentives. Private advisory services can be efficient and specialised but may neglect poorer women farmers who are not seen as profitable clients. NGOs and farmer organisations may be more inclusive, but their reach and sustainability vary. The practical solution is pluralistic coordination: different providers should have clear roles, shared standards and accountability mechanisms.

Farmer field schools and participatory learning approaches provide useful lessons. Their strengths include experiential learning, group problem solving and local experimentation. When designed well, they can improve women's confidence and technical competence. Yet they can also exclude women if sessions are long, distant or dominated by men. Gender-responsive farmer field schools require facilitation skills, careful participant selection, attention to timing and childcare, gender analysis of technologies, and explicit attention to who benefits from adoption. Evidence from farmer field school evaluations shows that participatory extension can improve knowledge and productivity, but outcomes depend heavily on implementation quality and institutional context (Davis et al., 2012).

Community video and peer learning have emerged as promising methods, especially where literacy is limited and trust is local. Videos featuring local women farmers can normalise women's technical expertise and encourage adoption. Peer learning also reduces the social distance between experts and farmers. However, peer models must be supported by technical validation. Farmer-to-farmer learning can spread useful innovations, but it can also spread incomplete or unsafe advice if not connected to agronomic expertise. A strong model combines local peer credibility with scientific backstopping and feedback loops.

The Gender and Rural Advisory Services Assessment Tool (GRAST) developed by FAO and partners is useful because it assesses gender responsiveness at policy, organisational and individual levels (Petrics et al., 2018). This is important because field-level inclusion cannot be sustained if organisational systems remain gender-blind. For example, an extension worker may be committed to reaching women, but if budgets do not cover local travel, reporting formats do not track women's outcomes, training materials ignore gender, and supervisors reward only total participant numbers, the worker's effort may remain isolated. GRAST-type assessment helps identify where reform is needed across the system.

International guidance also emphasises that gender-responsive EAS requires capacity development of extension personnel. Many agents are technically trained but not trained in gender analysis, facilitation, participatory methods, conflict-sensitive communication or safeguarding. Gender training should not be a one-time sensitisation lecture. It should be practical, field-based and linked to performance. Agents should learn how to map women's roles, identify invisible labour, facilitate mixed and women-only groups, design inclusive demonstrations, refer women to services, collect sex-disaggregated data and respond to feedback. Supervisors require similar training because they shape incentives and accountability.

A recurring lesson is that inclusion must be budgeted. Gender-responsive extension requires funds for female staff recruitment, local transport, childcare support, translation, community facilitators, monitoring, digital access, demonstration materials and safe venues. Programmes often declare gender objectives without allocating resources, which leads to tokenistic inclusion. A realistic budget is therefore a technical requirement, not an administrative detail.

## **12.8 India-Focused Pathways for Reimagining Extension for Women Farmers**

India presents a distinctive context for gender-responsive EAS because women are deeply involved in agriculture while land ownership, public recognition and institutional access remain uneven. Male migration, feminisation of agricultural labour, expansion of SHG networks, growth of FPOs, digital agriculture initiatives, climate stress and diversification into livestock, fisheries, horticulture and value addition all create new demands on extension. The challenge is not only to include women in existing extension channels but to redesign those channels around women's actual agricultural responsibilities and aspirations.

The Agricultural Technology Management Agency (ATMA), Krishi Vigyan Kendras (KVKs), State Departments of Agriculture, ICAR institutes, MANAGE, NGOs, SHGs, FPOs and private providers form a broad advisory ecosystem. This ecosystem can support women farmers if coordination improves. KVKs can provide technical validation and demonstrations; SHGs can mobilise women and support savings, credit and collective learning; FPOs can connect women to markets; MANAGE and NGRCA can strengthen capacity and policy guidance; ICAR-CIWA can provide gender-responsive research and technology models; and state departments can provide scheme linkage and field-level extension. The problem is that these institutions often work in parallel rather than as an integrated women-centred advisory system.

Government policy already contains important entry points. A Press Information Bureau release noted that guidelines of several beneficiary-oriented schemes under the Department of Agriculture and Farmers Welfare provide for States and implementing agencies to incur at least 30 percent expenditure on women farmers, and that MKSP was designed to empower women through systematic investments in participation and sustainable livelihoods (Government of India, 2021). More recent information highlights the role of MANAGE, NGRCA and ICAR-CIWA in training, gender-responsive extension, women-friendly technologies, entrepreneurship, digital technologies and gender-responsive models, with MANAGE-linked training initiatives reporting 61,496 women participants since 2020 (Government of India, 2026). These are important foundations, but they should be translated into district-level service standards and outcome indicators.

One priority is to strengthen women farmer databases at village and block level. Extension planning should identify women cultivators, tenant farmers, livestock keepers, SHG members, women FPO members, agri-entrepreneurs, women labourers, fisherwomen and women engaged in processing and marketing. This database should not be limited by land title. It should be linked to training calendars, scheme eligibility, custom hiring services, digital advisory groups and follow-up visits. Without such data, women remain dependent on informal inclusion.

A second priority is to integrate SHGs and EAS more systematically. India's SHG architecture under DAY-NRLM provides a large platform for women's mobilisation. However, SHGs are not automatically technical advisory institutions. They require technical partnerships, trained community resource persons, demonstration plots, input-output linkages and market support.

MKSP's community institution approach provides useful lessons because it recognises women as farmers and builds sustainable livelihoods through collective capacity. Future extension should avoid treating SHGs only as channels for disseminating messages; they should be co-planners of advisory priorities.

A third priority is to make KVK and state extension activities more accessible. Training calendars should include localised women-focused modules, village-level practical sessions, farmer field schools, women-led demonstrations and follow-up visits. KVKs should document the number and profile of women reached, but also adoption quality, labour impact, income control, nutrition outcomes and leadership development. KVKs and ATMA teams should actively include women in exposure visits, field days, innovation platforms and advisory committees. Token representation is insufficient; women members should influence agenda setting.

A fourth priority is to expand women-friendly mechanisation and custom hiring advisory. Women often lack access to machinery because equipment is designed around male body norms, ownership is capital-intensive, and hiring services are controlled by men. Extension should promote ergonomic tools, women-operated equipment, safety training, repair skills and women-managed custom hiring centres. This links Chapter 12 with the later chapter on drudgery reduction and farm mechanisation. Advisory services should evaluate technology not only by output but by labour time, fatigue, safety and women's control over use.

A fifth priority is digital inclusion with safeguards. Digital India and the expansion of mobile services create opportunities for weather advisories, pest alerts, market prices, e-learning and scheme information. Yet women may have less phone ownership, lower digital literacy and less privacy. EAS should therefore support shared but safe digital access points, women-only digital groups where appropriate, voice-based advisories, local language content, offline access, assisted digital services through community resource persons and digital literacy modules. AI-enabled advisory systems should be carefully validated and should not replace local extension accountability.

Table 12.3 summarises India-specific institutional actions. It is included in this section because it translates the broader conceptual framework into operational reforms for Indian extension organisations. The table can also be used by state departments, KVKs, NGOs and project teams as a checklist for designing district-level gender-responsive extension plans.

**Table 12.3. India-Specific Institutional Actions for Gender-Responsive Extension**

| <b>Institutional actor</b>           | <b>Possible role in women-centred EAS</b>                                         | <b>Priority reform</b>                                                                            |
|--------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| State Departments of Agriculture     | Planning, field extension, scheme linkage and monitoring.                         | Adopt district gender-responsive EAS plans with budgets and sex-disaggregated outcome indicators. |
| ATMA and block-level extension teams | Local demonstrations, farmer groups, exposure visits and convergence.             | Include women in advisory committees and prioritise women-led demonstrations.                     |
| Krishi Vigyan Kendras                | Technical validation, training, field trials and capacity building.               | Develop women-focused modules and track adoption, drudgery, income control and nutrition effects. |
| SHGs and DAY-NRLM platforms          | Mobilisation, savings, peer learning and livelihood collectives.                  | Train community resource persons and link SHGs with technical backstopping and markets.           |
| FPOs and cooperatives                | Aggregation, input access, processing, market linkage and enterprise development. | Ensure women's membership, leadership, voting power and benefit control.                          |
| MANAGE, NGRCA and ICAR-CIWA          | Capacity development, gender mainstreaming, tools, models and research support.   | Scale gender-responsive modules, advisory standards and women-friendly technologies.              |
| Digital agriculture providers        | Weather, pest, market, scheme and enterprise advisories.                          | Design voice-based, local-language, privacy-aware and assisted digital services for women.        |

## 12.9 Digital Advisory Services, AI and the Gender Divide

Digital agriculture is transforming advisory systems through mobile phones, social media, WhatsApp groups, interactive voice response, call centres, videos, remote sensing, decision-support tools and AI-based chatbots. These tools can reduce distance, improve timeliness and support personalised advice. For women farmers, digital EAS can be especially useful when mobility is restricted or when repeated in-person contact is difficult. However, digitalisation is not automatically inclusive. It can widen inequality if women

lack devices, connectivity, data, literacy, language access, confidence or control over digital spaces.

The design principle should be digital inclusion before digital delivery. Programmes must first assess who owns phones, who controls them, who can read messages, who can listen privately, who can respond, and who trusts the source. Voice-based systems may be more inclusive than text-heavy applications where literacy is uneven. Community video may be more effective than generic advisories because it combines visual learning and local credibility. WhatsApp groups can support rapid exchange but may exclude women who do not own smartphones or who avoid public group interaction. Assisted digital extension, where women community facilitators help interpret digital advisories, can bridge this gap.

AI-based advisory systems require particular caution. They can provide rapid responses and support scaling, but agriculture advice is context-specific and errors can cause crop loss, financial loss or unsafe input use. For women farmers, risks are compounded when they cannot easily seek second opinions or challenge advice. AI systems should therefore use verified knowledge bases, local language interfaces, uncertainty communication, escalation to human experts, data privacy safeguards and gender-sensitive evaluation. The question is not whether AI can answer agricultural questions, but whether women farmers can safely use it, understand its limits and hold the system accountable.

Digital advisory systems should also avoid reinforcing stereotypes. Content algorithms may prioritise users who ask more questions, own smartphones or produce commercial crops, thereby marginalising women in subsistence, livestock, homestead or unpaid roles. Data used to train advisory models may underrepresent women's crops, tasks and constraints. Gender-responsive digital EAS should therefore collect feedback from women users, include women's knowledge in content development and monitor differential outcomes. Digital platforms should report sex-disaggregated reach, engagement, query types, satisfaction and adoption, not merely total users.

Hybrid models are most promising. A woman farmer may receive a weather alert through voice message, discuss it with an SHG facilitator, attend a field demonstration on water-saving practice, receive input linkage through an FPO and report outcomes through a community meeting. This layered model recognises that advice becomes useful when it is embedded in trust, resources and decision-making. Figure 12.3 presents a digital-plus-human model for women-centred EAS. It places digital tools inside a larger support ecosystem rather than treating them as stand-alone solutions.

Digital-Plus-Human Advisory Model for Women Farmers

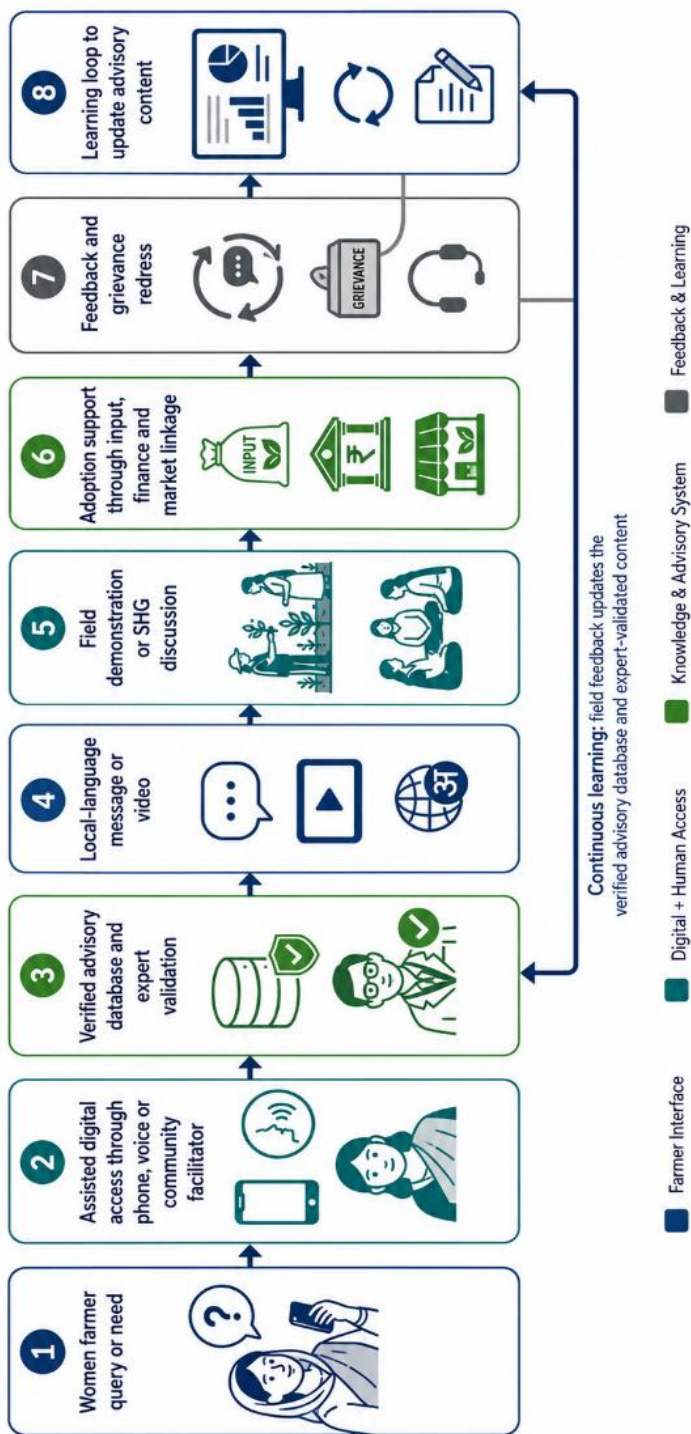


Figure 12.3. Digital-Plus-Human Advisory Model for Women Farmers

### **12.10 Monitoring, Evaluation and Learning for Gender-Responsive EAS**

Monitoring gender-responsive EAS requires moving beyond output indicators. Counting women participants, trainings conducted and messages sent is necessary but insufficient. A programme may reach many women and still fail if the advice is irrelevant, not adopted, increases the labour burden, or does not improve control over benefits. The evaluation should examine access, relevance, understanding, adoption, labour effects, productivity, income control, nutrition, climate resilience, leadership, confidence, and institutional responsiveness. It should also ask which women are reached and which are excluded.

Sex-disaggregated data are the minimum requirement. Programmes should record women and men separately across outreach, training, demonstrations, digital engagement, scheme linkage and adoption. But gender analysis must go further. It should include age, caste, tribe, land status, poverty status, disability, and the type of enterprise, where relevant and ethically appropriate. Intersectional monitoring prevents the system from serving only better-off women. It also helps tailor advisory strategies for landless women, tenant women, tribal women, migrant households and young women.

Outcome indicators should include the agency. Women's Empowerment in Agriculture Index (WEAI) approaches have shown the value of measuring decision-making, resource control, income, leadership, and time use rather than assuming that productivity gains equal empowerment (Alkire et al., 2013). EAS programmes can adapt these insights through lighter monitoring tools. For example, they can ask whether women participated in crop choice, input purchase, technology adoption, sale decisions and income use before and after intervention. They can track whether women speak in meetings, hold group roles, contact service providers and negotiate with market actors.

Learning systems should be participatory. Women farmers should review the quality of the advisory and identify any missing topics. Community scorecards, feedback meetings, phone surveys, grievance systems and participatory evaluation can improve accountability. Feedback must be acted upon. If women repeatedly report that training venues are inaccessible or advice is too generic, programme design should change. Monitoring without adaptation is only documentation.

Evaluation should also track unintended consequences. Extension may increase women's workload, trigger household conflict, expose women to market risk, create debt, or shift profitable activities to men once they become commercial. These risks are well known in gender and development practice.

Gender-responsive EAS should therefore monitor labour distribution, control over income and intra-household negotiation. Safeguarding and referral pathways are necessary where programmes address sensitive issues such as asset control, mobility or financial autonomy.

Finally, extension systems need indicators of institutional learning. These include budget allocations for gender-responsive EAS, the number of staff trained, the percentage of women extension personnel, women-friendly infrastructure, the integration of gender in training materials, the use of sex-disaggregated data in planning, grievance resolution, and women's representation in advisory committees. Without institutional indicators, gender responsiveness remains dependent on individual champions rather than system reform.

### **12.11 Ethical and Professional Standards for Women-Centred Extension**

Ethics must be explicit in EAS for women farmers. Advisory services influence livelihoods, labour, resource allocation and household relations. Poor advice can cause harm. Excluding women from advice is also harmful because it denies them information and opportunities. Professional standards should therefore include accuracy, transparency, inclusion, respect, confidentiality, safety and accountability. Extension agents should not promote technologies or inputs without considering affordability, risk, labour burden and women's control over benefits.

Consent and privacy matter in a data-driven extension. Women may share information about land, income, household decisions, phone numbers, or agricultural problems. Programmes must protect this information and avoid exposing women to social risk. Digital groups should have clear rules on respectful communication and data sharing. Photos, videos and success stories should be used only with informed consent, and women should not be represented merely as beneficiaries for programme visibility.

Commercial partnerships require safeguards. Private input dealers, agritech firms and financial providers can expand advisory reach, but their incentives may prioritise sales over suitability. Women farmers with limited bargaining power may be vulnerable to inappropriate products or credit. Public and NGO extension actors should maintain independent technical validation and disclose commercial interests. Advisory pluralism should not become unregulated marketing.

Professional extension practice also requires humility. Women farmers possess experiential knowledge about seeds, soils, livestock, wild foods, water, local markets and household nutrition. Gender-responsive EAS should respect this

knowledge and create spaces for the interaction of scientific and local knowledge. The objective is not to replace women's knowledge with expert recommendations, but to strengthen their capacity to evaluate options and negotiate choices.

### **12.12 Policy and Programme Recommendations**

First, governments should adopt explicit gender-responsive EAS standards. These standards should define women farmers broadly, require sex-disaggregated and intersectional planning, mandate inclusive delivery channels, include women in advisory committees and connect extension to schemes, credit, markets and social protection. Standards should be accompanied by budgets, not only guidelines. At least part of extension funding should be tied to quality indicators for women's access and outcomes.

Second, extension organisations should institutionalise gender analysis in planning. Each district or block plan should identify women's roles, constraints, priority enterprises, existing groups, digital access, labour bottlenecks and service gaps. Planning should use participatory methods with women farmers rather than relying only on administrative data. This analysis should determine training calendars, demonstration topics, staffing needs and partnerships.

Third, capacity development should be redesigned. Extension workers need practical competence in gender-responsive facilitation, not only awareness. Training should include field exercises, role-plays, case analysis, gendered technology assessment, digital inclusion, monitoring tools, and ethical standards. Supervisors should be trained because they shape incentives. Performance appraisal should reward meaningful inclusion, follow-up and outcome quality.

Fourth, women community facilitators should be professionalised. They require training, certification, remuneration, mobility support, digital tools and technical backstopping. Their role should be recognised in extension systems, not treated as unpaid voluntary labour. Career pathways can help retain capable facilitators and strengthen rural women's leadership.

Fifth, extension should integrate production, nutrition, climate, mechanisation, finance and markets. Fragmented training weakens outcomes. Women farmers need bundled support because their constraints are bundled. For example, a vegetable enterprise may require technical advice, access to water, seed supply, pest management, collective marketing, nutrition awareness, digital payments, and household negotiation. The extension should coordinate these elements.

Sixth, digital EAS should follow a gender-by-design approach. This means assessing device access, language, literacy, privacy and trust before platform rollout; using voice, video and assisted digital services; validating content; providing human escalation; and monitoring women's engagement and outcomes. AI tools should be introduced carefully, with transparent limits and strong expert oversight.

Seventh, monitoring systems should measure empowerment and accountability. Participation numbers should be complemented by indicators of decision-making, labour burden, income control, confidence, leadership, grievance redress and institutional change. Programmes should regularly publish learning briefs and adapt based on women farmers' feedback.

Eighth, research-extension linkages should prioritise women's innovation. Agricultural universities, ICAR institutes, KVKs, and participatory research programmes should involve women in priority-setting, technology testing, and evaluation. Technologies should be assessed for gendered labour, safety, affordability and benefit control. Research outputs should be translated into advisory content that is usable by women farmers and community facilitators.

## **12.13 Conclusion**

Reimagining agricultural extension and advisory services for women farmers requires a fundamental shift from inclusion as attendance to inclusion as recognition, agency, benefit and accountability. Women farmers do not need a smaller or softer version of conventional extension. They need a system that recognises their full role in agrifood systems, addresses structural barriers, values their knowledge, supports their enterprises, reduces drudgery, strengthens climate resilience, improves nutrition and links them to institutions and markets. The chapter has argued that gender-responsive EAS must be pluralistic, locally embedded, digitally inclusive and institutionally accountable.

The global evidence and Indian policy landscape both show that the opportunity is substantial. Public institutions, SHGs, KVKs, MANAGE, NGRCA, ICAR-CIWA, FPOs, NGOs, private providers and digital platforms can together create a more responsive advisory ecosystem. But coordination, budgets, capacity and accountability are essential. Without these, women may be counted but not empowered. A future-ready extension system must therefore ask not only how many women were reached, but whether women were recognised as farmers, whether they could use the advice, whether their labour burden changed, whether they gained control over benefits, and

whether institutions changed in response to their voices. This is the standard by which gender-responsive agricultural extension should be judged.

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# Gender-Responsive Agriculture: Pathways to Sustainable Rural Development

*Gender-Responsive Agriculture: Pathways to Sustainable Rural Development explores how gender equity can strengthen agricultural productivity, livelihood security, climate resilience, and inclusive rural transformation. The book recognizes women as farmers, entrepreneurs, knowledge holders, and decision-makers whose contributions to agriculture, livestock, nutrition, post-harvest management, and rural enterprises are essential but often undervalued.*

*It addresses gender-sensitive extension, access to land, credit, technologies, markets, digital tools, climate-smart agriculture, women-led enterprises, Farmer Producer Organizations, and policy support. Combining academic perspectives with field-based insights, the book offers practical pathways for integrating gender concerns into agricultural research, development programmes, institutions, and value chains.*

*The book is useful for students, researchers, teachers, extension professionals, policymakers, development practitioners, and organizations working towards equitable and sustainable rural development.*

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