

Review of Farmers Field School Approach for Facilitation of Climate Smart Agriculture

Siraj Shekmohammed

Africa Center of Excellence for Climate Smart Agriculture and
Biodiversity Conservation, Haramaya University, Haramaya, Ethiopia

Samuel Lemma

Africa Center of Excellence for Climate Smart Agriculture and
Biodiversity Conservation, Haramaya University, Haramaya, Ethiopia

ABSTRACT

Sustainable agricultural development strategies depend on ensuring farmers access technology and management techniques. Policymakers employ agricultural extension and advisory services to accomplish this goal. The extension was traditionally viewed as a 'top-down' institution, and used by policymakers to disseminate knowledge about farming to the public. These traditional extension methods have received criticism for being "one size fits all," failing to account for the wide variety of socioeconomic and institutional contexts that farmers must operate in, and failing to involve farmers in the creation of technology and practices suitable for their environments. Additionally, it was thought that more intensive strategies were required to communicate complex messages. Since the 1980s, a more inclusive methodology has been used to deliver extension services, with farmer field schools emerging as a key component. This paper examined farmer field schools as a strategy for promoting climate-smart agriculture. The paper also examined the role of this approach in promoting climate-smart agriculture and engaging the general public. A discussion of farmer field schools' experiences around the world is also included, with a focus on the effects of their methodologies. The paper also outlined the strength and weaknesses of farmer field school strategies.

Keywords: Approaches, Advisory service, Extension service, Farmer Field Schools, Technologies, Traditional, Social mobilization.

INTRODUCTION

Agriculture production, food systems, and food security are all negatively impacted by climate change and variability [1]. Depending on the crop, climate change is expected to continue to hurt overall crop yields in East Africa by up to 5-72%, or an average of 24.3% [2]. More climate-resilient, environmentally sustainable agricultural production practices must be adopted to boost agricultural productivity and strengthen agribusiness resilience in the face of rising climate variability [3]. This call requires coordinated investments from agricultural value actors and partners to support transformational change. For such a transformation, actionable, sustainable climate information is essential [4][5]. However, the majority of smallholder

farmers currently do not receive actionable climate information for efficient decision-making due to the difficulties of the climatic "new reality" [6][1].

Agriculture must become "climate-smart" to address some of the complex issues brought on by climate change. To do this, agriculture must sustainably boost agricultural productivity and incomes, adapt to the changing climate, and build resilience to it. Wherever possible, it must also reduce and/or eliminate greenhouse gas emissions [7]. Agriculture that practices climate-smart practices (CSA) helps to achieve sustainable development objectives. It combines the economic, social, and environmental aspects of sustainable development by jointly addressing the problems with food security and the environment.

A crucial element of CSA is the use of a co-learning strategy among all stakeholders to promote social learning. Farmer Field Schools are one such important capacity-development strategy to improve organizational and individual capacities [8]. One of the delivery models used in agricultural extension, the field school model is a concept based on group dynamics and experiential adult learning [9]. The goal of developing climate-resilient agricultural systems can be achieved by using field school methods that emphasize and incorporate climate information. FFS methodology is a bottom-up strategy based on Robert Chambers' "farmer first" philosophy [10]. Through social learning and capacity building, the methodology has been widely used to promote adaptation practices [11].

With an emphasis on problem-solving and discovery-based learning, the FFS approach is a cutting-edge, interactive, participatory learning strategy. FFS aims to increase farmers' ability to evaluate their farming systems, spot issues, test potential fixes, and ultimately persuade participants to adopt practices best suited to their farming systems [12]. To adopt, and grow, the pedagogical and empowering FFS approach has also been developing into "Climate Field Schools. This paper examined FFS as a scaling-up strategy for CSA practices.

HOW TO SCALE UP CSA: THE ROLE OF EXTENSION AND ADVISORY SERVICES

Expanding Climate Smart Agriculture can benefit greatly from the use of extension and advisory services (EAS) (CSA). All three of CSA's goals—food security, adaptation, and mitigation—are made possible by EAS, but at the moment their attention is primarily on the first goal, namely achieving food security through increased productivity. EAS now needs to be used more actively to aid rural communities in adapting to climate change and to help mitigate it [13]. Millions of agricultural producers will need to change their behavior, approaches, and agricultural practices to scale up CSA. These producers must learn more about the effects of climate change to adopt more climate-smart approaches.

EAS has long provided a link between agricultural research and farmer support by disseminating information on emerging technologies. However, the successful expansion of CSA necessitates strategies that go far beyond modifying agronomic practices at the farm level [14]. It necessitates identifying and promoting appropriate practices, technologies, and/or models (new, improved, adapted) within welcoming enabling environments. Additionally, it calls for beneficial institutional arrangements, policies, and monetary investments on both a local and global scale [15]. Therefore, EAS needs to be supported by extensive expertise and

skills to encourage interaction and the flow of knowledge among a wider range of stakeholders than is currently the case.

Contribution to Sustainably Increasing Productivity

The extension's emphasis is shifting away from disseminating knowledge, skills, and technologies about how to produce crops, livestock, and forestry products to farmers and toward developing technologies alongside farmers and fostering and facilitating innovation processes in response to the evolving nature of agriculture and farmers' needs. This change in emphasis is consistent with the requirement for site-specific assessments to determine the appropriate agricultural technologies and practices required for CSA.

Extension providers have demonstrated great success in many countries using participatory techniques and strategies, such as participatory technology development, enabling rural innovation, and innovation platforms to develop and disseminate technologies and promote innovation through multi-stakeholder engagement [16]. EAS also has a wealth of experience in disseminating technologies, knowledge, and practices using a variety of approaches, such as conventional extension modes (such as face-to-face interaction, demonstrations, field days, printed materials, etc.), ICTs (radio, mobile phones, video, social media), rural information centers [17], farmer-to-farmer extension [18], for a Kenyan experience. Through the development and information sharing, EAS significantly contributes to improving adaptation technology while steadily increasing productivity.

Role in Building Resilience

With a focus on improving farmer experimentation and problem-solving skills to promote adoption and decision-making regarding knowledge-intensive agricultural practices, EAS has a wealth of experience with non-formal education and experiential learning approaches (such as farmer field schools, farmer learning groups, and local agricultural research committees) [19]. To promote livelihood diversification, some AS have adopted a market-oriented approach to extension by supporting farmers in the area of marketing, value addition, and enterprise skills development. EAS collaborates closely with humanitarian organizations to distribute seeds and inputs, which helps to increase resilience after extreme climate events [20]. Although the role of EAS in building resilience has not received much attention, it is clear that enhancing this importance will typically necessitate new organizational and individual capacities and skill sets [21].

Supporting Climate Change Adaptation and Mitigation

The "linking" function of extension organizations, which connects farmers to other rural stakeholders and service providers, is one of their traditional roles. More recently, agricultural innovation systems (AIS) have been supported by AS providers in many nations by participating in various ways in the creation of multi-stakeholder innovation platforms. These include serving as the principal innovation broker (the entity that sparks the innovation process and connects the participants), serving as a "bridging" entity that promotes communication between participants, organizing and building networks, assisting participants, facilitating access to information, knowledge, and expertise, and offering technical support [22]. According to Leeuw and Hall [23], innovation platforms are a type of institutional innovation

that can support both adaptation to and mitigation of climate change. In this context, AS can play an important facilitation and brokering role for a variety of activities, including bringing farmers and researchers together to develop adaptation practices and creating climate service tools. By empowering farmer groups and rural organizations, connecting them to voluntary and regulated carbon markets, and supporting programs for payment for ecosystem services, extension providers can support mitigation efforts.

Participation in Policy Support, Advocacy, and Monitoring

Given the urgent need for more information on how climate change is affecting agriculture, AS should actively participate in documenting those effects as well as the advancement of CSA efforts in close cooperation with farmers and scientists. Even though AS is not frequently referred to as a member of the "climate change advocacy coalition" (i.e., environmental advocacy groups, scientists, journalists, agency staff, legislators, and leaders in renewable energy technologies), they can play a crucial advocacy role at the local level in decentralized governance structures to ensure climate change is kept at the top of the policy agenda and funds are allocated for CSA programs [24].

EAS is in a unique position to inform policymakers about the results of climate-related incidents and to promote CSA funding and policy change. EAS can help to keep climate change and CSA at the top of the policy agenda by using farmers, pastoralists, and others who are directly impacted by the changing climate as spokespersons to put a human face on the problem, highlighting potential solutions, and providing feedback on policies and progress [24].

THE ROLE OF FFS IN SOCIAL MOBILIZATION AND EDUCATION FOR CLIMATE-SMART AGRICULTURE

The FFS curricula have grown over time to include a variety of thematic areas, such as disaster reduction and climate change adaptation [25]. To promote the spread and creation of knowledge specifically suited to the social and cultural contexts of the target population, the FFS methodology emphasizes group dynamics, interactive learning, hands-on experimentation, and direct peer-to-peer communication among participants [26]. The FFS methodology is founded on the principles of experiential learning and social learning, which act as the main channels for the communication of information to farmers as they interact with both their peers and the surrounding environment [27].

It gives farmers a low-risk environment to test out novel agricultural management techniques, discuss their findings, and pick up new skills and knowledge from their experiences [28]. The FAO FFS program on Integrated Plant and Pest Management (IPPM), which promoted improved and adapted varieties and agroforestry practices in Mali and Niger, is one example of an FFS that has integrated elements of global climate change adaptation [29]. Climate Field Schools in Indonesia promoted strategies to deal with shifting precipitation patterns, such as recording and interpreting farm rainfall measurements and in-field water harvesting, and raised public awareness of global climate change [30].

Since 2010, several nations have begun utilizing a field school strategy to strengthen community climate resilience. With assistance from FAO, field school projects focusing on the

environment have been carried out in numerous nations. With the help of short- and medium-term interventions, projects in Eastern and Southern Africa, particularly Uganda, have integrated disaster risk reduction and climate change adaptation to address multiple threats to livelihoods. Climate field schools have been tried out by other organizations in various countries (e.g., Bangladesh, the Democratic Republic of Congo, Indonesia, and Nepal). In Honduras, South Sudan, and many other nations, CARE has addressed climate change using farmer fields and business schools. Several manuals and technical modules on resilience building through field schools have now been made available as a result of these initiatives [31] [29].

IMPACT OF FARMER FIELD SCHOOL APPROACH

FFS have been shown to affect productivity, adoption, and knowledge in various parts of the world. Research in the market and areas with high input costs has demonstrated that FFSs have allowed farmers to significantly reduce their reliance on pesticides without adversely affecting overall productivity [32]. To certify the clean production coming from FFSs and connect groups to higher-value urban markets, Central America has tested an IPM labeling system. Similar to this, a group in Ecuador created production agreements with the agri-food sector that offered more equitable prices and assisted farmers in avoiding the volatility of National markets. According to the results of a meta-analysis of 25 impact studies that the FAO had commissioned, the majority of the studies reported a sustained and consistent decrease in pesticide use that could be attributed to the impact of training. According to a review of 25 IPM-FFS evaluations, studies showed a significant and consistent decrease in pesticide use that was due to the impact of training [19]. Numerous studies discuss the training's wider developmental effects, which show remarkable long-lasting and widespread effects.

FFS encourages lifelong learning and that it improved social and political competencies, which prompted a variety of regional activities, connections, and regulations about better agroecosystem management [33]. According to Davis et al. [34], FFS raised earnings and productivity in east Africa. Studies on the global effects of FFS revealed lower use of harmful pesticides and a 4–14% increase in yield for FFS graduates who grew cotton compared to the control group [33]. Despite this effect, another advantage of FFS is that it fosters group action, leadership, organization, and enhanced problem-solving abilities [35].

From 2000 to 2004, Indian FFS graduate was trained to start their farmer field schools, also known as farmer-to-farmer schools (FSS) [36]. Through extension services, NGOs, and research organizations, more than 50,000 farmers received training in cotton IPM techniques over the course of these years. Each state carried out 2,300 field-based surveys per year. Over 200,000 farmers have benefited from the organization of 248 FFS and the direct training of about 100,000 farmers in chickpea production. The results include an increase of 20–40% in Andhra Pradesh's knowledge (6947 plum bodies, another name for FFS, were organized) [37]. According to an FFS study by Davis et al. [34], FFS increased African farmers' income, productivity, and knowledge gains. According to FAO [36], a study done in Ghana on four different extension strategies, FFS models have been very successful at boosting farmers' capacity and giving rural people more power.

In all areas where FFS has been developed and applied, the adult education concept and principles that underlie the design of curricula and the learning process are reliable [38]. There is convincing evidence for the effects of reduced pesticide use, increased productivity, and improved farmer knowledge [39]. Changes in perspectives with shattered pride and self-confidence are reported as empowerment outcomes from FFSs, as are social change and action that is sparked as a result of participation in FFSs. Farmers now have more freedom to live their lives how they want. Many of the social changes that FFS graduates have witnessed are the result of farmers making decisions to overcome difficulties by using critical reflection or group action.

In Africa, FFS increased productivity, knowledge acquisition, and empowerment, but only among the farmers who were most actively involved. According to Davis et al. [34], FFs in East Africa raised wages and productivity. Participants in the FFS increased yield by an average of 13% and net revenue (profit per unit of land) by 19%, according to Waddington and Howard [19]. Due to lower costs as farmers use pesticides, projects in Africa, Asia, and Latin America reported a positive impact on net revenue that is greater than yield. In IPM field schools in China, Pakistan, Kenya, Tanzania, and Ethiopia, the effects were observed. The platformers program connecting potato farmers with Agribusiness in Ecuador and coffee producers with the international market in Peru had a significant impact on net revenue because it covered cash crops and also provided complementary input-making components [34].

FFS' CONCEPTUAL FRAMEWORK FOR INSTITUTIONAL AND POLICY ENGAGEMENT

Reviews of agricultural field school initiatives worldwide reveal that the strategy has evolved into a model for agricultural/agropastoral education in many regions of the world (farmer, agropastoral, agribusiness, etc.) [40]. The development of local capacity and adult learning is strengthened by this integrated model. However, participants strongly agreed that to effectively integrate climate literacy into the process, agronomists must collaborate more closely with available agrometeorological service providers to guarantee that farmers are properly guided to participate appropriately in the "cogeneration" and application of climate information and climate-informed "agro-weather" advisories for their agricultural production purposes [41]. Figure 1 displays the kind of institutional framework that takes into account participant feedback. A network of CSA FFS networks will be formed from the field schools that are currently being formed to advance this advocacy agenda locally [42].

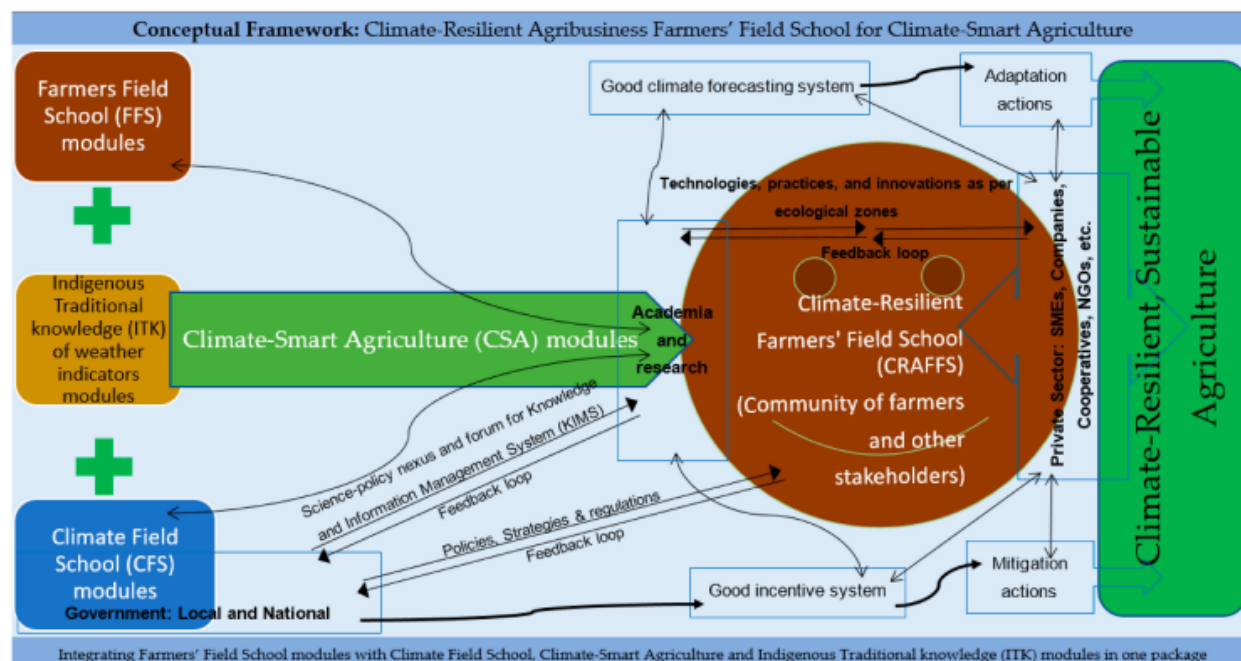


Figure 1. A conceptual framework for the innovative, integrated, Climate-Resilient Agribusiness Farmers' Field School for Climate-Smart Agriculture.

Source(s): Osumba et al. [1]

STRENGTHS AND WEAKNESSES OF THE FARMER FIELD SCHOOL APPROACH

Strengths

To improve farmer expertise in the management of particular agroecosystems, for which there appears to be no short-cut, hands-on education is required. FFS is crucial because it relies on the farmer's research and reflection rather than highly skilled outside advisors. FFS is crucial in providing a platform for enhancing human potential and empowerment, which can ultimately ensure the success of services offered to the community [38]. The FFS process encourages group action and fosters the development of group management skills, especially in women. In this way, the FFS serves as a tool to empower vulnerable farmers to form cohesive economic empowerment groups that can engage in joint, profit-making ventures and communicate with service providers and market intermediaries.

One of FFS's key advantages is that it aids in improving the productivity of cocoa farmers in the two states where social capital or civil society is at the village level [43]. This occurs when FFS sparks interest in a community, particularly among those who do not fall under the "official" classification of the community. As a result, farmers are given a voice once more and given greater consideration during the decision-making processes. FFS offers a chance for a farmer-to-farmer extension, which will scale up FFS intervention and cost reduction since graduates can be chosen and appointed as facilitators for new FFS groups in the community. This is related to the problem of a lack of formal extension staff, particularly in drylands and pastoral areas. Since the solution is developed jointly through experimentation, interventions can be scaled up even when there is very few extension staff. Even with facilitators with comparatively low technical skill levels, FFS can operate effectively. This is a significant benefit given the current state of curriculum design, which is often subpar or inappropriate.

Weaknesses

FFS are not a universal solution for development and they are not a replacement for more well-known technology-centered or profit-driven approaches to development, such as extension, credit cooperatives, core estates without growers, farmers' training centers, or the use of mass media [38]. To empower farmers to take the lead in local practice adaptation, it supports an educational strategy that places a strong emphasis on experiential learning, action research, and critical thinking. For achieving swift and widespread application of standardized recommendations, the FFS is not the ideal tool. These are situations where technology transfer is advantageous, and for such problems, non-FFS techniques like radio and community meetings are frequently more suitable. Thus, campaigns and the FFS were implemented concurrently or as a complement.

FFS is described as being expensive, which could lead to issues with long-term financial viability. Per farmer trained, the training activities are expensive. FFS is said to cost US \$62 per farmer trained [39]. If only farmer trainers were to serve as the primary trainers, cost-effectiveness and financial sustainability could be improved. Facilitating trainers, shipping materials, supervision, and graduation are the main expenses associated with putting FFS into practice. FFS are prone to quality loss, especially when it comes to poor or inappropriate curriculum design and a lack of focus on the effectiveness of the teaching and learning process. Occasionally, a sub-aspect of the approach will be selected without consideration for the adult education and experiential learning principles woven into FFS [7]. When the fundamental principles and elements are disregarded, the approach frequently loses its effectiveness, and it must be used in its entirety to produce the desired results.

CONCLUSION

Effective rural advisory systems, which include the organizations and actors involved in providing extension and closely related services (education, research, agribusiness support, etc.), the regulatory and policy structures that govern how the system operates, and the enabling environment, are required to handle the complexity of achieving CSA and to ensure the efficiency of the range of actors involved in pluralistic rural advisory landscapes. Governmental organizations typically play some leadership or coordination role, especially concerning policy and regulatory frameworks, even though the role of public sector extension in rural advisory systems will vary depending on the context.

The review looked at the FFS approach's ideas, execution, efficacy, strengths, and weaknesses. It primarily focuses on educating farmers about integrated pest management (IPM) programs for growing rice, but it has since expanded to cover other subjects in a range of contexts, including organic farming, soil and animal husbandry, forest management, groundwater management, human health, gender issues, and advocacy, among other things. In Asia, Sub-Saharan Africa, and Latin America, the FFSs Approach has been widely implemented. Local facilitators' adaptation to the widespread has coincided with local cultural and socioeconomic change. The approach reached smallholder farmers by sharing knowledge and skills, which had a positive impact on transforming farmers and raising the quality of produce (yields) and income of farmers, according to the available empirical evidence. The majority of the study

reported a sustained and consistent decrease in pesticide use, which was also concluded to be due to the impact of training.

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Conflict of Interest

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