

## **MODELLING EFFECTIVE AND SIMULTANEOUS PROMOTION OF FOOD SECURITY AND BIODIVERSITY CONSERVATION THROUGH AGRICULTURAL EXTENSION ACTIVITIES**

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### **ABSTRACT**

*There is no doubt that public agricultural extension has contributed to the success of South Africa's current large-scale farmers, the fruit of which the nation still enjoys. Nonetheless, the ineffectiveness of the extension service to meet the current challenges – particularly among resource-challenged, small-holder farmers – is widely acknowledged. This ineffectiveness extends to promoting household food security within the context of encouraging biodiversity conservation on farm lands. To examine this, this paper draws on recently conducted research to sketch the current model within which extension pursues these seemingly dichotomous objectives and identifies some gaps which, if addressed, can enable extension to simultaneously meet these two objectives. The paper presents a refurbished extension model which builds on the current South African model by introducing three elements: collaboration among all the stakeholders involved in promoting food security, biodiversity conservation and agricultural extension objectives; adopting a capacity-building approach (replacing the current top-down, technology transfer approach) to support farmers who are significant actors in food security and biodiversity agendas; and re-invigorating extension institutions through introducing specific presently lacking capacities. The refurbished model postulates that extension, alongside farmers, would be better placed to foster new farming ideologies to address the food security and biodiversity conservation concerns. Better positioning of farmers, who in themselves are thinkers and problem-solvers, and simultaneous promotion of effective working relationships among related governmental departments will strengthen complementary, rather than competition and contradiction, which currently hamper methodical and systematic pursuit of the necessarily conjoined objectives of and processes for achieving food security and conserving biodiversity.*

**Keywords:** Extension model, agricultural extension, food security, biodiversity conservation, collaboration, rural wealth

### **1. INTRODUCTION**

This paper originates from a study investigating the role of agricultural extension in promoting food security, within the context of encouraging biodiversity conservation. Research by Abdu-Raheem (2013) identified four sets of factors namely: household/community-level; social; ecological and service delivery, which impact public extension's capacity to simultaneously promote food security and biodiversity conservation in the KwaZulu-Natal province of South Africa. Key among these factors were: inadequate household production resources (including a lack of seed banks); poor education; over-reliance on social grants; inadequate involvement of youth and men in agriculture; inadequate and irregular rainfall; the top-down nature of food security and extension interventions; poor

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collaboration and coordination among extension, researchers, NGOs and government departments; as well as poor extension policy and capacity. This paper thus seeks to critique the current system within which extension is situated to perform its duties and to propose a refined model for sustainable extension, which can enhance sustainable promotion of food security and biodiversity conservation.

Agricultural extension has changed in definition and purpose over time. Recently, extension has been defined as “systems that facilitate the access of farmers, the organization and other market actors to knowledge, information and technologies; facilitate their interaction with partners in research, education, agribusiness, and other relevant institutions; and assist them to develop their own technical, organizational and management skills and practices” (Christoplos, 2010:3). This definition suggests that the relevance of extension moves beyond the traditional transfer of information, knowledge and technology from researchers to farmers, to include developing capacity, skills and effective management techniques among farmers and farming communities. On both the national and provincial scales in South Africa, extension has fallen short of this definition and has not had its intended impact (Abdu-Raheem, 2013).

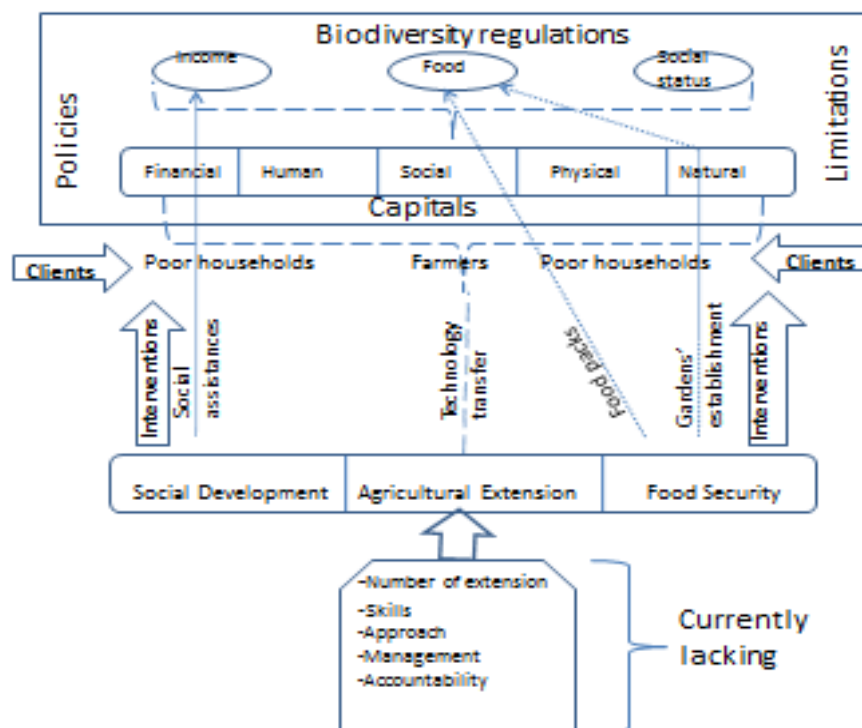
Constitutionally, extension provision is a provincial competency, while the National Department of Agriculture only determines the policies and funding resources. The Norms and Standards for Agricultural Extension and Advisory Services document (Department of Agriculture, 2005) challenges extension to improve household food security through agricultural-based activities, within the broad context of sustainability. In KwaZulu-Natal, extension has been working towards this goal through technology transfer to farmers and promoting the use of external farm inputs such as seeds, fertilizers and chemical pesticides and herbicides (Abdu-Raheem, 2013); a system that is clearly unsustainable.

Housed within the KwaZulu-Natal Department of Agriculture are separate sections directly charged with food security and biodiversity conservation programmes. The food security division promotes food security by distributing food packs in schools and encouraging household agricultural production, food diversification, household income, food distribution and improved nutritional status among households. These are implemented through projects which are delivered by contracted service providers with specific technical capacities. In practice, those responsible for these projects do not engage with public extension officers, citing that they have no working relationship with the extension division and that there is a lack of relevant skills and capacities among extension personnel (Abdu-Raheem, 2013).

Ezemvelo KwaZulu-Natal Wildlife (EKZNW) is the agency empowered to carry out conservation activities within the province. The EKZNW agency forges partnerships with landowners under various conservation agreements. The agreement most relevant to this study is the Biodiversity Stewardship Programme. Under this programme, partnerships are based entirely on terms set by the EKZNW agency-- a situation which can potentially create a disconnection between landowners and the EKZNW agency regarding conservation goals, thereby compromising success. Unless and until landowners are mutually engaged to determine the terms and are satisfied by the agreements, the exercise is bound to fail (Mayer & Tikka, 2006).

## **2. THE CURRENT MODEL FOR AGRICULTURAL EXTENSION**

Figure 1 depicts the operational model in which extension is currently expected to promote food security and biodiversity conservation. It shows that for ‘poor households’ and ‘farmers’ (the focus of state interventions in food security), extension and biodiversity conservation target the three main goals of their livelihood activities: income, food and social status.



**Figure1. Current model for extension to promote food security and biodiversity conservation**

These goals are pursued through actively combining five stocks of capital: financial; human; social; physical and natural (Putnam, Leonardi & Nanetti, 1993; Daily, 1997; Pretty, 1998; Pretty & Ward, 2000). Financial capital refers to the economic base or access to money, which could be in the form of income, grants, remittances, subsidies, pensions, credit facilities or savings. Human capital refers to the condition of an individual, including knowledge, skills, health, nutrition and education; the access to the resources affecting these conditions, such as schools and hospitals; and the capability to harness these resources for livelihood purposes. Social capital comprises the interpersonal relationships with others in the community; the rules, norms and values against which behaviour is measured and the general social traditions and practices shaping cohesiveness and connectedness within communities. Physical capital encompasses the general infrastructure on the farm and is found within the farmers’ communities, such as buildings, electricity or energy-sources, market facilities, communication facilities and transportation systems. Natural capital includes the available biodiversity and ecosystem services, ranging from land, food, water supply, wood, biological pest control, plant pollination, wildlife habitats, soil formation, nutrient fixation and recycling, climate regulation, to flood control and water regulation relating to leisure and recreational values.

Encasing the livelihood goals and capitals are policies and regulations which provide directions, opportunities, standards and limitations to livelihood activities. In this context,

they include agricultural policy, trade and other economic policies, biodiversity regulations and legislation, food security strategy, and the extension Norms and Standards, among others.

Feeding into the mix of policy, capitals and goals are the key state interventions offered by Social Development, Agricultural Extension and Food Security, respectively. Social Development assists qualifying households, including poor farmers, to achieve their income needs by augmenting their financial capital through grants, pensions and other instruments. While support is reported to have effectively contributed to poverty reduction and enhancement of education and health status (Woolard, Hartggen & Klasen, 2010), caution is required as its sustainability is questionable in the face of the perpetually increasing costs of maintaining it (Case & Deaton, 1998). In addition, Abdu-Raheem (2013) found that households tend to be over-reliant on social grants and lose the incentive to engage in productive livelihood activities, such as farming. To address this situation, this study suggests that social grants be linked to creating sustainable livelihood opportunities, including farming.

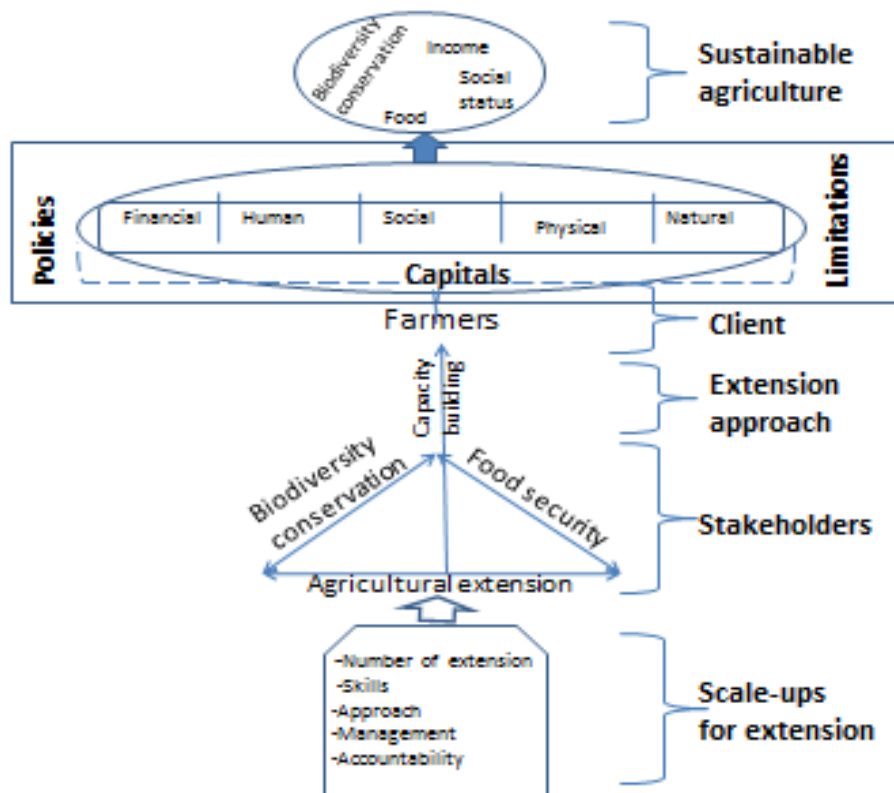
The current model, as depicted in Figure 1, includes Food Security structures as one of the intervening actors assisting poor households to achieve food security. Food Security augments the social and natural capital available to households in the execution of its programmes. It provides food through public schools and helps to establish home gardens and potential community markets for their produce. In this way, it impacts the use of biodiversity resources within households.

The current model also depicts Agricultural Extension as a third intervening actor; it engages all five forms of capital assets available to farmers to pursue their livelihood goals. The intention is that farmers would be assisted to optimally combine and sustainably harness their various capitals to achieve their goals, while leaving adequate stocks for future generations. If these capitals are exploited unsustainably, their depletion may or may not allow the current generation to fulfil their goals, but jeopardises the livelihood opportunities of the future generation.

As also depicted in Figure 1, compounding the situation are the institutional factors that affect agricultural extension, as well as food security sectors, in the efficient and effective discharge of their mandates. These include the number of officials implementing intervention programmes, the skills, approach and methods adopted for interventions and the overall institutional managements of the intervening bodies – all of which are currently lacking and thus inhibiting extension's capacity to carry out its mandate.

### **3. THE CHALLENGE OF THE REFURBISHED EXTENSION MODEL**

The model presented in Figure 2 identifies three elements to refurbish the existing model for agricultural extension, in order to position it to achieve food security objectives within biodiversity conservation consciousness. The model proposes that: genuine bilateral and multi-lateral collaboration be established between agricultural extension and governmental sectors concerned with food security and biodiversity conservation; agricultural extension be scaled-up in terms of the lack of resources currently hampering its effectiveness; and, to achieve food security and biodiversity conservation goals, extension adopts a capacity-building approach with farmers and rural families, to replace, or at least augment, the current single-mode, top-down technology transfer method.



**Figure 2. Refurbished extension model to promote food security and biodiversity conservation**

The refurbished model suggests creating coherent and collaborative networks in terms of institutions and processes among and within the various governmental departments that are, at the present, individually pursuing goals related to food security and biodiversity conservation. Also embedded in the model is ‘policy coherence’ – be it termed coherent policy-making, policy integration, policy coordination, joined-up government coherence or holistic government – which is essential to the successful implementation of programmes, particularly when they have overlapping processes and outcomes (Geerling & Stead, 2003; Duraiappah & Bhardwaj, 2007). Such policy coherence is most appropriately defined as “a pursuit of coherence, consistency, comprehensiveness and of harmonious compatible outcomes” (Challis, Fuller, Henwood *et al.*, 1988: 25). Such policy coherence anticipates “the systematic promotion of mutually reinforcing policies across government departments and agencies creating synergies towards achieving the defined objective” (Duraiappah & Bhardwaj, 2007:3, citing DAC, 2001). Thus, to be effective, policies must be “coordinated, consistent, complementary and not contradictory” (Dunn & Mondesire, 2002). These are particularly applicable in the national context within which extension, biodiversity conservation and food security operate in South Africa.

Policy coherence can be applied along vertical and horizontal dimensions, where vertical scale applies across a number of spatial or organizational levels and horizontal is along a single level (Briassoulis, 2004). Vertical and horizontal coherences also embrace institutional and organizational coherence and coherence between instruments (that is, processes or devices employed by government, corporate bodies or persons to realise anticipated outcomes) (Duraiappah, 2004). Organizational coherence encompasses coordination between organizations, such as ministries at the national level. Institutional coherence involves

synergism and reduces disagreements amid various rules, formal and informal, of 'separate' organizations (Duraiappah, 2004).

Alongside vertical and horizontal coherencies is the need for inter-territorial and intra-sectorial integration which must occur not only, in this instance, between different governmental levels, but must also include horizontal integration which occurs between sectors within a single organization with multiple mandates and operational units. Inter-territorial integration further applies between authorities sharing the same resources and intra-sectorial integration applies among various sections within a department of an organization (Geerling & Stead, 2003).

Among the various dimensions of policy coherence are some key points of convergence: integration at the scale of actors implementing various policies; carefully planned coordination at the level of procedures, management, resources and instruments employed among sectors pursuing common goals; and integration at the level of targets, ambitions and goals pursued by various actors, without making compromises. It is this degree of policy coherence that is envisaged in the refurbished extension model and would apply to all the policies, institutions and processes, as well as the full complement of actors (including farmers) involved in achieving biodiversity conservation and food security objectives.

The model further stresses that extension institutions should be strengthened with required capacities to facilitate their efforts and activities. The National Department of Agriculture, Forestry and Fisheries (DAFF, 2011: 1) noted that: "beneficiaries of government interventions invariably identified extension and advisory service as the weak link militating against the full impact of government agricultural programmes". Specifically in KwaZulu-Natal, a number of factors conspire against effective performance of extension in the province, among which are: inadequate numbers of extension compared to the number of people served; poor knowledge and skills among extension staff; poor management of extension; lack of accountability of extension to farmers; and poor remuneration of extension staff (Abdu-Raheem, 2013). Some of these issues appear to have equally been recognized by DAFF; the response to which prompted DAFF to launch an "Extension Recovery Programme" in 2011, the goal of which was to generally improve the quality of extension services throughout South Africa. Five pillars serve as the crux of the programme, namely to:

- *Ensure visibility and accountability of extension:* This pillar intends to redeem the image and relevance of extension to farmers, by training extension officers with necessary skills and equipping them with working materials, like digital pens and record books to keep logs of contact sessions with farmers. The record book is envisaged to enhance extension's accessibility to his/her clients' recorded information, while the digital pen facilitates communication of information to a central database.
- *Promote professionalism and the image of extension:* This focuses on facilitating extension to become active members of relevant professional bodies, whereby they can have access to scientific and/or position papers and equally gain from presented scientific findings.
- *Recruit extension personnel:* This is a commitment on the path of the DAFF to scale-up the number of front-line extension officers in ratios 1:400, 1:500 and 1:500 of extension against small-scale crop farmers, extension against small-scale livestock farmers and extension against small-scale mixed farm farmers, respectively. In this respect, provinces are required to meet these ratios by employing more extension

personnel who meet prescribed educational standards, and accordingly, assist them to build capacity in order to meet intended provincial growth and development targets.

- *Re-skill and re-orientate extension workers:* This is intended to train (through short courses and internal training) current extension officers in knowledge and skills, as prescribed in the Norms and Standards for Extension. Further to this, extension officers who lack the necessary qualifications are being encouraged to upgrade these and are offered financial aid to do so.
- *Provide ICT infrastructure and other resources:* This is to provide extension officers with relevant technologies, such as computers, Internet facilities and connection to Internet-based extension knowledge and information sharing systems, with particular reference to 'Extension Suite Online'.

In addition to the processes of the Extension Recovery Programme, there is an on-going process of creating a national policy for extension to provide effective frameworks that will enhance achievement of the goals set for extension delivery. At the time of writing, the new policy had been drafted and submitted for approval. Its main thrusts are to create policy and operational coherence among agriculture, forestry and fishery units at national and provincial levels and to refocus extension to being on the farmer, taking into account the vast diversity that is contained in the sector.

The refurbished model also suggests that the extension approach be broadened from the exclusive use of traditional technology transfer to focusing on building the capacities of farmers, as problem solvers and technology innovators engaged in and applying sustainable agricultural and conservation practices. Agricultural extension needs to decide whether its aim is to develop production itself or more specifically, the actors involved in production (Worth, 2002). To develop production, technology transfer aptly fits; developing farmers' capacity seems better achieved with a capacity-building approach. This implies that whichever objective is chosen, it must be clearly articulated and supported by the most appropriate strategy. While in its policy pronouncements South Africa prioritises development through capacity building (Cruse, Dollery & Worthington, 1999), implying the aim of developing the actors, practice on the ground is clearly production orientated, supported by technology transfer extension programming.

Farming in a sustainable manner is both knowledge intensive (Lawrence & Garforth, 1997) and information demanding compared to conventional methods, because skills effectively take the place of external inputs (Lawrence & Garforth, 1997; Pretty, 1995; Cho & Boland, 2004). In essence, the roles of knowledge, information, technologies, skills and attitudes in sustainable agriculture cannot be over-stated (World Bank, 2006) and sustainable farming would necessarily be best supported by extension through implementing programmes aimed at building capacity among farmers.

There have been varying scholarly opinions regarding the positions of farmers in a learning model. While perceptions exist that farmers are partners in extension (Düvel, 2000), they are equally seen as mere recipients of extension activities (Petheram, 1998). Aligning with the perception that farmers are recipients of extension, Schuh (2000) argued that it is the education from extension that suitably positions farmers to make effective use of their resources. Following the opinion of farmers as partners in extension, Roberts, Coutts, Ayers and Bilston (2002) argue that farmers' indigenous knowledge is only enhanced in a learning process.

The refurbished model would work well within the framework of farmers as co-learners or partners; in which case, the partnership proposed to support capacity building in the model envisages that:

- indigenous solutions are developed to tackle local problems while promoting social unity (Uphoff, 1996);
- common objectives and goals be set among actors, with a sense of achieving economies of scale and ownership (Castillo, 1997);
- there will be complementarities of efforts and skills based on comparative advantages of actors, as opposed to competition among them, to bring about efficiency (Zeigler & Hossain, 1995);
- replication of efforts is minimized among actors, while opportunities exist to access outside knowledge and resources to solve composite problems (Fesenmaier & Contractor, 2001);
- farming households achieve lasting benefits in terms of independence, self-management, autonomy and assuring structure of self-organization (Kibwana, 2000);
- asymmetry of information is reduced, thereby giving way to the birthing of new knowledge (Koza & Lewin, 2000); and
- access to harmonized competencies and specialized talent is enhanced, such that creates novel markets and suppliers (Carayannis, Alexander & Ioannidis, 2000).

#### 4. CONCLUSION

The ineffectiveness of extension to drive or otherwise contribute meaningfully to the achievement of South African goals for agriculture, food security and biodiversity conservation is apparent. While development policy clearly articulates the objectives, operational policy, implementation frameworks and the existing modes of delivery are unable to deliver them. This study documented the current working model within which extension is expected to drive food security objectives of households, as well as on-farm biodiversity conservation. An interrogation of the model identified critical gaps and disconnections that render the overall model ineffective. Key among these were: lack of collaboration among all the stakeholders involved in promoting food security, biodiversity conservation objectives and agricultural extension objectives; lack of adoption of capacity-building approach (replacing the current top-down, technology transfer approach) by extension to support farmers who are at the centre of the food security and biodiversity objectives; and weak extension institutions due to inadequacy of capacities that are essential for successful extension delivery. Drawing on the responses of key respondents in all three sectors – extension, food security and biodiversity conservation – the study proposes the refurbished extension model.

While continuing to work within the livelihood paradigms of farmers and rural families, the refurbished model defines a more logical structuring of service delivery mechanisms supported by policy coherence and the adoption of more appropriate extension methods to revitalize extension within the set context of achieving food security and biodiversity conservation simultaneously. The model suggests institutionalised and structured collaboration among all the stakeholders and institutions on the policy and processes fronts, in order to bring about complementarities and consistencies in efforts to achieve crosscutting objectives.



Specifically, the model suggests substituting, or at least augmenting, the current top-down, technology transfer approach of extension with a learning-based approach that focuses on building capacity among farmers and rural families to address their farming and food security in the context of the principles of biodiversity conservation. The capacity to be built, based on an assessment of farmers' strengths and weaknesses, is essentially in the arena of problem-solving through farmer-led, on-farm scientific enquiry, with an emphasis on generating local solutions and knowledge, with minimum reliance on external state support, be it extension or other state agencies.

The study cautions, however, that for the refurbished model to be effective, extension structures must be provided with sufficient staff members who have the appropriate knowledge and skills. They must also have adequate resources and be supported by accountable management personnel and processes – all of which are currently lacking.

The model ultimately submits that, rather than extension focusing all its attention and efforts on the outcomes (food security and biodiversity conservation), it should concentrate on facilitating change within the actors (farmers, rural families and at all levels in the extension service) in terms of skills, knowledge, attitudes and behaviour. Building such capacity will ultimately lead to the realisation of the desired outcomes.

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