

CHAPTER 1

Scaling Up

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Introduction

There has been a recent surge of interest in the subject of “scaling up” in development and natural resource management (NRM) and, to some extent, agricultural research. The literature is similar in focus to the large body of literature that already exists on diffusion or dissemination of innovations, especially with regard to agricultural innovations. However, there are some important differences (see, for example, Rogers [1995] and Ruttan [1996] for a history of diffusion research). There are also similarities with the literature on industrial scaling up.

This opening chapter provides an overview of basic issues addressed in the scaling up literature; it does not attempt to summarize the existing literature on dissemination. Within agricultural and NRM research, this area of debate reflects a concern to increase the impact, and thus the value, of research. Scale is understood to mean magnitude, and more is generally better than less (see Swallow et al. [2001] for a discussion of scale as magnitude and as hierarchy in the context of watershed management). In this sense, scaling up and the debates surrounding it do not constitute a social science issue as such. Rather, scaling up is a management issue. It is about how to manage projects to ensure that positive impact is maximized. In research in social and biophysical science, scale is generally understood in the terms of a hierarchy of levels of analysis. Research results relating to hierarchical scale can be very useful in the management of a process of scaling up, but the meaning of scale in the two contexts is different.

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The term “scaling up” and various related terms are widely used, and the literature on the subject is relatively extensive, yet our experience suggests to us that the terms do not have definitions that are clearly understood or universally accepted. As a result, it is often difficult to carry on a meaningful discussion about the underlying concepts. The purpose of this chapter is to summarize the central concepts and issues related to scaling up. We are interested in interventions/innovations that are the outcomes of agricultural research, such as new technologies, ways of managing resources (e.g., land and water), seed systems, agricultural enterprises, and collective organization (e.g., cooperatives, farmer research groups, and water-user associations). Research outcomes also include methodologies. The chapter also proposes working definitions that are both consistent with the literature, and useful for the International Center for Tropical Agriculture (CIAT, the Spanish acronym). The goal is to stimulate reflection and discussion within the center about how more attention to scaling up can enhance the ultimate impact of research. The chapter builds on several internal seminars, and served as input into the 2002 Annual Review.

The definitions and objectives discussed in the chapter are consistent with those developed by participants at the Consultative Group on International Agricultural Research (CGIAR)-nongovernmental organization (NGO) committee at the conference in the Philippines (April 2000, Silang, the Philippines), which defined the objective of scaling up thus:

“Scaling up leads to more quality benefits to more people over a wider geographic area more quickly, more equitably, and more lastingly.”

This definition is somewhat problematic because (a) it really defines the objective of scaling up, and (b) it uses the comparative yet does not state with what it is comparing. Nonetheless, this implies increasing the impact of an innovation or intervention to its logical or appropriate level, which in turn implies reaching larger numbers of people (Gonsalves, 2001b; p. 6). Scaling up according to this definition reflects both a concern for the extent of the impact, and for the quality of the impact in terms of sustainability and equity. Thus, scale refers not only to the benefits brought about through the intervention, numbers of people, and geographical area, but also refers to time scale and justice scale.

The chapter begins with a discussion on the reasons for the recent interest in this topic, followed by some general definitions of scaling up from recent meetings and literature. We briefly examine the relationship of scaling up with the longstanding body of work on dissemination and technology transfer, and the relationship between scaling up and issues of scale. We then look at some of the points and processes involved in scaling up, and suggest a structure for considering scaling up within CIAT’s projects.

Background—Recent Debates and Changes in Thinking about Agricultural and NRM Research

Quality of impact

The issue of scaling up has been the center of much recent debate within research and development (R&D) institutions, especially those concerned with NRM. Workshops carried out include those at the International Center for Research in Agroforestry (ICRAF) 1999, the World Bank 1999, the International Institute for Rural Renovation (IIRR) in the Philippines in 2000, and most recently at the Natural Resources Institute (NRI) in the UK in 2001. There is also a multitude of publications on the matter (see, for example, Unwin, 1995; IIRR, 2000; Unwin et al., 2000; Gündel et al., 2001; Harrington et al., 2001).

This interest has arisen in the context of several important developments in thinking about R&D. First, donors and civil society are increasingly pressuring that money spent in R&D must bring about lasting impact on the lives of the rural poor. Second, the recognition that many relevant technologies and approaches are not achieving their full potential impact because of low levels of adoption has led to more emphasis on the effectiveness of research to produce adoptable technological options.¹ Thus donors (amongst others) are not only calling for increased impact, they are putting conditions on the quality of that impact in terms of sustainability and equity. This leads to the objective of scaling up expressed in the IIRR workshop definition, and is one of the considerations that separates the scaling up literature from its dissemination predecessor.

New ways of involving end-users

Another change also has been important. In the past, agricultural R&D institutions traditionally adopted a technology-focused approach (Biggs, 1990). This implies a system in which scientists in institutions develop and test the technologies, such as germplasm, which they consider relevant to farmers, and once this process is complete, disseminate them, often through national agricultural extension services. Farmers were often involved in this process; however, their participation was usually not systematic nor were they in a position to make decisions over research priorities or activities. In this type of system, increasing impact implies disseminating material, and making sure it reaches as many people as possible. A significant amount of research was done on technology adoption/diffusion with the goal of improving the extension/dissemination process (see, for example, Rogers, 1995; Ruttan, 1996).

1. Skeptics may suggest that researchers are simply looking for ways to increase adoption of innovations that nobody actually wants. However, the literature on going to scale suggests that with many innovations there are barriers to going to scale that may not reflect a fault in the innovation itself.

Agricultural research organized under this model has been extremely successful in some cases; however, several limitations have come to light. In cases where there is a high diversity of environmental conditions, and users' preferences are poorly defined (as is generally the case with poorer smallholders), the technologies developed may not be useful or desirable to large numbers of the rural poor. This, in turn, leads to lower levels of adoption, which implies limited impact. Key restrictions of adoption include the small farmers' inability to be flexible with land, labor, and capital inputs. Often one or all are in short supply, so the technology cannot be adopted. Moreover, small-scale farmers need to protect household welfare; hence they are very cautious about changing established practices. Marketing challenges of products also limit adoption. For innovations to be adopted, these constraints must be addressed. The heterogeneous characteristics of small farms and families make vertical scaling up (see page 16) especially challenging, and perhaps impossible without adaptation or fine-tuning. These challenges have led to the development of new ways of working with end-users in order to both develop and scale up innovations, some of which are outlined below.

Systems' approaches

Confronted with the complexity of the problems facing farmers, an integrated approach often needs to be taken that works with different components of the system, including social, economic, biophysical, and policy dimensions. The farming systems' research initiatives of the 1970s and 1980s, which introduced social science inputs, and more recent participatory and gendered approaches, seek to address both the complexity and equity challenges (see Collinson, 2000). This change was also accompanied by a shift in focus from global or regional scales towards expanding efforts into local and intra-household perspectives.

Partly as a consequence of the development of research methods and perspectives, the types of innovations that centers are producing are evolving from relatively easy-to-use technologies (e.g., seeds) to more knowledge- and management-intensive innovations, such as guidelines for soil management or integrated pest management (IPM), or methods for organizing adaptive research or watershed management. Integrated natural resource management and integrated soil fertility management are examples of this (see Amede et al., 2003). An integrated approach also implies involving other actors, and including end-users in the research process in order to address multiple dimensions of a problem.

Part of the interest in going to scale—as opposed to disseminating technologies—has arisen in the context of these changes, which have led to more complex research outcomes and new ways of working with end-users. Scaling up of these more knowledge- and management-intensive innovations has created new challenges, some of which are not addressed adequately in the dissemination literature. The knowledge of breeders is

effectively “packaged” into the seed, so in order to transfer this knowledge it may be necessary only to make sure that the farmer has access to the seed, and some basic technical knowledge. To pass on the knowledge a scientist has about how to evaluate different varieties (in the case that the seed is not appropriate to the farmer as is), or about other topics, such as soil nutrient flow and management, is far more complex (Simon Cook, personal communication, 2002). Thus, going to scale is similar to extension/dissemination in the sense that they both aim to get more benefits to more people more quickly, but presents different challenges.

Interest in going to scale with these types of innovations also has to do with how integrated systems research is conducted. In order to integrate research on many aspects of a problem, work often must focus on a single or very small number of physical sites. Large impact may be observed in a site, but it is difficult to identify causality given the high and often sustained level of intervention of researchers and others. Observed results are often due to both the research process and the technologies, so to some extent both must be replicated to achieve similar impact elsewhere. How to do this is the essence of the scaling up challenge. This problem is faced not only by research projects working in field sites, but also by NGOs who work in a limited number of communities yet hope to achieve impact in many.

Basics of Going to Scale

A note on definitions: Scale

Scale is a key element in natural and social science. Scale is generally understood in terms of hierarchy, and different disciplines generally have different criteria for defining and measuring scale. Research results are often dependent on the scale at which the analysis was done. Two important concepts concerning scale are the ecological fallacy (what works at one scale will work at another), and the composition fallacy (what is good for one person is good for everyone). An example of the ecological fallacy might be to extrapolate subplot-level soil erosion data to the watershed level, given that most soil moves only a short distance, may have its movement interrupted by a variety of biological or physical structures in the landscape, and may take a very long time to reach streams or other areas where it could potentially cause harm (Swallow et al., 2001). An example of the composition fallacy would be to assume that if one village increases its income by growing a new crop, all villages in the region could do the same. Unless there is a large market for the product, the result of expanding production would likely be a fall in prices and reduced rather than increased income. Multi-scale, multi-disciplinary analysis will play a key role in supporting the process of scaling up the use and impact of technologies.

More definitions—Scaling up

Part of the confusion with terminology comes from the fact that scaling up is often used as a catchall general term to refer to a combination of different processes, which themselves have a variety of different definitions. One of the earlier papers in this body of work defined four different types of scaling up for NGOs: Quantitative, functional, political, and organizational (Unwin, 1995). These are described in Table 1.

Table 1. Typology of scaling up.

| Unwin's terms ^a | Description | Alternative terms |
|----------------------------|--|---|
| Quantitative scaling up | "Growth" or "expansion" in their basic meaning; increase the number of people involved through replications of activities, interventions, and experiences | Dissemination, replication Scaling out or horizontal scaling up ^b |
| Functional scaling up | Projects and programs expand the types of activities (e.g., from agricultural intervention to health, credit, training, etc.) | Vertical scaling up ^b |
| Political scaling up | Projects/programs move beyond service delivery, and towards change in structural/institutional changes | Vertical scaling up ^b Institutionalization |
| Organizational scaling up | Organizations improve their efficiency and effectiveness to allow for growth and sustainability of interventions, achieved through increased financial resources, staff training, networking, etc. | Vertical scaling up ^b Institutional development |

a. Terms from Unwin (1995).

b. Term adopted in Gündel et al., 2001.

SOURCE: Adapted from Gündel et al., 2001.

However, for the purpose of this chapter, we have decided to use the terms, horizontal scaling up and vertical scaling up, proposed by the participants in the Going to Scale Workshop (IIRR, 2000). These are defined in Figure 1.

An example of **horizontal scaling up** (often referred to as scaling out) could be the adoption in different communities of a tool for managing soil nutrient content. **Vertical scaling up** may mean moving from individual to collective decision making, or it may involve moving from simple organizations based on face-to-face interaction to complex, hierarchical organizations. An example of this is if the same integrated soil nutrient management tool goes from being used by individual farmers to being used in a coordinated way by a group of farmers in the same community, or by an association of farmer groups in many communities. Such vertical scaling up might allow farmers to deal with soil management problems above the plot level.

Vertical scaling up includes **institutionalization** (often referred to as "mainstreaming", especially in the participatory literature). This implies

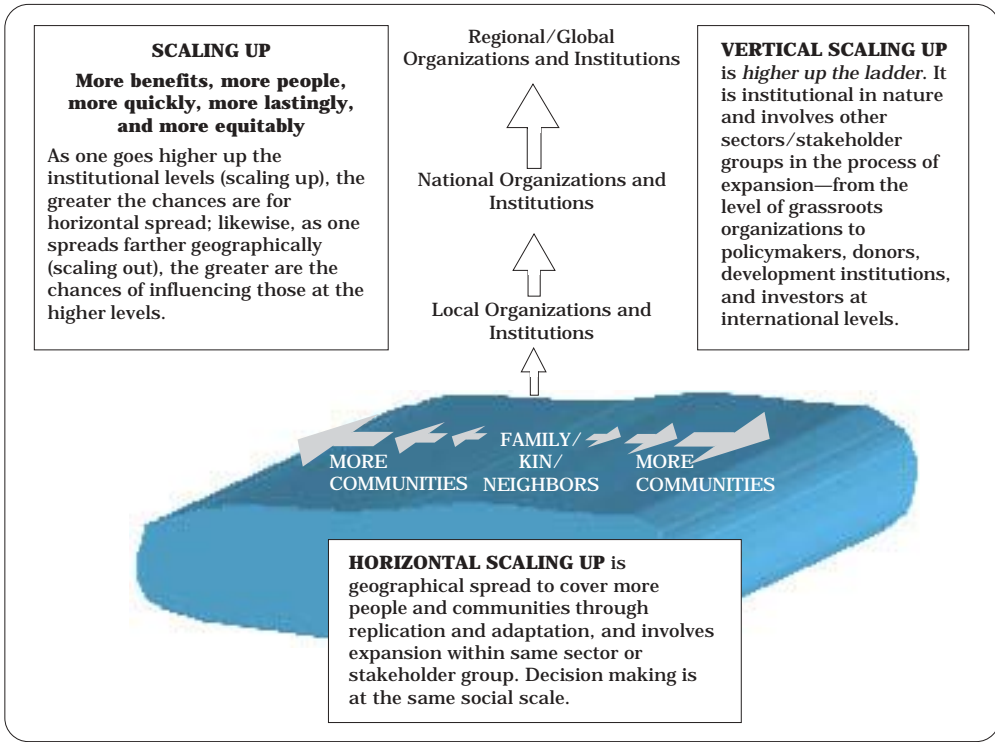


Figure 1. Definitions of scaling up (adapted from IIRR, 2000, p. 17).

getting institutions to accept and internalize the underlying principles of an innovation so that these will remain as guiding principles of practice even after the initial innovative project or program has come to an end. There is a growing body of work on the institutionalization of participatory approaches (see Blackburn and Holland, 1997; Bainbridge et al., 2000). For example, where the community has adopted a participatory integrated soil management process, the principles underlying this would be applied in other areas. So the same community may use the organizational and participatory approaches to work in areas such as water management, education, or health, or they may use the more holistic approach to combat a certain pest by incorporating organic solutions into their pest management strategies.

Horizontal scaling up

Horizontal scaling up of the more complex research outcomes referred to above differs in many respects from the process of disseminating a new variety. Because these complex research outcomes involve the end-users, and work with several different components of a complex system, immediate research outcomes will be less applicable for others. Horizontal

scaling up therefore implies adapting knowledge and innovations to the conditions of different end-users, which requires understanding the principles underlying an innovation. For this to be done successfully, those doing the scaling out, whether extension agents or farmers, will need more training and support networks in order to work with communities to adapt innovations to their needs.²

In addition to technologies, methodologies can also be end products of research. The farmer participatory research (FPR) methodologies, such as Committees for Local Agricultural Research (CIALs, the Spanish acronym), participatory plant breeding modules, or farmer field schools (FFSs), are also research outputs that can be horizontally and in some cases vertically scaled up. A CIAL is a model for involving specified actors in a structured process with set objectives. Horizontal scaling up almost certainly will involve adaptations and unexpected impacts; however, the general process is well defined. Replicating CIALs according to the methodology, but allowing and even encouraging adaptation, is an example of scaling out. A similar argument could be made for methodologies for organizing watershed management associations, or implementing FFSs. Thus, replication of these methodologies is complicated because to horizontally scale up these innovations it will be necessary to adapt them to the conditions and demands of other communities. Again, this implies building capacity and transferring understanding about the underlying principles rather than just the methodologies themselves. These factors are discussed in more detail below.

Vertical scaling up

Vertical scaling up refers to expanding an innovation beyond the original participants and objectives. In the first instance, we can take the example given above of the adoption of an integrated soil nutrient management tool on a larger scale. The tool was designed to facilitate innovation at the plot level, but the basic information and principles (diagnosis, experimentation) may also be useful for addressing higher-level problems, such as community-level soil and water management. Scaling up the tool would involve recognizing its usefulness for other problems, and bringing additional actors into the innovation process so that it is broadened and strengthened via the coordination of their research/experimentation/adaptation activities. This almost certainly implies an increase in the geographical scale of the unit in which the technology is adapted and applied; however, the key variable is that decisions are being made at a higher level.

The sustainability condition within scaling up implies leaving people with the adaptive capacity to deal with problems as they arise. This

2. Farmers have always adapted agricultural innovations. However, recent thinking reflects recognition of the necessity and utility of this adaptation, and a commitment to support it.

process is inherent in adaptive management, which is increasingly understood as a promising way to innovate in whole ecosystems where, for example, major dysfunctions are occurring, the exact cause-effect relationships are difficult to ascertain, and interventions have to be made on a trial-and-error basis. The capacity to adapt is understood as a central characteristic of sustainability, also defined as the capacity to withstand or bounce back after major shocks occur in complex systems. One factor that contributes to adaptive capacity in a complex ecosystem is the extent to which the human beings impacting it are able to learn from experience and innovate. The development of this adaptive capacity involves a range of activities, including training, building networks, creating functional organizational structures, and gaining institutional support.

Institutionalization

Where the principles underlying an innovation and the adaptive capacity mentioned above become an internal part of an institution in a sustainable way, we can refer to this process as institutionalization. This implies not only a change in the way people work, but also a change in the written and unwritten rules of the institution, and a change in the way people within that institution think. This is the subject of much debate within participatory literature. While a lot of work has been done within management studies on processes of institutional change, there remains a long way to go on increasing the understanding of these processes within public institutions (Chell, 1987; Collins, 1998; Jones et al., 2000).

Often, these processes of institutional change are a necessary precondition for successfully going to scale on an innovation. As mentioned above, many innovations now involve a multi-disciplinary approach that incorporates a variety of stakeholders into the research process. Many institutions are structured in a way that does not easily allow for the creation of multidisciplinary teams or direct interaction with end-users. These are some of the obstacles to scaling up.

Elements of effective scaling up

This section will briefly highlight some strategies for scaling up as discussed during the four international workshops, based on participants' experiences (IIRR, 2000; Franzel et al., 2001; Gonsalves, 2001a; Gündel et al., 2001). We summarize the key strategies discussed under six key themes:

- (1) Incorporating scaling up considerations into project planning,
- (2) Building capacity,
- (3) Information and learning,
- (4) Building linkages,
- (5) Engaging in policy dialogue, and
- (6) Sustaining the process (funding).

Incorporating scaling up considerations into project planning. A key strategy that emerged in all the workshops is that to increase the impact of research, scaling up must be considered from the beginning of the research and planning process. This implies:

- Building scaling up strategies into the technology development process and including them in project proposals can ensure that these considerations are given full attention throughout the life of the project. The likelihood of scaling up can be increased if key opportunities and challenges are identified at an early stage, thereby allowing key channels for scaling up research activities and development outcomes to be identified. In this way, it forms an integral part of the technology/methodology development process, and much work can be done during the research process to lay the groundwork for going to scale. This is one of the key recommendations found in the industry literature on scaling up.
- Involving stakeholders as decision makers from the beginning of the innovation process. This is crucial in identifying real priorities, and in developing appropriate solutions to problems. Therefore research outputs (technologies, processes, methods) are shaped at an early stage of the project in collaboration with stakeholders and users, and can subsequently be adapted throughout the project. Additionally, participatory research can enhance the capacity of farmers and communities to become agents of change, and to respond to new problems arising in the future.
- Identify strategies to package/sell your outputs.
- Better use of extrapolation methods—linking different methods (geographic information systems [GIS]/FPR/economic modeling). In expanding the impacts of research outputs, it will be critical to use different methods. For example, linking FPR results to GIS information may offer a strategy to identify regions where the results can be scaled up—such as areas with comparable geographical, cultural, and socioeconomic characteristics.

Capacity building. In order for complex innovations, such as a soil nutrient management tool, to be adapted and applied in a variety of different contexts, those involved need to have a good understanding of the knowledge and principles underlying the innovation. This implies rigorous capacity building of staff in local institutions, and building the adaptive capacity mentioned above within local institutions and local communities. This process often occurs implicitly in the participatory research process, but needs to be made explicit in scaling up.

Capacity building is an important strategy, especially in the implementation and exit stage, to internalize new ideas within communities and institutions. This involves building the capacity of farmers and scientific personnel and the institutional systems to sustain and replicate the process.

Building and strengthening the capacity of communities to innovate may often be just as, or even more important than, the technologies themselves. It is critical for stakeholders to understand that the underlying principles behind a technology can help communities cope with changing environments, and in addressing arising problems. Finally, strengthening local capacities empowers farmers and local communities, and helps create broad-based support and effective local implementation of scaling up activities.

In addition to building the capacity of communities, it is important to develop a critical mass of R&D personnel with skills and experience in modalities for conducting agricultural and NRM research. This can include skills in consulting and collaborating with stakeholders, skills in working across disciplines, and an understanding of scaling up strategies, amongst others.

Information and learning. In order to ensure informed, effective, and appropriate decision making by a wide range of stakeholders in the scaling-up process, it is important to invest in a process of documenting, drawing lessons and experiences, and also undertaking corrective measures throughout the project cycle. Learning and corrective loops should be central to scaling up processes, in deciding what should be scaled up and how this might be achieved, and in providing validated evidence to influence policymakers. This involves several aspects:

- Participatory monitoring and evaluation (PM&E), which involves identifying indicators of change and building a process to monitor and evaluate change, and to measure impact and process of scaling up/out. PM&E ensures that learning and corrective loops are built into the innovation process.
- Effective impact assessment will also be necessary in order to learn from, and gain credibility on, the effectiveness and extent of impact of innovations, and to provide validated evidence to influence decision makers at different levels. Furthermore, impact assessment will help to identify factors that are important for adoption that may contribute to the success of innovation. However, if innovation occurs as the result of the interaction of the results of many simultaneous and independent (or perhaps only loosely coordinated) research initiatives, the traditional concepts of diffusion, adoption, and impact (especially attribution of impact to a specific research investment) may not be appropriate.

Building linkages. Developing partnerships and strategic alliances with other stakeholders (private sector, NGOs, governmental organizations [GOs], communities) is one of the essential strategies for successfully scaling up innovation. This will increase pathways through which the innovation can be scaled up, and thus leverage scarce resources to achieve greater impacts. These linkages have to be robust, ideally with

direct participation of the other stakeholders in the research process in order to ensure local ownership, and to ensure that the necessary adaptive capacity is developed. This can involve several strategies, such as developing partnerships and strategic alliances, and linking with other stakeholders (private sector, NGOs, GOs, communities). This includes expanding and strengthening links amongst institutions and organizations with complementary agendas, expertise, resources, and “reach”, as leverage resources. Inter-institutional collaboration and coordination is not only important, it is crucial, and a prerequisite for maximizing impact.

Engaging in policy dialogue. It is necessary to engage in dialogue with policymakers not only to gather support for innovations and projects, but also to create the right institutional environment for innovations to be scaled up. For example, it may be necessary to convince managers of the need to work with end-users, but it may also be necessary to encourage the changes within the institutional structure necessary to overcome the institutional barriers mentioned above.

Engaging in policy dialogue on pro-poor development agendas is critical in achieving impacts. The NRI workshop emphasized the importance of placing research in the context of local, regional, and national development agendas because this helps identify key entry points and the major priorities. The participants felt that policymakers should be consulted at an early stage of the research project so as to shape the overall project design, and additionally through regular reviews of the project or at other development discussions.

Sustaining the process (funding). For the process to be sustainable requires reliable funding. Thus, donors need to be lobbied to obtain long-term flexible funding, which allows for a learning process to take place. Appropriate mechanisms also need to be developed to sustain capacity for expansion and replication. This involves paying special attention to mechanisms for self-financing, input/output markets, capacity building, and local and regional networking.

Conclusions: Implications for CIAT

A quick survey of CIAT projects will show that most already include many of the strategic elements mentioned above. Researchers have a general understanding of the need to scale up, and the issues involved, whether or not they term this as scaling up. However, to fulfill the equity and sustainability conditions of scaling up, many challenges remain to be met. Scaling up will imply more changes in the way we work.

The elements mentioned above are similar to those listed in Gündel and Hancock (2001), which have been put into Table 2, and may help incorporate scaling up considerations into project planning.

Table 2. Elements of effective scaling up.

| Project phase | Activity relevant to scaling up | Strategic elements towards successful scaling up |
|----------------|---|--|
| Pre-project | Situation analysis | Engaging in policy dialogue on pro-poor development agendas Identifying community, institutional, and environmental enabling and constraining factors Appraising institutional capacity of agencies involved |
| | Identifying target groups | Identifying appropriate research objectives and outputs within development processes to ensure widespread uptake |
| | Setting objectives and outputs Developing monitoring and evaluation system | Identifying indicators and planning, monitoring, and evaluation methods to measure impact and process |
| | Collaboration | Building networks and partnerships to increase local ownership and pathways |
| | Funding mechanisms | Developing appropriate funding mechanisms to sustain capacity for expansion and replication |
| Implementation | Capacity-building and institutionalizing | Building capacity and institutional systems to sustain and replicate |
| | Partnership forging | Demand, supply, and support actors identified |
| | Networking | Other resource organizations contribute with products and by building technical capacity |
| | Raising of awareness | Multi-media dissemination of findings |
| | Policy dialogue | Aggregate and assess findings from individual projects and derive policy-relevant information |
| Post-project | Monitoring and evaluation and support studies | Central to scaling up processes in providing evidence to influence policymakers, in deciding what should be scaled up, and how this might be achieved |
| | Exit strategy dissemination | Concerted action required on a regional level should involve the target group as disseminators |
| | Impact assessment | Built upon monitoring and evaluation Representatives of target group part of assessment team Technological and livelihoods assessment required |

SOURCE: Adapted from Gündel et al. (2001).

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