What kind of research and development is needed for integrated natural resource management?

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Abstract

This paper presents a set of principles and operational cornerstones for R&D to address natural resource management problems better. The work is based on a series of workshops where experts and practitioners distilled best practices. The principles and cornerstones, a number of which relate to scaling issues, are illustrated with case studies from Zimbabwe and Indonesia. The former incorporated catchment management for improved small-scale irrigation, while the latter focused on work with communities that had confronted logging companies, partly because of the negative impact of logging on water quality. The principles are grouped as follows: (a) Commitment to action research, learning and experimenting among stakeholders. Considerable experience of action research at the farm level exists, but much remains to be learned about its application at the scale of socio-ecological systems (e.g. catchments). (b) Project flexibility and adaptation to the types of action required. Analysis and intervention must be at multiple scales, and scaling-up and out must be planned from the outset. (c) New forms of organisation to implement

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Effective development research. Eleven operational cornerstones for implementing the approach are suggested: shared focus, collaborative partnership, team work, facilitation, governance, organisational capacity, information, learning, incentives, scaling-up, and research design and process. The elements and strategies for two of these cornerstones (partnerships and scaling-up and out) are illustrated.

**Key words:** Social learning; Participatory action research; Adaptive management; Innovative organisations; Operational guidelines; Research and development; Partnerships; Integration; Scales; Scaling

1. **Introduction**

Natural resource research in developing countries has not brought the benefits that its proponents had hoped for, especially in benefiting the poor (Anderson, 1998; Röling and Jiggins, 1998; Barrett, 2002). Instead, the major impacts in natural resource management (NRM) have come from approaches conventionally viewed as less scientific in terms of researcher objectivity, the type of data collected, and the methods employed. Greatest impacts tend to occur where actors become researchers and vice-versa; where researchers investigate the ‘softer’ social systems, as well as the ‘harder’ environmental factors; and where facilitators create learning processes among stakeholders at different scales, not just among scientists (Lee, 1993; Hagmann, 1999; Sayer and Campbell, 2004).

Natural resources research needs to re-invent itself. Researchers can no longer remain external actors using the routine design controls. They need to engage themselves in the disorderly,
more time-consuming world of action research to develop appropriate solutions together with
resource users and policymakers. A ‘third generation’ research and development (R&D) is needed
(Roussel et al., 1991), in which researchers and other stakeholders work together to improvise and
integrate R&D. As they do so, the distinction between the two will become less clear (Chambers
and Jiggins, 1986; Douthwaite et al., 2001). We suggest using the term “development research.”

Development research on natural resources that has real impacts for the poor is urgently
needed. Billions of poor people depend on natural resources for the range of goods and services
upon which their livelihoods are based (e.g. Byron and Arnold, 1999); yet inadequate management
of these resources has led to their degradation and declining supply (e.g. Cleaver and Schreiber,
1994). The initial gains of agricultural research, which were largely confined to areas of high
agricultural potential, often benefited more prosperous farmers, missing the poorest of the poor
(Conway, 1997). In many cases agricultural research yielded short-term gains at the expense of
long-term degradation of soils, water, biodiversity and forests (e.g. Angelsen and Kaimowitz,
2001). In the meantime population densities increase and global climate change renders partly
irrelevant the accumulated local and scientific knowledge upon which agricultural improvements
are based. As water becomes scarcer and supplies less predictable, a number of human and social
stresses jeopardize the capacity to improve agricultural production. HIV/AIDS, malaria,
tuberculosis and emergent diseases undermine the social structures of rural people. Increasing
commercialisation and globalisation of production often foster economies of scale, where larger
companies realize economic advantages over smallholder farmers. As a result of these trends, it is
likely that poverty will worsen, particularly in Africa, where these problems are especially acute.

Major questions remain as to how poverty-alleviation goals match with longer term
conservation interests. Countless studies have documented the deficiencies of previous efforts to
conserve landscapes and improve livelihoods (McShane and Wells, 2003), and many agree on the need to adopt new approaches to natural resource problems (Binswanger, 1998; Sayer and Campbell, 2004). Recently, the World Bank, the United Nations Convention on Biological Diversity (UNCBD), the Global Environmental Facility (GEF) and the UN Convention to Combat Desertification (UNCCD) adopted policies committing to new integrated approaches to environmental problems. If these new approaches are to be more effective, what must be done differently?

This paper presents a set of principles and operational cornerstones for re-inventing R&D to address NRM problems of the rural poor more adequately. In the following section, the approach is described, as well as the workshops on which this paper is based. In the third section, two case studies (dryland Africa and humid Indonesia), both with water-related development components, are described. In the fourth section, the principles of development research are introduced. In the fifth section, the operational cornerstones for implementing the advocated approach are highlighted. To show the level of detail required to achieve quality implementation of development research, two of the eleven guidelines (partnerships and scaling-up) are used as examples. Finally, in the last section recommendations are provided to make development research a reality.

2. Approach

The development research principles discussed here are based on the presentations and discussions generated during two international workshops (in Penang and Cali). These were convened by the Integrated Natural Resource Management (INRM) task force of the Consultative Group for International Agricultural Research (CGIAR), which includes 16 Centres. Different facets of INRM were documented in a special issue of Conservation Ecology (http://www.consecol.org/vol5/iss2) and synthesised by Sayer and Campbell (2004).
Although identification of the key principles is an important advance, there is inadequate experience as to how they can be operationalised effectively. The third INRM workshop (in Aleppo) addressed issues surrounding effective practice and derived an operational framework for managing NRM interventions (Turkelboom et al., 2002). This was based on the LearningWheel, a methodology for systematising experiences of multiple stakeholders (Hagmann, in prep). In a stepwise process, participant’s experiences representing a variety of cases from around the world were shared and then analysed systematically to identify factors leading to successful outcomes for the local people and the environment.

More than 100 persons—mostly from the CGIAR but also including NGO staff and academic and government agency researchers—contributed to the workshops. The participants’ experience was in a few disciplines or sectors, rarely addressing whole social-ecological systems (Walker et al., 2002); nevertheless, their combined experience provided a fairly complete picture. Building on that analysis, the success factors were clustered into a set of ‘cornerstones’ that must be addressed in order to manage NRM interventions effectively. These cornerstones were subsequently elaborated by Campbell et al. (in prep.).

The two case studies used herein, from dryland Africa and humid Indonesia, have been the subject of intensive R&D efforts by teams of researchers for a decade. The authors of this paper formed part of those teams (Campbell et al., 2002; CIFOR 2002).

3. Complexities faced by researchers in Zimbabwean drylands and Indonesian rainforests

3.1 Drylands of southern Zimbabwe
One of the greatest challenges in this area is the lack of water for household and farming activities (Table 1). Water specialists are faced with a complex biophysical situation: the need to examine resources and use at different scales, and the multiple interaction of resource use at the same and different scales. Key questions include: How does surface water interact with ground water? How can water storage be increased for small-scale irrigation without severely impacting downstream use? How can the effects of frequent droughts be ameliorated? In addition, management of the land and vegetation resources in the catchment has to be considered.

Nevertheless, these issues are only a minor component of those that need addressing in the larger socio-ecological system. Local organizations (e.g. irrigation and water point committees, district government) perform poorly. In addition, local rules and regulations have numerous problems as illustrated by the inoperative bye-laws of the district. Although a water reform process is occurring, it remains top-down, unlikely to mesh well with local institutions.

To solve water-related and other problems, R&D agents need to engage multiple local and external players, from local committees to the national extension service and to large NGOs such as CARE operating in the area (Hagmann et al., 2002). R&D agents need to confront the reality that NRM organizations have different perspectives. For example, the boundaries of administrative units and different natural resources do not match. Unfortunately the organizational mandates and agendas of R&D agents are not set up to embrace the complexities.

In these drylands local livelihoods involve a diverse portfolio of activities so narrow crop or animal-specific approaches are likely to make little difference to the overall household economy. For example, the activities (dryland crops such as maize and sorghum) of the international research centres CIMMYT (International Maize and Wheat Improvement Centre) and ICRISAT (Institute for the Semi-Arid Tropics) together cater to less than 20% of the household-income portfolio. Thus,
even though they have a major technological breakthrough that is adopted, the impact on income will be limited. Livestock research by ILRI (International Livestock Research Institute) and research on forest and tree resources by ICRAF and CIFOR would also be needed. In addition, at least a quarter of the total income is derived from non-farm sources, so poverty reduction must also be addressed through efforts to improve small business opportunities and remittances from urban employment (e.g. through a growing national economy). Furthermore, HIV/AIDS has created a new situation, requiring agricultural R&D agents to work closely with health specialists.

3.1 Rainforests in northeastern Indonesia

In Borneo, the second case study site, the local government, large and small timber companies, and the national forest department have sought to extract timber through concessions, small-scale timber cutting licenses and illegal activities, often in overlapping and unclear arrangements. Local people have relied on the forest for subsistence and cash income (Levang, 2002). The local villages, comprised of 18 distinct ethnic groups with their own historical alliances and conflicts, want to secure the boundaries of their territories to control use within them and claim compensation for logging (Limberg, 2004). However, forests are only one aspect of the local people’s lives. All villagers want better agricultural productivity and improved market, transport, education and health infrastructure, as well as improved access to good-quality water for drinking, bathing and fishing. Logging negatively influences water quality, to the point where at least one village has made a stand against a logging company (Iwan, 2003). While rural population densities are only about 1 person/km², conflicts over natural resources have increased dramatically since decentralization and democracy reforms began in 1998 (Sudana, 2004), which have led to exceptionally rapid changes.

In the midst of these changes, external assistance committed to specific geographic areas or populations has had the most impact in contrast to interventions built on specific technical and
institutional arrangements, which have been short lived. The World Wide Fund for Nature has been active in managing the 1.3 million-ha Kayan Mentarang National Park and promoting biodiversity conservation and community development since 1990. A missionary of the Catholic Church has worked with ethnic Punan groups for three decades.

Technical research on large-scale logging, conducted by CIFOR in 1996-1999 (Sist et al., 2003), demonstrated the value of reduced-impact logging. However, this work became obsolete suddenly when the new district government introduced small-scale timber-cutting licenses in 2000, and the logging companies had no interest in sustainable logging. Meanwhile, other researchers focused on improving management of the watershed, including consideration of the role of forests in maintaining water quality. They purposely engaged different players at national, district and local levels, who were often at ease with one another (Campbell et al., 2003). Local-level research on community-boundary demarcation brought distrust at the district and national levels. Research on logging methods with the logging companies was frowned upon by local communities because they felt cheated by the companies. Nevertheless, the research has sought to bolster the influence and capacities of weaker groups and build communication and cooperation amongst all groups through a learning-process approach using participatory mapping, multi-stakeholder dialogues and field visits, intercommunity workshops, collaborative monitoring, training in facilitation and conflict management, and joint economic development activities (Wollenberg et al., in press).

4. Foundations for re-inventing natural resources research

A set of principles, grouped into three categories (Fig. 1), are proposed to guide development research: (a) Commitment to participatory action research (PAR), learning and
experimenting among stakeholders; (b) Project flexibility and adaptation to the types of action required. (c) New forms of organisation to implement effective development research.

4.1 Commitment to learning approaches

This principle is regarded as a fundamental value for achieving effective development research. Ideas established in three rather different traditions—adaptive management, social learning and action research (Holling et al., 1998; Daniels and Walker, 1999; Hagmann, 1999; Maarleveld and Dangbegnon, 1999)—suggest that when dealing with multiple stakeholders, management must be organised in a way that promotes active, conscious individual and social learning. Resource management should be based upon continuous dialogue, deliberation, planning, action, reflection and re-planning based on the insights of what has been learned amongst the stakeholders.

4.1.1 Improving adaptive capacity

In Indonesia, the value of the research with an adaptive approach was demonstrated during Indonesia’s violent period of policy change and uncertainty. The strategy shifted from seeking national policy changes that accommodate community claims to forest to a strategy of district government capacity building and co-learning with communities about forest-based income opportunities. These rapid changes left little room for meaningful influence on national policy so national agencies were greatly disempowered. When opportunities were opened up by a community that confronted a logging company, researchers stepped in to help the community achieve its aspirations. In Zimbabwe, constant dialogue with villagers and district officials allowed for flexibility of action and analysis. The work on bye-laws with a focus on small-dam resources was not planned in the project proposal but emerged as the project unfolded.
In mainstream R&D the prime objective is often to introduce improved technologies; however, in a multi-stakeholder situation, it is unlikely that any single technological objective will suit all stakeholders. Standardised technologies that work in many contexts will only be part of the solution. Given heterogeneity, complexity and dynamism, one of the prime objectives will be to improve the adaptive capacity of the actors; that is, improve their ability to sustain a flow of the diverse products and services under constantly changing conditions (Gunderson and Holling, 2002; Lynam et al., 2002). Tools to improve adaptive capacity include a variety of modelling approaches (e.g. Failing et al., 2004); for instance, the one adopted at the Zimbabwe site places great weight on the perspectives of different stakeholders (Campbell et al., 2002; Lynam et al., 2002).

4.1.2 Social learning

In comparison to farming systems research (Collinson, 2000) or the ecosystem approach, the approach described herein involves ‘getting into the system.’ There has been an evolution from understanding the system to making it understand itself better. It is no longer research on systems but within systems, combining understanding and change at the same time (Hagmann et al., 2002; Sayer and Campbell, 2004). Researchers should recognise themselves as being an integrated part of the system, one of the many actors, with the research process driven by the users of the research results. Thus rural people will be partners, not passive beneficiaries. Empowerment from outside and emancipation from inside the system are central thrusts.

4.1.3 Adaptive management

The use of PAR entwines the R&D processes so as to gain understanding within a particular socio-institutional context, while influencing change at the same time (Scoones and Thompson, 1994). At the Zimbabwe site, for example, PAR was used at the village level to arrange the
implementation of expanded smallholder irrigation; while at the district level it was used to negotiate a new governance arrangement for common-pool resources. In Indonesia PAR involved a multitude of stakeholders with varying interests and perspectives, facilitating institutional change and reflecting on the effectiveness of progress (Wollenberg et al., in press).

Although there is considerable experience with PAR at the farm level, a great deal remains to be learned about its application at the level of socio-ecological systems (German et al., in press). To accomplish this goal, additional efforts are required to reflect the larger scale and multiple interactions among numerous stakeholders. Management of these systems will be experimental in terms of (a) technical solutions for farms and other landscape units; (b) collective action or other socio-institutional structures required; and (c) service and policy support. Natural resource agencies will no longer be able to project their own vision of a single best way of managing the landscape.

Information management is also crucial to the learning process. Mainstreaming monitoring and evaluation, and impact assessment are key tools for adaptation, learning and performance enhancement along with providing data for further negotiation amongst stakeholders and for resource-allocation decisions (Gijnt, 1998; Gottret and White, 2001). The key issue is not monitoring and evaluating by outsiders, but self-monitoring and evaluation by all the actors with their different realities and perspectives (Gijnt, 1998).

In the research context high-technology research on system components is still vital but must be embedded in a context of specific biophysical and socio-economic situations. Moreover, research needs to recognise stakeholders’ multiple and sometimes competing goals. Identification of and dialogue regarding different stakeholder goals are key components of the PAR approach. For instance, competing goals are clear in the Indonesian case, where district authorities and local communities have very different perspectives on development needs.
4.2 Types of action: What is required where?

4.2.1. Balancing soft and hard approaches

In development-related research many scientists adopt a ‘hard’ science approach with only one correct answer that is discovered using formal (conventional) research methods under controlled conditions. Nevertheless, some scientists working alongside local resource managers understand and use constructivism (Douthwaite et al., 2001). They observe the multiple realities of the different stakeholders and understand that constructing new ones requires full participation, ownership and empowerment of local stakeholders.

With the mainstreaming of PAR approaches, development practitioners have increasingly taken a ‘soft’ science or more constructionist approach. In so doing, getting the balance right between soft and hard approaches is a key challenge (Douthwaite, 2002). In Indonesia the two approaches were not integrated until after a number of years’ interaction when better balance was achieved.

4.2.2. Approaching systems from an organisational and institutional perspective

This perspective is essential because organisations greatly influence the ‘hard’ (ecological) system and its performance. Many institutions aimed at balancing different stakeholders’ interests (i.e. through norms, rules and regulations) have limited effectiveness. Issues of property rights, access to resources and decentralisation of decision-making are central to research on socio-ecological systems. Nevertheless, organisations with their mandates and roles can influence the behaviour of numerous actors.

In Indonesia, for example, researchers examined who controlled decisions at each scale, who was really involved and what benefits people really received. With respect to land use planning initiatives, district officials’ own visions and interests guided the plans; and consultants who barely knew the area, other than from satellite imagery and maps, conducted the analysis. The
plans turned out to be irrelevant to how communities and companies eventually used their forests.

Researchers need to understand the political landscape and be adept at navigating within it (Berkes and Folke, 1998; Berkes et al., 2003). At one point it became possible to host the district-level GIS laboratory at the CIFOR offices, and this proved to be the major impetus for researchers to engage with district planners. In Zimbabwe, the bottlenecks to expanding the irrigated gardens mostly related to institutional problems. By working with the irrigation committee and having community members undergoing “Training for Transformation” (emphasis on empowerment), the community irrigation area was finally doubled in size.

4.2.3. Multiple levels of analysis and intervention

Actors involved in action on a limited spatial scale (e.g. NGOs working with one community, farmer PAR) need to use tools to achieve impact at multiple levels as well so that higher level constraints can be removed and costly local interventions can achieve wider impact. Thus, approaches require multiple levels of analysis and intervention, not merely adding landscape-level analyses and interventions to the farm-level efforts. Specific issues may call for work at three or more levels. In Indonesia, for instance, district officials were not giving much attention to the woes of Setulang, a village that was standing up against a logging company that wanted to log its water-catchment area. The researchers worked at the international level, helping Setulang become one of the finalists in the World Water Prize, and the village went on to get the nation’s premier environmental prize. This forced the district officials to engage with them. In Zimbabwe an example of impacts at multiple scales is provided by Hagmann et al. (2002), who undertook research that spanned the plot-to-policy scale. Their work resulted in successful interventions (soil-conservation methods) at the plot level and in an important reorientation of thinking within the national extension service (to a more participatory, demand-driven approach).

4.2.4. Integrating across dimensions
Reductionist research or research tackling single-sector issues is often inadequate. Having to cope with multiple problems and improving the ability to seize opportunities require integrated approaches. Integrating across various dimensions will therefore be a key concept: across scales, across multiple stakeholders with divergent understanding of problems/opportunities, across different system components and across R&D. A challenge for the research teams will be to get the appropriate balance between reductionist research and a more synthetic approach.

4.2.6. Focussed systems thinkers

The problems posed by complex systems require researchers to become focussed systems thinkers. Given the complexity of socio-ecological systems, the main challenge is to centre on the impacts being sought as ‘guiding stars’ and not get lost in peripheral issues, although connecting interventions to impacts is a difficult task (Gottret and White, 2001; Douthwaite et al., 2003). A variety of tools to tackle complexity will be necessary (e.g. modelling, databases, geographical information systems, decision- and negotiation-support tools). Negative attitudes towards modelling abound given the heavy data requirements of large, complex simulation models. While such complex models undoubtedly have their place, the concept of ‘throw-away’ models is also attractive; i.e. working computer-implemented models built in a few days to explore a particular problem and then discarded (Lynam et al., 2002). The same holds for ‘fuzzy logic’ models dealing with uncertainties and dynamics or simple diagrammatic models to understand relationships and interactions. Some recent work has used participatory modelling, in which stakeholders assist in the development of models, and model results are fed back to communities using participatory techniques such as role playing (Lynam et al., 2002).

Members of the Resilience Alliance (http://www.resalliance.org/) contend that complexity is not boundless but has its own natural subdivisions and boundaries and that three-to-five key variables often drive a particular system (Gunderson and Holling, 2002). The trick will be to
identify these variables, taking care that ‘slow’ variables are not forgotten. These are variables that change imperceptibly; but when they reach a threshold, the system may switch rapidly into a new state (e.g. Gunderson and Holling, 2002). In order not to get lost in complexity, it is key to have clear objectives of where to go and then understand tradeoffs and the consequences of alternative interventions, monitoring outcomes and correcting past courses of action. In the Indonesia example, researchers maintained a systems perspective by working through households, village officials and local government, while always trying to maintain a sustainable livelihoods approach, which forces one to examine social, biophysical and economic aspects in an integrated manner (Carney, 1998). Less successful were efforts to understand ecological processes and land-use interactions at the watershed level. Costs of collecting reliable data over the large, difficult terrain were high; and disciplinary experts (e.g. soils, aquatic organisms, wildlife specialists) tended to work independently.

4.3 New forms of organisation to implement effective development research

Implementing NRM effectively inevitably requires rethinking the culture, organisation and roles of NRM R&D agencies. These agencies are faced with highly dynamic changes and have to deal with non-equilibrium conditions, multiple aspirations and ambiguity (Ashby, 2001; Sayer and Campbell, 2004). During the reform years in Indonesia, researchers had to learn how to work with spontaneous forms of cooperation and adjust the strategy of project work plans annually (Wollenberg et al., in press). Agencies involved in NRM will need to establish new modes of organisation by becoming learning organisations, where top management promotes institutional flexibility, conditions favourable for complex learning, integration of scientists with other stakeholders, etc.

4.3.1. Innovative incentives
New incentives are required for those working in the NRM agencies (Ashby 2001). Scientists, for example, should get more kudos for a publication with or by partners than for their own single-authored publications. They should also be rewarded for packaging results in different formats, each appropriate to different target groups such as donors, development practitioners and academics. Scientists with the capacity to build quality partnerships should also be rewarded for such critical work.

4.3.2. New leadership and facilitation skills

To ensure flexibility, teamwork and partnerships, leaders must develop new facilitation skills. They must also be able to review large bodies of information and simplify complexity. Only by doing so in a timely manner can better questions be asked, implementation strategies be identified, and wise decision-making facilitated.

Given multiple levels, stakeholders and experts, a key element in development research success is likely to be project facilitation. In a farmers’ group, for example, one farmer may be nominated for training in facilitation. At the district level, a professional facilitator may be hired to orchestrate multi-stakeholder negotiations. Facilitators will need to ensure depth and quality of discussion as well as bring out and acknowledge different perspectives. Process management and facilitation also include good leadership with clear thinking, vision, foresight, ability to use intuition and common sense, flexibility and consistent application of operational principles. Integrative work can generate high transactions costs. Integrated rural development projects of the 1970s and 80s were prone to these problems (e.g. Binswanger, 1998). Facilitators need to see the big picture, maintain focus and move the process forward rapidly.

In Zimbabwe, a full-time facilitator was recruited locally, working and living in the village; and facilitators were routinely part of all major processes in research done at both district and national levels.

4.3.3. Multiple sources of innovation
Broader participation with a variety of stakeholders leads to wider ranging development impacts. Ultimately, in the ideal scenario, all management is experimental and all research involves managers, with little distinction between management and research (Sayer and Campbell, 2004). Nevertheless, scientific principles are still likely to be applied with varying rigor and disciplinary orientation. The traditional research-development continuum has to be replaced by a model acknowledging that the innovation process is non-linear, with multiple sources of innovation and interaction (Röling and Jiggins, 1998; Douthwaite, 2002).

4.3.4 Create an enabling environment for scaling up and out

Organisations need to plan and invest to create an enabling environment for scaling up and out (see Section 5.0 for more detail) as part of the research process rather than as a delivery mechanism for a finished product. Embedded in the concept of scaling up is the idea that any change (technological, institutional and/or policy) is brought about by the formation and actions of networks of stakeholders in a social process of communication and negotiation (Hagmann et al., 2002). Scaling up and out is an important departure from positivist science. In Indonesia, for example, researchers not only worked intensely with four villages but also created communication networks of villages in the watershed and with NGOs of national influence. Work at both scales enabled the effective sharing of information at other scales.

4.3.5. Knowledge management

In order to organize and share the diversity of information held by different actors and applying it at various scales, knowledge management is required. More weight will have to be given to the sharing of informal or tacit knowledge as it often drives decisions. Scientists need to learn humility and give credence to the fact that the lives of local resource users depend upon informal knowledge accumulated over generations and then fully recognize and incorporate it into development research (Berkes et al., 2000).
5. Operational cornerstones to implementing a new brand of development research

5.1 Overview of cornerstones

The NRM LearningWheel is shown in Figure 2. The eleven cornerstones are grouped into three categories, involving: (a) working together; (b) establishing the institutional and organisational framework; and (c) improving the approaches to the task.

5.1.1. Working together

A number of the cornerstones relate to how different researchers and partners work together, with facilitation being an important part of this endeavour.

- **Shared focus**: Mutual agreement among R&D teams about problem and opportunity focus
- **Partnership**: Clear partnerships and collaborative arrangements built on trust, ownership and joint commitment to vision and impacts
- **Teamwork**: Effective cross-disciplinary learning teams of R&D agents
- **Facilitation**: Effective facilitation, coordination and negotiation at different levels

5.1.2. Establishing the institutional and organisational framework

Two cornerstones are dedicated to governance and policy issues and to ensuring local organisational capacity:

- **Governance**: Enabling governance and policy that provides incentives, capacities and resources to key stakeholders
- **Organisational**: Local organisational capacity for collective action and self-governance

5.1.4. Improving the approaches to the task
A number of cornerstones pay attention to the processes of engagement, covering information access, the learning process, incentives to engage, scaling up and out, and research design and process.

- **Information**: Access to information on technical, institutional, market and policy options
- **Learning**: Shared creativity and learning through exposure, experimentation and iterative reflection
- **Incentives**: Interest and energy created in the short term to ensure commitment among partners to the longer term goals and processes
- **Scaling up and out**: Explicit scaling-up and scaling-out strategy building on successes and strategic entry points
- **Research design and process**: Effective research design and processes to integrate R&D objectives

The major utility of the LearningWheel is its practical application to situations in NRM initiatives and programmes. The framework can be used as an analytical tool for strategy development; planning, strategic monitoring and steering of NRM initiatives by the partners involved, as well as knowledge management to re-integrate the lessons and experiences gained from different sites and actors. The framework facilitates gap analyses, bottlenecks and identification of critical entry points and priorities for intervention. NRM is a comprehensive process involving a number of key functions (cornerstones) that need to be in place or developed if interventions are to be successful. All cornerstones interact with each other. Overlaps between the cornerstones are unavoidable and desired in this perspective. Not all guidelines have to be addressed actively at all times. Some might be in place without having a negative influence on the NRM process at a given time; others may be weak and need to be addressed actively to support the process work.

[Insert Fig. 2]
Some of these cornerstones are now well established in the development lexicon, but the tendency is to use the terms without considering what it takes to operationalise them. This limits the potential effectiveness of an effort. For example, partnerships may be high on the agenda, but while many individuals and organizations embrace their importance, little has actually changed in the way partners are selected and sustained. It is about the meaning of these terms and the quality of implementation that underlies them. Campbell et al. (in prep.) provide more detail on each cornerstone. Here we use the partnership and scaling-up cornerstones as examples of the depth required to ensure quality implementation of development research.

5.2 The partnership cornerstone

Partnerships enable the coordination of projects among diverse groups with a stake in or capacity to improve NRM. Partnerships occur in varying degrees of collaboration with varying levels of commitment and investment. Partnerships are a basic ‘ingredient’ when trying to solve complex NRM problems because of the need to acknowledge different perspectives, disciplines and competencies that can have a bearing on the NRM problem. Collaboration among stakeholders and resource people with different functions, skills and perspectives, if well facilitated, can generate an atmosphere allowing for sharing, exchange and creative problem-solving. Collaborative arrangements should reflect a strategic mix of official institutions, influential institutions, organisations with the capacity to mobilise resources and service providers such as extension agents and technical specialists.

To achieve quality in implementing each cornerstone, its elements need to be outlined with detailed strategies to achieve them. Four elements of the partnership cornerstone are recognised, each with a series of strategies. The four partnership elements are:
• Assess need for partnership; then identify and assess potential partners
• Maximize synergies and complementarities with clear roles and balanced competencies
• Establish shared ownership and identify common values and principles
• Establish and maintain conditions and processes for decision-making and reaching agreements that are fair and equitable, as well as for monitoring the partnership

Each element has a number of specific strategies. As an example, the strategies for the last element are:

• Establish processes and mechanisms to ensure clear operational modalities with checks and balances for accountability
• Establish communication and feedback mechanisms; review these periodically
• Ensure strong leadership that is inclusive, fair and accountable
• Establish ways to deal with unequal partners and power relationships as well as ways to negotiate and/or deal with differences. Have mechanisms to uncover differences so they do not ‘fester.’
• Ensure collaboration, not co-option; establish trust
• Promote transparent information-sharing and allow for divergence and convergence of opinions
• Conduct partnership appraisals periodically to highlight the strengths and weaknesses and what needs work in the partnership

These ideal principles are, in reality, difficult to implement and may require modification. In the Indonesia case, researchers developed formal partnerships with local government and the national forest research agency while attempting to build local partnerships through district-level workshops, to which different stakeholders were invited. To build these sensitive partnerships, trust had to be developed by not requiring the same types of accountability measures from national and
local organizations as might have been requested from other partners. Similarly, while communities were initially suspicious of efforts to establish formal contracts, excellent partnerships were developed during the five-year collaboration. The high-quality partnership resulted from sharing similar goals of empowering local villagers, as well as from strong informal bonds developed among a full-time resident field staff. The staff regularly received visitors, tried to answer villagers’ questions about all matters of concern to them, and visited other villages and government officials. The researchers worked with existing leadership but firmly requested representation of marginalized groups such as women in activities. Communities were given the political space to make their own decisions, with researchers largely having a facilitation role. Regular newsletters were developed to report activities and evaluations of different kinds were conducted to get community feedback on the activities. As expected, the good partnership with communities has made it more difficult and more time consuming to cultivate good relations with other stakeholders who view community empowerment as a threat. When the Setulang village received the national environmental prize for its catchment management efforts, jealousies amongst communities were heightened. This has potentially been turned around in a new initiative at a larger catchment program that will now involve two of the neighbouring communities.

5.3 Example of the scaling-up and scaling-out cornerstone

Deep involvement of R&D actors in specific pilot sites can yield valuable insights, but researchers have to consider how to “go to scale…to bring more quality benefits to more people over a wider geographical area more quickly, more equitably and more lastingly” (Gonsalves, 2000). Scaling up is vertical; e.g. through institutions, and organisational-competence development and improvement at higher levels. Scaling out is horizontal; e.g. from community to community, involving service providers. Scaling out is used to define spatial extrapolation of successful
approaches to other sites with similar circumstances; in other words, replication (with adaptation) at the same scale but at different locations.

Scaling up and out involves four elements:

- Identifying promising options to scaling up and out
- Engaging organizational partners for scaling up and out
- Identifying and training service providers and identifying appropriate institutional arrangements
- Sharing knowledge and information

Each element has a number of strategies. Those for the last element, for example, are:

- Develop a communication strategy so as to target products in various media for various ‘users’ and situations.
- Find appropriate ways and actors to collect and share information
- Develop feedback mechanisms to find out how useful the information is and to identify further information needs to target client information needs better.

From the Zimbabwe case study, it was possible to identify good and bad practices. In the case of the water-related work, which involved trying to establish local institutions for water and catchment management, insufficient attention was paid to scaling up. The national water reform process should have been engaged to foster a partnership that scaled up project efforts. In defence of the research team, the key players in the national process were invited to various meetings but never attended because of other commitments that were considered of higher priority. Other means of engagement should have been attempted. On the positive side, the research team worked with CARE, who had water projects in 55 sites, so the opportunities for scaling out development
research were good. Hagmann et al. (2002) provide an example of scaling up through their work in engaging the provincial extension service, while mainly focussed at the farmer level.

In Indonesia, researchers tried to scale up and out by involving influential NGO networks and individuals in the field activities (e.g. in training, facilitation of workshops, evaluations), sharing newsletters widely, sharing donor reports and facilitating regular cross-visits among villagers and local officials to other communities or districts in Indonesia. Although NGO networks and newsletter recipients were selected strategically, other activities were more ad hoc. In one activity, the researchers disengaged themselves from a national committee because of the disproportional time requirement required, maintaining instead less formal communication channels. Managing activities at different scales and striking the balance between testing ideas on the ground and sharing information and experiences are a challenge.

6. Conclusions – The way forward

Fundamental concepts essential to effective development research include partnerships and scaling. Scaling is important from a number of different perspectives – multiple scales of analysis and intervention are needed and scaling up from case studies or demonstration sites needs tackling. Integration (across components, stakeholders, expertise, perspectives and entry points) was recorded as a key principle. It goes well beyond integration of physical entities and process, right down to inclusion and empowerment—ensuring that voices and choices at the lowest scale are heard and counted; and addressing and subscribing to diversity.

Considerable effort is needed to redesign R&D. The principles and operational cornerstones provide a comprehensive description of a new way of doing business. Development research is
much more than the integrated management of soils, water and other resources. It is also distinctly
different from farming systems research approaches and farmer participatory research.

So, how can development research become a reality? The operational cornerstones provide a
good starting point as the elements and strategies are concrete ways in which process and practice
can be improved. A cookbook approach is not needed as development research needs creativity to
match particular contexts. One major problem will be to ensure that the range of appropriate
strategies across the different cornerstones is being tackled in a timely and integrated fashion. If the
weakest operational cornerstone is not dealt with, the entire implementation process could be at
risk. Implementation teams can use the operational framework to reflect on their intervention and
analyse the state of art for each cornerstone. Reflection must take into account the quality aspect,
which is where many research efforts fall down. This requires linking the LearningWheel to a
clearly defined performance-assessment framework based on observable indicators, indicative of
‘good’ practice related to what is trying to be achieved.

Although the operational cornerstones do provide a means to establish better development
research and while some of the principles will be readily accepted by most researchers, at another
level reforming R&D can be a mammoth undertaking. For many researchers, a move away from the
current incentive system is difficult in the short term. How many scientists in academic institutions,
where the vast majority of researchers are trained, would be willing or able to shift their incentive
systems from numbers of refereed publications to the quality of developing partnerships?
Enlightened leadership from numerous actors is needed for development research to become a
reality.

7. Acknowledgements
We acknowledge the support of the CGIAR’s INRM task force. More than 100 colleagues participated in the workshops that have led to the principles and operational cornerstones described here. The case study teams in Indonesia and Zimbabwe are gratefully acknowledged. We would also like to thank Lisa Petheram for doing the final edit.

8. References


FIGURES

1. The foundations for natural resources research.

2. NRM LearningWheel – Conceptual framework for managing and implementing research.
Table 1  
Comparison of the two case studies used herein

<table>
<thead>
<tr>
<th></th>
<th>Dryland Zimbabwe</th>
<th>Indonesian Rainforests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate</td>
<td>Seasonal climate, ca. 600 mm rainfall</td>
<td>Equatorial climate, &gt; 3000 mm rainfall</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Dry deciduous savannas</td>
<td>Evergreen rainforests</td>
</tr>
<tr>
<td>Local land uses</td>
<td>Mixed farming including rainfed agriculture, smallholder irrigation, livestock production and woodland product use</td>
<td>Shifting agriculture, fishing, hunting and gathering</td>
</tr>
<tr>
<td>Pressures from external actors</td>
<td>Minimal</td>
<td>Mining and logging interests; rent-seeking behaviour by local officials</td>
</tr>
<tr>
<td>Water-related issues</td>
<td>Severe droughts affecting agriculture, household water availability; catchment management to maintain above- or below-ground water resources</td>
<td>Poor water quality as a result of land cover change</td>
</tr>
<tr>
<td>Primary aims of the work</td>
<td>Achieving management of the common pool resources in the catchments for improved local livelihoods</td>
<td>Sustainable forest management integrating social, economic and silvicultural issues</td>
</tr>
<tr>
<td>Water-related aims</td>
<td>Catchment management, expanded smallholder irrigation</td>
<td>Maintenance of water quality in the face of land cover change, expanding fish farming</td>
</tr>
<tr>
<td>Scale-related issues</td>
<td>Analysis and interventions planned at local and district scales, scaling-out through links with an NGO, scaling up planned (but not possible) via the national water reform process</td>
<td>Analysis and interventions planned at local, district, provincial and national levels; scaling-out through cross-village visits; scaling-up through national policy influences and links to the ecosystem approach of the UN Convention for Biodiversity (CBD)</td>
</tr>
<tr>
<td>Periods of engagement</td>
<td>3-year project, with much lower levels of engagement after project completion</td>
<td>Nearly a decade of R&amp;D, with multiple projects</td>
</tr>
<tr>
<td>Types of partners</td>
<td>Government researchers, development NGOs, district officials</td>
<td>Government researchers, conservation and development NGOs, district officials</td>
</tr>
</tbody>
</table>