INSPIRING INITIATIVE:
IDENTIFICATION, DEMONSTRATION AND ADOPTION OF APPROPRIATE 
ECO-TECHNOLOGIES TO ENSURE SUSTAINABLE RESOURCE 
MANAGEMENT

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Country/region of the action:

South Africa 
Kwazulu Natal, Limpopo and Mpumalanga Provinces 
National, Provincial, District, Community levels (Multi-stakeholder 
approach)

Category/subcategory: Sustainable agriculture; rainwater harvesting; soil and water 
management.

1. SUMMARY

This study reflects an action research approach applied to improve the social and 
environmental circumstances of small-scale farmers and to promote sustainable 
land management. Multi-stakeholder engagement and social learning were applied 
so as to engage all sectors of the community and to incorporate their diverse and 
often conflicting views, interests and objectives. The approach facilitated long-term 
processes that bring different groups into constructive engagement, dialogue and 
decision-making. At three sites participants developed shared visions, identified 
strategies, detailed action plans and M&E frameworks. A range or ‘basket of eco-
technologies’ were identified and introduced to project participants during the 
planning process. Farmer capacity for innovation was enhanced via on-farm 
experimental trials, and farmer-to-farmer extension assisted the dissemination of 
technical improvements. Farmers were generally enthusiastic about the new eco-
technologies that were introduced. Although there were significant changes in 
practice, these processes require longer and deeper engagement than a 2 year 
project cycle allows.

BACKGROUND STORY

The development, use and management of natural resources demand an approach 
of sustainable utilisation and a healthy relationship between the land user and the 
environment. It is therefore critical to make a range of sustainable or eco-
technologies available to land users through an active participatory and long-term 
learning process. For that purpose the National Department of Agriculture (DoA) 
awarded the Agricultural Research Council – Institute for Soil, Climate and Water 
(ARC-ISCW) a tender to launch an eco-technology programme in selected farming 
communities of three provinces of South Africa (i.e. Limpopo, Mpumalanga and 
KwaZulu-Natal). The programme was funded for a period of twenty-four months 
(October 2006 to October 2008). The aim of the programme was to empower 
participants with new knowledge and skills to be self-reliant, and be able to 
identify, develop, adopt and adapt various eco-technologies (i.e. rainwater
harvesting, sustainable vegetable production, land rehabilitation, Conservation Agriculture (CA), Wise Use of Wetlands and grazing management) that will ensure sustainable land management in these three study areas. In order to achieve the above-mentioned aim, an action research model for sustainable land management was used to implement eco-technologies in the three provinces (see Figure 1).

Figure 1. The action research model for sustainable land management (Smith, 2006).

2. STRATEGIES

The strategy (methodology) followed in this project was based on the action research model shown in Figure 1. Different action research methodologies were employed within the major phases of the model and for practical purposes these phases and methodologies were translated into ‘Objectives’ and ‘Activities’ within the action (business) plan of the project. The final report serves as a manual and reference document for practitioners, the methodology (i.e. objectives and
activities) is consequently discussed within each phase of the model as it was implemented during the project cycle.

A significant part of the project revolved around a process of multi-stakeholder engagement and social learning. Agricultural development often fails because stakeholders are not given enough consideration. Stakeholder analysis (SA) is thus important to deal with stakeholders’ multiple and often conflicting views, interests and objectives and to set up the project in such a way that it facilitates long-term processes that will bring different groups into constructive engagement, dialogue and decision-making.

During the month of October 2006 a Stakeholder Analysis (SA) process was embarked upon in view of identifying and involving the relevant stakeholders in the eco-technology project.

The critical objectives of the stakeholder analysis were to:

- Select a study area and site to demonstrate and implement eco-technologies.
- Identify and involve stakeholders who (should) play a critical role in the following (who, when and how):
  - Target area selection
  - Site selection
  - Planning workshop (November)
  - Demonstration (and all implementation activities)
  - Learning and Adapting.
- Identify stakeholders who should be informed about above actions.
- Have an overview of the farming systems in the selected study area.
- Identify possible eco-technologies suitable for the area.

After consultation with various provincial and district stakeholders (such as the respective LandCare coordinators), the ARC eco-technology team visited potential study areas in each province to screen different LandCare projects for the selection of an appropriate site. The following selection criteria were used: existence of other eco-technologies (e.g. erosion structures, grazing management, etc.), good stakeholder involvement, existence of potential beneficiaries or communities, suitable climate (annual rainfall > 600 mm), suitable soils (arable, representative), distance that is relatively central to Pretoria, flat slope, availability of implements and the demonstration site should be easily accessible from main road. The team members in each province approached individuals (key informants) related to each LandCare project for assistance during the selection process. After collecting information from different projects, the following sites were selected to implement the eco-technology project in the three provinces:

- Moretele ward, JS Moroka Municipality, Mpumalanga Province.
- Masehlaneng village (Koringkoppies), Sekhukhune district, Limpopo Province.
- Potshini catchment, in the Bergville district, KwaZulu-Natal Province, and later Hlabisa and Big 5 in the Umkanyakude district, northern KwaZulu-Natal.
In each study area, key informant interviews and group discussions were used to identify possible stakeholders and demonstration sites suitable for the projects. These were followed by further interviews to get a proper understanding of the stakeholder situation in the study areas. Through these discussions each stakeholder’s interest, experiences, influence, importance, perception and role were determined and possible challenges could also be identified. The data collected through these interviews were listed, grouped and analysed through various methods and tools, such as Venn diagrams and matrices. Venn diagrams were used to show the relationships between and amongst the various actors. These diagrams revealed the importance of various actors who will have a role in the eco-technology intervention. This information formed the basis for further discussions and finding ways for improvements.

As an example of how the results were used, Figure 2 depicts the relationship and involvement of different stakeholders in the Mpumalanga eco-technology project. The thick and short lines would be people who have well established relationships in the project while dotted lines show weak involvement with a normal solid line portraying moderate involvement.
Figure 2. Venn diagram to demonstrate stakeholder’s involvement in and relationship to the Mpumalanga eco-technology project.

Using a Stakeholder Influence and Importance matrix, it was possible to assess the power that stakeholders have to influence a project. Stakeholders with much power and influence can easily divert project resources from important intended beneficiaries with little influence. These may be politicians or funders that could make important decisions on the continuation of the project. Grouping of stakeholder’s positions in the eco-technology project could assist in the development of a useful strategy on how stakeholders should participate in the project.

An example of this Importance and Influence matrix for the Kwazulu Natal site is provided in Figure 3. Stakeholders are grouped from left to right based on their influence on the project. People with high influence have authority on the project. Grouping from bottom to top is based on the importance of the stakeholders. Stakeholders of high importance would be people that are physically busy on the project such as the planting of the trial. Stakeholders in the top left corner have high importance and low influence and may need special initiatives to protect their interests. Conversely, stakeholders with high influence but with low importance need careful monitoring because their interests are likely to be affected by the intervention and so they could be a source of significant risk to achievement of project objectives. It would be wise to build good relationships with stakeholders with a high degree of influence and a high importance to ensure an effective coalition of support for the project.
Another tool – *stakeholder role matrix* – was used to help identify and/or improve partners or collaborators in various project phases and activities. Table 2 provides an example for the Limpopo eco-technology project. For example, the Department of Agriculture (DoA) is the only sponsor in the project and is thus a key participator in funding (1) of the eco-technology project. The Limpopo Department of Agriculture (LDA) would be moderately involved in identification (3) and adaptation (5) and key participants in the demonstration (4) of eco-technologies. On district level, extension was involved in identification (3) of eco-technologies and sites. The idea was to move them to moderate or key participants in research (2), implementation and demonstration (4) and the learning and adaptation (5) of eco-technologies.

Masehlaneng farmers were moderately to little involved in the identification (3) of eco-technologies, but they would play a key role in the implementation (4) and adaptation (5) of eco-technologies.

The ARC plays a key role in all aspects of the project from research (2) to identification (3), *demonstration (4) and training (5).*
Table 1. Stakeholder role matrix in the Limpopo eco-technology project

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Financial support</th>
<th>Research</th>
<th>Diagnosis, planning, identification</th>
<th>Implementing, demonstration</th>
<th>Learning/ adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DoA</td>
<td>*****</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masehlaneng ward 31 farmers</td>
<td>***</td>
<td>****</td>
<td>*****</td>
<td>*****</td>
<td>*****</td>
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<tr>
<td>ARC</td>
<td>*****</td>
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<td>*****</td>
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<tr>
<td>NGOs</td>
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<td>***</td>
<td>***</td>
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<tr>
<td>Other districts/war ds</td>
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<td>LDA</td>
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<tr>
<td>District extension</td>
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</tbody>
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At a later stage community meetings were arranged with the aim of choosing lead farmers (in each village) that will represent their communities in different eco-technologies and form part of the implementing teams. Communication structures, such as monthly forums and steering committees meetings, were initiated and facilitated with the local stakeholders in each of the study areas for continuous learning and management in the projects.

The third phase of the eco-technology project cycle implemented in the three provinces was **strategic planning and design**, which was conducted through a series of participatory planning workshops. The aim of the workshops was to initiate a participatory process to strategically plan and identify the different activities to be undertaken with both the farming community and different stakeholders. This strategic plan would form the basis for the implementation and management of the different strategies and activities. The participants developed shared visions, identified strategies and action plans, how they would be achieved, time frames and stakeholder’s roles and responsibilities, who would assist in the execution of the strategies, and a M&E framework. A range or ‘basket of eco-technologies’ were identified and introduced to project participants during the planning process.
The awareness strategy in the **implementation and management** phase is usually the start of a long-term learning process, which is also repeated throughout the iterative project cycle. Three major awareness activities were launched during the project cycle, namely: a) Annual awareness events, b) An awareness booklet and material, and c) ‘Cross visits’.

The training approach for relevant beneficiaries and participants was developed on the principles of adult and action learning. The technical outcome of these courses was to equip lead farmers with sufficient knowledge and skills (concepts and principles) to independently implement eco-technology practices on their farms by using simple experiments or demonstrations. These farmer-led trials formed the basis for M&E and the adaptation and ultimate adoption of eco-technologies by farmers. Apart from providing training on technical aspects of best practices, some facilitation and life skills were also presented.

Another outcome of this phase was to develop farmers’ capacity to experiment with and adapt their practices from a ‘basket of eco-technology’ principles and management choices. The action research approach used in this project uses experimentation as a key methodology, which intends to improve the innovation capacity among various stakeholders, a critical ingredient for sustainable land management. The following two types of experiments were introduced through the eco-technology project: a) On-farm, collaborative-managed (CM) trials and b) On-farm, farmer-managed (FM) trials.

Farmer-to-farmer extension has developed as a means of improving the dissemination of technical improvements at the local level. It was found that 433 community members have received some form of ‘training’ by lead farmers, and 188 of those farmers have started to practise CA to some extent.
From the start of the eco-technologies project, the learning and adapting phase has in essence been creating an environment to foster a learning process. The major learning event for the key stakeholders was the monthly Action Forum. These forums were seen as highly important for the success of the project and were found to be quite effective and successful to facilitate feedback and reflection on key project activities. In all three provinces, the value and quality of monthly forum meetings were rated high at 95%. Lead farmers mentioned that they obtained an improved understanding of the activities and technologies that were implemented in the project, through participation in the action forums.

3. STAKEHOLDERS & BENEFICIARIES
- ARC-Institute for Soil, Climate and Water;
- ARC-Range and Forage Unit;
- National Department of Agriculture (DAFF);
- Provincial Departments of Agriculture: – Limpopo, Mpumalanga, KZN;
- Extension;
- Communities;
- Traditional Authorities;
- Municipalities;
- NGO’s;
- Farmers

4. SUCCESS (IMPACT)
Researchers facilitated frequent Monitoring and Evaluation (M&E) events or field visits in collaboration with extension officers and lead farmers. During these events, information on the use of technologies and various other implementation issues was collected among participating farmers through informal interviewing techniques. The main aim was to assess the intended and unintended outcomes, impact and sustainability of the project and identify areas in need of improvement. The initial M&E findings revealed that the participation, commitment, leadership and technical knowledge and skills among the group of lead farmers had improved dramatically by the end of the first season. In spite of this phenomenon, at least half of them still found it difficult to implement some of the new eco-technology principles correctly.

As part of the responsibilities of ARC-ISCW an impact assessment was done in order to evaluate the impact of the project on the local farming community. Furthermore, the impact assessment was used to evaluate to what extent the project goal and objectives were attained. The Impact Assessment surveys were conducted in each of the study areas during September 2008, one month before the end of the project contract. A structured interview approach was used with the inclusion of some open-ended questions. A summary of some of the major findings of the assessment was done, while they are also integrated in the conclusions and recommendations.

Most respondents (lead farmers) said they are practising CA. About 70% said they have planted field crops and experimented with CA principles. The remaining 30% said they only adopt CA principles in the vegetable gardens. On average, a lead farmer used to harvest 5-6 bags on a 1.5 ha field. Most of them believe that if CA principles are adopted, crop yields will increase. It is also encouraging that most farmers would like to practise CA on a larger scale, i.e. on the rest of their farm/fields. From their responses during the interview, most farmers prefer vegetables than CA; 43.8% reported that they would like to learn more about CA while 56.3% said they would like to learn more about sustainable vegetable production. Furthermore, 18.8% said they would like to learn more about grazing
management and 12.5% wish to know more about gabion construction, rainwater harvesting and bookkeeping. Achievement of long-term objectives, or at least positive trends towards them, was more pronounced for natural and human capital, as reported by the lead farmers. Generally, farmers were impressed with the progress made in terms of human and natural capital. More than 95% of lead farmers mentioned that all eco-technologies were very appropriate. Some of the skills that they have learnt were not new; however, in the past they were practised in a way that was not sustainable.

5. THREATS AND CHALLENGES

As part of the exit strategy, various project communication structures were developed that would assist a smooth phasing-out of the project (and not a quick exit). The main aim of the exit strategy was to develop ownership and capacity among the local stakeholders to implement and manage the various project activities and technologies in a sustainable manner and over the long term. The most prominent project communication structure developed for this purpose (i.e. a smooth exit strategy) was the *Steering Committee Meeting*. In general, the project communication structures designed as part of the exit strategy were well received by stakeholders, although *there were a number of quite serious challenges experienced*. Firstly, it was difficult to identify (involve) the most relevant persons to represent a specific stakeholder group. Secondly, the participation (attendance) of these meetings was poor while the group representation had very little continuity.

6. SUSTAINABILITY

**Lessons learned:**

1. A new model for the selection of lead farmers should be investigated. Experiences and best practices with this exercise should be reviewed for implementation in future projects.

2. The use of an approach based on participation and action learning to stimulate the interest of the participants and to convey key theoretical and practical concepts during the training courses could be improved.

3. It was found that a change in behaviour and practice in the eco-technology project has not yet been adequately achieved within a period of 24 months. Although lead farmers have on-farm trials, about half of them have mastered the new technology to an acceptable level, while only a small percentage of their trainee farmers have adopted certain components of the eco-technologies, such as trench bed gardens and mulching. This was expected since this outcome (i.e. change in behaviour and practice) in general will start picking up from the third year of experimentation. It is of utmost importance to facilitate and support FM trials among as many farmers for as long as possible, as this has important implications for the development and dissemination of complex eco-technologies such as CA.

4. Since FM experimentation is crucial to adoption, adaptation and impact, the enabling environment and capacity to facilitate and support it should be intact. Local capacity to perform that function is preferable, but otherwise external support (i.e. researchers) should be involved as long as possible, preferably for about four to five years.

5. Some ownership and capacity were developed among the local stakeholders to implement and manage the various project activities and technologies. However, it is doubtful whether it will be sufficient to carry on without the
assistance of the ARC and their service providers. The above statement is supported by two main observations: firstly, the difficulty to identify (involve) the most relevant persons to represent a specific stakeholder group in project communication structures (e.g. steering committee meetings) and secondly, the poor participation (attendance) of these meetings could have a serious impact on the sustainability (and continuation) of the project.

6. Based on the results it is believed that the eco-technology project has still not reached a point where the phasing-out of all activities would be favourable or recommended. A high level of awareness and interest, and a reasonable level of knowledge and skills (short-term outcomes) on eco-technologies have been generated in the project, which shows that it is well on the way to achieving its goal. However, a significant change in behaviour and practice (adoption) would only be achieved over the medium to long term.

7. REFERENCES

Department of Water Affairs and Forestry, 2005. A practical field procedure for identification and delineation of wetlands and riparian areas.


