# Assessing the Effectiveness of a Role Playing Game as a Stakeholder Engagement Tool for Integrated Natural Resource Management

*Master of Science: Geography*

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**March 2015**

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## PREFACE

This thesis is the result of an internship that has formed the basis of my Master in Science (MSc) in Geography. The internship was conducted at the Institute of Natural Resources (INR) a Non-Profit Company (NPC) in partnership with Anstea Group consulting firm, as part of the European Union funded project, *Afromaison*. *The Afromaison* project (Africa at meso-scale: adaptive and integrated tools and strategies on natural resources management), aimed to develop strategies for Integrated Natural Resources Management (INRM) in five African countries, by providing underdeveloped regions with a 'toolbox' type approach to effectively adapt to the consequences of climate change through sustainable solutions at a community and management level. The case study countries included in the project are Ethiopia, Mali, South Africa, Tunisia and Uganda.

An element of the *Afromaison* project involved the development and use of a simulation model as a tool for stakeholder engagement. In addition, the tool was intended to integrate the components of the project and test and discuss the integrated strategies developed. A Role Playing Game (RPG) was selected as the tool for this purpose. In each case study, a researcher (author) developed and conducted a RPG that was adapted to each region based on a generalised framework and design. The RPG guideline chosen for the project is called Wat-A-Game (WAG), which focuses on water management as a means of integrating natural resource management at a catchment scale (WAG, 2012). The purpose of this research is to assess the effectiveness of the tool for its purpose within the *Afromaison* project and its ability to complement the approaches to INRM adopted by the project.

I have thoroughly enjoyed working in the field of natural resource management and participatory modelling, and am privileged to have had the opportunity to work with a significant range of local and international organisations. I am eager to continue exploring this field, particularly investigating various mechanisms of achieving affective stakeholder engagement as a mechanism for complimenting integrated environmental management.

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## ACRONYMS

| | |
|---|---|
| AA1000SES | AccountAbility Stakeholder Engagement Standard |
| ABS | Access and Benefits Sharing |
| AIDS | Acquired Immunodeficiency Syndrome |
| AIS | Alien Invasive Species |
| AMP | Adaptive Management Program |
| BABS | Bioprospecting, Access and Benefits Sharing |
| CAMPFIRE | Communal Areas Management Program for Indigenous Resources |
| CBNRM | Community Based Natural Resource Management |
| DAFF | Department of Agriculture, Fisheries and Forestry |
| DM | District Municipality |
| DEA | Department of Environmental Affairs |
| DEAT | Department of Environmental Affairs and Tourism |
| DoT | Department of Transport |
| DWA | Department of Water Affairs |
| ES | Ecosystem Services |
| GCD | Glen Canyon Dam |
| HIV | Human Immunodeficiency Virus Infection |
| IDP | Integrated Development Plan |
| INR | Institute of Natural Resources |
| INRM | Integrated Natural Resource Management |
| KZN | KwaZulu-Natal |
| LED | Local Economic Development |
| LM | Local Municipality |
| MAS | Multi-Agent Systems |
| NEMA | National Environmental Management Act |
| NGO | Non-Governmental Organization |
| NPC | Non-Profit Company |
| NPO | Non-Profit Organization |
| NRM | Natural Resource Management |
| OLM | Okhahlamba Local Municipality |
| PES | Payment of Ecosystem Services |
| RDC | Rural District Councils |
| RPC | Role Player Card |
| RPG | Role Playing Game |
| SES | Stakeholder Engagement Standard |
| SL | Sustainable Livelihoods |
| SSF | Small Scale Fisheries |
| UDM | UThukela District Municipality |
| UML | Unified Modelling Language |
| WAG | What-A-Game |
| WP | Work Package |

**KEYWORDS**

Adaptive Management, Ecosystem Services Approach, Integrated Natural Resource Management, Meso-Scale, Okhahlamba Local Municipality, Role Playing Game, Simulation Modelling, Stakeholder Engagement, UThukela District Municipality, Wat-A-Game

***DECLARATION***

I, Sian Oosthuizen, declare that *Assessing the Effectiveness of a Role Playing Game as a Stakeholder Engagement Tool for Integrated Natural Resource Management* Is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references. In addition, I declare that:

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**Full name:** Sian Rose Oosthuizen          **Date:** March 2015

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## ABSTRACT

The European Union funded project *Afromaison* (Africa at meso-scale: adaptive and integrated tools and strategies for natural resources management) aimed to address current challenges facing South Africa's environmental policies in a holistic manner though the concept of integrated natural resource management (INRM). The approach of INRM is receiving growing acceptance internationally although its implementation lacks momentum due to the lack of 'buy-in' from those on the ground. Therefore, one of the primary objectives of the project was to effectively engage stakeholders by adopting a participatory simulation model.

There is growing international concern and dissatisfaction that on-the-ground stakeholders are not adequately engaged in the actions and management decisions which affect their social, economic, biophysical and cultural environment. In response, various stakeholder engagement tools have been developed to fulfil this objective. Participatory simulation models have been highlighted as tools for assisting INRM, due to their ability to replicate complex systems and effectively encompass the perceptions and visions of stakeholders as a means of developing and testing integrated management plans. The *Afromaison* project adopted a Role Playing Game (RPG) as such a tool to integrate the various facets of the project. This research involved the development of the *AmanziGame* RPG, which was used to interact with a range of diverse stakeholders as a means of creating and testing a combined strategy for the region. To assess the effectiveness of *AmanziGame*, a three-fold critique was applied. Firstly, an assessment of the tools ability to meet the objectives of the *Afromaison* project, in particularly, effective stakeholder engagement. Second, its ability to meet the objectives and address the challenges typically experience within INRM, and lastly its success in meeting the requirements as a participatory tool and mitigating the limitations commonly experienced. International and local case study examples of the *Afromaison* INRM approaches, other approaches to INRM, and Role Playing Game tools are used to tests the success and limitations of *AmanziGame.*

## 1. INTRODUCTION

Globally, stakeholder engagement has been acknowledged as a potential means of solving environmental and policy challenges and decision making (Greyling and du Plessis, 2015). However, there is a growing international concern and dissatisfaction among stakeholders that they are not adequately engaged in the actions and management decisions which affect their social, economic, biophysical and cultural environment (DEAT, 2002). The international AccountAbility Stakeholder Engagement Standard (AA1000SES) was developed as a framework for good quality engagement (AccountAbility, 2011). AA1000SES defines stakeholders as (AccountAbility, 2011; Pg. 8):

> *"… not just members of communities or non-governmental organisations. They are those individuals, groups of individuals or organisations that affect and/or could be affected by an organisation's activities, products or services and associated performance with regard to the issues to be addressed by the engagement."*

Stakeholder engagement, or public participation, is therefore a process that is adopted by a relevant body to connect those that may be affected by proposed actions or management decisions (AccountAbility, 2011). The AA1000SES demonstrates that (AccountAbility, 2011; Pg. 9):

> *"Quality stakeholder engagement can:*
>
> - *Result in more equitable and sustainable development by giving those who have a right to be heard the opportunity to be considered in decision-making processes;*
> - *Enable better management of opportunities, risks and reputation;*
> - *Enable the complementary pooling of resources (knowledge, people, money and technology) to solve problems and reach objectives that cannot be reached by individuals, groups of individuals or organisations acting on their own;*
> - *Enable understanding of the complex operating environments, including market developments, political and cultural dynamics;*
> - *Enable learning from stakeholders, resulting in product and process enhancements and innovations;*
> - *Inform, educate and influence stakeholders to improve their decisions and actions that will have an impact on the organisation and on society; and*
> - *Contribute to the development of trust-based and transparent stakeholder relationships."*

In South Africa, Section 23 of the National Environmental Management (NEMA) Act No. 107 of 1998 stipulates that:

> *"The general objective of integrated environmental management is to: (d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;"[1]*

This demonstrates that stakeholder engagement is a legal requirement within environmental management. To clarify, NEMA defines the "public participation process" as:

> *"…a process by which potential interested and affected parties are given opportunity to comment on, or raise issues relevant to, the application…"[2]*

This is further reiterated in NEMA Chapter 2 "National Environmental Management Principles", where it is indicated that:

> *"Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge."[3]*

Therefore, it is insufficient that stakeholders are simple informed by environmental management, but rather have an active involvement where they are provided with the opportunity to comment and raise issues that are of their concern and provide input based on their knowledge, interest and desires. Despite this requirement, effective stakeholder engagement often lacks adequacy and thus effectiveness, demonstrating the need to develop means of successfully achieving this legal obligation (Matthews and Catacutan, 2012). Means of how, when and to what degree to involve stakeholders is a much debated topic both in local and international platforms (Greyling and du Plessis, 2015).

Integrated Natural Resource Management (INRM) encompasses the notion that natural resources not only have direct use importance, but are crucial in supporting local economic development, basic service provision and social wellbeing (Lewis *et al*, 2014). Resource management issues are difficult to resolve due to the complexity, technicality and involvement of multi-stakeholders (Greyling and du Plessis, 2015.)

In the field of INRM, effectively involving stakeholders is a challenge that is commonly experienced, particularly in a country such as South Africa, where stakeholder diversity (cultures and socio-economic groupings) is prominent (Blignaut and Choles, 2011). Where stakeholder engagement is conducted, it is often done so with a low budget and as a last component to complete a checklist. This results in engagement often being inadequate due to attempts to cut costs and reduce time expenditure, making the process and its outcomes ineffective. This frequently results in the exclusion of groups of stakeholders, most predominantly the rural poor, who are often considered as an unnecessary part of the process and hence do not have much 'voice' of their own. In addition, these stakeholders are rarely given the opportunity to be 'heard' and it is likely that they are unaware that they have the right to participate in such management decisions (Matthews and Catacutan, 2012). There is no doubt that the

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[1] NEMA 107 of 1998, Section 23 (2d)
[2] NEMA 107 of 1998, Section 1 (1) [Definition of "public participation process" inserted by s. 1 of Act 62/2008]
[3] NEMA 107 of 1998, Section 2 (4g)

decision making process needed for INRM cannot be based on a single perception or individual, enhancing the need for methods that effectively capture the perceptions and opinions of all stakeholders (Blignaut and Choles, 2011). Traditional means of involving stakeholders have proven to be unsuccessful and ineffective, often as a result of stakeholders not being able to understand the complexity of the situation (de Fooij, 2011). In addition, the terminology used by experts is often foreign to those on the ground, creating misunderstandings as well as constraining those on the ground who are already politically and economically disempowered (Matthews and Catacutan, 2012). Thus, the need to find a method of displaying this complexity in a language that a range of diverse stakeholders can relate to is a key objective of INRM. Participatory simulation modelling is rapidly becoming a vehicle for achieving this aim, while displaying several other benefits that complement INRM.

Natural systems are dynamic with complex interactions and challenging problems which cannot be viewed from a single objective means (de Fooij, 2011). It is evident that such perspectives are based on the specific context and therefore differs depending on the stakeholders and their situations. As a result, traditional modelling is no longer sufficient in adequately representing such systems (de Fooij, 2011). Practitioners and researches have highlighted the need for multi-stakeholder decision making and as a result, several tools have been developed to meet these requirements (Rydannykh, 2011). The purpose of this research is to review effective stakeholder engagement mechanisms, develop and test such a tool, and assess its effectiveness in terms of complementing the specific approaches and objectives. The outcomes of this research adds to the growing body of knowledge regarding effective means of involving stakeholders in planning and decision making, with particular focus on the complex field of INRM.

## 1.1.  *Afromaison* Project

The European Union (7th Framework Program) funded project, entitled *Afromaison*[4] (Africa at meso-scale: adaptive and integrated tools and strategies on natural resources management), was undertaken by a local institute, the Institute of Natural Resources (INR) Non-Profit Company (NPC)[5], in partnership with the lead consulting firm, Antea Group[6]. The project aimed to develop strategies for INRM in five African countries, by providing underdeveloped regions with a toolbox to effectively adapt to the consequences of climate change through sustainable solutions at a community and management level. The case study countries included in the project are Ethiopia, Mali, South Africa, Tunisia and Uganda.

One of the key objectives of the *Afromaison* project was participatory planning, placing emphasis on involving all stakeholders in the development of a common NRM strategy (Lewis *et al*, 2014). Importance was placed on taking into account multiple perspectives, which included indigenous knowledge and practices, local community requirements, modern NRM technologies, and scientific understandings of systems (Lewis *et al*, 2014). To achieve this, an element of the project involved the

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[4] http://www.afromaison.net/
[5] http://www.inr.org.za/
[6] http://www.anteagroup.com/

development and use of a simulation model as a tool for stakeholder engagement. In addition, the tool was intended to integrate the components of the project as well as test and discuss the integrated strategies developed.

A Role Playing Game (RPG) was selected as the tool for this purpose. The selection of the RPG tool not only stemmed from the need for effective stakeholder engagement for INRM, but also due to the diversity of stakeholders evident. In the case studies, stakeholders ranged from rural subsistence farmers to government and business owners, for example. For this reason, there was a need for a tool that could effectively engage with a range of stakeholders on a single platform to enabled simultaneous discussion and decision making. A RPG achieves this by using the global 'language' of gaming, which enables stakeholders of varying characteristics to generate a homogenous understanding of their system. For the South Africa case study, historical tension among stakeholder groups was evident, which further called for an engagement tool that voided conflict (Matthews and Catacutan, 2012). A RPG was an ideal vehicle to achieve this as it actively engaged stakeholders in an informal, relaxed manner.

In each case study, a researcher developed[7] and conducted a RPG that was adapted to their region based on a generalised framework and design. The RPG guideline chosen for the project is called Wat-A-Game (WAG) which specially focuses on water management as a means of integrating NRM at a catchment scale (WAG, 2012).  The purpose of this research is to assess the effectiveness of the tool for its purpose within the *Afromaison* project and its ability to complement the approaches to INRM adopted by the project.

The uThukela District Municipality (UDM), located in KwaZulu-Natal (KZN), was selected as the South African case study for the *Afromaison* project. This case study was selected due to the UDMs being home to the source of the uThukela River, which is one of the main river systems in the country, providing for local, provincial and national water requirements (Matthews and Catacutan, 2012). Not only is water an important provider downstream, but it is a vital resource for supporting livelihoods of stakeholders in the case study and provides a common ground for management purposes.

The WAG simulation model was developed for a representative portion of the case study, focusing on the Okhahlamba Local Municipality (OLM) in the western region of the case study. The water management focused tool (WAG) was selected because of the case study's water resource importance. The OLM was an ideal representative as it contained the key elements and dynamics of the case study, while also being home to the source of the vital river system. It contains the biophysical elements, such as commercial farming, rural subsistence farming, tribal authority areas, protected areas, towns, settlements and dams, and important social aspects such as poverty, political instability, lack of service provision and unemployment. The WAG was used to address key issues of the area such as soil erosion, resulting in land degradation and siltation of water systems, caused by various unmanaged activities in the region. The model did so by demonstrating the cumulative impacts of activities on the natural environment, which consequentially impact socio-economic components of the system.

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[7] The author of this dissertation, Sian Oosthuizen, was the researcher that developed the RPG for the South Africa Case Study

### 1.1.1.  *Afromaison* Approach to INRM

The *Afromaison* project adopted three key approaches to INRM, namely meso-scale, ecosystem services, and adaptive management.

- A **meso-scale approach** is a scale that effectively incorporates natural and administrative elements of management, and where national policies and plans can be translated and implemented at the local level by taking into account local conditions and interests (Lewis *et* al, 2014; Hamdard, 2012). Therefore, it is large enough to include natural systems such as catchments, while still being within a political delineation. This approach was applied to avoid limitations formerly experienced related to poor coherency between provincial departments that result in the failure of management programs, through the promotion of regular and structured stakeholder interaction (Bellamy, 2005).

- An **ecosystem services (ES) approach** enables a prioritisation of resources for management focus by understanding supply and demand conditions. This approach assists in identifying where to focus INRM efforts (Lewis *et* al, 2014).  The value of the ES approach is that it makes a direct link between natural systems and the role they play in supporting human wellbeing and economic prosperity and therefore gives effect to the sustainability model (Cork *et al*, 2007).

- An **adaptive management approach** aims to incorporate the views and knowledge of all interested parties in an adaptable framework. The approach was based on the realisation that it is not possible to have all the information ideally needed for developing a coherent management plan and therefore approaches NRM from a 'willingness to learn' perspective (Johnson, 1999).

These three approaches guided the thinking of the *Afromaison* project and are used as a basis to assess the effectiveness of the RPG tool in meeting the objectives of the projects' INRM approach.

The *Afromaison* project aimed to address the complex implementation of INRM, which was driven by the integration and communication of actors and stakeholders. This was a challenging process as it involved the evaluation and assessment of the dynamics of the current situation, and the development of an integrated mechanism based on predicted future scenarios. To address this challenge, a stakeholder engagement tool was adopted to facilitate the involvement of stakeholders in the project.

## 1.2.   Role Playing Game

The *Afromaison* project was structure according to eight work packages (WPs), of which WP7 was responsible for the development of the operational framework, which aimed to ensure the integration of all the WPs. Therefore, WP7 was intended to develop a coherent strategy based on the findings and outcomes of the work being conducted for the specific case study. The development of a RPG formed this WP, with the intention of being a participatory tool to gain the perceptions and visions of actors and stakeholders involved in the case study. The RPG is also intended to test the draft strategies selected, as a means of simulating possible future situations to enable stakeholders, actors and experts to make appropriate decisions and conclusions.

The RPG was designed for the Okhahlamba Local Municipality (LM), which was selected because of its importance for DM as a whole (source of the uThukela River). The LM is inclusive of all the elements of the case study and therefore was chosen as a representative system. It is visioned that the findings and outcomes of the RPG process can be replicated into the other local municipalities.

The development of the RPG was broken down into three phases which are outlined below.

### Design Phase (1)

The initial development of a RPG for the South African case study was based on the guidelines and framework of Wat-A-Game (WAG)[8]. The game or model simulation was created through calculated and relative representations of elements and dynamics in the area with the aim of highlighting key issues, challenges and activities present in the reality. The information used for this development was based on actual data as well as the perceptions and understanding of local actors, specialists and researchers gained through interviews. During this phase the RPG was tested with various groups of participants, and refined after each game session to ensure accuracy and precision with reality. The RPG was tested with specialists and stakeholders who have an in-depth understanding of the area and its dynamics, as well as with university students to ensure the flow and 'playability' of the game.

### Testing Phase (2)

RPG workshops were conducted with focus groups of stakeholders and actors, ensuring the involvement of a range of categories that covered a variety of sectors, organizations and stakeholders. The aim in this phase was to have focus sessions that allowed stakeholders to have their perception, challenges, opinions, visions and thoughts captured, without the influence of other sectors. This stage also enabled in-depth testing of the RPG, allowing participants to critique the tool and its accuracy with the reality of the case study. This was done to ensure that the RPG accurately represented the dynamics, actions and systems in place on the ground. The feedback from each session was applied to the tool before the following workshop, not only to heighten its accuracy but the test the alterations made.

After each focus group workshop, a detailed report was compiled, indicating the participant's reactions and responses to the RPG as well as feedback provided about the tool. The reports also included the outcomes and discussions of the debriefing session as well as a digital copy of the spatial analysis exercise. At the end of this phase, a summary report was compiled, highlighting the main outcomes and findings of all of the focus group workshops, which was used in the drafting of the INRM strategy for the case study.

### Application Phase (3)

The final stage of the RPG is the main aim of the entire process, which was to test the strategies selected by stakeholders as a means of predicting future outcomes. Here, the outcomes of phase 2 were used to make final alterations to the tool, ensuring its accuracy with reality. This phase also involved the inclusion of elements of the draft strategies into the RPG so that the challenging actions could be 'acted out' through the RPG. The key challenging element that was identified in the drafting of the strategy

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[8] https://sites.google.com/site/waghistory/

workshop was its implementation. Therefore, the final RPG workshop tested various institutional mechanisms for implementation and conclusions were made based on the outcomes and stakeholder discussions. The outcome of this process displayed implementation challenges and possible institutional mechanisms applicable for the case study. Finally, the RPG was included in the *Afromaison* toolbox which will be utilised for INRM in the future.

The applicability and effectiveness of RPGs in South Africa has not been widely research and therefore there is a need to fill this knowledge gap and develop confidence in adopting such a tool.  The tool is often criticised as not providing scientifically sound results and being unable to complement the project outside of a stakeholder engagement task. This reiterates the need for further research, experimentation and validation of a participatory tool to enhance their application and use for multi-stakeholder engagement and decision making. Therefore, this research aims to address such assumptions by developing a project specific RPG to assessing its applicability in terms of a participation tool as well as its ability to complement the approaches adopted by the project.

## 1.3.   Aim

To assess the effectiveness of a Role Playing Game as a participatory tool for integrated natural resource management in South Africa, through a local case study.

## 1.4.   Objectives

- Develop, test and implement a Role Playing Game within a local case study environment
- Analyse the effectiveness of the tool's implementation through an assessment of its ability to meet the required objectives and mitigate common challenges
- Critique the process and outcomes to assess the success of the tool as an effective stakeholder engagement tool

## 2.  LITERATURE REVIEW

A literature review provides insight into the research topics assessed, separated into two sections. The first topic of the review is integrated natural resource management (INRM), which is defined and its various approaches explored. In this section (2.1), the various scales and approaches of INRM are assessed through the review of several case studies. This research has been conducted in order to create a comparison between the *Afromaison* Projects' approach to INRM and other case studies. The second part of the literature review (section 2.2) explores the development and the use of Role Playing Games (RPGs) as a participatory tool for INRM. The specific RPG guideline chosen, Wat-A-Game (WAG), will be reviewed, demonstrating its benefits and challenges. This is also conducted through the review of several case studies as a means of creating a comparison between various RPG's and their success as participatory tools.

The first topic, INRM, has been developed in response to global transformations and their impacts on the natural environment. As a result of transformations, such as advances in science and technology, changing societies, economic growth, globalisation and trade, population increase and a general global development, it is apparent that there is a critical need for effective management of natural resources to mitigate the impacts (Ochola *et al*, 2010). With increasing pressure on global economies to heighten produce comes a greater demand on the natural environment and the services it provides, not only in terms of raw produce such as minerals, oil and agricultural land but in the form of natural service provision such as clean water. The increasing demand on natural systems is posing risks on the sustainability of water systems, forests and rangelands among many others. NRM is defined as a stakeholder driven process that integrates various natural resources into an adaptive management plan as a means of achieving sustainability of both natural and socio-economic systems (Ochola *et al*, 2010).

The second topic, RPGs, have been developed in the last 25 years as a participatory tool for resource management (Ferrand *et al*, 2008). A RPG creates a representative or simulation model of a dynamic system based on the processes that occur. The tool is primarily aimed at effectively involving stakeholders in the management of their system, however it is used to capture perceptions and indigenous knowledge, while being a discussion and decision making platform. The aim of a RPG is to allow participants to self-analyse their situation and develop management plans based on the outcome of their game (D'Aquino *et al*, 2003).

Within South Africa, development and global transformation trends are prominent, which are consequently having severe implications on natural resources (DEAT, 2004). Therefore, there is a need to adopt INRM as a means of managing and mitigating the negative environmental implications of such trends. Stakeholders form a vital component of achieving this and cannot be excluded from management processes. The use of a RPG creates an ideal vehicle for the inclusion of such stakeholders; however experience with such a tool is limited in South Africa, and even more so at the local, KwaZulu-Natal, level. This limitation results in little localised research which can be used for review of this topic. This reiterates the need to enhance research about such tools within SA, and more especially at a local level.

## 2.1.    Integrated Natural Resource Management

The European Union (EU) funded project *Afromaison* (Africa at meso-scale: adaptive and integrated tools and strategies for natural resources management) aims to address current environmental challenges in a holistic manner though the concept of integrated natural resource management (INRM). The approach of INRM is receiving growing acceptance internationally although its implementation lacks traction. The *Afromaison* project adopted three approaches to address and achieve INRM, with each having its own sets of benefits and challenges. These approaches are:

1.  Meso-scale
2.  Ecosystem services
3.  Adaptive management

Meso-Scale is a management scale that is localised enough to incorporate both decision makers and actors while covering a large enough geographical area to encompasses large natural systems such as water catchments. This scale enables vertical and horizontal collaboration between sectors and stakeholders to promote integration (Hamdard, 2012). In addition, this level is chosen due to its ability to incorporate the best of both small and large scale management systems without becoming too focused and isolated or generalised and blurred  (Bellamy, 2005).

An Ecosystem Services (ES) approach aims to demonstrate the value that natural systems have for human wellbeing, acting as a mechanism to address social, economic and environmental challenges (Lewis *et al*, 2014). This approach is a means of giving INRM momentum within government departments through the realisation of the value of ES, not simply in terms of service provision but also to benefit other sectors such as health, tourism and development (Cork *et al*, 2007).

Adaptive management is based on the realisation that it is not possible to have all the information for developing an ideal, complete and perfect management plan and therefore approaches NRM from a 'willingness to learn' perspective. Therefore, learning is an inherent objective of adaptive management, basing its approach on the ability of the NRM plan to be adapted as information is uncovered (Johnson, 1999).

The ES approach is a unique foundation for achieving effective and integrated NRM, while adaptive management allows for a flexible plan that can be altered as information is uncovered. This acts as an important means of linking and integrating NRM in a non-static manner, while using a meso-scale focus to ensure the inclusion of all stakeholders and the management of large natural systems. This gives effect to the notion of sustainability that requires an integrated view and approach, which is the crux of the *Afromaison* project.

Other approaches to NRM are analysed in terms of their focus and challenges through a practical case study example. Such assessments include community based, environmental entitlements and sustainable livelihood approaches to NRM. It is evident that these approaches have similarities and common challenges; however they differ in terms of scale, objectives and focus. A conclusion is made

about the applicability of a meso-scale, ecosystem services and adaptive management approach to NRM for the *Afromaison* Project.

### 2.1.1.  Defining Natural Resources

Natural Resources are generally defined as occurring naturally within environments, and for the most part, are a renewable, but finite, product of nature (Ochola *et al*, 2010). They are important in supporting social wellbeing and economic activities through service provision, use and extraction. However, the understanding of what natural resources are varies between perceptions and the context in which they are being addressed.

The definition of 'natural resources' is constantly changing as it is influenced by different schools of thought, and influenced by the understanding of what a resource is (Ochola *et al*, 2010). The definition also varies based on the context of which they are being addressed, and thus between ecological, sociological and environmental perspectives. For example, sociology perceives natural resources as raw material sources of wealth (minerals, water, timber) that occur naturally.  An extension of this is the economic perspective, which considers the commercial value of natural resources and sectors they support. In essence, this perspective views natural resources as an economic asset that is privately owned. As a result, the efficient use of natural resources is conducted for economic gain rather than their protection and preservation. Such perspectives are usually the drivers of conflict associated with natural resource use, exploitation and ownership.

The availability of natural resources significantly contributes to the development of a region in various ways. These range from economic activity and a growth source to creating livelihoods, jobs provision and a general provider of environmental services (Ochola *et al*, 2010).

### 2.1.2.  Defining INRM

INRM is defined as a scientific and technical principle which forms the foundation of sustainable management and governance of natural resources. Such natural resources include land, fauna, flora and water. The focus is on the management of the actions of current generations' quality of life, without jeopardising the lifestyles of future generations (Ochola *et al*, 2010). INRM can therefore be defined as:

> *"An approach that integrates research of different types of natural resources into stakeholder-driven processes of adaptive management and innovation to improve livelihoods, agro-ecosystems resilience, agriculture productivity and environmental services at community, eco-regional and global scales of intervention and impact" (Ochola et al, 2010)*

It is evident that natural resources are not only important for its users but are critical in supporting basic service provision, local economic development (LED) and social wellbeing (Lewis *et al*, 2014).

INRM therefore has the ability to (Ochola *et al*, 2010):

- Integrate various levels of analysis
- Empower relevant stakeholders
- Generate institutional and policy options for stakeholders
- Accommodate complexity by focusing on the key element
- Resolve conflict among stakeholders
- Merge perspectives stemming from various disciplines

The concept of INRM enables the process to cut across sectors that may be isolated through encouraging interaction among stakeholders and highlighting the dependence that such sectors have on each other.

### 2.1.2.1.    Challenges of INRM

The challenges with the implementation of INRM stem from difficulties related to the dynamic, complex and multifaceted nature of the discipline. As a result, the impacts of INRM are difficult to evaluate and therefore limit the benefits of the management process (Gottret and White, 2001). In most cases, secondary positives can be used to determine the value of INRM, through an evaluation and reflection of measurable outcomes such as economic growth, poverty alleviation or service provision. In line with this is the lack of knowledge regarding to how implement such management, particularly when the complexity is not fully understood or known, further limiting its effectiveness. Another challenge is the temporal lag of INRM, which allows time for political and social variations to influence the management plan. It is evident that the longer an INRM is in place, the greater the socio-economic and biophysical benefits are, however this time consuming process is a challenge and may result in the full benefits of the approach being misled (Gottret and White, 2001).

### 2.1.3.    *Afromaison* Project Approach to NRM

### 2.1.3.1.    *Meso-Scale Approach*

The *Afromaison* project is addressing NRM through a meso-scale approach which is considered as a scale that effectively incorporates natural and administrative elements of management. Therefore, it is a scale that is large enough to include natural systems such as catchments, while still being within a political delineation (Lewis *et* al, 2014). This is conducted through the promotion of vertical and horizontal sector integration and coordination to avoid limitations formerly experienced such as poor coherency between provincial departments that result in the failure of management programs (Bellamy, 2005).

Within South Africa, the *Afromaison* project management team (lead by *Antea Group* and comprised of local and international specialists) defined the meso-scale as a district municipality level. This scale was chosen because this level of government is where national and provincial policy is placed into action and where government interacts directly with society (Afromaison, 2014). This scale was ideal as district municipalities are large enough to incorporate natural systems, including their cumulative effects, which is important for INRM. Therefore, the meso-scale approach enables management plans to not only

incorporate both natural and political systems, but also gain the benefits and coordination of local, provincial and national scale governance structures.

### *Australian Case Study*

A similar approach to the meso-scale approach is evident in the PAGASYS Natural Resource Governance Systems demonstrating Australia's approach of regional governance (PAGASYS, 2013). In an attempt to overcome the limitations of previous management approaches, the Australian governments and regional communities have made several experiments to test a regional scale approach. A key element is the emphasis on broad participation through the development of consultations, partnerships and strategic alliances as a means of bridging the gap between authorities and stakeholders.

The Australian government has adopted a similar approach (to the *Afromaison* meso-scale approach) whereby management zones span the country and are classified as NRM regions (Bellamy, 2005). These management areas were delineated between 2002 and 2004, with the aim of managing areas based on the natural resources they protect as well as the current governance structures in place. This move came about as the Australian government realised that its environment is not only the centre of their identity, but also that a significant portion of the country's wealth is derived from its environmental assets through agriculture, mining and tourism (Bellamy, 2005). Such environmental assets were perceived as providing important ecosystem services through water provision and purification, waste control, climate regulation and disease prevention, to name a few. Without the functionality of these natural services, it is predicted that the Australian economy would experience significant cost deficits. The threat on natural resources as a result of pollution, climate change and water scarcity combined with past inappropriate land management programs have led to the development of this regional NRM division.

Each of the 54 meso-scale regions operates independently, with legal mandates and guidelines from the national government to ensure effective management. Over the last decade, each region has evolved in an *ad hoc* fashion, based on the specific elements and dynamics of the area. Such a process benefits from being guided by national structures, while still having the freedom to be managed in a unique way based on the specific conditions, stakeholders and actors of the region.

Within Australia, each NRM region is governed by three spheres of government, namely National, State/Territory and local (Bellamy, 2005). The national sector is responsible for enforcing legal mandates and managing international relations of NRM. The state sector has the role of fulfilling legislative, developing administrative frameworks and establishing who delegates the land use and development planning of local governments. NRM plans are developed by the state sector, with a strong alliance with the local actors, allowing each region to implement specific programs that are suited to the areas particular conditions. This approach allows NRM to not only be addressed vertically across governance bodies but horizontally as stakeholders in each region are encouraged to work together to develop their management plans (Bellamy, 2005). This demonstrates that the approach taken in Australia mirrors the meso-scale approach of the *Afromaison* project. Both approaches indicate the regional focus, which is

strongly influenced by both national and local scales, while using political boundaries for delineation rather than environmental dynamics.

***Challenges of a Meso-Scale Approach***

Dealing with management at a meso-scale can pose a challenge due to the need to find a point of departure in the development strategy as well as finding a compromise between all those involved. Working across various levels of highly fragmented governance (local and district municipalities in South Africa for example) is difficult as sharing of responsibility may lead to further division of the integrated approach to NRM and defeat the purpose of the process. Therefore, communication and collaboration between actors and stakeholders is a challenge when aiming to achieve meso-scale INRM.

Various challenges related to Australia's Regional NRM approach have been identified that replicate those of *Afromaison's* meso-scale approach. Such challenges include (Bellamy, 2005):

- Balancing triple bottom line focuses (business and industrial development with environmental and social constraints)
- Dealing with the interconnected and complex dynamics of NRM at a regional scale (large variations)
- Complex transboundary problems (possibly working across political boundaries)
- Bridging previously divided sectors and spheres
- Managing contrasting perspectives, ideas and visions of sectors involved in the process
- A range of foci, from local stakeholders to national and even international sectors (focused approach but still inclusive of the broader picture)
- Designing specific NRM plans while still fulfilling national mandates
- Environmental protection without undermining economic and development growth
- Integration of varying knowledge systems (traditional and indigenous knowledge combined with holistic and scientific approaches)
- Resource constraints (ownership of resources, external uses, regulator powers, etc.)

In conclusion, challenges related to meso-scale NRM stem from the requirements of the approach to connect and bridge gaps in a dynamic, social, economic and environmental system. It is perceived that the majority of these challenges can be addressed through effective and regular communication between actors, decision makers, governments and stakeholders who are involved (Bellamy, 2005). Communication and collaboration are key in cutting across boundaries that are typically divided.

### 2.1.3.2.    Ecosystem Services Approach

Within the South African Case Study of the *Afromaison* project, an ecosystem services (ES) approach has been applied as a means of prioritising resources for management focus by understanding supply and demand conditions (Lewis *et* al, 2014; Cork *et al*, 2007). This approach assists in identifying where to focus INRM efforts. The value of the ES approach is that it makes a direct link between natural systems

and the role they play in supporting human wellbeing and economic prosperity and therefore gives effect to the sustainability model.

For several decades, ecologists and economists have been working together in attempts to explain the dependence humans have on the natural environment. This is not a new concept, however further research and greater explanation of the relationship has resulted in the approach gaining traction in mainstream thinking. The realisation is that ecosystem services are the driving force behind economic stability and are therefore a key aspect that needs to be included in future environmental policy (Cork *et al*, 2007).

It has become internationally recognised that an ES approach is required to address the constantly increasing loss of biodiversity and ecological services by stressing the importance of ecosystem services. Cork *et al* (2007) (Page 1) defines the approach as:

> *"The ecosystem services concept reduces the complexity of natural systems to a manageable (comprehendible) number of services that people get from ecosystems as a way to focus on human dependence on the environment and to engage stakeholders and the community in dialogue about what services are needed where, when and by whom."*

The concept of ES has been accepted on a global scale by organisations such as the World Bank, the World Resources Institute and the United Nations (2005 Millennium Ecosystem Assessment) to name a few (Cork *et al*, 2007). The rationale behind the acceptance of the ES approach is due to the fact that other related frameworks lack the ability to effectively capture the central role that can be understood and therefore accepted by a broad audience. The Millennium Ecosystem Assessment has defined the basis of the approach simply as (Cork *et al*, 2007; Page 2):

> *"...ecosystem services are the benefits people obtain from ecosystems."*

Originally, the ES approach was intended to include a full range of services, with examples such as:

- Tangible product: air, fresh water and food
- Indirect services: water flow regulation, soil stability, water filtering, pest control
- Intangible services: recreational, cultural, intellectual desires

By highlighting the importance of ES, and that their loss and diminution will have negative implications for human wellbeing, this practical model is gaining traction as a motivation mechanism for conservation and restoration. Figure 2.1 indicates the role that different ES types play in supporting elements of human wellbeing, as represented by the Millennium Ecosystem Assessment (Cork *et al*, 2007).
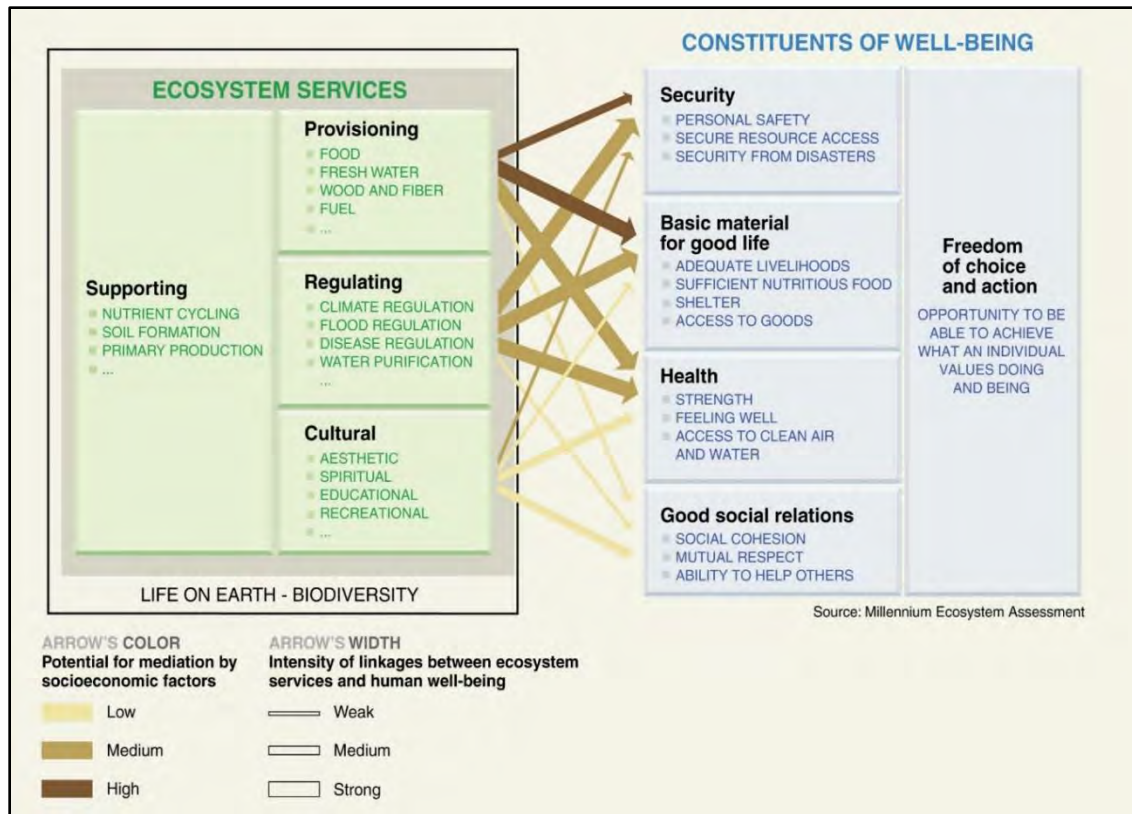
**Figure 2.1: The classification of ecosystem services used by the Millennium Ecosystem Assessment (Source: Cork et al, 2007)**

The ES approach has been successful in several international countries by providing a means of focusing NRM priorities at a catchment, regional, national and global scale. The success of the approach is as a result of creating a link between the environment and human well-being (Cork *et al*, 2007). In South Africa, service provision and backlogs are a reality, with a lack of basic provision being a limiting factor to many sectors (Matthews and Catacutan, 2012). Government simply cannot keep up with the growing demands of the developing nation, which not only negatively affects the population, but also the sustainability of the natural environment (Society of Ecological Restoration, 2013). Therefore, there is a critical need to highlight the importance of natural systems as effective and long term service providers if they are correctly conserved, restored and protected.

### *Implementation of ES approach*

It is evident that an ES approach needs to be implemented in a holistic manner, and thus avoid placing focus of individual components. Errors arise when attempts are made to extract aspects of the ES approach, for example focusing on the marketable services that the natural environment provides. By doing so, emphasis is placed on a specific component of the ES, unbalancing the nature of the integrated approach. Another common error is the use of the 'ES' term to refer to services being provided by people (piped, clean water for example) rather than the natural service provided by ecosystems. Therefore it is vital that the concept not only be approached in a holistic and integrated manner but also with a clear understanding of the elements of the approach (Cork *et al*, 2007).

The ES approach is therefore one that aims to integrate the ecological, social and economic dimensions of NRM by means of:

- Clearly identifying and classifying the benefits humans gain from ecosystems, inclusive of market and non-market, use and non-use, tangible and intangible benefits.
- Describing and communicating these benefits in a language that can be understood by stakeholders.
- Asking a series of important questions that can be used to ensure the sustainable management of ecosystems and in turn human welfare. Such questions include:
  - Which services are provided by which ecosystems?
  - Who benefits from the different services? How are these benefits derived? What are the future needs of humans from these services?
  - What are the impacts of humans on different ecosystem services?
  - What is the role of biota and other natural assets?
  - How do different ecosystem services interact with one another?
  - What are the critical levels of ecosystem services for human welfare and survival?
  - What are the possibilities and implications of technological substitution for ecosystem services? (Cork *et al*, 2007)

It is important to note that there are other approaches that overlap with, and incorporate elements of, the ES approach. Such approaches are not to be disregarded but rather built into an ES approach (Cork *et al*, 2007), by yielding synergies that are needed to effectively deal with the challenges affecting the natural environment while simultaneously ensuring human welfare.

### *Goulburn Broken Catchment Case Study*
An ES approach was conducted by the Australia's Commonwealth Scientific and Industrial Research Organisation for the Goulburn Broken catchment in South-East Australia as a means of understanding the services ecosystems deliver for policy and management (Cork *et al*, 2007). The project's main objectives were:

- Raising awareness
- Increasing society's understanding of ecosystem services
- Determining the value (economic and other) of ES services relative to real decisions and challenges
- Exploring new means and institutional provisions for identifying and improving the use of such values

To achieve the above, a framework for analysing ES services was developed with stakeholders (Cork *et al*, 2007). This framework consisted of the following actions:

1. An inventory displaying semi-quantitative values of the ES services in the catchment, their current utilisation and their status under the existing management
2. An identification of key future decision scenarios

3. Assessments of economic, ecological and social (quantitative and qualitative) decision and an survey of new options
4. An analysis of institutional activities and examination of new means of increasing the value of ES services

The above actions were conducted through stakeholder engagement, reviews of existing data and statistics, and qualitative assessments. The relationships between ES services and its users was determined by assessing the impact that the absence of such services would have on the receiving environment and by the implications that land use changes would have on the ES. An understanding of the catchment was generated and conducted in an integrated manner, not only highlighting the value of ES services on it dependents, but also the impact that dependents could have on the functioning of the ES.

From this process, 12 key ES services were identified (Figure 2.2). During this process, challenges facing the area were identified and analysed in relation to the key ES services.

| Services | Land uses | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Pollination | | ■ | | | | | | | | | | |
| Life fulfillment | ■ | | | ■ | | | | | ■ | | | ■ |
| Regulation of climate | ■ | ■ | | | | ■ | | ■ | | | | |
| Pest control | | ■ | ■ | ■ | | | | | | | | |
| Provision of genetic resources | | | | ■ | | | | | | | | |
| Maintenance of habitat | | ■ | ■ | | | | ■ | | ■ | | ■ | ■ |
| Provision of shade and shelter | ■ | | | ■ | | | | | ■ | | | |
| Maintenance of soil health | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| Maintenance of healthy waterways | ■ | | | ■ | | | ■ | ■ | | ■ | ■ | |
| Water filtration and erosion control | | | ■ | | ■ | | | | | ■ | | |
| Regulation of rivers and ground water | ■ | | | ■ | | | | | | | | |
| Waste absorption and breakdown | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | |

Figure 2.2: Semi-Quantitative Inventory of Eco-System Services in the Goulburn Broken Catchment (Source: Cork *et al*, 2007). Ecosystem services (rows) judged to be of high importance (indicated by dark shading) to various land uses (columns) in the Goulburn Broken Catchment. Key to column headings (land uses): 1 – Dairying, on farm; 2 – Fruit and grapes; 3 – Vegetables; 4 – Grazing; 5 – Crops; 6 – Intensive animals; 7 – Forestry; 8 Food processing; 9 – Housing; 10 – Water production; 11 – Recreation; 12 – Areas of cultural/future options

During the project, several challenges associated with determining the value of ES services were encountered (Cork et al, 2007). These included:

- Financially valuing the ES services provided (e.g. water filtration, natural pest control, flood control) in relation to the alternative technological measures (e.g. water treatment plants, pesticides, flood mitigation infrastructure)
- Determining the value of non-market goods (e.g. cultural and aesthetic values)
- Assessing the economic generation from investment in land use changes in comparison to investments in ecosystems
- Examining the means of considering entire ecological-social systems and dynamics

The framework development for the Goulburn Broken Catchment enabled an understanding and semi-quantitative evaluation of the ES services being provided by the ecosystem. This not only enabled stakeholders and decision makers to realise the value of such services, but generated a prioritisation to correctly determine where investments could be made to produce the greatest outcome from a social, economic and ecological perceptive. The value of this approach was to generate a current understanding and to assist in future decision making and planning to ensure the protection of ES to benefit society while ensuring economic development. Therefore, this approach was an ideal tool for INRM that incorporated a range of stakeholders and providing measurable outputs.

### *Benefits of an Ecosystem Service Approach*

An integrated ES approach is a means of tackling challenges related to climate change to ensure the sustainable use of natural resources (Society of Ecological Restoration, 2013). This is done through the provision of an effective tool box for combating loss of ES services that are not only important for conservation of natural systems but also to ensure human wellbeing. Ultimately, it is an approach that enhances the natural provision of services to ensure sustainability, through a usable concept and language that offer benefits to framing and communicating environmental policy. Such an approach gains traction within other sectors due to the benefits demonstrated outside the environmental sector. This was evident in the Goulburn Broken catchment case study where ES services were prioritised by their economic, social and ecological value. Therefore, an ES approach can provide a reliable framework to support the design, implementation, evaluation and communication of NRM policies and programs. It is designed to complement and build on current approaches rather than to replace them as a means of building on the existing experiences and knowledge base (Cork *et al*, 2007).

Another benefit of the ES approach is its ability to assist in various phases of the policy cycle, such as:

- Identifying issues in terms of human needs and what they value as well as indicating those people that are being affected by which ecosystem process
- Identifying action priority and plan interventions with the focus on human welfare outcomes
- Monitoring of outcomes (not of ecosystem services but of the assets and processes they underpin)
- Assisting in determining what products and services could act as the focus of incentives, particularly related to variations between public and private goods and services

**Challenges of an Ecosystem Services Approach**
One of the key challenges of ES approach is the consideration of a full, holistic range of services rather than focusing on a few specialised ones. This is not to say that it is impossible to focus on a specific ecosystem service through the approach, but rather that the concept must first be approached from an integrated perspective, with individual foci being a follow-on once the entire system is adequately accounted for (Cork *et al*, 2007).

Another key challenge that the approach faces is the difficultly associated with adequately assessing the state of ecosystem services, as was acknowledged in the Glouburn Broken Catchment case study. In attempts to mitigate this limitation, the Millennium Ecosystem Assessment has demonstrated a range of environmental attributes that can be used as indicators to assess the state of ecosystem services. It is important to note that the human value of an ecosystem is determined by the needs and demands of those reliant on the system, meaning that a change in social structure will result in a change of ES value (Cork *et al¸* 2007).

### 2.1.3.3.    *Adaptive Management Approach*
Adaptive management, another approach adopted for the *Afromaison* Project, has been used as a NRM technique since the 1970s. While there are variations in the definition of the approach, the consistent aim is to incorporate the views and knowledge of all interested parties in an adaptable framework (Johnson, 1999). The approach is based on the realisation that it is not possible to have all the information ideally needed for developing a management plan and therefore approaches NRM from a 'willingness to learn' perspective. Therefore, learning is an inherent objective of adaptive management, basing its approach on the ability of the NRM plan to be adapted as information is uncovered. As a result of this objective, it is often thought that an adaptive management approach should be broadly applied within NRM, indicating its ability to be utilised in conjunction with other approaches as a decision making tool (Johnson, 1999). The nature of this approach enables it to be flexible enough to be used for both large and small scale systems.

Adaptive management differs from other methods in that it addresses uncertainties by using management as a tool to gain important knowledge (Johnson, 1999). The overall aim of this approach is not to maintain an optimal state of specific resources, but to develop an optimal management capacity. This is achieved by developing a range of acceptable outcomes that eliminate negative consequences rather than attempting to manage to a single, optimum state (Johnson, 1999).

**Glen Canyon Dam Case Study (America)**
The Glen Canyon Dam (GCD) Adaptive Management Program (AMP) was developed in the late 1990s and provided knowledge, insight and understanding for the Colorado River Ecosystem in the Grand Canyon National Park (Weisheit, 2008). The primary object of this AMP was to prevent biological and cultural degradation of the unique and beautiful landscape.

During the development of the dam, an adaptive approach was taken as the implications on the river's stream flow were unknown and therefore needed to be closely monitored and the management plan altered accordingly. The dam helps regulate the Colorado's River water supply and stabilises storage for the Upper and Lower basins while being responsible for the recreational wellbeing and ecosystem functionality of the basin (Pitzer, 2011). It is also a source of hydropower through the use of turbines to provide power for neighbouring areas. The dam has a key relationship with the Grand Canyon in terms of sediment distribution, particularly during high, flood like flows as a means redistributing sediment downstream to ensure ecosystem health.

The difficultly in developing a management plan for this region was to find a way to balance water demands, hydropower requirements and ecosystem functionality. In an attempt to do so, a Long Term Experimental and Management Plan was developed, stemming from the lack of information known about the stream flow requirements to support these systems. Experiments of varying flow release from the GCD have been conducted to evaluate the implications of different situations and how they affect each key component (Pitzer, 2011). Through monitoring and assessment, more knowledge and a greater understanding of the catchment was unveiled and the management plan was altered accordingly. An Adaptive Management Work Group was established to monitor and alter accordingly the ADP as insight was gained (Weisheit, 2008). Figure 2.3 demonstrates the structure that is used to review, monitor and alter the AMP.
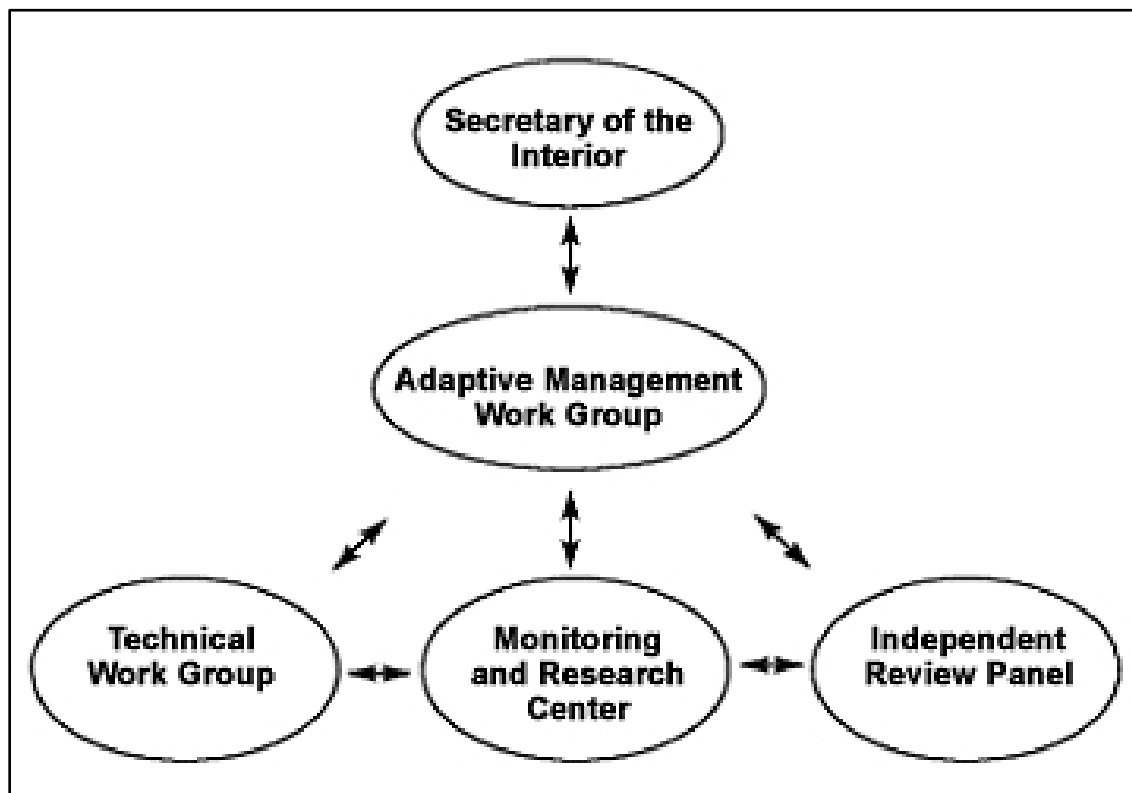


**Figure 2.3: Structure of Adaptive Management Program for the Glen Canyon Dam (Source: Weisheit, 2008)**

There has been much debate over the success or failure of the GCD AMP, with no final conclusion being made. Pitzer (2011) suggests that this ongoing debate is due to constant alterations and knowledge building through experimentation that is still being conducted. Therefore the project is incomplete and no final concluding remarks can be made about the AMPs success or demise (Pitzer, 2011).

***Challenges of an Adaptive Approach***

Due to its use of modern technologies and models, the adaptive management approach is criticised as being a costly and time consuming exercise to complete. This is exacerbated by the monitoring plan which results in constant alterations having to be made. However, due to the large scale and range of resources that the approach can cover, the value of the benefits outweighs the initial outlay (Johnson, 1999). The approach may be critique as dangerous as management and actions are conducted without adequate knowledge. There is also a challenge of experimentation when applying an adaptive approach, as is seen in the GCD case study. In this example, stream flow experiments were conducted over many years as a means of filling in knowledge gaps about the consequences that activities would have on ecosystem function, hydropower production and water distribution. It is evident that this experimentation gave researchers the required data, however it is a risky process and needs to be conducted with extreme caution and considerable research (Pitzer, 2011). This risky approach could be detrimental as it is develops management plans without adequate knowledge and is thus in danger of implementing actions that could be harmful. Even if caution is used in decision making, an adaptive management approach lends itself to the acting before adequate knowledge about the system is known.

Although the approach is perceived as a good choice when dealing with large scale, complex situations, its success is not always evident. Many applications of the approach have not gone beyond the assessment phase and therefore failed to make meaningful changes to the management process. Many of these issues stem from the lack of commitment by stakeholders to participate in a constantly changing management program whose results are not clear (Johnson, 1999). It is therefore suggested that an adaptive approach to NRM be taken to small scale agencies, where situations are not as complex as large scale ones. It is perceived that the approach will have more success in small scale systems and be able to adequately capture complex systems, identify unknowns and adapt the management plan as information is available. An adaptive management approach is particularly appropriate in cases where grey areas and gaps in knowledge are apparent.

## 2.1.4.   Alternative Approaches to INRM

The following demonstrates other approaches that can be applied INRM, outside those selected from the *Afromaison* project. As previously indicated, each approach is defined and a case study explored to identify the benefits and challenged of each.

### 2.1.4.1.   *Community Based NRM*

The notion of Community Based Natural Resource Management (CBNRM) is based on the premise that local populations hold a greater interest in the sustainability of their natural resources than external or

distant stakeholders and therefore have a greater ambition to conserve and manage them (Brosius *et al*, 2005). The approach aims to encourage greater NRM outcomes through the inclusion of local stakeholders, such as local communities, institutions and users, into decision making activities (Armitage, 2005).

This is further justified by the perception that local communities are more cognisant and conscious of the state of their local resources and therefore have a greater understanding of the how they should be managed. Such localised management is also viewed as an effective means of ensuring that NRM is fulfilled as it is underpinned by the local community's traditional management, regulations and knowledge systems (Armitage, 2005). CBNRM is perceived to give communities a sense of ownership over the local resources which consequently results in a sense of pride in the natural environmental, enhancing the communities desire to ensure their management and sustainability (Brosius *et al*, 2005).

### CAMPFIRE Case Study (Zimbabwe)

One of the most referenced examples of CBNRM is the Communal Areas Management Program for Indigenous Resources (CAMPFIRE) programme, which was implemented in Zimbabwe in the late 1980s by the state (Bond and Frost, 2007). In many cases, this project has inspired the development of CBNRM projects in other parts of Southern Africa and even globally (Brosius *et al*, 2005). The programme combined the notion of 'community conservation' with the popular economic incentive of Payment for Ecosystem Service (PES). It was largely developed as a means of managing wildlife and habitats in communal areas as well as the people living in those areas (Bond and Frost, 2007). CAMPFIRE, therefore, aimed to reduce poverty in rural areas by convincing local communities that wildlife is an economic asset as opposed to trying to change their mind sets away from agricultural production. This double fold management approach resulted in the benefit for not only rural communities, but for wildlife and their habitats. This form of CBNRM uses a bottom-up approach through changing the mind sets of grass-root communities with the aim of addressing greater socio-economic issues related to rural poverty as well as environmental concerns (Logan and Moseley, 2002).

Historically, Zimbabwe's wildlife was a state owned resource with limited licenses provided for commercial use, which resulted in wild animals being perceived as pests by local farmers due to their lack of economic value. The situation was worsened by an expanding agricultural sector, which caused a loss in wildlife habitat and consequently, a wide range of species (Bond and Frost, 2007). In 1975, the Parks and Wild Life Act was passed, which allowed private landholders to utilise wildlife on their land for their own benefit through hunting, capture and selling of animals. This caused the wildlife industry to flourish, especially after the 1980 elections, when the Act was altered to allow rural communities in communal areas to follow suit. The thinking behind this process was to reduce the rapid rate of agricultural expansion and encourage communities to utilise existing resources as opposed to transforming land. CAMPFIRE aimed to encourage the notion of long term management and development through sustainable natural resource use by giving communities ownership of the wildlife resource. The protection of wildlife outside of nature reserves not only benefited communities in terms of economic gain though hunting and selling of animals, but also encouraged the sustainable industry of

eco-tourism to flourish. The program was later altered to include Rural District Councils (RDC) who acted as cooperatives for communities that gave a portion of their profits back to the community through a PES agreement (Bond and Frost, 2007).

This example of CBNRM started as a relatively small program (8 880 households) which, by 2002, had expanded to cover 244 000km$^2$ and include approximately 777 000 households (Bond and Frost, 2007). It is perceived that only about a third of those involved correctly followed the process of CAMPFIRE and had a sustainable marketable quota of wildlife. None the less, the case study is perceived as a flagship example of CBNRM and indicates one of the greatest successes that the approach to NRM has had (Bond and Frost, 2007).

Despite it positive appearance, many criticise the CAMPFIRE programme for not achieving one of its primary objectives – localised poverty alleviation. Benefits of the program were evident in terms of wildlife conservation outside protected areas as well as slowing down agricultural expansion, however its socio-economic limitations have resulted in much criticism (Logan and Mosely, 2002).  This issue is perceived to have stemmed from the programmes exclusion of political and historical realties, particularly related to resource use and ownership within Zimbabwe. Such situations were not adequately implemented into the design framework of CAMPFIRE, thus creating tension when moving from state to communal ownership of resources. From this stems conflict related to resource management and use, therefore limiting the process as a whole (Logan and Mosely, 2002). In any CBNRM programme, the issue of communal ownership of resources is a sensitive issue and therefore needs to be carefully built into the program from the design phase.


### *Challenges of a CBNRM Approach*
In addition to the above, some of the challenges of CBNRM is finding a balance between local management and decision making with the requirements of external managers and users. This is often a evident as the approach aims to give local stakeholders the power to manage their resources, however the cumulative and dynamic nature of resources results in external parties being influenced by the practices undertaken at a local level. Such external influences can be in the form of neighbouring communities who are affected by NRM practices as well as national and even international users of the resources (Brosius *et al*, 2005). Related to this is the lack of control that the state consequently has on the actions and management plans of communities. In essence, CBNRM enables local communities to exploit their resource without the state having the legal standing to control their actions. Not only does this negatively impact on the ecological aspects of the programme, but also often results in community's conflicts, divisions and tensions (Logan and Mosely, 2002). In addition, communities are rarely provided with the necessary skills such as financing, administration, accounting and policy understanding, resulting in inadequate management.

Another issue, as demonstrated in the CAMPFIRE case study, stems from poor design related to the inadequate inclusion of important and critical social dynamics. A CBNRM programme cannot be successful without looking a historical situations and realising that such tensions may once again arise

when attempting to alter the practices of communities (Logan and Mosely, 2002). In addition, the CAMPFIRE example also demonstrates the tensions that are likely to arise when defining communal resource ownership, as this often leads to uncertainties and unease. It is recommended that community based programs need to be carefully designed and managed, while still allowing for adaptations to be made to suit the unique dynamics of individual communities (Logan and Mosely, 2002).

### 2.1.4.2.        Sustainable Livelihoods Approach

**Sustainable Development**

The emphasis of 'sustainability' within NRM originated during the natural conservation movement of the 19th century, making the notion of 'sustainable development' a globally recognised concept by the early 1970s (Ochola *et al*, 2010). The term 'sustainable development' was officially defined at the Bruntland Commission as (UN, 1987; Page 41):

> *"…development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

The definition is one that is broad enough to encompass the essence of a pattern of resource use that meets human needs, encourages economic development and preserves natural resources, while still ensuring intergenerational equity (Ochola *et al*, 2010). Therefore, to achieve *sustainability*, human activities can only use natural resources at a rate at which they can be naturally replenished. The idea of sustainable development is based on the integration and balance of three sectors – economic development, social progress and environmental responsibility (Figure 2.4) (Lamb, 2011).
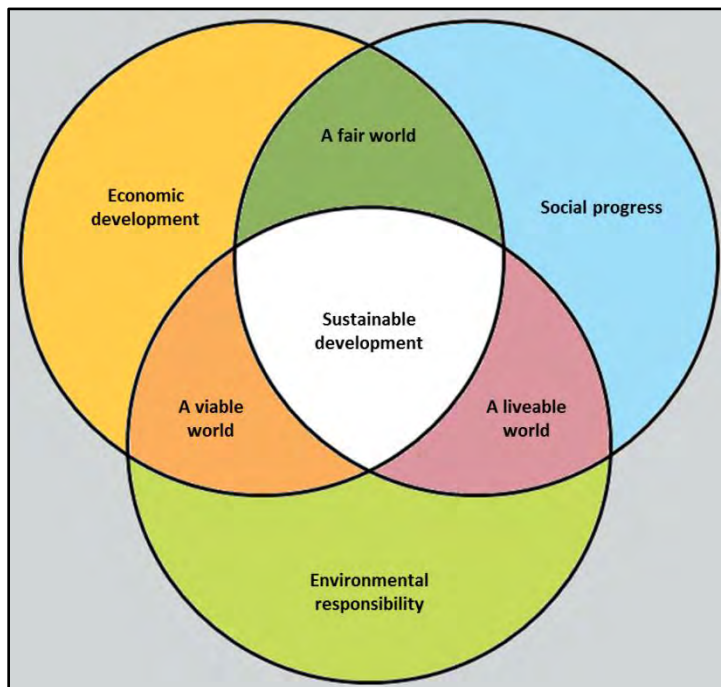


**Figure 2.4: Sustainable Development Model (Source: Lamb, 2011)**

Each dimension of the model is defined as follows (Ochola *et al*, 2010):

1. **Economic development**: The ability to produce consistent goods and services, manage debt and avoid imbalances that result in poor agricultural or industrial production.
2. **Social development:** To ensure fair distribution and opportunities for all individuals through adequate service provision (health, education, gender equity) by balancing environmental and development concerns with the governance of social service provision.
3. **Environmental sustainability:** The maintenance of a stable resource base by avoiding overexploitation of renewable and non-renewable resource systems. This includes the maintenance and protection of ecosystems services, biodiversity and atmospheric stability. A key factor here is to not perceive natural resources simply as economic assets or generators, but to ensure their protection as a means of achieving environmental sustainability.

The notion of sustainable development is approached from a *nested rings/ dependency* perception, indicating that the economy is dependent on society, who is dependent on the environment (Figure 2.5). This demonstrates that economic activities take place within the environment and are based on society's activities, which in turn have an impact on the environment (Willard, 2010). A key aim of sustainable development is therefore the integration of these three spheres by overcoming barriers and cutting across disciplines (Ochola *et al*, 2010).
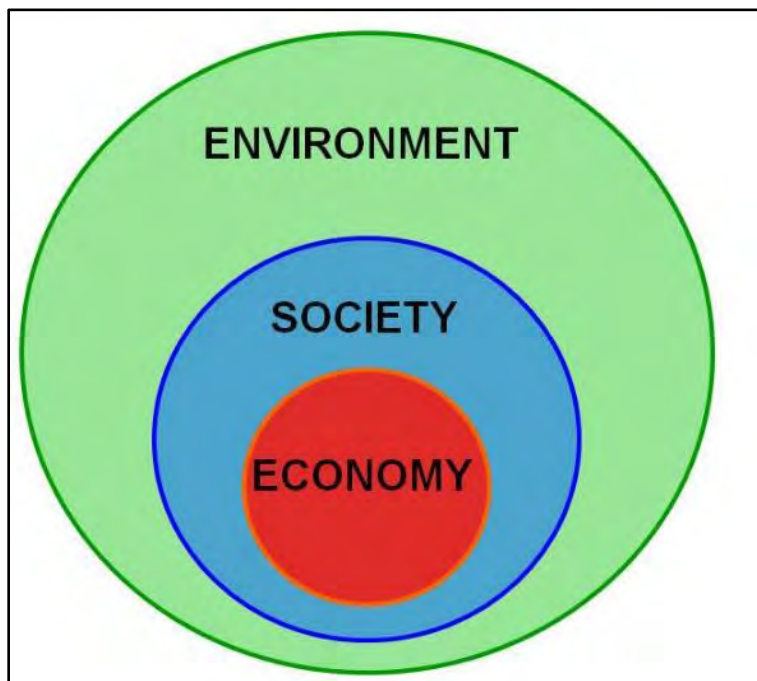


**Figure 2.5: Three nested ring/dependency sustainable development model (Source: Willard, 2010)**

### *Sustainable Livelihoods Approach*

From the notion of sustainable development has risen the sustainable livelihoods (SL) approach to NRM (Knutsson, 2006), which is defined as follows by Chambers and Conway (1991, Page 6):

> *"A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term."*

The SL approach to NRM has developed from this, using a Department of International Development (DIFD) SL framework to ensure equal access to a range of livelihood resources such as economic, human, natural and social capitals (DFID, 1999; Satia, 2003). The aim of this approach is to generate an understanding of how natural resources contribute to sustaining people's livelihoods and alleviating poverty (Shackleton *et al*, 2008). The framework focuses on people and their assets and activities rather than through conventional points of entry such as the focus on sectors and their performance (Ellis, 1999). The approach is centred on poverty eradication (Shackleton *et al*, 2008) and is based on the following core objectives (DFID, 1999; Satia, 2003):

- A social environment that is more cohesive and supportive
- Improved access to basic and facilitating infrastructure
- Better management and secure access to natural resources
- Greater access to information, training, technologies and high quality education
- Better nutrition and health
- More secure financial resource access
- An institutional and policy environment that support various livelihoods strategies and promotes equal market access.

Therefore, this approach aims to place people, in particular rural people, at the centre of the web (as seen in Figure 2.6), which shows the interconnected actions that are taken to maintain their livelihoods (DFID, 1999; Ellis, 1999). Communities are identified as users, managers and custodians of natural resources and are therefore recognised as central in the NRM process (Shackleton *et al*, 2008). NRM requires dynamic and flexible communities and practices that are able to adjust to a constantly changing environment and withstand shocks and stresses as well as external influences.
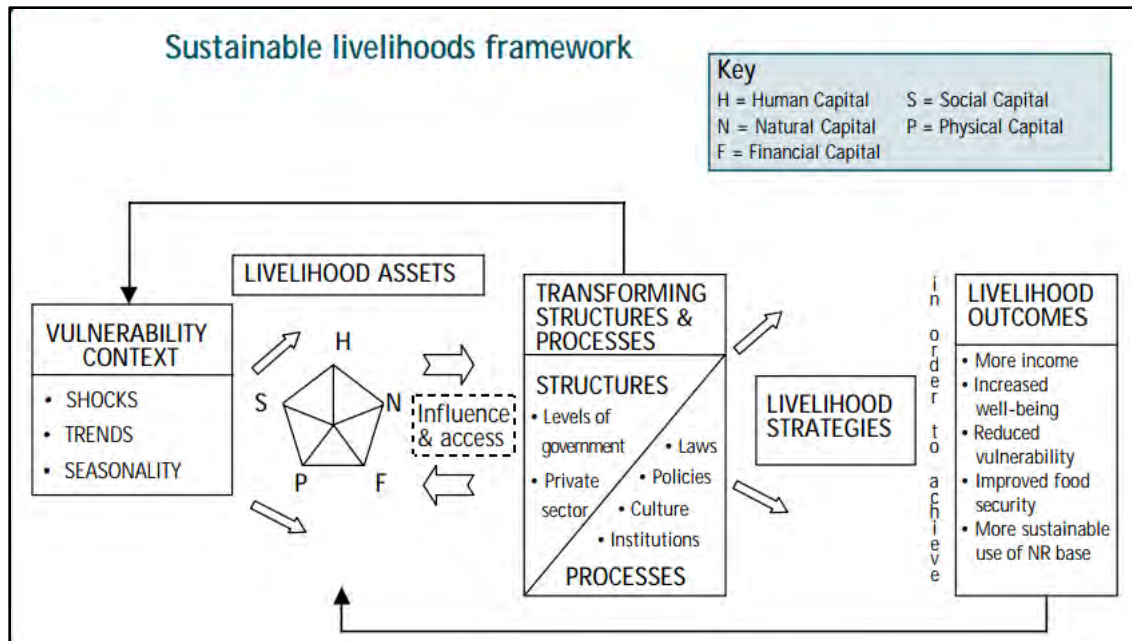
**Figure 2.6: Sustainable Livelihoods Framework (Source: DFID, 1999)**

Resource and livelihood assets that are accessed and utilised by the community are placed in the framework (in the pentagon), with each asset/capital described as follows (DFID, 1999; Ochola *et al*, 2010):

- **Human capital (H):** the knowledge, skills, labour ability, good health and physical capability that individuals in the community possess as a means of achieving livelihood strategies
- **Natural Capital (N):** natural resource stock (water, air, forests, etc.) and environmental services (hydrological cycle, pollution, etc.) from which livelihoods are derived
- **Financial Capital (F):** the capital base (cash, savings, credit/debit as well as other economic assets such as infrastructure, technologies and production equipment) which are essential elements within a livelihood strategy
- **Social Capital (S):** networks, relations, claims, associations and affiliations that make up the social resources which people coordinate through and draw on for livelihood strategies
- **Physical capital (P):** the productive assets (housing, tools, infrastructure, schools, water and other social amenities) which contribute to livelihood improvement and stability.

Sustainable Livelihoods projects aim to enhance the wellbeing and livelihoods of people who hold the responsibility for sustaining the natural resource base to ensure that future generations are able meet their needs (Ochola *et al*, 2010). The SL approach realises that natural and social resources are the most vulnerable and central; indicating that their protection and management is critical is supporting other sectors and ensuring overall sustainability (DFID, 1999). Ellis (1999) critiques the framework by indicating that the livelihood diversity results in complex interactions which are not as straightforward as the framework suggests.

*Kondkitunda Small-Scale Fisheries Case Study (Asia)*

A SL approach was used to address poverty in low-income countries where the importance of Small Scale Fisheries (SSF) was identified as having a key role in development and management (Allison and Ellis, 2001). In 1990, it was estimated that 28.5 million people in Asia made all or part of their livelihoods from fish production and capture, of which a major portion (24 million) were small scale. In many situations, SSF are outshone by industrial development and larger scale activities, resulting in the neglect and even loss of such localised livelihoods. This consequently results in a poverty spike, due to the large number of households that are dependent on the industry for survival. As a result, SSF are often characterised as "the occupation of last resort" and fisher folk as "'the poorest of the poor' (Allison and Ellis, 2001; Page 377). In an attempt to manage this natural resource and develop an adaptive strategy, a SL approach was applied to SSF, with fisher folk being the centre of the interconnected web as a means of achieved a maximum sustainable yield. The approach goes beyond this to identify other resources that households have and build onto existing practices and knowledge.

Small Scale Fisheries are dependent on a resource that is prone to uncertainty in terms of supply and thus is difficult to manage and distribute (Allison and Ellis, 2001). Baumann (2000) provides an example of the SL approach put in place in the Kondkitunda micro watershed in Orrisa, India. The process was initiated by indicating the capital assets that local households had access to (Figure 2.7), as a means of showing that fisheries were not the only resource that locals could base their livelihoods on. For the purpose of the case study, 'political' was added as a capital item as it was felt that the framework was incomplete without this important external influence. This process allowed dynamics of the area to be identified, such as the external impacts, influences and reliance that the community has on various assets. An assessment was then conducted to demonstrate the sustainability and replicability of each asset as a means of identifying the 'strong points' of the community (Baumann, 2000).

| Assets | Generation of assets by watershed development |
|---|---|
| Natural | Vegetative bunds; crop demonstration; plantations of various types; rejuvenated forests; farm forestry and agro-forestry; farm pond; vegetative check-dam. |
| Financial | Direct employment on project; processing of agricultural products for sale; enhanced income from purchase of land, livestock and material. |
| Physical | Cross-drainage work; earth and stone contour bunding; mechanical check-dam; oil processing machinery; *Vikas Kutir*; poultry and goats. |
| Human | Skill development; less hard labour in gathering; more vegetables in diet; empowerment and less fear of strangers etc |
| Social | Increase in associational activity (grain banks, *mahila mandal*, Watershed Committees, youth club). |
| Political | Social empowerment, but little knowledge or engagement with the wider development context. |

**Figure 2.7: Capital Assets in Kondkitunda (Source: Baumann, 2000)**

The SL approach to NRM of SSF in Kondkitunda enabled a micro framework to be formulated that demonstrated the sustainable strengths of the region by mapping out the dynamics of change. The livelihoods outcomes that were identified in the process could be used by the community to plan future actions to ensure the sustainability of their livelihoods. Locals are therefore encouraged to utilise and base their activities on the resources that have been identified as sustainable and replicable, rather than those that are easily influenced by external factors, shocks and stresses (Baumann, 2000).

### Challenges of a SL Approach to NRM

It has been acknowledged that a SL framework is a useful base to develop a SL analysis for a region as a means of understanding the complexities of the dynamics and elements that make up a system, particularly at a micro level (Baumann, 2000). However, the approach is criticised as being limited to micro analysis which focuses on a limited number of resources as the framework is not broad enough to encompass large scale complexities.

The Kondkitunda case study indicated the exclusion of *political capital* in the SL framework, which is a downfall as people's livelihood choices depend on political circumstances (Baumann, 2000). It is evident that political dynamics are not transparent and without its inclusion, it is unlikely that they would ever be uncovered and analysed. The case study indicated that the SL approach is simply an analysis tool and does not go beyond this point to make plans or programmes for achieving the livelihood outcomes. The SL framework is intended to provide an analytical structure for understanding the complexity of livelihoods and influences on poverty as a means of identify where interventions can be conducted (Baumann, 2000). As a result, this approach is often used in conjunction with other approaches as a means of giving the SL framework momentum.

### 2.1.4.3.    Environmental Entitlements Approach

The Environmental Entitlement approach aims to emphasise the multi-facetted nature of human-ecosystem interactions as a means of challenging the orthodox views of NRM-Poverty linkages and the 'Tragedy of the Commons' perceptions (Ochola *et al*, 2010). The notion of this approach is that people are shaped through endowments or entitlements that they gain based on the institutions (formal and informal) that govern them. In addition it is based on the assumption that environmental degradation has the greatest negative implication on poverty stricken sectors of a population due to their heavy reliance on natural systems for their livelihoods and wellbeing (Mearns, 1996).

This approach stems from the ideal that 'sustainable development' should be based on local solutions which are derived for community involvement and initiatives. The environmental entitlement approach aims to achieve NRM by (Ochola *et al*, 2010):

- Highlighting the central role of institutions
- Regulating of patterns of behaviour between individuals and groups of society
- Mediating environmental-society relationships

The environmental entitlements approach supports the notion of the importance of community involvement in NRM, as was evident in other reviewed approaches such as CBNRM. In many cases, this approach is used in conjunction with other approaches such as CBNRM, using central institutions to regulate the behaviour and interactions of groups of society and individuals. This notion arose as it was identified that by giving ownership of a resource to communities, there would always be a division in those who own the resource and those that gain access to it indirectly. Through the creation of a local, community institution that governs resource use, this conflict and polarisation (between owners and users) is eliminated. Therefore, there is a move away from community lead management plans to institutions that represent communities and individuals as a means of eliminating challenges related to individual gain and consequential resource abuse (Leach *et al*, 1999).

This dynamic between socio-economic status and environmental entitlements is shown in the framework below (Figure 2.8), demonstrating the link between people and their environment against the structural process of the region. This framework demonstrates that environmental management practices are constantly changing because of the constantly changing economic, political and social systems on which they are based (Mearns, 1996).
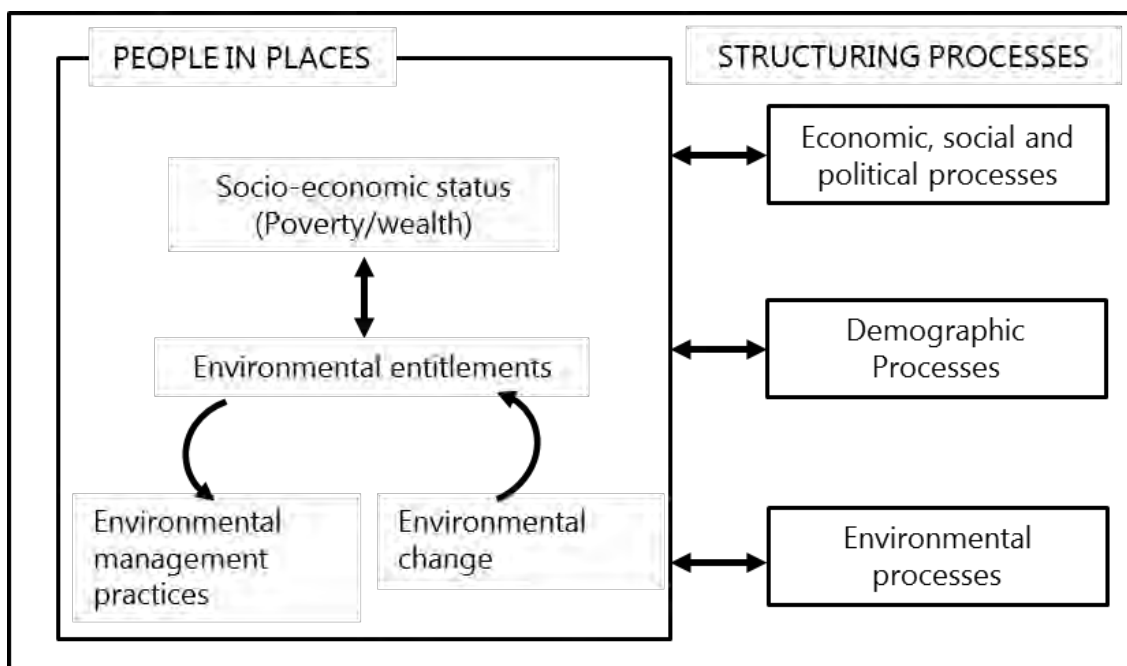


**Figure 2.8: Environmental Entitlements Framework (Source: Mearns, 1996)**

Therefore, the environmental entitlement approach stresses the need to differentiate local actors and stakeholders in terms of their endowments, capabilities and entitlements (Ochola *et al*, 2010) to ensure equal access to natural resources. This acknowledgement, combined with the use of local institutions as a regulatory body, ensures an effective environmental entitlement approach to NRM.

***Mongolia Case Study***

Mongolia has more than half its population living in rural conditions who are largely dependent on livestock as a livelihood (Mearns, 1996). The country has a history of liberalisation due to its early independence, which has resulted in a large private sector spanning across industry, trade, service and agricultural sectors. In the early 1990s, the country experienced a severe economic shock that threw the country into a state of poverty, with income decreases of approximately 30% (Mearns, 1996). Agriculture has always been a large contributor to Mongolia's economy, for both local and international markets. Livestock husbandry makes up 75% of the agricultural industry, however national and international trade of the produce is limited by heavy transport costs. This has consequently resulted in fewer people investing in livestock, and thus fewer numbers of farmers owning livestock. This meant that there were the same amount of cattle belonging to fewer farmers, resulting in less herders and a limited capacity to manage grazing. Overstocking and overgrazing quickly resulted in patches of land becoming degraded and unusable, further marginalising grazing areas. This vicious circle caused a declining situation that could only be solved with an effective grazing management plan.

An environmental entitlement approach to NRM was implemented as a means of solving issues related to livestock grazing in Mongolia (Mearns, 1996). It was acknowledged that in land tenure areas, attempting to give property and resource ownership or rights to individuals was not the solution (especially in the case of grazing land where some areas have much higher productive capacity than others). The idea in Mongolia was to build on existing, even though limited, community level institutions as they have considerable years' worth of experience in the specific environment. Such bodies were expanded and strengthened, giving local communities and individuals the opportunity to create comprehensive grazing management frameworks that were in line with the effective governance in the management of natural resources, while still allowing for indigenous knowledge and practices to be followed (Mearns, 1996). In conjunction with this, a social analysis was conducted to indicate the demographic profiles of households that owned livestock and those that acted as labour for the sector. From this, a set of environmental entitlements was established based on the specific communities' social profile and implemented though a community based institution.

Figure 2.9 demonstrates the example of an environmental entitlement framework that was compiled for herding households in Mongolia. This framework provides an example of how the process of economic change results in shifts in the environmental entitlements of certain herding households (Mearns, 1996). The environmental entitlements (access to grazing and water, access to labour, etc.) affect both the environmental management practices and environmental change, which too influence each other. The structuring processes (demographic changes, environmental constraints, etc.) affect the components of these. For example, environmental constraints effect environmental change and management practices, and visa versa. In the same vein, demographic change influences the environmental entitlement of herders, which again affects environmental management practices and change. In addition, the various structuring processes influence each other meaning that, for example, changes in demographics can alter the environmental constraints of herders. A framework of this kind assists in understanding the dynamics of the environmental entitlements and how changes to one component have ripple effects to various others.
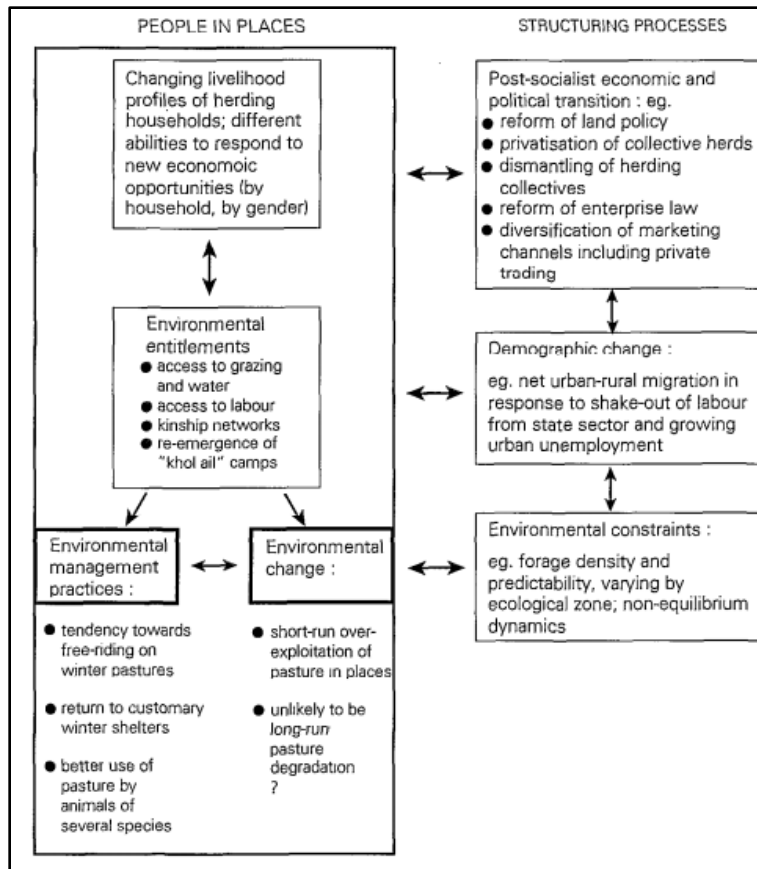
**Figure 2.9: Changing environmental entitlements of Mongolian herding households (Source: Mearns, 1996)**

### *Challenges of an Environmental Entitlement Approach*

One of the greatest criticisms of this approach is that, due to its basis on community institutions which are usually newly developed or built on from existing collapsing structures, there is a likely consequence of failure. It is demonstrated that a successful entitlement approach to NRM can be extremely positive and greatly benefit local, and predominately rural, communities by finding the balance between environmental and social requirements. However, the collapse of such a system could be detrimental as farmers, in the case of Mongolia, invest all their assets into a community institution. If such an institution was to fail, not only would the management framework be lost, but conflict and tension would arise over the resource's that were meant to be communally managed (Mearns, 1996).

In addition, it is often assumed that new or developed formal institutions will adequately capture and replicate local and indigenous knowledge systems as well as enhance community involvement; however this may not always be the case (Leach *et al*, 1999). In many instances, the failure of existing indigenous management plans is a result of the lack of confidence that locals' have in them. However, on the contrary, communities may be reluctant to buy into newly developed institutions without proof of their success. Therefore, there is a balance that needs to be found when introducing this approach, which is

usually achieved through interaction and communication with local stakeholders, actors and resource users.

Another difficulty arises from the very specific, household focus of the approach, which is difficult to adequately assess and capture. It may be an effective and relatively simple task to conduct in a small, localised community, but for larger more complex communities, inaccuracies and challenges may arise. Therefore, the approach is often criticised as being too structured and does not allow for flexibility. It is evident that when dealing with matters related to environmental and social dynamics, the key to an NRM programme is its flexibility and therefore it cannot remain static.

### 2.1.5.   Comparison of Reviewed Approaches to NRM
Based on the above review, it is evident that approaches to NRM vary in terms of their objectives, scales and methodologies, as well as their benefits and challenges. Broad themes are used as a means of comparing the six approaches discussed (meso-scale, ecosystem services, adaptive management, community based, sustainable livelihoods and environmental entitlements).  These themes are:

- **Objective:** focal subject that the approach aims to address or the stance it takes to achieve NRM
- **Scale:** geographical scale (from small, localised to larger provincial/national focus)
- **Benefits:** advantages of the approach
- **Challenges:** limitations of the approach
- **Stakeholders involvement:** what level and span of stakeholders are included

From the previous descriptions of each approach, it is evident that it is rare for only a single approach to be applied when implementing NRM. In the main, as with the *Afromaison* Project, two or more approaches are used in parallel as a means of gaining the benefits of more than a single focus. Therefore, it is important to remember that the challenges experienced in one approach may be outshone by the benefits that another brings.

#### *2.1.5.1.     Main Objectives of Approaches*
The approaches to NRM all have similarities in terms of their objectives, however they differ in terms of their main focus and methods. Overall, the six approaches discussed aim to include a wide range of stakeholders, in particular local communities who have a direct influence on the state of natural resources. Another commonality between them is the requirement to find a balance between social, economic and environmental concerns and conditions, therefore approaching NRM from a triple bottom line perspective. In all the approaches discussed, social wellbeing is a common thread as it is used as a driver for the implementation of NRM.

The meso-scale approach's main aim is to include a large range of stakeholders within a political boundary that is large enough to include natural systems, without being too large a scale that localised involvement is lost. This aims to alleviate issues related to political tension over NRM but still coordinate

and communicate vertically and horizontally across seemingly divided sectors (Afromaison, 2014). The ES approach is focused on the services that natural resources supply and are prioritised based on their demand as a means of supporting human wellbeing (Cork *et al*, 2007). An adaptive management approach is applied when knowledge gaps and uncertainties are evident and the management of an area is unclear (Johnson, 1999). This process involves experimentation to uncover information, whose outcomes are used to alter and update the NRM regions. CBNRM is a bottom-up approach which aims to give power to local communities by giving them ownership of their resources and allowing them to manage and allocate them as they see fit as a tool for poverty alleviation. This approach is localised, but is often supported by community institutions with very little mandate from government (Armitage, 2005). SL approach also focuses on poverty alleviation, particularly of rural communities, while also adopting a localised, small scale management system (Knutsson, 2006). As with CBNRM, an SL approach does not allow for much external influence, except in terms of political restrictions and stresses or shocks that may affect the localised system. Lastly, the environmental entitlements approach also follows a similar process of CBNRM in that it aims to give those that are directly reliant on the resource a say in how they are managed so that they can directly benefit from the protection on their natural resources (Mearns, 1996). It is evident that all approaches to NRM vary, but have cross cutting similarities. As previously indicated, in some cases, more than one approach can be used such a SL approach being used in conjunction with CBNRM approach.

### 2.1.5.2.     Scale of Approaches

The approaches discussed range in the scale at which they aim to address NRM, ranging from a localised, bottom-up approach to a large scale focus. Most of the approaches are dynamic enough to be applied to a variety of scales, although it is evident that they are better suited for certain scales. The inclusion of local stakeholders, government bodies and external influencers is also an aspect that aims to be included when deciding on a scale. Therefore, even localised, community based approaches have influences from external actors, and vice versa.

CBNRM, Environmental Entitlements and SL approaches all focus on small scale, localised communities by applying a bottom-up approach to management. The idea here is to provide decision making and management power to those who directly influence rely on the natural resources so that they can gain the benefits of their NRM. In some the programmes based on these approaches, community institutions or government bodies influence the management of these systems. As the name suggests, a meso-scale approach aims to focus efforts at an intermediary level so as to include both small and large scale aspects into a single plan. This is supported by the aim of staying within political boundaries that are large enough to encompass natural systems. An adaptive management approach is generally applied on a relatively large scale, however, even though it is not focused on community resources, it can be used for the management of small natural systems such as a canyon or a small catchment area. Lastly, an ES approach aims to be large enough to effectively include natural systems and dynamics with the ability of focusing efforts on smaller scales as prioritisation dictates. Although the approaches are intended for a specific scale, they are dynamic enough to be applied to other scales. However, experience reveals that attempts to do so have not been successful due to the nature of the approach.

### 2.1.5.3.    *Stakeholders Involvement in Approaches*

The notion of integrated NRM demonstrates the involvement of stakeholders into the process which is a key element in all the approaches reviewed. NRM programmes involve grassroots stakeholders such as local communities, intermediate sectors such as community institutions or local governments as well as higher non-governmental organisations (NGOs) and national government. Such higher level sectors are predominantly involved through the initiation of the program and to ensure that the objectives are being achieved where local levels are responsible from actions, management and decision making.

As indicated in the discussion on the scale that approaches have taken, the CBNRM, environmental entitlements, SL and adaptive management approaches all involve grass-root stakeholders as key decision makers and managers. Although the majority of decisions are made by locals, external sectors such as government and NGOs monitor actions to ensure the objectives of the program are being met. In some cases, such as the SL approach, external involvement is limited and rare, resulting in the majority of control being in the hands of local communities. An ES approach follows a similar localised focus, although local stakeholders are predominately incorporated when efforts are focused on a particular area that has been prioritised. The initial prioritisation and analysis is usually conducted by large or medium level stakeholders, although the inclusion of locals in this phase is not exempted. The meso-scale approach aims to cross-cut all levels of stakeholders by gaining the perceptions and ideals of locals while still being influenced by national legalisation and guidelines. Most of the decision making and planning is made at middle scale, which captures the influences from both peripheries, and developed into an integrated plan.

*Access and Benefits Sharing*

The 1992 Convention on Biological Diversity (CBD) presented a new means of dealing with the trade and regulation of resources, introducing the notion of 'access and benefit sharing' (ABS) (DEA, 2012). This notion stemmed from the growing global recognition that natural resources are vital for social and economic development of both present and future generations. In response, the South African Department of Environmental Affairs (DEA) promulgated and administered the National Environmental Biodiversity Act No. 10 of 2004 (NEMBA) and its accompanying Bioprospecting, Access and Benefit Sharing (BABS) Regulation of 2008 (DEA, 2012). This provided guidelines for providers, users and regulators of resources. The key objectives of the BABS Regulation include the sustainable use of indigenous resources, fair and equitable sharing of benefits amoung stakeholders, and the conservation of biodiversity (DEA, 2012). The notion of ABS is thus built into the South African legislation to ensure that benefits gained from natural resources are fairly divided among all stakeholders. This reiterates the importance of effective stakeholder engagement in NRM to ensure that all users, providers and regulators are given the opportunity to be involved in the fair and equitable distribution of the countries resources.

### 2.1.5.4.    Challenges of Reviewed Approaches

With any integrated approach there is the challenge of cutting across sectors, groups of stakeholders and issues that were formally in isolation.  This integration often results in conflict and tension, and can be a challenging dynamic to manage. In addition, the issue of resource ownership, particularly in situations where resources were formally state owned or a communal or individual asset, can be sensitive in an integrated management approach. With this comes the difficulty of defining who should protect and manage the resource as well as who gains the benefits from it. Such challenges have to be addressed with all stakeholders before an NRM is put in place, irrespective of the approach adopted. Another issue is the attempt to balance the triple bottom line (economic, social and environment) where management requires the consideration all three aspects equally as a means of formulating a holistic, integrated, sustainable and fair programme.

With localised approaches (CBNRM, environmental entitlements, adaptive management and SL) there is the challenge of finding a balance between local indigenous systems and scientific knowledge as there are benefits and challenges of both. Indigenous knowledge and the systems they instil are adapted to suit the specific environment meaning that they are well suited for the region. This is also beneficial in that local stakeholders are familiar with such processes and have therefore accepted them as practice. However, many of these systems fail to consider external users, changes or influences and therefore highlights the need for scientific knowledge to be incorporated. Such scientific knowledge has the benefit of having of up-to-date information and technology. However the downfall may be that they are not applicable for the specific context and/or that they will not be accepted by local stakeholders. Therefore a balance between indigenous and scientific knowledge needs to be carefully implemented into a localised approach to NRM.

Another challenge with localised NRM approaches is the lack of control government has over the actions being taken. In some cases, it is mandatory for government to assess and monitor the progress and decisions being made at a local level. This may be seem to be beneficial as communities evolve in a unique way to suit their system, although it is a risk in terms of conflicts that may arise over ownership, beneficiaries and general management (Brosius *et al*, 2005). Localised approaches have been criticised as often being regionally myopic and therefore exclude cumulative effects and external impacts (Ellis, 1999). The exclusion of these outside influences not only negatively affects the external users relying on the resources, but may result in unexpected negative implications for the local community.

As previously indicated, there are challenges associated with cross-cutting between sectors that were formally divided or isolated, particularly with approaches that range in scale and stakeholder involvement such as a meso-scale approach. Not only is this difficult to manage because of the vertical involvement of different institutions, organisations and government sectors, but the horizontal range results in the collaboration of stakeholders from different sectors who may have contrasting opinions. With this comes the challenge of meeting the mandates of each group of stakeholders involved while still placing natural resources at the crux of decision making.

When managing a medium or large scale system through a meso-scale or ES approach, the range of concerns and issues involved are generally more widespread and complex than those of localised,

community level systems. To achieve effective NRM at these levels, much research needs to be conducted to adequately understand and capture the dynamics of the system. Such research can sometimes be challenging to conduct, especially in the case of an ES approach when assessing the state of the natural resources. Varying perceptions and the dynamic nature of the natural environment makes this a momentous task and one that requires in-depth analysis.

Site specific limitations result in approaches often being used in conjunction with others as a means of counteracting such difficulties. For example, a SL approach is often perceived as a useful analysis tool but lacks traction in terms of implementation and is therefore often used alongside a CBNRM programme.

Finally, a challenging aspect of NRM is the division in focus due to the marketable and non-marketable value of natural resources. It is inherent that the resources that have direct social and economic benefits are the ones that are most likely to be protected while those that have secondary benefits are perceived as 'non-valuable' and therefore not a priority. The aim of a NRM process is to make stakeholders realize the direct and indirect value of the natural environment and that without a holistic, balanced approach, the objectives will not be met. The failure of such programmes may also be disastrous as conflict and tension may arise over ownership to resources, beneficiaries and future management.

### 2.1.6.   Conclusions of Reviewed Approaches to NRM

NRM aims to create programmes or frameworks based on triple bottom line concerns (economic, social and environmental), as a means of creating a holistic and sustainable approach. Another key aspect of the discipline is the inclusion of a wide range of stakeholders, which is often a difficult task to undertake. Cutting across sectors that are usually separate and isolated is a driving point behind the implementation of NRM, giving the discipline its traction and success.

It is evident that no single approach to NRM is perfect and ideal for every system and situation. Each approach comes with its own objectives, ideal scale, benefits and challenges and therefore has to be chosen based on the specific social, economic and environmental dynamics. The *Afromaison* project adopted a meso-scale, adaptive management, ES approach as a means on joining several approaches to gain the best advantages of all of them. The outcome of the process is a timeless management plan that can change with the system and highlights the importance of natural systems. This changes the mind-set of stakeholders to realise the key role they play in economic sustainability and social livelihoods. Therefore the value of environmental systems, from not only a direct economic gain perspective, needs to be a learning point for all of those involved in the process to adequately achieve NRM.

As previously indicated, the focus of various approaches to NRM can range in terms of scale, objectives and stakeholder involvement. Scale is determined by the level at which efforts need to be focused, ranging from a local community or small catchment to large scale administrative boundaries or complex natural systems. Although most approaches are flexible and can, in theory, be applied to any scale, it is recommended that they are applied for their specific intention so as to adequately capture the level of detail required and to gain the most of the approach. The objectives of each approach vary, especially in

localised approaches where the focus may be placed on a specific sector, resource, group of stakeholders or desired outcome. In many cases, NRM programs are driven by the need for poverty alleviation and natural resource protection, reiterating the need for a holistic, triple bottom line approach. The involvement of stakeholders varies between approaches and is often determined by the scale of the project. Localised approaches usually involve local communities and institutions, while simply being initiated and monitored by external sectors such as NGOs and government. On the other hand, larger scale approaches may include a greater range of stakeholders, from grass-root locals, to intermediate decision makers and managers, while not excluding high level government sectors and even international parties. The inclusion of stakeholders throughout the process is a key aspect of any NRM as their exclusion will result in a non-holistic approach.

The challenges experienced in an NRM are related to the difficulty in cutting across sectors and disciplines that were historically seen in isolation while balancing social, economic and environmental concerns. A key building block to solving such challenges is to alter the mind-sets of stakeholders through the realisation that all systems are integrated. Therefore, the actions of one sector inherently affect another, which is a notion that needs to be adopted in a NRM programme. Challenges can be overcome by adopting more than one approach to NRM as a means of using the benefits of one to counteract or complement another, as is evident in the *Afromaison* Project.

In conclusion, the approaches adopted by the *Afromaison* project were chosen based on the desired scale of the project and the key aim to address poverty and environmental degradation while ensuring economic prosperity and development, through a dynamic, interchangeable vehicle. Collaboration of stakeholders horizontally and vertically across sectors was a driving point behind the chosen meso-scale approach, while an ES perspective was utilised to highlight the importance of natural service provision. The adaptive management approach enables planning and decision making to be conducted in a flexible manner to allow alterations to be made as a greater understanding of the system is established. Such aspects are important to address issues in developing countries, especially when such a large reliance is placed on complex natural systems and the resources and services they provide. It is evident that without the sustainability and functionality of natural systems, social and economic prosperity will not occur, further reiterating the importance of integrated, holistic, dynamic and ongoing NRM.

## 2.2.   Role Playing Games

The second part of this literature review assesses the use of Role Playing Games as a public participation tool for achieving NRM, which can be used to complement the reviewed approaches. The development of a RPG formed part of the NRM 'toolbox' for the *Afromaison* project. This is based on recent perceptions that natural systems are dynamic with complex interactions and challenging problems which cannot be viewed from a single objective means (de Fooij, 2011). It is evident that such perspectives are based on the specific context and therefore differs depending on the stakeholders and their situations. As a result, traditional modelling is no longer sufficient in adequately representing such systems (de Fooij, 2011). Practitioners and researches have highlighted the need for multi-stakeholder

decision making and as a result, several tools have been developed to meet these requirements (Rydannykh, 2011).

RPGs are a common type of participatory modelling, acting as a tool to achieve affective stakeholder engagement. Daniell (2008) (Page 4) indicates that:

> *"Participatory modelling is a process which allows a number of different points of view to be explicitly represented and collectively reflected upon by a group of stakeholders through a series of semi-structured decision cycles."*

Therefore the key elements of a successful participatory model are to:

- gain a range of perspectives,
- openly represent those perspectives,
- collectively reflect on them with a group of stakeholders, and
- conduct a series of semi-structured decision cycles

A successfully participatory model is considered to be the basis for a discussion about the system by framing the problems and possible solution at hand (de Fooij, 2011).

The use of Role Playing Games (RPGs) as a negotiation and participatory tool is derived from managerial science and operational research. One of the oldest uses of RPGs is evident in war games where they acted as simulation models (Barreteau *et al,* 2003). RPGs are a powerful tool that can be used for a wide range of intentions such as education, exploration and transformation (Rydannykh, 2011). The use of models as artificial societies is increasing, particularly for testing scenarios and to gain full control of the desired parameters for repetition purposes (Barreteau *et al,* 2003). It also aids stakeholder participation through the gaming experience as well as enabling them, and researchees, to understand the complex and dynamic structures of systems (de Fooij, 2011).  Barreteau *et al* (2003) demonstrated that:

> *"RPGs are also a means to reveal some aspects of social relationships by allowing the direct observation of interactions among the players. This may be especially useful when the players are stakeholders.*"

### *Types of Role Playing Games*
Ferrand *et al* (2008) indicates that there are four main types of RPGs, namely Educational and Training; Common Pool Resource Management; Experimental; and Policy Simulation Games. A RPG can be a combination of the different types and/or combined with other modelling systems to serve various purposes. For example, an Educational and Training game could later be used as an Experimental game while a Common Pool Resource Management game could be used to link a computerised model with reality. The various types of games are explained as follows:

1. *Educational and Training* games are a communicative approach for field education which are often based on or backed by a computerized model that can be conducted with a range of participants (children, students, adults). They are generally generic enough to be used at any

site across regions, types and even countries, therefore demonstrating a generalised system rather than a specific situation. The aim of these types of RPGs is to facilitate training and education through a scenario driven focus that can be conducted with a range of stakeholders.

2. *Common Pool Resource Management* games are a means of applying educational tools to reality to enable on the ground stakeholders to acknowledge and understand their critical role in the management of resources. Such games can stem from computerised models and act as a tool to facilitate discussion and negotiation as a means of promoting management protocols.

3. *Experimental* games are more specialised than the former two types as players are placed in a very controlled situation to analyse and understand the causes of their collective and individual behaviour. Within social science, such games can be used to test hypotheses or theory as well as to better understand human behaviour through their use as a prospecting tool. Experimental games are usually conducted with students but can be run with professionals or local stakeholders to test social adhesion and assess the performance of the system.

4. *Policy Simulation* games are used to identifying means of managing potential systems in a range of fields. This is conducted through the development and analysis of scenarios to create virtual dimensions. Such games are particularly useful in improving management of possible problems that various stakeholders may be faced with.

### Motivation for Role Playing Games

Barreteau *et al* (2001) supports the above categories by demonstrating the need for simulation tools (RPGs) for research, training and decision support purposes.

- *Research*: It is often difficult to carry out research and experiments on real ecosystems due to their complexity, management needs, stakeholder's involvement and natural time lag. There is also a need for experiments to be repeated while being able to set or control the parameters in which they are being conducted, which is almost impossible to do in reality. Therefore, there is need for a simulation tool that involves all stakeholders which can be repeated and tested with a range of parameters while quickly demonstrating results that complex natural systems may incur.

- *Training:* Simulation models are often used as a tool for education or training purposes to not only further understand and improve knowledge of NRM but to develop new skills in the field. Such developments are gained through experimentation, trial and error, and testing as a means of understanding and unpacking the behaviour of the ecosystem. Such methods limit the cost of experimentation as simulation is used for training and education, which can then be linked and replicated into reality.

- *Decision Support:* It is becoming more common for simulation models to be used to support decision making processes particularly in the field of NRM where decisions are rarely based on a single perception. Such decisions are the result of the interactions and discussion between participants. This process is often driven by a single person or body (e.g. managers) as the final decision inducer or maker. Therefore, the use of a simulation tool for decision making is

conducted to aid the process on which decisions are made through the involvement of a range of stakeholders to ensure acceptance, suitability and legitimacy of outcomes.

### 2.2.1.1.    Benefits of Role Playing Games

RPGs are a participatory tool to involve stakeholders and are useful in explaining and understanding multi-agent (stakeholder) systems (Barreteau *et al*, 2003). Other benefits of RPGs include (Barreteau *et al,* 2003; Morardet *et al*, 2012; de Fooij, 2011):

- They are a good communication tool as it places stakeholders in a close-to-real situation
- The flexibly of the general guideline or RPG model which enables it to be adapted to any situation
- The simplification of reality makes complex systems more accessible and makes issues easier for all stakeholders to understand
- When using RPGs to address management issues, fewer side effects are experienced as learning is conducted through simulation rather than by doing
- They limit the cost of trial and error methods as RPGs act as an opportunity to safely explore potential situations without having to face the consequences of reality.

### 2.2.1.2.    Critiques of Role Playing Games

Despite the knowledge that RPGs are extremely effective in improving decision making and enhancing collaboration through mutual trust, understanding and knowledge sharing, the inability to scientifically test and validate the impacts of such games is limited. Other criticisms of the tool include (Barreteau *et al,* 2003; Rydannykh, 2011):

- Difficulty in reproducing results particularly when wanting to make systematic comparisons as there are too many uncontrolled elements
- Limited in its ability to be replicable as those who have played the game more than once will have learnt aspects from previous sessions that cannot be forgotten, thereby altering the context of the session
- The model (game) is never really complete, perfect or ideal as each session is, in itself, a test, and alterations can constantly be made to improve its accuracy and applicability
- The perceptions of the players will affect the design of the tool which can be laborious when dealing with a range of stakeholders
- In some cases, the outcomes of the model will demonstrate a specific set of circumstances which makes it difficult for the outcomes to be replicated back into reality
- A lack of robust scientific assessment methodology which could be used to evaluate the impacts of the RPG process

Such limitations may result in the outcomes and findings of games being disregarded due to their lack of scientifically sounds results. This therefore demonstrates the need for further research, experimentation

and validation of such participatory tools to enhance their application and use in multi-stakeholder engagement and decision making.

### 2.2.1.3. Conclusions of Role Playing Games

RPGs are being used to simulate reality as a means of complimenting research, enhancing experimentation, limiting time and cost implications, and supporting decision making. As Ferrand *et al* (2008) demonstrated, a RPG can be used for a specific purpose, such as for education and training, or for a range of objectives that can be stacked to complement each other. The tool is not a standalone mechanism but rather one that compliments existing research or management while acting as a means of achieving stakeholder integration and participation. Limitations of the tool are mainly associated with the difficulty in replicating the outcomes in reality. In addition, the tool is limited in the number of times it can be played with the same stakeholders, unless the conditions of the game are altered. Despite such limitations, RPGs are perceived as a useful tool, particularly when dealing with complex systems which require stakeholder participation and integration for future planning and management.

There are several guidelines that can be used to develop a RPG. Due to the wide range in types and focus of RPGs, the guideline chosen for their development needs to be based on the research objectives. For example, if the research is focused on water resources management, a guideline that places water at the forefront should be selected. For the *Afromaison* project, the Wat-A-Game (WAG) guideline was chosen for the development of the tool. The justification being that the WAG guideline focuses on water resources and includes other important resources such as land, labour and money, to name a few. Therefore, for the NRM project, a guideline that includes all types of resources in an integrated manor was ideal.

### 2.2.2. Wat-A-Game

WAG is a toolkit or guideline for developing a RPG about water management, which was recently developed (in 2004) to specifically address issues of water use, management and governance at a small catchment level (Ferrand *et al*, 2008). WAG is designed as a simplistic tool that is adaptable and easily taught to new game designers, and can be used in water management to facilitate multi-stakeholder engagement and decision making (Rydannykh, 2011). The WAG framework enables the developer to build a simulation model that is specific and unique to their local situation. When the guideline is adopted, it is important that a balance between realism, comprehensibility and playability is achieved to successfully facilitate management, exploration and education of systems (de Fooij, 2011).

Rydannykh (2011) indicated that WAG demonstrates two types of RPGs, namely a common-pool resources management game and a policy simulation exercise. However, this is not to say that WAG cannot be used for training and education as well as for experimental purposes. In many cases, it has been used as a modelling process to compliment and support decision making processes (de Fooij, 2011). Ferrand *et al* (2008) demonstrated that a WAG allows for *"full flexibility in the games settings and adaptation to a local case study"*, indicating that even though a game may be developed for a specific

system, it can be adopted to various sites and contexts. In addition, WAG is designed to integrate various viewpoints as a means of enhancing participation and discussion among a range of diverse stakeholders. The justification for the development of such a game was due to the realisation that traditional top down or bottom-up NRM approaches need to be reconciled. This enables a collective learning process that is inclusive of all stakeholders as a means of achieving the integration requirements of NRM (Moreadet *et al*, 2012). This is justified by the need to create a participatory process that can be upscaled to various institutional and geographic levels.

WAG creates a model of reality that represents the key features and dynamics of a system so that participants can easily identify the system. At the same time, abstraction is created to not only simplify the system but to avoid displaying aspects of reality which may cause tension between participants. The design of the model is usually developed by the facilitator based on research and insight from local experts. Although, when conducting the game with participants, the facilitator can choose to present them with the model they created and allow participants to adjust it as they feel necessary to enhance their sense of ownership. In a case where the facilitator has an extended time period to develop and conduct the game, the model can be developed with the participants to increase the level of ownership, although this is not usually the case (WAG, 2012).

The 'play' of the game is regulated by the flow of water from the top of a region to the bottom. Players are provided with certain activities to play based on the role they are representing. These actions use and manipulate the resources in the system with consequential influence other players and their activities. The dynamics, resources, actors and processes of the game depend on the system that it is replicating. The play is altered by the facilitator who applies a different scenario for each round that can be based on seasons, climate, legislation, politics and any other relevant and applicable scenario of the region. Once a round of the game is played, the outcomes are assessed and an action plan may be drawn up for the next round depending on the players' desires. A game session comprises of an average of 4 to 5 rounds, after which a debriefing is conducted to discuss and conclude the outcomes of the session (WAG, 2012).

### 2.2.2.1.    *Types of Wat-A-Game*

There are four types or levels of WAG which range from simple, abstract versions to more complex and specific types. (WAG, 2012) They are:

1. **Ini-WAG:** A simple, quick game based on a generalised, abstracted system that can be used with any audience. Enables participants to understand general aspects of water use, sharing and management generating generalised discussion.
2. **Mini-WAG:** A slightly more specified game than an Ini-WAG as it provides 'out-of-the-box' games that are based on a certain scenario. Current Mini-WAG games that are available are a 'North' version which addresses issues faced by European and Meditation types of scenarios, while a 'South' version focuses on semi-arid environments.

3. **Crea-WAG:** Uses the general game elements (bricks, tokens, etc.) in a way that replicates a specific system or region so that participants can adopt the general model to their own situation.

4. **Self-WAG:** Provides a guideline (methodological booklet) that guides the developer in creating and managing their own WAG, specific to their context.

Figure 2.10 displays an example of an Ini-Wag being played, demonstrating the basic cards and tokens provided for the generalised simulation model.
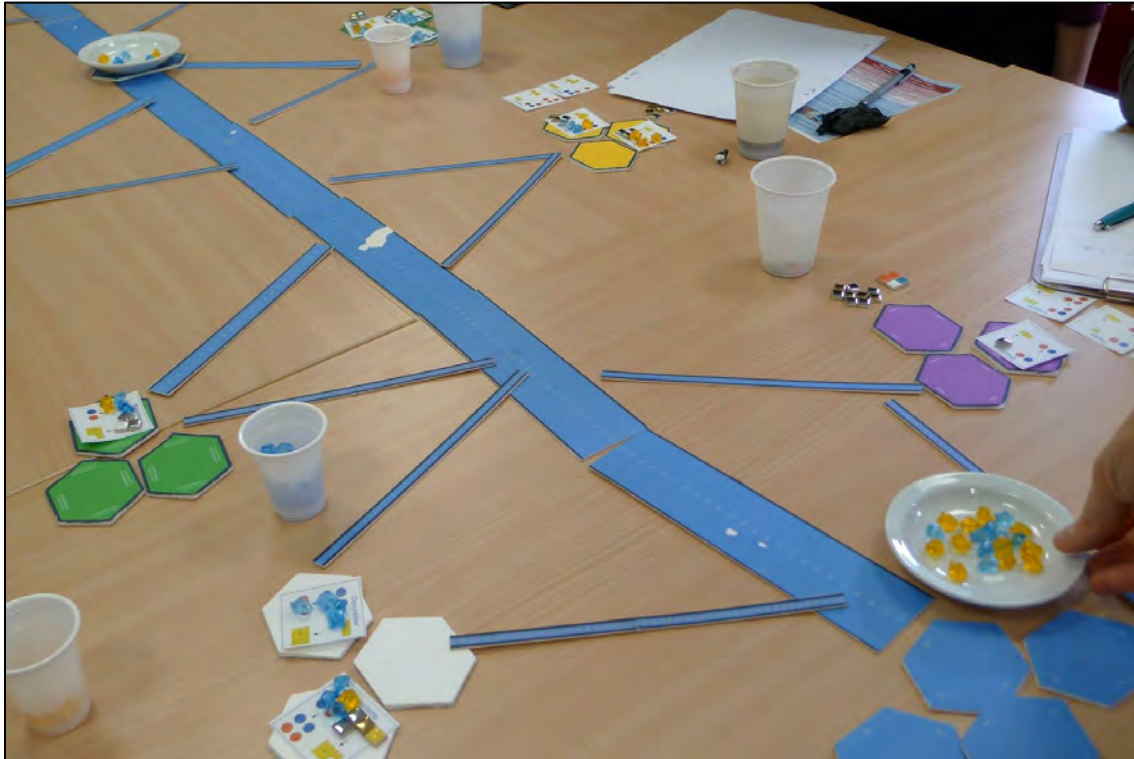


**Figure 2.10: An Ini-WAG being played (Source: WAG, 2012)**

The various types of WAG result in the framework having a wide application as a simple Ini-WAG model can be used to quickly and simply enable players to understand the dynamics and interconnectedness of a system, while a Self-WAG enables the understanding of specific complexities whose outcomes can be used for the management of a specific region. The *Afromaison* project adopted a Self-WAG as a tool for addressing specific issues and challenges of a system and promoting solutions, discussions and decisions making.

The key features of WAG include (WAG, 2012; de Fooij, 2011):

- Simple, repeatable and transposable making it is easy to adopt, implement and design
- Cost effective as it requires basic equipment (tokens, stones, paper) and does not need modern technology (such as computers) resulting in it being ideal for illiterate and poor regions.

- A fun, interesting and interactive mechanism for addressing complex and sensitive issues without fuelling conflict or tension between participants
- Scalable in terms of the number of players as well as the size of the system it can represent
- Time effective as a game session is only a few hours, commonly half a day
- Produces measurable outcomes which can be used to inform decision making and create actions plans (due to its development involving calibration and real dynamics evident in the system)
- Easy to teach and set up new games
- Adaptable, enabling participants to recognise their own system being simulated, generating results and discussion that are specific to their system
- A personal model that is based on region specific elements that stakeholders can identify with, producing management outputs that are based on the thinking and decisions of locals. This gives stakeholders a sense of ownership, not only of the game but of the management plan as a whole
- Combines technical and theoretical information with indigenous knowledge as a means of producing a self-analysis management tool that all stakeholders can relate to and use in future planning.
- Allows not only the final modelling product, but also the development of the model, to be a process that aids participation and involvement of stakeholders.

### 2.2.3.    Role Playing Game Case Studies

The following demonstrates case studies where a RPG has been used in the management of a system. Each case study demonstrates a different approach taken and the guideline used for developing the type of RPG adopted.

#### 2.2.3.1.    *Senegal River Valley Irrigated Systems (Barreteau et al, 2001)*

Simulation modelling was adopted in the Senegal River Valley region to combat issues related to water use and coordination among farmers. In this case study, a RPG was adopted in conjunction with Multi-Agent Systems (MAS), a computerised modelling discussion support tool. MAS replicates reality by creating a virtual ecosystem where it is possible to conduct experiments according to various scenarios selected by the user. Therefore, it simulates the evolution of a real ecosystem with a given hypothesis that enables repeatability and a control of scenarios for experimenting purposes. The use of MAS for natural resource and environmental management is growing steadily but is limited to the laboratory as it is difficult to explain its content in the field (reality). Synergy between MAS and RPGs enables this link to be made and the RPG enables the content of MAS to be applied to the reality. The two cycles enable feedback to the real world and stakeholders as a means of promoting communication, while the RPG creates an additional mode of making this link (Barreteau *et al,* 2001).

The combination of the two tools were intended to combat the issues experienced in the Senegal River Valley by improving the function and management of irrigation systems through three means: research,

training and negotiation. To achieve this, it was demonstrated that the game must win the trust of stakeholders and that materials used should be as simple as possible to enable rapid participation.

Initially, a MAS was designed for the Irrigation System, where rice paddies are the main form of agriculture. This model was referred to as *SHADOC* and was centered on water collection, allocation and use as well as farmers' location in relation to pumps. In the model, each farmer had a specific goal and was part of a 'friendship group' (other players that they were allowed to communicate with). Each 'friendship group' had a representative that would communicate with other groups to manage the use of water in the system. Actions taken by farmers were based on daily activities and cropping seasons, enabling them to gain credit based on their actions. Rules and actions could be changed to imitate good practices taken by farmers. *SHADOC* enabled communication channels and management practices to be developed but was limited as the link between the model and reality could not be made. Therefore, *SHADOC* was converted into a RPG by simplifying the model and limiting the number of players (avoiding large groups of people that will all play the same actions). A few of the *SHADOC* rules were eliminated after consultation with the local farmer association. The RPG was called *ShadocLight* and demonstrated a 'sped-up', simplified and site specific version of original MAS. To ensure that the link between reality and the model was made, each village played a RPG on their own table to highlight the realistic separation within the Senegal River Valley. Five, half day game sessions were conducted with groups of participants, where community members who did not participate, were able to observe and offer unbiased opinions.

The *ShadocLight* RPG was perceived as a useful management tool by the local communities, with several players requesting to use it for future experiments, discussions and planning. It was perceived that the RPG was successful in explaining the content of the MAS as it enabled participants to initiate discussions about their real systems. Participants indicated that the individual experiences and knowledge of stakeholders were revealed during the game session, which enabled it to become common knowledge that could be used for improved management.

***Challenges of the Senegal River Valley Irrigation System***
*ShadocLight* was only used for research as participants were concerned with validating the RPG, thus limiting its use as a training and negotiation tool. Difficultly was experienced in getting players to admit the reality of hierarchy system in terms of water use and allocation. This was a sensitive issue and had to be dealt with in an indirect way to avoid causing unnecessary conflict and tension.

### 2.2.3.2.    WETwin Ga-Mampa Wetland Project (Morardet et al, 2012)
The *WETwin* Project aimed to enhance the role of wetlands within basin-scale IWRM as a means of improving community service functions while ensuring ecological conservation status. The project not only focused on wetland conservation, but aimed to integrate stakeholder's perceptions and enhance communication between such role players. A small wetland located on the Mohlapitsi River in Ga-Mampa in the Limpopo province, South Africa, was selected as the project case study. A *WetWAG* was

developed as a multi-agent analysis tool for wetland management in the region. The main objectives of the *WetWAG* were to achieve stakeholder engagement through the provision of efficient support for negotiation, awareness raising and environmental education. This process was based on the aim of designing a wetland management plan that involved all stakeholders to guarantee environmental protection and sustain the livelihoods of the dependent villages.

The *WetWAG* was derived from the WAG guideline to facilitate exploitation and transformation of water management and use, at a small catchment scale. The *WetWAG* acted as an awareness or training tool rather than a decision support tool. It was initially part of the stakeholder involvement phase of the project, but was also used in other phases (such as the Conceptual Framework and the toolbox). Stakeholders and decision makers at the local (basin) and national levels (ranging from sector department officials, local governments, elected representatives, to agriculture and environmental extension officers, among others) were involved.

Figure 2.11 below indicates the development process of the *WetWAG*, which involved a series of testing phases where stakeholders gave feedback and the *WetWAG* was altered accordingly. A combination of desktop research and participatory methods were used, which were based on key resources that stakeholders exploited (livestock, land, water, money).
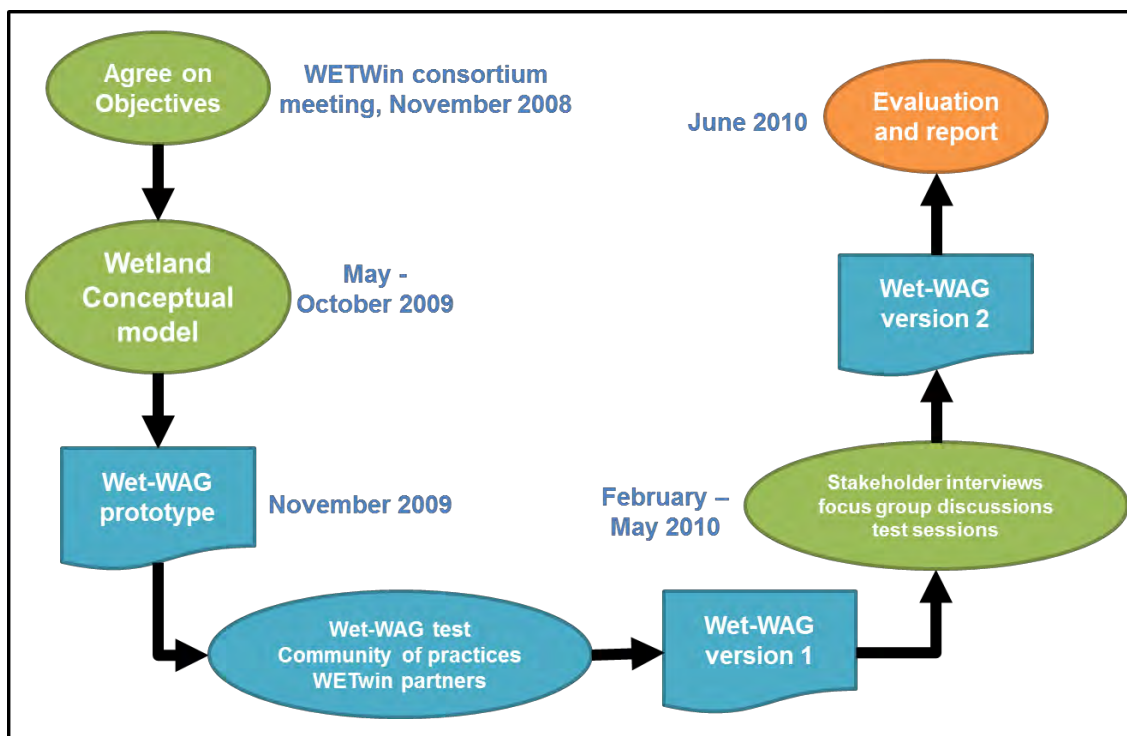


**Figure 2.11: Overview of WetWAG development process (Source: Morardet et al, 2012)**

In the game, players were confronted with new policies, management rules or external events to which they had to react to while maintaining activities and livelihoods at a viable level. Each session was conducted over 3 to 4 hours which included an introduction, playing the game and debriefing. Each

round of the game was determined by the season (wet or dry) and the amount of rain being experienced in that year.

The *WetWAG* was used to trigger collective discussion once several rounds had been played. Discussions were based on the wetland management issues currently being experienced in the basin and acted as a basis for management and planning. Some of the discussions based on the *WetWAG* included:

- Sharing of irrigation water among users, which was a rule in the game and enabled players to understand the necessity of such management.
- The wetland monitoring sheet created discussion during and after the game related to the condition of the wetland based on the consequences of over-cropping, which inherently lead to control mechanisms as means of mitigating and avoiding wetland degradation.
- The use of event cards (which introduced unplanned and unexpected events to the game, such as broken irrigation machinery) to indicate the need for collaboration and savings as resilience against maintenance and rehabilitation requirements. Discussion was created by players around the development and management of such a system.
- Players also found the game to be an ideal platform to think about various issues and assist in decision making in the Ga-Mampa real system resources management.

Therefore, the *WetWAG* was successful in enabling stakeholders to understand and discuss their impacts on the wetland and the surrounding systems. This in turn enabled stakeholders to identify their constraints, trigger discussion and support decision making in the reality. It was noted that the *WetWAG* *"provided useful information for WETwin research mainly by supporting the validation of proposed management options"* (Morardet *et al*, 2012). In addition, the game enabled stakeholders to easily understand the alternative through the provision of visual and tangible description. The process allowed for testing to reveal the social-economic consequences of their decisions. Benefits were not only received by stakeholders, as planners and decision makers were able to understand complex social systems and protocols with regards to the management of resources, through the game simulation process.

### Challenges of the WETwin Ga-Mampa Wetland Project

Despite the positive outcomes and use of the tool, several downfalls of the process were highlighted. Firstly, that the game was time consuming, particularly in the initial phases when players tried to understand how to play the game. It was noted that at least two rounds of the game needed to be played to enable relevant discussion. As a result, it was recommended that several game sessions be conducted with a single group of stakeholders to maximize the benefits of the outcomes. As a means of mitigating such time constraints, the *WetWAG* was simplified, allowing several rounds to be played in a shorter amount of time. However, after conducting game sessions with the simplified version, stakeholders indicated that the game was too abstract from reality and that it remained too complex for community members, farmers and senior individuals. Thus, it was evident that the community wanted to target a range of stakeholders by finding a balance between realism, complexity, abstraction and

simplicity. Despite such negative feedback from players, the *WetWAG* was perceived as a useful tool that the community could use for future management and planning as the simulation of scenarios aided decision making.


***Conclusions of the WETwin Ga-Mampa Wetland Project***

The *WetWAG* achieved its objectives of contributing to the stakeholder engagement process of the *WETwin* project. Despite its perceived complexity, time consumption and distant abstraction from reality, the game still provided a useful tool in many aspects. It was successful as an awareness raising tool, particularly for external stakeholders who indicated that they were able to become familiar with the local system. Local stakeholders were able to understand the importance of economic management and planning within their farming system. In addition, *WetWAG* was perceived as a useful platform for raising discussion and assisting decision making. This was evident in the debriefing after each game session, which raised discussion around important issues and possible management solutions which informed the decision making process.


### 2.2.3.3.    *Sylvopastoral Systems in the French Mediterranean Forests (Etienne, 2003)*

Sylvopastoral Systems have been developed as a means of addressing socio-economic and technical constraints being experienced in multiple use Mediterranean Forests. Sylvopastoral management planning is a means of enabling many users to interact and combine activities to achieve numerous benefits in the long term. In this case, forest operations have been developed as a mechanism for fire control, rural development, conservation and/or landscape management. Attempts to include pastoral activities in such areas have been made, however their failure stems from the lack of understanding of multiple use rules, constraints and dynamics. A companion modelling approach was applied to set up a sylvopastoral management plan to avoid potential conflict and to support the complex negotiation process.

The companion modelling conducted aimed to integrate multidisciplinary knowledge into a model that is able to represent the interactions of the various dynamics and behaviours in the region. A Multi-Agent System (MAS) was used to assist livestock farmers and foresters in integrating their actions by simulating various management strategies and accessing their outcomes and impacts. In addition, a RPG was initially used as a training mechanism, but due to its success in unpacking the complex interactions, the Sylvopast RPG became the key tool in the process. The Sylvopast RPG was perceived as a *"key means of enriching and improving the representation of the negotiations and interactions between livestock farmers and foresters involved in the management of the same forest"* (Etienne, 2003). The RPG, combined with the MAS, enabled participants to be placed in a specific environmental and social situation as a means of accessing probable consequences and informing management planning.

The development of the RPG was based on two fundamental questions:

1. How can the development and evolution of sylvopastoral management systems be simulated in a fun, playful way?
2. How can such a complex system be presented in a manner that all stakeholders can understand?

To address the above, the game was developed by breaking down complex environmental and social dynamics, to demonstrate the implications they have on each other. The main goal of the RPG was to stimulate desirable futures through the use of sylvopastoral management planning. The game rules were very flexible which enabled players to select their own goals, choose management options and plan their actions freely. The only rule provided was that players had to interact and negotiate with each other on a regular basis. Due to the large complexity of the system, the RPG was a very simplified, abstracted version of the system. The game board (Figure 2.12) consisted of a grid with varying coloured squares which indicated the characteristics of the land. Based on the characteristics, activities could be conducted by farmers (players) as a means of meeting their desired goals. Each time an activity was conducted in a land plot (square), a number would be placed in the square, which increased each round. At the end of a round, squares would be recoloured according to the number to demonstrate which areas are being heavily utilised and to unpack the impacts or consequences of activities.
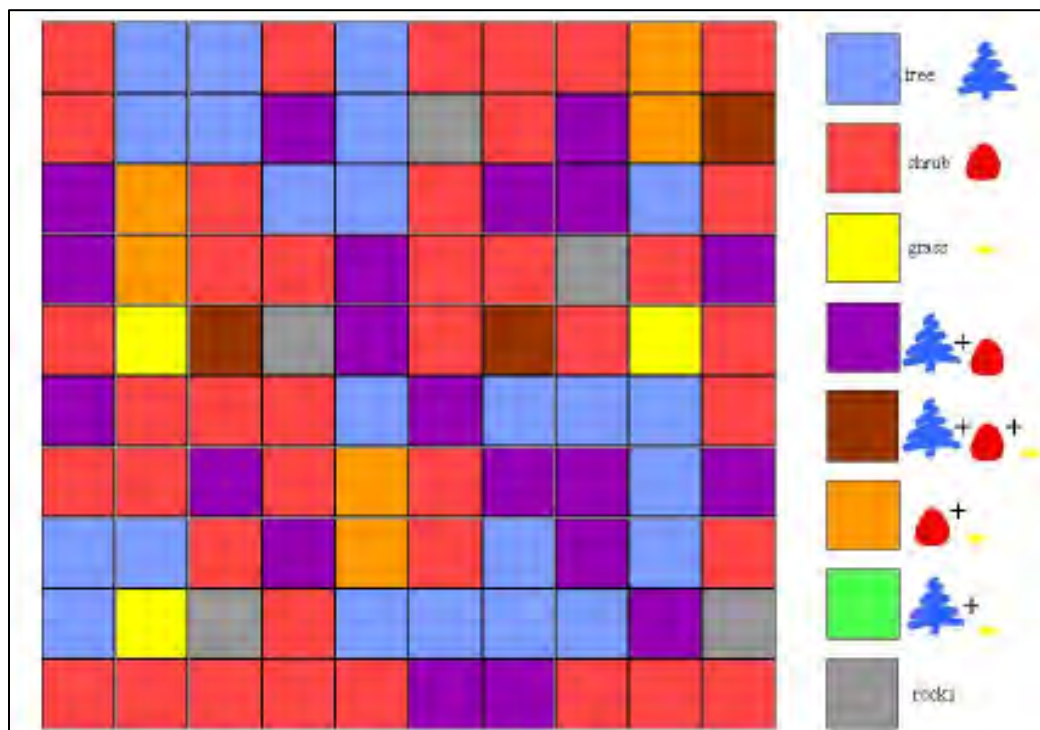


**Figure 2.12: The interface (game board) of the Sylvopast model and RPG. The colours correspond to the characteristic of the land plot (Source: Etienne, 2003)**

Each round of the game was provided with a climatic variable (dry, mild or rainy), however players did not have this information in advance. Coupled with this was fire risk which was automatically calculated through a fire propagation index and displayed at the end of each players' turn. Despite the index, the occurrence of fire was relatively low and its occurrence demonstrated impacts such as the

encroachment of shrubs, for example. Such implications resulted in combined clearing activities being conducted as a means of communal management. Each player monitored their situation based on production, energy and cost as a means of assessing their situation. A general monitoring was conducted at the end of each round to assess the state of the resources.

Since its development in 2000, the Sylvopast RPG has been used for training (students), development of sylvopastoral management plans (farmers and foresters) and to assist in understanding the complex system (for managers, conservationists, biologists and economists). Minimal alterations were made when the game was played with various players, indicating its flexibility with only slight modifications to complexity and rules.

### Challenges of Sylvopastoral Systems

One of the key challenges experienced in the development of the RPG was the varying time scale of the various activities that formed part of the management plan. The two different agriculture sectors varied in their time planning scales as livestock farmers manage their activities based on the lifespan of their stock (10 years), while a forester plans according to the lifespan of trees (100 years). This not only means that their management plans will vary in time, but the regularity of their activities also vary. For example, a livestock farmers conducts activities on a daily basis, while a forester's works on a monthly or annual activities. This created difficulty in developing a game that could capture varying time scales and irregularity of activities.

Within the Sylvopast RPG, a role player is given the task of having the final say in decision making. In most of the game sessions conducted, the forester was given this position. However, it was noted that as a result of this dominance, forestry was being placed at the forefront of the management plan, meaning the woodlands were dominant and limited grazing was displayed. Therefore, this dominating role affected the management plan of the system and enabled a bias party to make the final decisions.

A technical limitation of the RPG was that it is a computerised model which meant that participants needed to have access to a computer and have a level of skill required to operate the game. Therefore the game is not as flexible and easy to use as other RPGs, which use simple materials such as paper, tokens and dice, for example.

### 2.2.4.   Comparison of Role Playing Game Case Studies

The benefits and limitations demonstrated through the above case studies (*ShadocLight*, *WetWAG* and Sylvopast RPGs) are compared below as a means of revealing commonalities in the adoption of a RPG.

#### 2.2.4.1.     Benefits of Role Playing Games

The benefits of RPGs demonstrated in the case studies reviewed support the benefits noted in the research of RPGs highlighted at the beginning of this section (2.2). These benefits are presented in Table 2.1 below, demonstrating how the case studies mirror the literature. In addition, the case study review

demonstrated several other benefits which were not highlighted in the literature. These too have been included in Table 2.1 below.

**Table 2.1: Benefits of Reviews Role Playing Games Case Studies *(ShadocLight, WetWAG* and Sylvopast)**

| Benefits of Role Playing Game | RPG Case Studies | | |
|---|---|---|---|
| | *ShadocLight* | *WetWAG* | Sylvopast |
| **Bridge the Gap between Modelling and Reality** | ✓ | ✗ | ✗ |
| **Combines Various Role Playing Game Types[9]** | ✓ | ✓ | ✓ |
| **Control of Parameters** | ✓ | ✓ | ✓ |
| **Cost Effective** | ✓ | ✓ | ✗ |
| **Discussion Tool** | ✗ | ✓ | ✗ |
| **Engage with a Range of Stakeholders** | ✓ | ✓ | ✓ |
| **Flexible and Adaptable** | ✓ | ✓ | ✓ |
| **Limit Experimentation Side Effects[10]** | ✓ | ✓ | ✓ |
| **Repeatability** | ✓ | ✓ | ✓ |
| **Simplification of Complex Systems** | ✓ | ✓ | ✓ |
| **Stakeholder Involvement (Communication Tool)** | ✓ | ✓ | ✓ |
| **Time Efficient** | ✓ | ✓ | ✗ |

Ferrand *et al* (2008) demonstrates that there are various types of RPGs and that a single game can be one or several of the types. This elaborates of the benefit of 'combines various RPG types', which indicates that the RPGs' reviewed highlighted the use of the tool for various objectives or purposes. Table 2.2 below demonstrates the three RPGs reviewed and which type(s) they are as a means of demonstrating the cross cutting, multi-use ability of the tool.

**Table 2.2: Summary of the Types of RPGs used in the Case Study's reviewed**

| Types of Role Playing Games | RPG Case Studies | | |
|---|---|---|---|
| | *ShadocLight* | *WetWAG* | Sylvopast |
| **Educations and Training** | ✓ | ✓ | ✓ |
| **Common Pool Resources Management** | ✓ | ✓ | ✓ |
| **Experimental** | ✓ | ✗ | ✗ |
| **Policy Simulation** | ✗ | ✓ | ✓ |

This indicates that the RPGs reviewed combined the various uses of the tool to achieving greater inputs into their respective projects. From the case study review, it is evident that education and training, and common pool resource management types are among the most popular, closely followed by policy simulation types. In most cases, experimental RPGs are not used as this can be a time consuming process and is usually the final stage of the process which is often not reached. Therefore, RPGs are perceived as beneficial as they can be used for a range of purposes.

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[9] As per the RPG types defined by Ferrand *et al* (2008)

[10] Although this benefit was not explicitly highlighted in the case studies, the fact that a RPG was used as a means of testing and experimenting indicted that the likely side effects of trying such actions in reality were eliminated.

The benefits of adopting a RPG therefore include its use for stakeholder engagement, discussion support and experimenting while still being time efficient, cost effective, simple, adaptable, repeatable and flexible.

### 2.2.4.2.    Challenges of Role Playing Games

Several challenges were experienced and highlighted in the case studies. One of the key challenges is finding a balance between a game that is simplified enough for players to understand while still having enough reality and complexity to adequately reflect reality so that is can be replicated back into the real situation. This problem was found in the *WetWAG*, where stakeholders criticise the complexity of the game but at the same time indicated that certain elements were too abstracted and generalised to reflect the reality.

In the development and design of the RPG itself, it is common to get fixated on the validation, testing and accuracy of the game, rather than the real value of the tool which is its assistance in aiding discussion, decision making and planning. This was particularly evident in the *ShadocLight* RPG where too much time was spent revising and reworking the game instead of using it as a training and negotiation tool as intended.

It is evident that some elements of reality may be sensitive, such as class and hierarchy, and therefore need to be dealt with in an indirect manner to prevent causing tension within communities. This was evident in the *ShadocLight* case study, where participants were reluctant to admit to such issues, which consequently had to be dealt with in an indirect way.

Varying time scales of activities are also a challenge when attempting to develop a single integrated model that captures the activities of all role players. This was evident in the Sylvopast RPG as the activities of the foresters and livestock farmers varied in time, thus creating difficulty when trying to model their actions together. Due to this large variation, one of the role players, in this case the foresters, became dominant and their management ideas trumped others. This illustrates the challenge of dominant sectors when attempting to manage varying practices.

Lastly, the tool was critiqued as being time consuming, particularly in the initial stages of the process when participants were trying to learn and understand the game. This was pointed out in the *WetWAG* case study, where several game sessions were conducted as a means of mitigating this issue. In this case, the RPG was simplified to reduce time expenditure; however, the game was then criticised as being too abstracted and difficult to link back to reality. Thus, in some cases, the solution of a challenge sparks another, creating a vicious circle.

### 2.2.5.   Conclusions of Role Playing Games

RPGs are a useful tool to simulate reality for a range of purposes and to directly feed into management and planning projects. The tool can be used for training and education, management, experimentation

and simulation while effectively involving stakeholders in a fun, interactive and simplified way. RPGs are used as mechanism for linking theoretical, complex or lab based ideas to reality in a way that is easy for all stakeholders to understand.

It is evident that a RPG is difficult to develop as there is a need to carefully balance the various modelling requirements. The model is not an exact replica of reality, demonstrating that technical realism is not the only factor that has to be considered when developing a game. A simplification of reality is required to facilitate the complex processes and dynamics of a system. This process is particularly difficult as the model cannot demonstrate too much complexity as it may compromise participants' understanding. At the same time, the model needs to be a fun experience that is not too time consuming to ensure its playability. Therefore, it needs to be a simplified, easy to understand representation of a complex system which is fun and easy for players to reflect their experience into practice.

WAG is a framework or guideline that can be adopted when using a RPG, particularly for water management projects. The four types of WAG allow the adoption of the tool to be as simplified or as complex as desired. WAG is considered as a cost effective, flexible, scalable, time effective tool making it easy to develop a unique, personalised simulation model that can be used as a fun, interactive management tool.

From the reviewed case studies, numerous benefits and advantages of adopting a RPG were demonstrated. These range from it being easy to adopt and its flexibility, to it being a cost and time effective mechanism for successfully engaging with stakeholders. Other benefits of RPGs include their ability to test various strategies and management plans while controlling the parameters, without having negative implications on natural systems or people. This limits the costs associated with normal trial and error experimentation. The tool acts as a discussion support basis, raising topics, issues and solutions in a relaxed setting where all stakeholders can interact and discuss.

It is evident that the development and implementation of a RPG is not a static process. In many cases, the development of the game is never complete or perfect, but rather displays a continuing changing tool that is altered according to stakeholder feedback. Although simplicity is relatively easy to achieve in a model that is an abstraction of reality, it can also be a difficult task to achieve. This is mainly due to the risk of making the game too simplified so that it loses its replication of reality and the key elements of the complex system. Stakeholders noted that this results in a tool that is easy to play and understand, but makes the outcomes and discussion elements difficult to reflect back into reality.

In addition, several challenges of developing a RPG were acknowledged through the case studies. Many of these were related to the challenge of integrating several different role players and activities into a single management simulation model. Sensitive issues in reality, such as class and hierarchy, are difficult to simulate, mainly because participants are reluctant to acknowledge such issues. Therefore, a level of sensitivity and an indirect approach has to be applied when dealing with such challenging issues. As previously indicated, difficulty arises in trying to find a balance of abstracting a reality, so as to not make the game too complex but at the same time to not lose the models link with reality.

## 2.3. Conclusion

Through the review of two topics, INRM and RPGs, an understanding of the disciplines is developed by providing insight into their objectives, approaches and challenges. By comparing practical examples to the approaches adopted by the A*fromaison* project, trends and variations can be identified. The project applied a meso-scale, ecosystem services and adaptive management approach to INRM and adopted the Wat-A-Game RPG to complement its objectives. Across both of the reviewed topics, several common threads were evident.

The most obvious thread is that of the application of an integrated approach to management. Throughout the review, it is evident that all of the approaches to NRM, and various types of RPGs, place integration as a key objective. Not only does this relate to the integration of various sectors (such as economic, environmental and social), but also to the collaboration of stakeholders and disciplines. There is a strong sense that the disciplines are moving away from former divisions and scale limitations, to address management and the associated challenges in an integrated manner. From such integrated approaches, stem a range of challenges, which too were common across the reviewed literature. Such challenges relate the difficulties when attempting to work across scales, divisions, sectors and disciplines that are commonly divided and isolated. These variations often result in conflict and tension, and require care to be taken to limit such issues. In relation to this is the dominance of certain sectors, which is also a key component that needs to be addressed when aiming to achieve integration.

An additional common practice was the layering of various approaches or tools to gain a range of advantages and mitigate each other's downfalls. This is a particularly useful notion as it is evident that no one practice is ideal and therefore requires various mechanisms to be overlaid or stacked. In a similar vein, it is important to note that no case study is the same and therefore each is unique and requires its own approach which is likely to be a combination of various processes. This review provides a strong foundation for this research to create discussion and draw conclusions about approaches and tools for INRM.

## 3.  METHODOLOGY

This section describes the process taken to develop the Role Playing Game (RPG) for the *Afromaison* project, providing an overview of the *Afromaison* project, its local case study and the methods used to develop and apply the stakeholder engagement tool. The methodology for developing the RPG follows the three phases (design, testing and application) of the Self-WAG guideline.

### 3.1.   *Afromaison* Project

The *Afromaison* project was divided into eight work packages (WPs), with each having tasks that integrate with other WPs. Work package 1 (WP1) was the main coordination and managing aspects of *Afromaison*, ensuring that the credentials of the proposal were met. WP2 – WP7 formulated the research aspect of the project, whose outcomes were integrated into WP8, the final dissemination package of the project. All of the WPs were integrated to ensure that the development and findings of each was not done in isolation, but rather to formulate an integrated outcome. A basic outline of each WP is demonstrated below.

**WP1:** Efficient and effective project management and coordination to ensure communication, budget management, quality control and to address any possible conflicts that may arise.

**WP2:** A crosscutting responsibility to conduct a multi-disciplinary assessment of the context of the specific case study, across scale, sectors and disciplines. If such information was not available, further brief assessment was conducted to fill in the gaps. WP2 was also involved with mapping of ecosystem goods and services together with WP3 and WP5.

**WP3 – WP6:** Utilising the product of WP2, these WPs focused on developing specific tools. The work conducted in these WPs was amalgamated with the main objective which was to achieve an integrated set of tools and strategies.

- **WP3** focuses on strategies of restoration and adaptation of ecosystems.
- **WP4** concentrates on economic and non-monetary tools, and incentives for their implementation
- **WP5** looks at tools for spatial planning and spatially-explicit impact assessment to implement the strategies of WP3. This requires the development of a livelihood map, which was used in conjunction with the maps developed by other WPs.
- **WP6** involved the assessment and mapping of vulnerability to global changes (climate change) and development of operational strategies for adaptation and vulnerability reduction through interaction with WP3-5.

**WP7:** A multi-phase WP to generate a comparison between all the case studies and to create an operational framework and concept of the toolbox. With the cooperation with WP3-6, the framework was adapted and applied to each specific case study. This WP developed methodologies to evaluate the operational performance of the tools and strategies for INRM and created a toolbox that encompassed the strategies into a toolbox.

**WP 8:** Dissemination, capacity building and end-user involvement by applying the methodologies of WP7. The key aim was to integrate the projects outcomes in the case study's' local authorities and institutes as well as international institutes and platforms, which was achieved through strong networking and capacity building.

The *Afromaison* project aimed to address INRM, which is driven by the communications and integration of stakeholders. This was a challenging process as it involved the evaluation and assessment of the dynamics of the current situation, and the development of an integrated mechanism based on predicted future scenarios. To address this challenge, a stakeholder engagement tool (RPG) was adopted to facilitate the involvement of stakeholders in the project, which formed part of WP7.

## 3.2.    *Afromaison* Case Study

The uThukela District Municipality (UDM), located in KwaZulu-Natal, was the South African case study for the *Afromaison* project. The WAG simulation model was developed, selecting the Okhahlamba Local Municipality (OLM) as the representative portion of the region. This selection was based on the importance of the OLM as it is home to the source of the uThukela River, which is a vital water source at a local, provincial and national level. The OLM was also selected as it encompasses the key natural resources, dynamics and stakeholder types that are presented in the case study (UDM).

The OLM is one of the five local municipalities within the UDM, located in the western portion of the district (Figure 3.1). The region predominantly consists of rural settlements and subsistence farms, although there are a variety of other land use types including small urban towns, such as Bergville and Winterton, commercial farming regions, large dams, tourism industries and protected nature reserves, such as The Royal Natal National Park and the Okhahlamba Drakensberg World Heritage Site. According to the 2012/2013 Integrated Development Plan (IDP) for the Okhahlamba Local Municipality, the three main issues for the region are infrastructure development, poverty alleviation and management of the HIV/Aids pandemic (Draft IDP, 2012/2013).
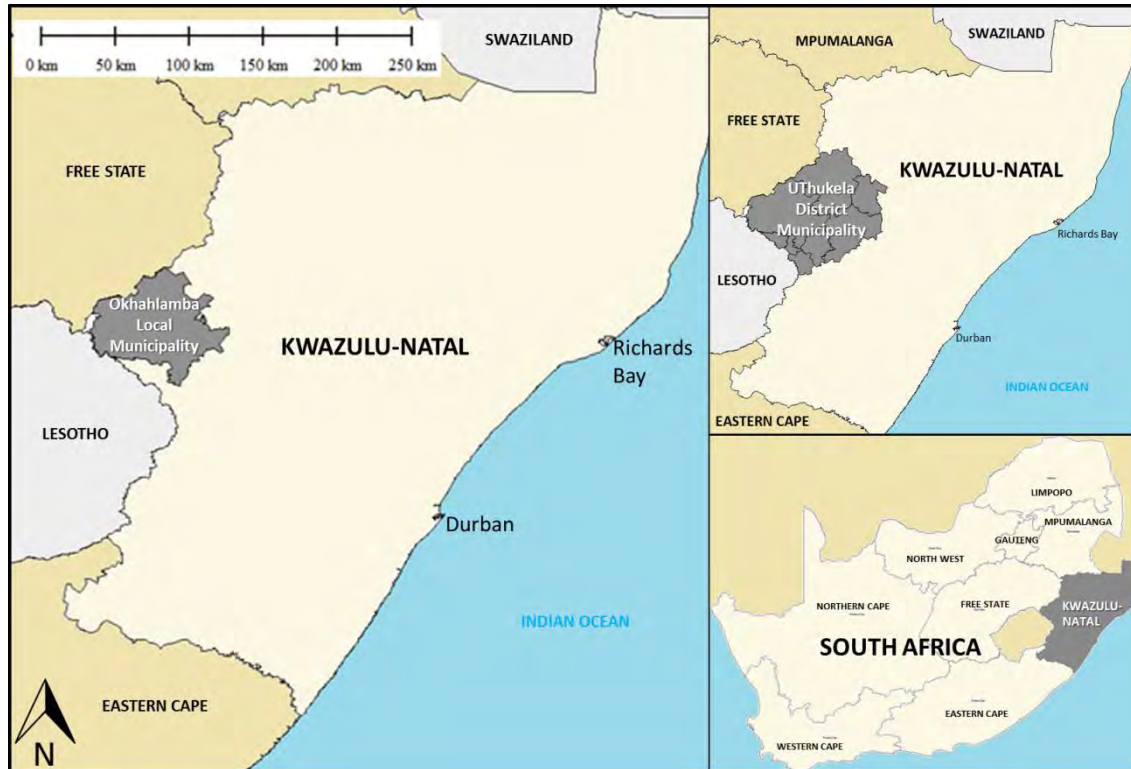
**Figure 3.1: Location of the Okhahlamba Local Municipality in the UThukela District Municipality, KwaZulu-Natal, South Africa**

The 2007 community survey indicated that the region has a population of approximately 151 500 people, the majority of which are African Females and 75% of the population are under the age of 35 (Draft IDP, 2012/2013). This demonstrates a typical underdeveloped trend with a large young population sector likely as a result of the impact of HIV/AIDS-related deaths and out-migration of economical active age groups (Afromaison, 2014). This trend has resulted in a high female proportion, reiterating the occurrence of out-migration (males relocate to urban hubs in search of employment) (Matthews and Catacutan, 2012). The most predominate language in the municipality is IsiZulu (96%), stemming from the ethnic tradition and culture still evident in the area, which is governed by tribal authorities. In terms of infrastructure, services, employment, income and education, the municipality has a huge inconsistency in provision and is currently experiencing a major backlog (Draft IDP, 2012/2013).

The natural characteristics of the region range from small areas of arable land in the flat, low lying areas to large grassland areas closer to the Drakensberg Mountains (Matthews and Catacutan, 2012). The area has a high biodiversity, being home to several endemic and endangered species, resulting in the increased need for effective management in the municipality (Draft IDP, 2012/2013). Although there are numerous commercial farming lands in the municipality, the area is predominately comprised of rural subsistence farms. The region is subject to soil erosion and land degradation due to natural conditions such as steep topography, susceptible soils and high rainfall, and is exemplified by human activities such as poor farming activities and over grazing. Figure 3.2 provides a visual of the OLM, demonstrating the main water systems, towns, conservation areas and settlements.
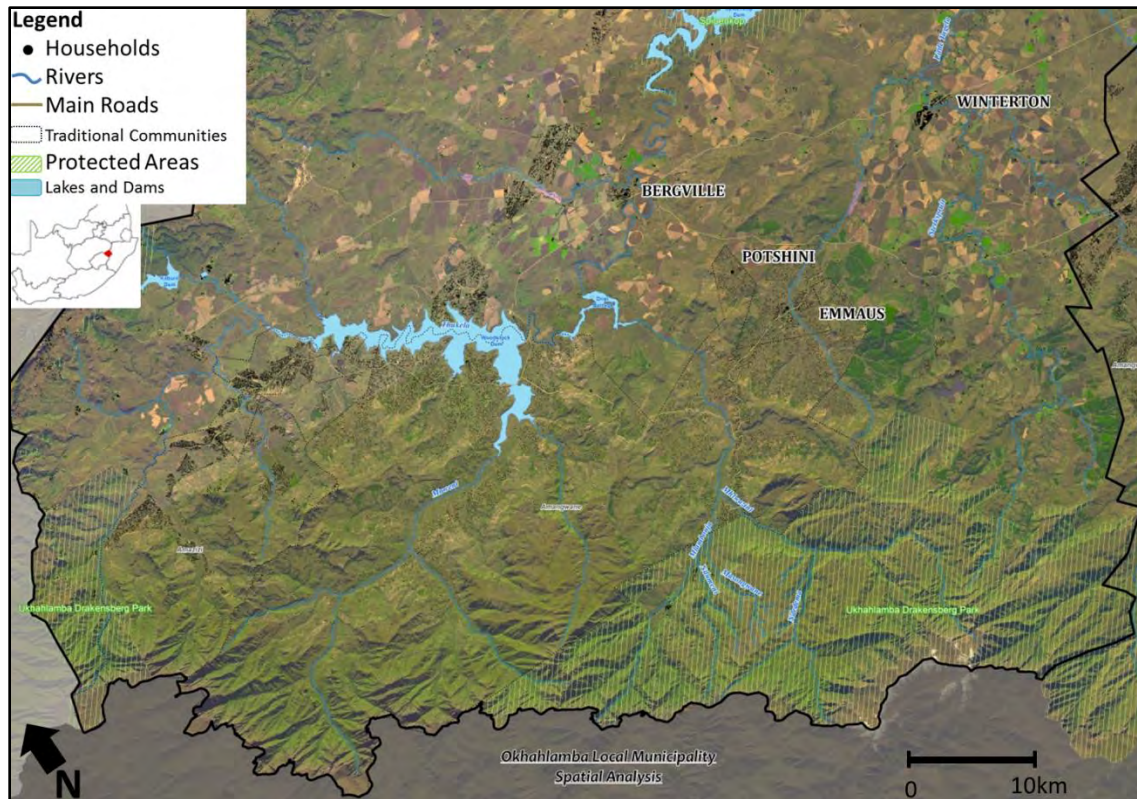
**Figure 3.2: Spot Photo of the Okhahlamba Local Municipality**

## 3.3.    Developing a Role Playing Game

The RPG tool was selected for the *Afromaison* project as a means of achieving stakeholder engagement, enhancing the decision making process and integrating the elements of the project. WAG was selected as the guideline for developing the RPG for the *Afromaison* case study. WAG aims to represent and capture the dynamics between the natural resources of an area and replicate the relationship they have with the social and economic components. The Self-WAG guideline was selected, which guides the developer in creating and managing their own WAG, specific to their context (WAG, 2012). The design and implementation of the Self-WAG for the local case study (named *AmanziGame*) was conducted in three main phases, namely the *Design, Testing* and *Application* phases. Figure 3.3 demonstrates a summary of the three phases and the process taken in each.
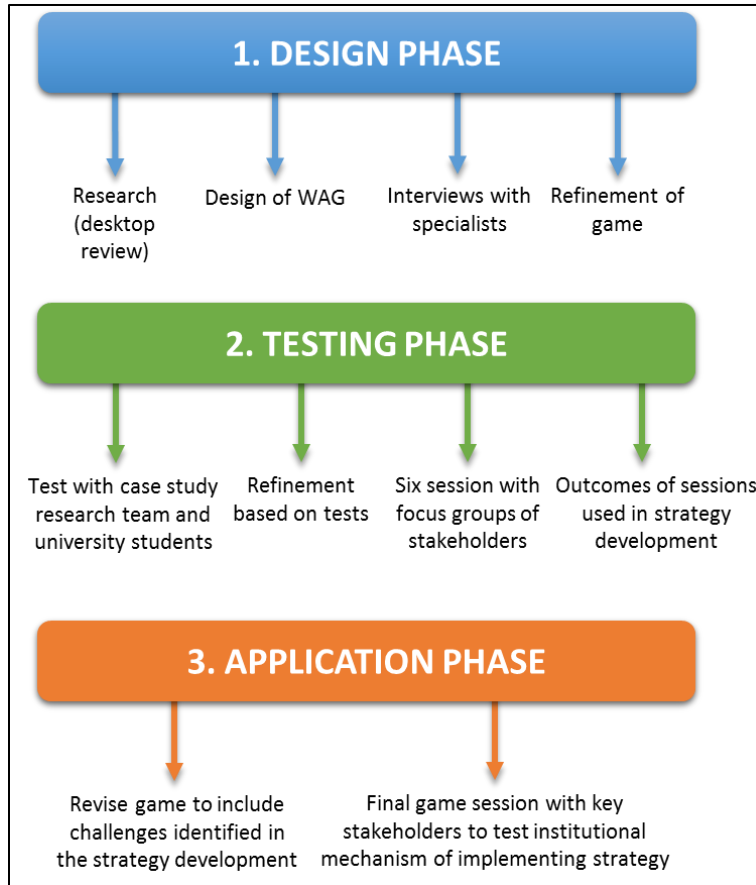
**Figure 3.3: Summary of the Self-WAG development phase**

### 3.3.1.   Design Phase (1)

Before the game could be designed, an in-depth review of the case study was conducted. This was largely achieved by reviewing the research[11] conducted for the *Afromaison* Project and conducting interviews with members of the project team and relevant stakeholders and specialists. This process enabled an understating of the dynamics, challenges, stakeholders, activities and status quo of the OLM case study, on which the game was developed.

Designing the Self-WAG (*AmanziGame*) was conducted during two training workshops where several of the WAG developers (Géraldine Abrami, Nils Farrand, Raphaele Ducot and Sylvie Moradet) assisted a researcher from each case study (Ethiopia, Mali, South Africa, Tunisia and Uganda) to develop a game for their particular study site. The initial training workshop involved developing a detailed understanding of the dynamics, actors, relationships, processes, natural environments and actions taking place. At the end of the first workshop, the first version on the *AmanziGame* was developed, after which it was tested

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[11] Matthews, L., and Catacutan, D. C. (2012). Context of uThukela Watershed, KwaZulu-Natal, South Africa, *Afromaison* Project Draft Report

with university students, the synergy committee and other stakeholders from the region. During this process, the *AmanziGame* was constantly being altered and updated based on the outcomes of each session. The second training workshop enabled the game developers to refine and conclude the process. Focus in the second workshop was placed on running the game, monitoring, feedback and debriefing during future sessions. The *AmanziGame* was reviewed several times and alterations made before moving onto phase 2 of the process: Testing.

The following steps were used in designing *AmanziGame*. It is important to note that the game development is not a linear process and that all elements were continually modified throughout its development. These steps are the general guideline for developing a Self-WAG (WAG, 2012).

a) **System cartography**: mapping of the hydrological elements of the region, indicating water users and the zones of activities
b) **Game elements description:** defining scenarios, events, roles (actions and objectives)
c) **Verification:** a check of the game to ensure it corresponds with the frame of reference and that material and data needed is available
d) **Calibration:** quantifying elements of the game (water, soil, pollution, etc.) and defining actions, role objectives and events
e) **Production:** collecting tokens to represent elements, producing cards (action, role playing, events, land plots, etc.) and the development of monitoring and scenario boards
f) **Game Session:** organizing, animating and debriefing the game session

It is important to note that this thesis does not aim to focus on the in-depth research and development conducted to build the *AmanziGame*, but rather to assess its application and success as an effective stakeholder engagement tool. Therefore, the development process is not elaborated on, but rather the key steps and the final product are explained. What follows is an explanation of the development and production of the AmanziGame, while its application and outcomes are indicated in Section 4 (Results).

### a) System Cartography

Using topographical maps and cartographic resources, the *AmanziGame* could be developed by understanding relevant land use, hydrology, activities and topographic features of the case study. These elements were simplified to create a representative simulation model of the area.

***Game Board***

The first step was to create a game board that demonstrated an abstracted version of land and water systems in the case study, which encompassed the unique conditions of the system. Based on the desktop review and consultation with specialists and key stakeholders, the following conclusions were made:

- The hydrological elements of the system were represented in terms of important water sources identified. The main river (the uThukela River) and one of its main tributaries (the Mweni River)

were included on the game board. Other important water sources such as boreholes and dams were included later.

- The case study is home to nature conservation areas (Okhahlamba Drakensberg World Heritage Site and the Royal Natal National Park) which were important to include from a land use, conservation, tourism and management perspective.

- Soil erosion, and the consequential siltation of water systems, was identified as a key issue affecting in the area. As a result, it was vital that the game board include this dynamic. It is evident that the erosion potential of the area is primarily based on slope and therefore needed to be classified into zones of erosion potential. This was conducted by categorising the area based on its typography, generalising that steep slope areas have a higher erosion potential than flat areas. Figure 3.4 provides a visual of how the categorised areas look, demonstrating the zones, which vary from 'Zone 0' (no erosion potential) to 'Zone 3' (high erosion potential).
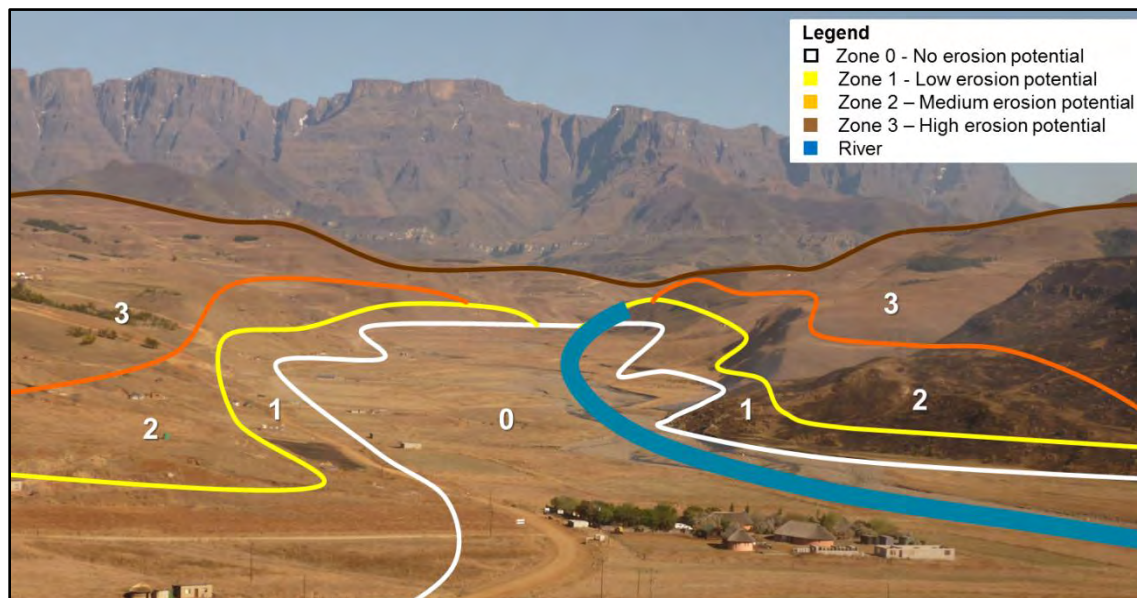


**Figure 3.4: Stylized representation of the zones of erosion potential categorised for the game board development. Erosion zones defined according to the slope steepness (0 – none, 1 – low, 2 – medium, and 3-high erosion potential)**

The above three components were used to generate the game board below (Figure 3.5). In addition, the region was divided into up-, mid- and down-stream areas to represent the spatial variation and restrict the movement of players (as would be evident in reality).
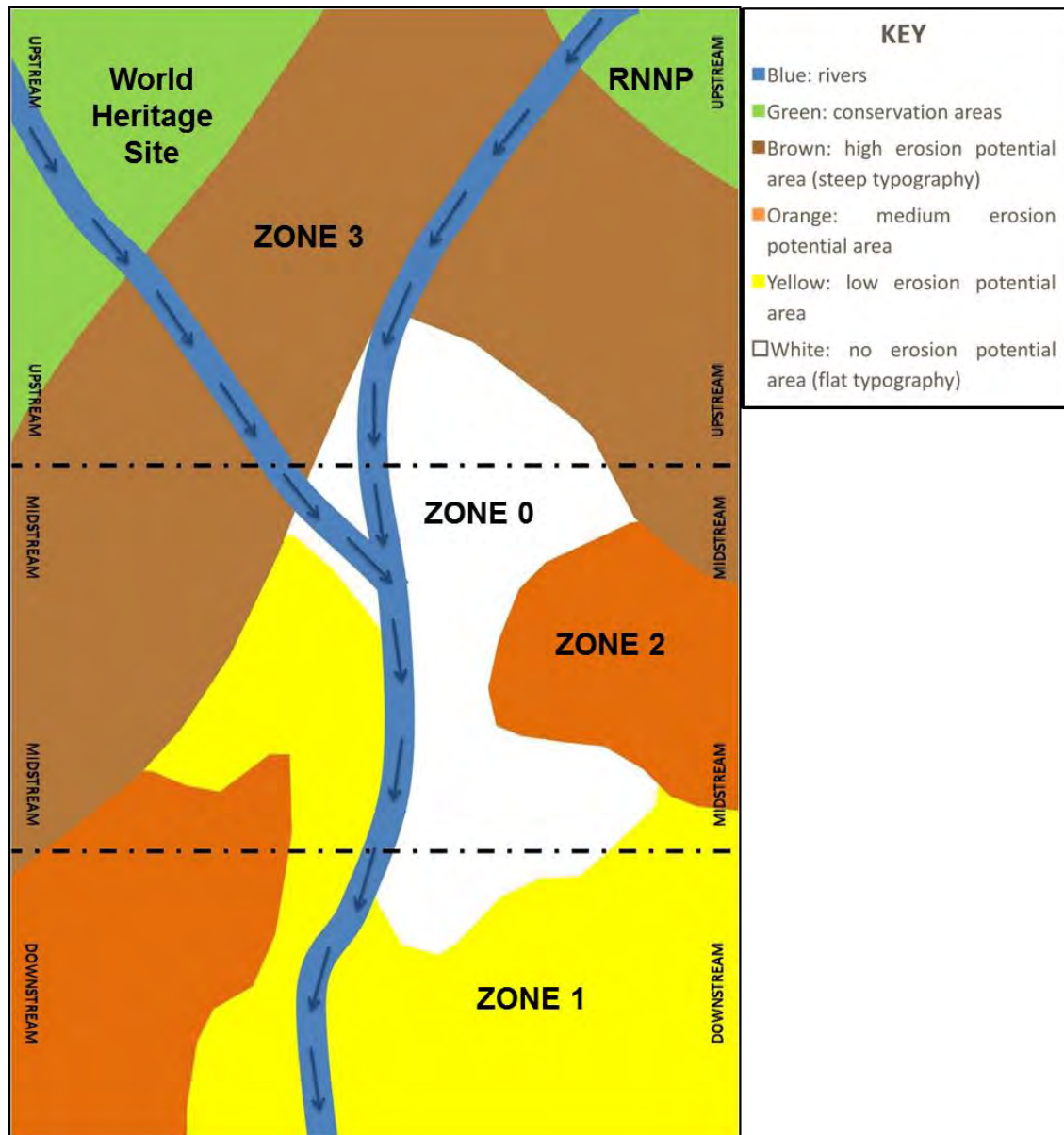
**Figure 3.5: The *AmanziGame* game board**

To gain an adequate understanding of the system, an in-depth analysis of the social, environmental and economic dynamics of the region was undertaken. The following broad categories (based on the above WAG guideline) were used to understand how the dynamics of the region were broken down for the purposes of the RPG development. These categories, "Mapping of Actors and Resources", "Defining Roles, Actions and Effects on Natural Environment" and "Dynamic Elements" are elaborated on below.


***Mapping of Actors and Resources***

To capture the dynamics and relationships between different actors and their influence on resources, a schematic of interactions and dynamics of the region was developed (Figure 3.6). It is important to note

that the actors, relationships and resources demonstrated in the schematic are simplified, abstract versions of reality. This process is done to simplify interactions and present them in a way that is suitable for the development of a RPG. It is important to note that all interactions are two way, indicating that actors influence the state of resources and vice versa.

The key stakeholders (actors) were identified through the *Afromaison* context report (Matthews and Catacutan, 2012) and supplemented by interviews with key stakeholders. The three main groups of stakeholders were government, external actors and local actors. Not only do these actors interact with each other, but they use, manage and effect resources of the region, namely water, labour and land resources. 'Government' was sub-divided into the various levels of authority and were classified as having effect on resources though the management of other actors and the allocation of resources. External actors, such as NGOs, the market and the private sector, have an effect on resources through direct management and interaction with other actors. For example, NGOs protect and rehabilitate water and land resources, and employ labour to conduct their activities. Local actors include commercial and rural communities and are the primary users of resources. Their interactions with resources range from use, such as using land and water for farming practices, to employing or being the source of labour. The schematic of the interactions and dynamics between actors and resources was simplified for the purposes of the game development. From this, roles, actions and the effects of such interactions could be developed for the RPG.
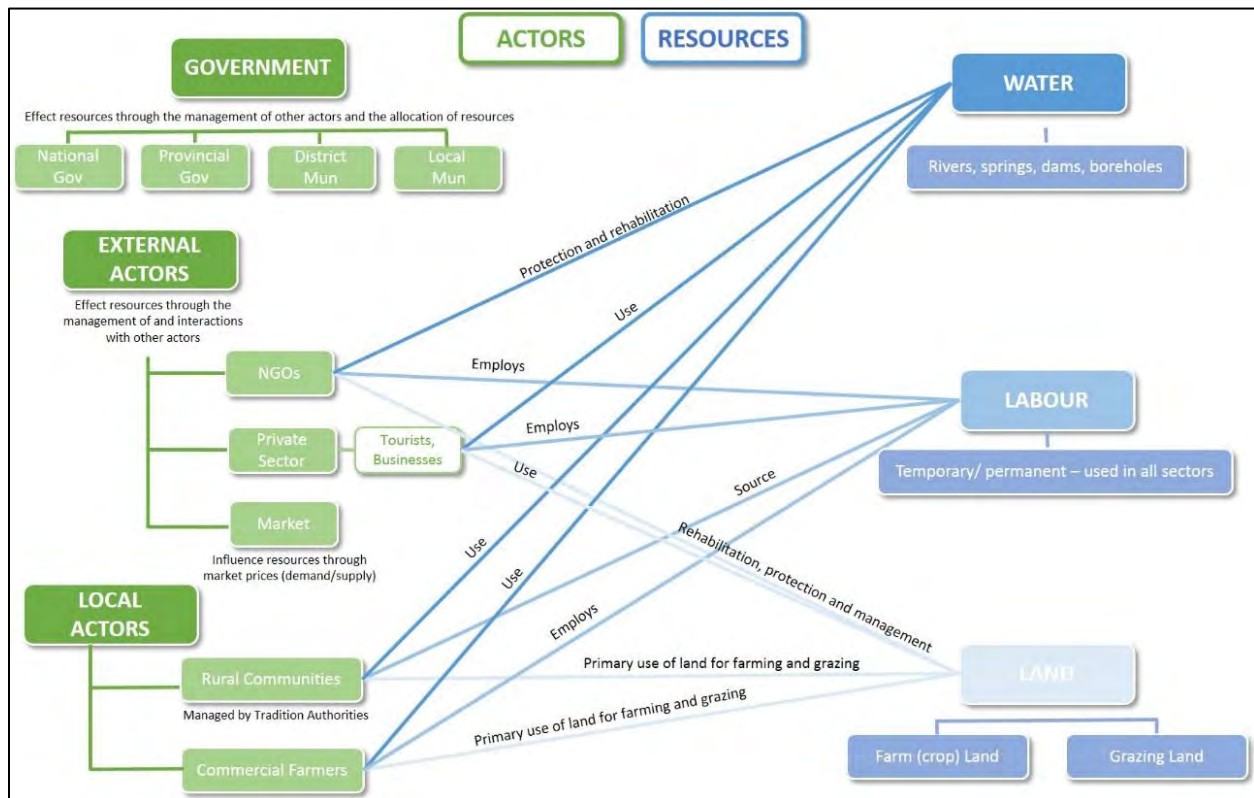


**Figure 3.6: Schematic Diagram of the dynamics and relationships between various actors and resources used in the development of the *AmanziGame***

### Defining Roles, Actions and Effects on the Natural Environment

The mapping of actors conducted above enabled the identification of key types of role players evident and influential in the system. Table 3.1 demonstrates the broad roles chosen to represent the dynamic groups of stakeholders in the region, indicating who they represent, the general actions they conduct and the elements of the natural environment which they effect. This forms the basis for defining the roles that participants play in the *AmanziGame.*

| Role Players | Represent | Actions | Effect on Natural Environment |
|---|---|---|---|
| **Rural Farmers** | Rural subsistence farmers who live in communal areas and perform small-scale subsistence farming to sustain their livelihoods. They represent the labour that may be employed by other role players. | Crop farming and stock (grazing) | Water use and quality, land (soil quality) |
| **Commercial Farmers** | Large scale commercial farmers who operate on private farms and conduct activities to generate income and gain profits. | Crop farming and stock (dairy and beef) | Water use and quality, land (soil quality) |
| **Tourism Managers** | Represent any tourism enterprise/industry/activity | Businesses (various types of tourism activities), employ locals | Guest water consumption, dependency of locals on land |
| **Government officials** | All government departments including local and district municipality | Support towns, business and farmers – general upkeep of region, law enforcement | Actions influence how other roles effect the natural environment |
| **Environmental Officers** | Any NGO, NPO, research institutional, organisation or association operating in the area who aims to conserve and manage the natural environment. | Assist other players to improve the condition of the environment, law enforcement | Actions influence how other roles effect the natural environment |
| **Tribal Authorities** | The local tribal authorities (such as chiefs) who manage communal areas. | Manage rural area and stakeholders | Actions influence how other roles effect the natural environment |

**Table 3.1: The role players, their actions and the effect they have on the natural environment**

From the above, the roles of the players in the game were defined, which are elaborated on in the following sub-section.
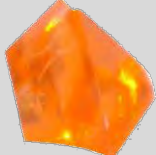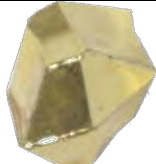
### b) Game Elements Description

### Dynamic Elements

Dynamics elements, such as water, economy and labour, are represented in a WAG by means of tokens or pebbles. This provides players with physical representation of exchangeable or usable resources. The outcomes of the previous game development phases resulted in the selection of resources which would

be represented by tokens, namely water, soil/silt, labour, cattle and money (Table 3.2). A description of each of the elements is provided in Table 3.2, illustrating what token was selected to represent each element in the game. These token would be used by players to achieve actions and affect the condition of the system. For example, a player would use water (a token) to grow crops (their action), thus use the resource and affect the amount of water in the region.

**Table 3.2: Dynamic Elements represented in the *AmanziGame***

| Element | Description | Representative Token |
|---|---|---|
| **Water** | From various sources (rivers, boreholes, dams, rain, etc.) Used to represent the quantity available to in the system that is used for various activities | |
| **Soil/silt** | Soil in the land (both quantity and quality) and silt as it enters the water system, affecting both the quality and the quantity of water in the system | |
| **Labour** | Representing people who perform activities in the area (for economic or livelihood purposes) and are reliant on the system to sustain themselves | |
| **Cattle** | Animal stock used to sustain livelihoods and generate income, whilst also holding economic and cultural wealth | |
| **Money** | Economic wealth generated through various activities and used to sustain livelihoods | |

These elements were calibrated using statistical data and the comparative perceptions of stakeholders and specialists (see sub-section d). All players use these elements to achieve their actions and as a result, affect the state of the environment (condition of soil, water quality and quantity, etc.).

***Role Playing Cards***

Defining the roles of players was developed from the understanding and generalisation generated, as displayed in Table 3.1. A Role Playing Card (RPC) was developed for each type/group of player which defined their role, the objective in the game, the assets that they have at the start of the game, what resources they have access to, what they need to manage and specific rules that govern their actions.

Figure 3.7 below is an example of the RPC developed for participants playing the role of a rural farmer. The RPCs for the other roles can be found in Appendix 1.

| RURAL FARMER | |
|---|---|
| **Description** | You are representing many rural subsistence farmers, relying on crop production and cattle grazing to sustain your family (labour and dependent members). Your activities will affect the soil condition of the land plots that you use and will influence your food outputs. |
| **Objectives** | • Gain Money Units to sustain family: 1 Money Unit labour/ dependent member<br>• Keep cattle alive (cultural wealth) |
| **Assets** | • 4 labour<br>• 1 herd of cattle<br>• 3 dependent family members |
| **Access Rights** | • Water Units: from borehole or river<br>• Access to communal Graze and Crop Land Plot Cards within you area (upstream, midstream, downstream) |
| **Manage** | • Graze cattle on desired Graze Land LPC<br>• Select type of crop (Maize, Legumes or Vegetable) for Crop Land<br>• Release Organic Pollution Units and Water Units based on chosen activity<br>• Support family members with Food Units |
| **Specific Rules** | • Cannot do an activity (crop or grazing) on a Land Plot Card with insufficient organic credit (less than indicated on activity card)<br>• Labour can be employed to earn Food Credits (Environmental Officer, Tourism Manager)<br>• If you do not fulfill the needs of the Activity Card, the activity fails and you do not receive the outcomes<br>• Excess Money Units (MU) can be stored for the next season (round) or exchanged with other players for other benefits<br>• You may relocate to any area of the game board at the start of a round, if you desire<br>• The facilitator acts as an external market where you can buy and sell cattle to<br>• Keep track of your actions with your monitoring sheet |

**Figure 3.7: Role Playing Card for "Rural Farmer" role in *AmanziGame***

### *Land Plots Cards*

Players can either own or have access rights (communal property) to certain types of land that are used to perform various activities. These areas are represented through Land Plot Cards (LPCs), which demonstrate a portion of land that can be used for a specific activity. Based on the important land use types identified in the review of the case study, the LPCs were developed for the *AmanziGame*.

In some cases, the LPCs have set inputs and outputs (activities) that cannot be altered by the player and therefore the action is built into the land plot. For example, the Town LPC requires specific inputs and generates outputs and, even though the government official is responsible for ensuring the town can meet its requirements, the player cannot alter the conditions of the LPC. If the town grows, another Town LPC is added to demonstrate this. In the same vein, the Wetland and Alien Invasive Species (AIS) LPCs have specific conditions that cannot be altered.

It is important to note that the facilitator of the game plays an important role in terms of conducting actions that occur naturally. Table 3.3 below demonstrates the *AmanziGame* LPCs and the role that is able to use or manager them in the game.

**Table 3.3: Land Plots Cards developed for the *AmanziGame***
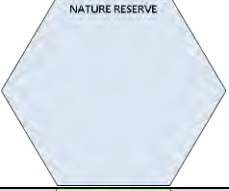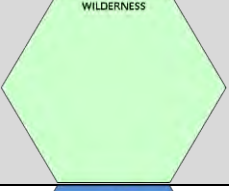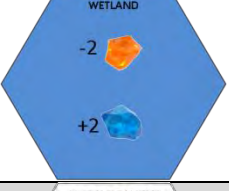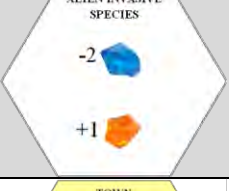
| Land Plot Card | Name | Description | Role/s |
|---|---|---|---|
|  | **Farm Land** | For both commercial (crop and dairy) and rural (crop) farming | Commercial Farmer Rural Farmer |
|  | **Graze Land** | For both commercial and rural farming | Commercial Farmer Rural Farmer |
|  | **Nature Reserve** | Conservation areas used for tourism activities | Tourism Manager |
|  | **Wilderness** | Community conservation areas used for tourism activities and grazing by rural farmers | Tourism Manager Rural Farmer |
|  | **Wetland** | A natural areas which can be converted into grazing or farm land | Facilitator Rural Farmers Commercial Farmers |
|  | **Alien Invasive Species (AIS)** | AIS which appear throughout the case study and can be cleared by any player | Facilitator All roles |
|  | **Town** | Built up, small urban area which the government official is responsible for | Government official |

Figure 3.8 below demonstrates an example of the types of areas that the Farm and Graze LPCs represent in reality in a rural farming context.



**Figure 3.8: Representation of a Farm and Graze Land Plot Card**


*Action Cards*

The actions of each player were developed based on the activities that they perform in reality, which were also generalised in Table 3.1. Each player receives a suit of action cards based on the role that they are playing, which are used on the relevant LPC. An action card demonstrates the activity (maize production, cattle grazing, running a hotel, etc.), the requirements (inputs) to achieve the activity (water, soil, money, labour, etc.) and the outputs that the activity will produce (water runoff, soil loss, money, etc.). The input and outputs of the activity are based on the calibration conducted in sub-section (d) as well as the comparative perceptions of those on the ground. Table 3.4 below displays the action cards that were developed for each role.

In addition to the above, action cards were developed for the game facilitator to place on land plots that were unoccupied for a round. This was conducted to demonstrate that even without continual human use of land; the implications of human activities will still affect the natural environment. For example, if a crop land plot is left unoccupied without a mulch or revegetation, soil erosion is still likely to occur as there is no ground cover to prevent soil being lost due to runoff or strong winds. Various action cards were developed for this purpose and are summarised in Table 3.4 below.

It important to note that for farming activities, the implications in terms of soil erosion differed between the erosion potential zones (Figure 3.4 and Figure 3.5), resulting in several activity cards for the same

action being created with varying outputs based on the zones. A detailed matrix of the inputs and outputs of each activity can be found in Appendix 1.

**Table 3.4: Action Cards developed for each role in *AmanziGame***

| Role | Action Card | Description |
|---|---|---|
| **Rural Farmer** | Maize | Maize production, a stable food crop mainly grown for consumption |
| | Legumes | Legumes production, mainly grown for consumption |
| | Vegetables | Vegetable production, mainly grown for consumption |
| | Graze – 1 herd | Herding of one herd of cattle for grazing |
| | Graze – 2 herds | Herding of two herds of cattle for grazing |
| | Free Graze – 1 herd | Free roaming (no herding) of one herd of cattle for grazing |
| **Commercial Farmer** | Maize | Maize production, for commercial purposes |
| | Dairy | Dairy production, for commercial purposes |
| | Soya beans | Soya beans production, for commercial purposes |
| | Wheat | Wheat production, for commercial purposes (winter crop) |
| | Beef (Graze ) – 1 herd | Beef production, for commercial purposes – 1 herd grazing |
| | Beef (Graze ) – 2 herds | Beef production, for commercial purposes – 2 herds grazing |
| | CA[12] - Crop Rotation | Conservation farming – rotation of crops to preserve land |
| | CA - Organic Soil Cover | Conservation farming – organic mulch to preserve land |
| | CA - No Tillage | Conservation farming – no tillage to preserve land |
| | CA - Central Pivot | Conservation farming – efficient water irrigation |
| **Tourism Manager** | Guided Hiking Tour | Hiking tour accompanied by a guide |
| | Horse Riding | Horse riding |
| | Bird Watching | Bird watching with no guide |
| | Hiking | Hiking with no guide |
| | Hotel | Accommodation facility |
| | Rock Art Tour | Guided tour of rock art |
| | Backpackers | Accommodation facility |
| | Camping | Accommodation facility |
| | Educational Tour | Educations tour for students |
| **Government official** | Fine - Excess Water Pumped | Fine for commercial farmer for pumping excess water (outside of license) |
| | Fine: Wrongful Labour Dismissal | Fine for tourism manager or commercial farmer for the wrongful dismissal of labour |
| | Grant: Unemployment | Monetary grant given to rural farmers when unemployed |
| **Environmental Officer** | Low Tillage: Crops | Conservation farming activity – low tillage to minimise degradation |
| | Contour Ploughing: Crops | Conservation farming activity – contour ploughing to minimise degradation |
| | Vetiver Grass | Planting of vetiver grass for land rehabilitation |
| | Stone Pack | Building stone packs for land rehabilitation |
| | Gabion | Building gabions land rehabilitation |
| | Alien Species Eradication | Clearing of alien invasive species |
| | Fine - Wetland Destruction | Fine commercial farmer for the destruction of a wetland |
| | Fine - Excess Water Pumped | Fine commercial farmer for pumping excess water (outside of license) |

---

[12] CA: Conservation Farming activities conducted by commercial famers

| Role | Action Card | Description |
|------|-------------|-------------|
| | Fine - Excess Organic Pollution | Fine commercial farmer for high siltation |
| | Fine - Illegal Dam Construction | Fine commercial farmer for illegally construction a dam |
| | Permit - Dam Construction | Permit for a commercial farmer to construct a dam |
| **Tribal Authority** | None – *simply a managerial role* | None |
| **Facilitator** | Unoccupied Crop Land | Crop land that is not being used and has no ground cover (susceptible to erosion) |

Figure 3.9 below displays an example of an Action Card, demonstrating how the card is read and what its elements represent. The card indicates what role it is for (rural farmer), what the activity is (vegetable), the zone the activity that must occur in (orange – Zone 2) and the inputs (water, soil, labour) and outputs (water, silt, money) of the activity. All of the action cards developed for *AmanziGame* can be found in Appendix 1.
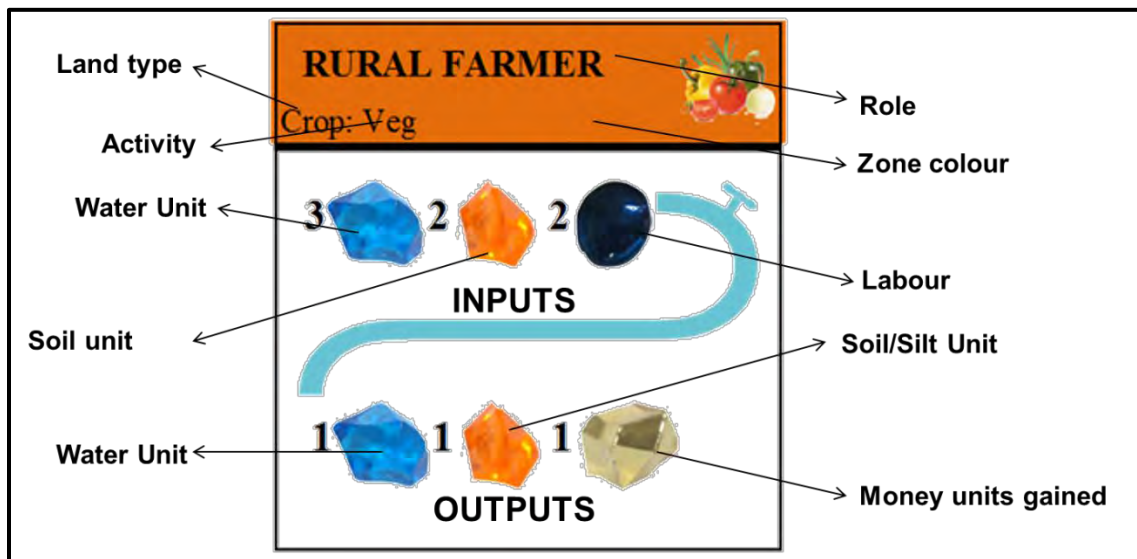


**Figure 3.9: Example of an Action Card developed for the *AmanziGame***

In some cases, the action cards of one role could be adopted by another role player. For example, the land rehabilitation techniques (stone packs, contour ploughing, etc.) implemented by the environmental officer could be used by a rural farmer who had learnt the skill of the action card.

*Development Cards*

Based on a player's activity, it is possible that an action card will require them to buy or invest in an infrastructural component. To represent such an investment, Development Cards were created to provide a representation of the purchased infrastructure. For example, a tourism manger may choose to

develop a hotel, for which there is an initial expenditure (building the hotel), before it can be operational and generate an income (Figure 3.10). In the same vein, a commercial farmer may choose to purchase a centre pivot which can be used as a conservation farming technique to reduce irrigation and water use. The Development Cards were produced based on the requirement of the Action Cards and provided by the facilitator as a player requests and purchases the item.



**Figure 3.10: Example of a Development Card for a 'Hotel' in *AmanziGame***

*Events*

The final game element to be developed was that of Event Cards, which represent external occurrences that effect players. Such events are unpredictable, influence players individually and are uncontrollable. Positive, negative and ordinary event cards were developed for each role to represent such occurrences. At the end of each round, players received a randomly selected Event Card to which they had to respond to. Figure 3.11 below demonstrates a positive, negative and ordinary event card for a rural farmer. All of the event cards developed can be found in Appendix 1.

| **RURAL FARMER** ☺ Good Harvest: Gain 2 Money Units/Crop AC | **RURAL FARMER** ☹ Death in Family: Pay 3 Money Units for funeral | **RURAL FARMER** 😐 Broken Borehole: Ask Gov. to assist, 4 MU for repair |
|---|---|---|
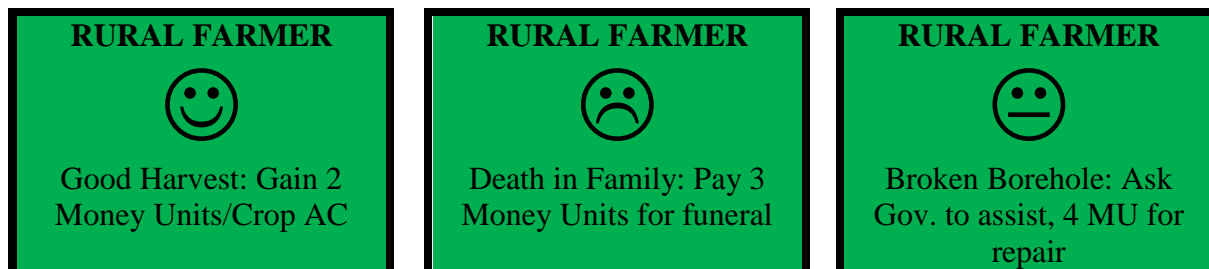
**Figure 3.11: Example of a positive (left), negative (middle) and ordinary (right) Event Cards for a rural famer**

*Scenarios Determination*

To understand the state of the case study in different conditions, scenarios for the *AmanziGame* needed to be developed to understand their implications. The following broadly defined scenarios were generated based on review and consultation and were used to define the rounds of the game session.

- Weather based scenarios – the amount of rainfall received varies based on the season selected for the round
    - Summer (high rainfall)
    - Winter (low rainfall)
- Climate change scenarios

- o   Intensified event activity (drought, flooding, heavy rainfall)
- o   Shift in rainfall patterns
- Anthropogenic scenarios
  - o   Population increases
  - o   Labour reduction (due to migration or illness)

These scenarios were developed in the game development stages, however during the game sessions (application), participants requested to test additional scenarios, which were easily conducted at the time.

### *Monitoring*

Finally, general and individual monitoring sheets were produced as observation tools for the game facilitator and players to keep track of the outcomes of the session. Monitoring elements are designed to have a continuous assessment of the happenings of the game as well as capture the individual and general progress of the session. Individual monitoring sheets were developed for each role, which players completed at the end of a round to keep track of their actions and progress (Figure 3.12). The individual monitoring sheets for the other roles can be found in Appendix 1.



| RURAL FARMER: Monitoring Sheet | | | | Name: _____ |
| --- | --- | --- | --- | --- |
| Round | Labour | Money Unit Need | Extra Money Units | Herds of Cattle | Comments |
| 0 | | | | | |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

**Figure 3.12: Rural Farmer monitoring sheet for the *AmanziGame***

In addition, a general monitoring sheet was generated and completed at the end of each round by the facilitator to monitor the status of the system (Figure 3.13).

**Figure 3.13: General Monitoring Sheet for the *AmanziGame***

### c)   *Verification*

The verification stage involved cross-checking the accuracy and relevance of the game with reality. This was done by constantly building onto the understanding of the region and adjusting the model accordingly. Draft versions of the *AmanziGame* were played with the *Afromaison* (South Africa) project team members to increase the game's accuracy. Figure 3.14 shows the mock version of the *AmanziGame* being played in the early stages of its development. This was conducted to ensure the dynamics and relationships were accurately captured as these cannot be established through desktop research. By playing a mock version of the game, it assists in identifying and avoiding any social tensions and conflicts that may arise due to the way the game has been designed. Once the verification process was conducted, the game was adjusted accordingly before it was run with local stakeholders.
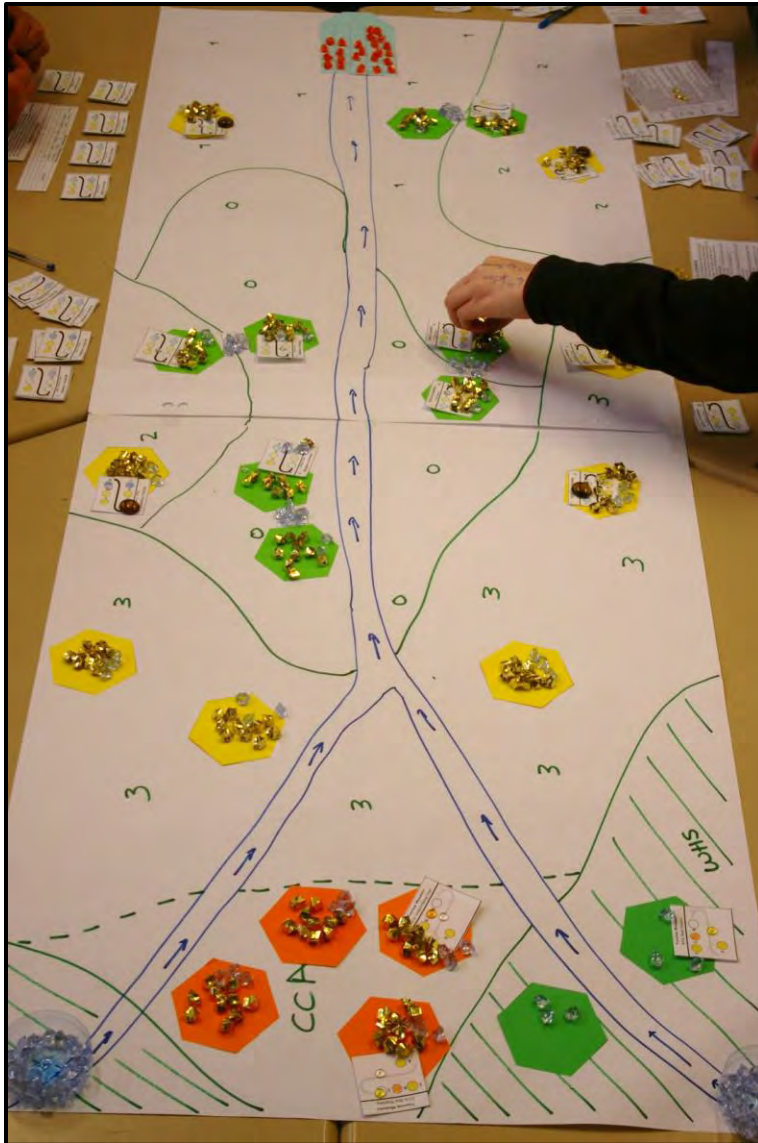
**Figure 3.14: Mock version of *AmanziGame* being played for verification**

### d) Calibration

Calibration is a means of quantifying elements so that they are relative to the systems actual data. Therefore, units used to represent water, land plots, cattle, money and labour are representative of realistic amounts. This is done through a calculation and a logical account of scientific information as well as the qualitative perceptions of local experts and stakeholders based on relativity.  For the purposes of this thesis, the calibration process is not elaborated on; however an overview of the data used to inform the calibration of the game elements are as follows:

- **Land Plot Cards**: data and topographical maps to calculate the representative area of types of LPCs

- **Water tokens**: data (for example rainfall, runoff, storage,)
- **Soil tokens**: data (soil loss)
- **Labour tokens**: data (census)
- **Cattle tokens**: data (herd size)

Further details of the calibration process can be found in Appendix 1.

### e) Production

The production stage involves the making of representative tokens and cards as well as developing monitoring, action plan and scenario boards used to conduct a game session. As previously indicated, tokens are used to represent various elements in the game such as water, soil, money and labour. The amount of tokens used in the game are distributed for various activities based on the calculations done in the calibration stage.

The following activity cards were produced to play the game:

- **Role Playing Cards**: provided to each player at the start of the game to define their role and their objectives and activities in the game
- **Land Plot Cards**: indicating the location of different activities and the type of land used
- **Action Cards**: chosen and used by players in every round to provide an activity for their LPC
- **Event Cards**: provided to players at the end of a round to provide an external dynamic that affects the individual players
- **Development Cards**: representation of items purchased or investments made from certain action cards
- **Monitoring Sheets**: individual and general monitoring sheets to track the progress of the game session

### f) Game Session

The final stage of designing the *AmanziGame* involved planning of the game session which includes animating and organising the game session.

#### Animating

The *AmanziGame* was animated by establishing how the participants will play the game. This animation was based on the WAG guideline and follows the standard procedure taken to play a WAG (WAG, 2012). The following steps (Figure 3.15) were provided to indicate the actions taken to animate the *AmanziGame*.

---

**PLAYING THE GAME**
- Before a Round
    - Full dams and boreholes
    - Facilitator cards (alien invasive and unoccupied)
- Decision Time
    - All players choose activities for round, place on board and invest
    - Movement of labour between players
    - Government and Environmental Officials plan activities that effect other players
- Play
    - Facilitator decides on type of season and scenario – and then makes it 'rain'
    - Process each players' activities from upstream to downstream
- End of a Round
    - Rural Farmers sustain families, get labour back from employees
    - Tourism Manager and commercial farmer pay tax to Government Official if necessary
    - Government Official supports rural farmers if necessary
    - Government Official receives 1MU for every pristine wilderness LPC
    - Government official sells water and receives tax
- Monitoring
    - Players fill out individual monitoring

**Figure 3.15: Steps of playing a round of the *AmanziGame***

*Organising*

In organising the game sessions, the following was conducted: **monitoring**, **feedback** and **debriefing**.

**Monitoring** of the game session was conducted in three forms:

- Individual player monitoring sheets (as previously demonstrated)
- General monitoring sheet which was completed at the end of each game round (as previously demonstrated)
- External monitoring conducted by an additional facilitator/note taker using the monitoring template. This recorded the reactions of participants to the game, the actions they took, comments made and the dynamics of the game amongst others observations[13].

At the end of the game session, participants were offered the opportunity to provide **feedback** on the applicability and accuracy of the *AmanziGame* to the case study. This encourages participants to critique how the game represented reality and if it captured the dynamics, processes, roles and activities occurring in the region. The outcomes from this discussion were used to alter and update the *AmanziGame* before the next session. This was designed to be a semi-structured process where participants were able to freely give their perceptions, however structure was ensured by individually asking participants to provide feedback.

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[13] A skeleton of the external monitoring document can be found in Appendix 1

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The **debriefing** conducted by all players after each game session produced the important findings and understandings needed for the *Afromaison* project. An outline of how the debriefing sessions were conducted is detailed in the next section: testing phase. The outcomes from this process were used as a comparison between all the game sessions conducted with stakeholders and the findings fed into other components of the project.

### 3.3.1.1.    Conclusions of the Design Phase (1)

During the design phase, the *AmanziGame* was tested with university students and members of the *Afromaison* project team to ensure the playability of the game was achieved. Not only is it important for the game to flow but it needs to move swiftly while still being fun, interactive and easy to understand (Figure 3.16).



**Figure 3.16: Final version of the *AmanziGame***

The *AmanziGame* was developed not only through research, analysis, modelling and calibration but by constantly updating the model based on feedback. Although the factual elements of the RPG are important, it is vital that the perceptions and understanding of stakeholders are accurately captured and represented. This gives stakeholders a sense of personalisation, and ownership, when participating in the RPG, enabling them to test ideas through the model and base discussions accordingly.

Once the development and planning of the model has been conducted, game sessions were held with stakeholders (such as farmers, tribal authorities, town managers, municipal officials, local experts and organisation representatives). The *AmanziGame* was dynamic and could be altered by the players as they saw fit so as to make participants connect with the game on a personal level. The game session was played, based on 4 or 5 rounds, allowing adequate time for action plans to be drawn up between each

round, and a feedback and debriefing session was held at the end of the game. These aspects were vital as they highlighted the outcomes of the two phases; firstly the game and secondly the future NRM ideas that the game was able to develop.

What follows is an elaboration of the testing phase (2) of the *AmanziGame* development which involved the participation of stakeholders from a range of sectors and the refinement of the model for use in the final application phase (3).

### 3.3.2.  Testing Phase (2)
The testing of the AmanziGame consisted of the following stages:

1. **Planning**: identify stakeholder sectors that would ideally be involved in the *AmanziGame* sessions
2. **Structure**: developing a structure for conducting the game session workshops
3. **Implementation**: conduct the game sessions with stakeholders based on the planning demonstrated above
4. **Results**: identify the key results of the game session workshops and produce outcomes that are to be used to both feed into the strategy development of the *Afromaison* project, as well as phase 3 (application) of the WAG development. These results will be demonstrated in Section 4: Results

#### *1.  Planning*
In the build up to this section of the *AmanziGame* development, a plan was conducted to identify which sectors needed to be included in the focus group workshops as well as the key companies, organisations and stakeholders that would ideally be involved. The list below indicates the broad categories that were defined and demonstrates examples of who would ideally fall into each bracket.

- Rural Subsistence Farming and Community
    - Non-Governmental Organisations (NGOs)
    - Non-Profit Organisations (NPO)
    - Researchers
    - Agriculture developers and support groups
    - Local Communities
    - Tribal Authorities and representatives
- Conservation
    - Conservation societies (private and government)
    - NGOs
    - Relevant government departments
    - Cultural and heritage departments/associations
- Commercial Agriculture
    - Farmers associations

- o   Relevant government departments
- o   Conservation agriculture associations
- Tourism
  - o   Cultural and heritage departments/associations
  - o   Tourism societies/departments/companies  (private and government)
- Authorities, local planners and government sectors
  - o   Relevant government departments
  - o   Local and District Municipality

Stakeholders from various organisations and companies were asked to participate in their relevant division so as to gain feedback that is not swayed by other sectors. The above categories and participants were the ideal but not all were met for various reasons. Each sector workshop was governed by its particular focus (tourism, commercial agriculture, etc.) to ensure that perceptions were focused and not swayed by alternative sectors. This was controlled as it was anticipated that persons may represent more than a single sector, and thus leave room for conflicting perceptions.

### 2.  *Structure*

To ensure that all the focus group workshops were conducted in a similar format as a means of delivering comparable outcomes, a guideline structure was drawn up before the commencement of the testing phase (2). The basic structure of the workshops was outlined as follows:

**Introduction**

- Use of a PowerPoint presentation to introduce the *Afromaison* project and the *AmanziGame*, the current stage of the research and the next phase
- Description on the *AmanziGame* and its purpose
- How the *AmanziGame* is played

**Playing the RPG**

- Trial run to ensure all participants understand how the game is played
- Playing the game: 3 or 4 rounds, each round having various external influences (high rainfall, low rainfall, population increase, etc.)

**Wrap-up**

- Feedback related to the accuracy of the RPG
- How participants felt playing the game
- Areas for improvement or alterations
- Positives of the game and learning points

**Debriefing**

- Current issues or challenges facing the area
- Possible solutions to the above
- Who the responsibility should fall on for implementing and leading such solutions
- Current initiatives/ programs/ projects in place: reasoning for their success/ failure

**Closing**

- Final comments and thoughts

Ideally, an additional facilitator was present to conduct ongoing monitoring of the session, capturing participants' actions, attitudes and interactions. In cases where an additional facilitator was not available, portions of the workshop were video recorded and reported on at a later stage. Detailed monitoring and evaluation of each focus group workshop was given in each *game* session report.

### 3. Implementation

Six focus group workshops were conducted, which included 4 of the 5 categories of the stakeholder sectors. These included participants of rural community members, developers and researches, tourism representatives (limited), government authorities, and conservation sectors. Despite their interest and willingness to participate, a workshop with commercial farming participants did not materialise. Other groups of participants that were unable to participate were a large portion of the tourism industry, heritage representatives and several government departments.

Table 3.5 below indicates focus workshops that were held and the participants (groups) that attended.

**Table 3.5: Groups of stakeholders who participated in the *AmanziGame* focus group workshops**

| Group No. | No. of Participants | Stakeholder Types |
|:---:|:---:|:---|
| 1 | 8 | NGOs, NPOs, Researches and Planners |
| 2 | 11 | Local Rural Community and NGOs |
| 3 | 11 | Conservation, Researches, NPOs and NGOs |
| 4 | 7 | Conservation, NGOs, NPOs and Agriculture |
| 5 | 11 | Authorities and Government |
| 6 | 10 | Government (Local Municipality) and Tourism |

As is evident, some workshops hosted a range of participants from various organisations, departments and companies while others focused on single divisions. Both compositions came with sets of advantages and disadvantages, and yet always resulted in useful and in-depth outcomes. These outcomes will be demonstrated in Section 4: Results.

### 3.3.3. Application Phase (3)

The final, application phase of the game development concludes both the first two phases of the *AmanziGame* development, as well as the outcomes of the *Afromaison* project. The key challenges

identified in the process were workshopped with key stakeholders by altering the AmanziGame to simulate, discuss and address them.

## 3.4.    Limitations of Methodology

The most notable limitation in developing and implementing the *AmanziGame* was the time constraints of various stakeholders and experts, which limited their insight and interaction in the process. In the initial stages of the *AmanziGame* development, there were numerous experts and key stakeholders that could have provided great insight and contributed to the accuracy of the model. However, due to time limitations, such consultations could not be conducted. In addition, setting up focus group workshops with some groups of stakeholders, particularly commercial farmers and the tourism representatives, was particularly challenging and in some cases did not materialise. However, these stakeholders and experts had been previously consulted during the *Afromaison* project and therefore their opinions were not excluded as the game development was based on the findings from the rest of the project.

## 3.5.    Conclusions of Methodology

The development of the *AmanziGame* was conducted using the Self-WAG guideline, which was divided into three phases – design, testing and application. As a basis for this development, in-depth research of the case study was conducted through the use of the *Afromaison* context report (Matthews and Catacutan, 2012) and supplemented by interviews with key stakeholders. From this, an understanding of the resources, stakeholders and social, environmental and economic dynamics of the region could be developed. Abstraction of reality was fundamental in the game development, ensuring that elements of reality were represented in a simplified manner without losing the unique characteristics of the region. The design phases resulted in the formation of the *AmanziGame*, where the various component of the WAG were developed (action cards, role playing game, game board, dynamic elements, development cards, scenarios and monitoring sheets). Before the game could be played with stakeholders, it was verified through consultation with key stakeholders. In addition, the playability of the game was tested with by conducting various mock game sessions. The final step in the design phases was the planning of game sessions, which involved organisation of how each session would be conducted to ensure adequate structure. The testing phase of the WAG development involved planning how the series of game sessions would be conducted and with whom. The implementation and results of this stage, as well as the application phase of the *AmanziGame* development, are demonstrated in the chapter to follow (Section 4.2: Testing Phase and Section 4.3: Application Phase).  The key limitation experienced in the game development related to engagement and time constraints of stakeholders. This resulted in poor representation of some of the sectors, and in extreme cases, an inability to conduct focus groups game sessions with some of the sectors.

## 4. RESULTS

The following section reveals the outcomes of the *AmanziGame* application, specifically demonstrating the outcomes of the testing and application phases of the game development. The section concludes by demonstrating the main findings of the section as well as limitations experienced with the *AmanziGame* development and application.

### 4.1. Design Phase (1)

As demonstrated in Section 3: Methodology, the design phase was based on findings from research, interviews, stakeholder consultations and existing information regarding the case study developed by WP2 (Matthews and Catacutan, 2012). The outcome of this process was the development of the Self-WAG for the *Afromaison* project, the *AmanziGame*.

### 4.2. Testing Phase (2)

The *AmanziGame* developed in the design phase (1) was implemented with local stakeholders. During this phase, several game session workshops were planned and conducted to involve stakeholders in the RPG process. During these workshops, the game was played, after which a debriefing session was conducted. This debriefing consisted of the identification of the issues/challenges that the case study faces, possible solutions to such challenges and the party/ies that should be responsible for implementing such solutions. In addition, the current initiatives were discussed, highlighting their status and the reasons for their success or demise. The outcomes of the testing phase are demonstrated below.

#### 4.2.1. Issues and Challenges Identified by Participants

Table 4.1 below summarizes all the issues or challenges that were raised by participants during the debriefing conducted after the *AmanziGame* had been played. The table provides a summary of the perceptions of the stakeholders in all six focus group workshops as well as their perceived drivers. The columns indicate the group number of the workshop and stakeholders who participated, with a tick to indicate whether or not the group perceived the topic to be of concern. The number provided in the final column (Totals) is an indication of how many groups of participants agreed with the issues raised. From this, the key issues and drivers, as identified by participants, can be determined.

**Table 4.1: The perceived issues or challenges as highlighted in all *AmanziGame* focus group workshops and the total number of groups that perceived it as a concern**

| Issue/Challenge | Group | | | | | | Totals |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | |
| | Rural Dev. | Local Com. | Conserv. Auths. | Conserv. & Agric. | Gov. Depart. | Local Gov. | |
| **Access to and lack of general infrastructure** | ✓ | | ✓ | | | ✓ | 3 |
| **Ad Hoc Burning** | | ✓ | ✓ | | | | 2 |
| **Individual greed** | | | | | ✓ | | 1 |
| **Historical tension (culture divides, stereotypes)** | | | | ✓ | ✓ | | 2 |
| **Incorrect government spending and corruption** | ✓ | | | ✓ | ✓ | | 3 |
| **Lack of Education and Skills (Farming)** | | ✓ | ✓ | ✓ | ✓ | | 4 |
| **Lack of Coordination and Communication** | ✓ | | ✓ | ✓ | ✓ | ✓ | 5 |
| **No Land Use Management Plan** | | ✓ | | | | | 1 |
| **Stock theft and criminal activities** | | ✓ | ✓ | | | ✓ | 3 |
| **Supply and distribution of water** | ✓ | | ✓ | | | ✓ | 3 |
| **Tribal Tension** | ✓ | | | | | | 1 |
| **Unemployment and Poverty** | | | | | | ✓ | 1 |
| **Drivers of Issues/ Challenges** | | | | | | | |
| **Land Degradation** | ✓ | ✓ | ✓ | ✓ | ✓ | | 5 |
| **Water Quality** | ✓ | | ✓ | | | ✓ | 3 |

*Rural Dev.: Rural developers, NPOs, NGOs, researches and planners; **Local Com.**: Local rural community; **Conserv. Auth.**: Conservation authorities; **Conserv. & Agric.**: Conservation authorities and agriculture developers; **Gov. Depart.**: Relevant government department; **Local Gov.**: Local Municipality and tourism representatives*

Each issue or challenge is explained as follows, based on the perceptions of participants as demonstrated during the debriefing conducted during the *AmanziGame* focus group workshops:

- **Access and lack of general infrastructure**: inability to access remote areas, particularly in mountainous areas where few roads exist. The lack of service delivery in terms of roads, water and sanitation provision, and basic facilities are evident. This may refer to poor planning by government departments, who simply construct roads without adequate consultation from experts and with no rehabilitation of quarried areas, which has negative implications for the natural environment.

- **Ad hoc burning:** result of fires that are not managed, controlled or planned for. This is mostly done by the local community members as a means of burning grasslands to gain new green shoots that are ideal for grazing.

- **Greed of individuals:** indicates the isolated attitude of people in the area, often resulting in negative impacts on others and of the natural environment demonstrating a lack of integrated catchment understanding.

- **Historical tension (cultural divides, stereotypes):** is as a result of the political history of South Africa. Such tensions are still evident in today's society and result in division and negative attitudes among locals.
- **Incorrect government spending and corruption:** demonstrates that government budgets are not being spent wisely, and in some cases not on the local community at all. Such challenges are heightened by corruption that is typically experienced in government sectors.
- **Lack of education and skills (farming)**: indicates the limited schooling systems available as well as the lack of knowledge related to farming practices, particularly in the rural subsistence areas.
- **Lack of coordination and communication**: refers to the poor interaction that occurs between people, sectors, departments, industries and actors in general. It was perceived that the lack of communication between actors has been the driving force behind the majority of other issues or challenges that the area experiences.
- **No land use management plan:** indicates the lack of planning and coordination by those in power, which results in individuals conducting activities and using resources without a guideline or management plan.
- **Stock theft and criminal activities:** affects peoples' livelihoods and their management practices. Some criminal activities result in trade paths (passes) through the Drakensberg Mountains as a means for transporting illegal goods, which result in erosion and land degradation. As a result, livestock owners isolate their herds in safe areas as a precaution, resulting in overstocking and overgrazing.
- **Supply and distribution of water:** closely linked to the issues of a lack of basic infrastructure. Although, it encompasses the control of water use (rights), its supply (provision) and availability.
- **Unemployment and poverty:** a relatively self-explanatory issue relating to the lack of jobs, income and sustainability of the people living in the area, particularly in rural areas.

Each driver is explained as follows:

- **Land degradation:** resulting in land that is no longer usable or productive. Such degradation is as a result of poor farming practices, ranging from crop production to grazing patterns and a general over use of the land, which in some cases is not suitable for use (steep mountainous regions). This is largely caused by erosion as a result land is mismanaged and this consequently results in the siltation of water systems.
- **Water quality:** relates to siltation and organic pollution of water systems due to the degradation of the land, resulting in poor quality of water for locals to use as well as for external users (downstream and transferred).

During the most of the game session workshops, the issue of coordination, collaboration and communication between people in the area was perceived as the greatest challenge (Figure 4.1). Participants indicated that this issue resulted in other problems such a stock theft, as farmers are not efficient in 'getting the word out' and consequently are not able to apprehend those committing the crime. The communication issues could also stem from other challenges highlighted, such as the

historical tension. Other issues that were perceived as key by various groups of participants were that of 'incorrect government spending and corruption', 'supply, distribution and quality of water', 'access and lack of general infrastructure' and 'stock theft and criminal activities'. Therefore, it is important to note that even though the issues or challenges have been separated, they are interrelated and influence each other.

One most commonly perceived driver of challenges that the LM faces is addressing land degradation, which is the reason for many other issues and challenges (Figure 4.1). A reason for above issue can be highlighted through other common challenges indicated such as the lack of education and skills, particularly related to farming practices in rural areas.
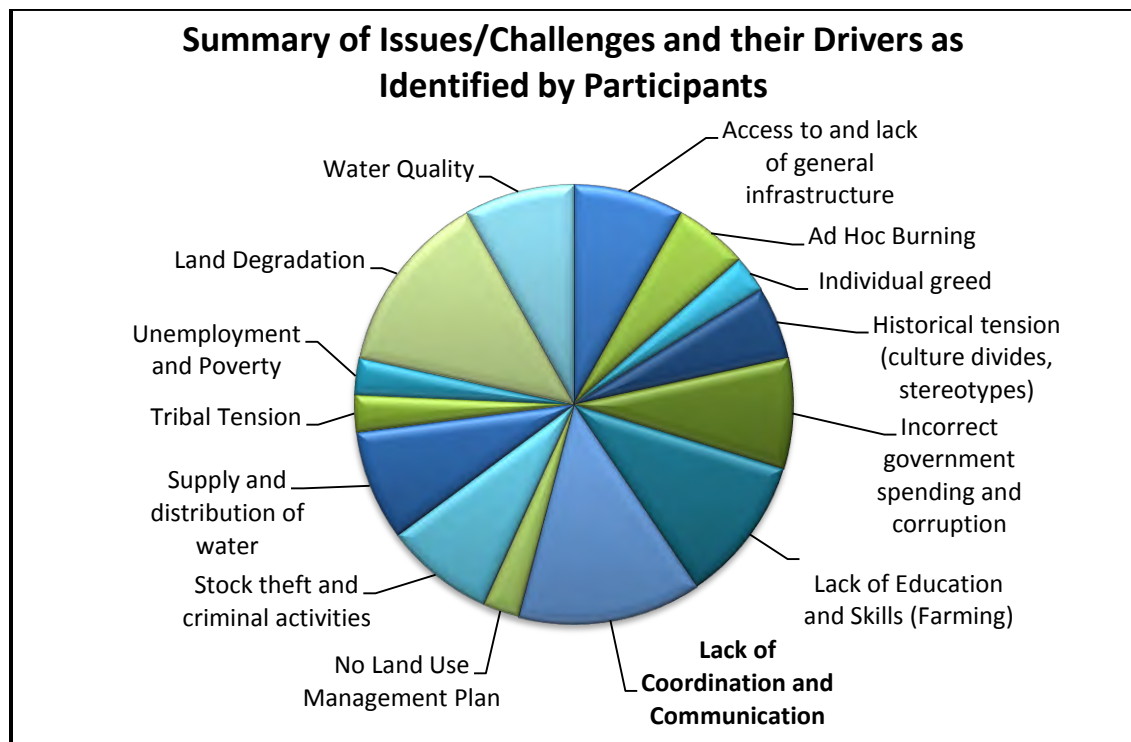


**Figure 4.1: Pie Chart demonstrating the summary of concern as perceived by participants (based on Table 4.1 results)**

### 4.2.2.   Possible Solutions to the Issues and Challenges Identified by Participants

During *AmanziGame* workshop, a debriefing session was conducted where participants were asked to pose possible solutions to the challenges or issues highlighted. In most cases, the solution proposed addressed more than one of the issues, usually taking an integrated, holistic approach to problem solving. Table 4.2 below indicates the solutions proposed by participants in the various workshops and the total number of groups that supported each option.

**Table 4.2: The perceived possible solutions as highlighted in all focus group workshops and the total number of groups that perceived it as a concern**

| Solution Proposed | Group | | | | | | Group |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | |
| | Rural Dev. | Local Com. | Conserv. Auths. | Conserv. & Agric. | Gov. Depart. | Local Gov. | |
| Change of Mindsets (Culture, Race, etc.) | | | ✓ | ✓ | ✓ | | 3 |
| Education and Training for the Rural Community | ✓ | ✓ | ✓ | | ✓ | ✓ | 5 |
| Education Interchange (Rural and Commercial Farmers) | ✓ | | | ✓ | ✓ | | 3 |
| Encourage Employment Opportunities in Other Sectors (Tourism) | | | ✓ | | | ✓ | 2 |
| Identify Suitable and Productive Land (Farming) | | | | | ✓ | | 1 |
| Implementation and Monitoring of the Law (Burning, Crime, Farming Practices) | | ✓ | | | ✓ | ✓ | 3 |
| Integration of Actors | ✓ | | ✓ | | | | 2 |
| Localised Decision Making and Planning | | | ✓ | ✓ | | | 2 |
| Long Term, Sustainable Management Plan | ✓ | ✓ | | | | | 2 |
| Ongoing Training for Farmers (Extension Officers) | | ✓ | | ✓ | | | 2 |
| Planning of Developments (Roads, Dumps, etc.) | | ✓ | | | | ✓ | 2 |
| Single Farmers Association | | | ✓ | ✓ | | | 2 |
| Strengthening of Government Structures (Training) | | | | ✓ | | ✓ | 2 |

*Rural Dev.: Rural developers, NPOs, NGOs, researches and planners; **Local Com.**: Local rural community; **Conserv. Auth.**: Conservation authorities; **Conserv. & Agric.**: Conservation authorities and agriculture developers; **Gov. Depart.**: Relevant government department; **Local Gov**.: Local Municipality and tourism representatives*

The possible solutions identified are explained as follows which are based on the perceptions of participants as demonstrated during the debriefing conducted during the *AmanziGame* focus group workshops:

- **Change of mindsets (for example culture and race):** indicates the need for an alteration in the attitudes and relationship between actors. It was indicated by participants that this change cannot come from an external source, but rather needs to be implemented by a local power such as the tribal authorities. The change of mindset of people will make them more open to learning new practices, enabling knowledge sharing between different types of farmers. An example could be the notion of having smaller herds of healthy, high quality cattle rather than large herds with low production rates and poor immune systems which are susceptible to disease, as a means of decreasing pressure on grazing lands. Such a change in mindset will not only directly benefit the quality of cattle outputs and the grazing lands, but also, for example, the quality and quantity of water in the system.

- **Education and training for the rural community:** demonstrates the need for skills development, particularly related to farming practices, which will address the challenge of soil erosion and land degradation as a result of the improved use of natural resources. This will also benefit other issues such as the quality and availability of water as well as improving the livelihoods of the rural community.

- **Education interchange (rural and commercial farmers):** links to the solutions above by creating localized training initiatives whereby commercial farmers can host workshops as a means of sharing their farming knowledge with others in the area. This solution can only be put in place if there is a 'change in mindset' of locals, as the poor relationship between different types of farmers limits this.

- **Encourage employment opportunities in other sectors (tourism):** was perceived as a possible solution by participants as a means of encouraging the local community to decrease their directly reliability on the land and discover alternative forms of income through industries such as the tourism sector. Another suggestion to achieve this is to encourage locals to start their own businesses and become entrepreneurs.

- **Identify suitable and productive land**: particularly related to farming land, where an analysis needs to be completed to improve the use and management of available land. This will decrease the use of land that is not suitable and reduce the negative implications for the natural resource. Such identifications may be used for planning of developments such as suitable areas for dumpsites and landfills.

- **Implementation and monitoring of law (burning, crime, and farming practices):** to address a variety of issues ranging from ad hoc burning, stock theft and criminal activities; incorrect government spending and corruption; for the creation of a 'blanket' law that is applied to all farmers. These solutions were identified as a result of the unfair law enforcement applied to commercial and rural farmers, highlighting the need for a law that is implemented to all farmers, regardless of their classification. Therefore, farmers that are incorrectly managing water use, for example, need to be penalized whether they are commercial or rural farmers.

- **Integration of actors:** to address the issue of the communication and collaboration between local actors in the community. Such integration will enable improved planning and management of the area and subsequently improve the use and state of natural resources. This is linked to the creation of a single farmers association as opposed to individual, isolated associates – as indicated in 'Single Farmer Associations' notion.

- **Localised decision making:** is a possible solution to improve management and implementation of laws by enabling locals to participate in decision making and giving them responsibility. This can be done so as to empower of the local community and give them a sense of unity.

- **Long term, sustainable management plan:** a long term solution that aims to address all the issues and challenges that the area faces in an integrated manner. For this to be achieved, participants agreed that midterm solutions such as the change of local mindsets, training and education, law enforcement and strengthening of government structures need to be implemented.

- **Ongoing training of farmers (extension officers):** indicates the need for trained members of the local community to remain in the area to provide examples of improved farming practices, as opposed to the temporary workshops and education means that are currently in place. This approach allows locals to have an ongoing practical example and advisor close to their homes, where they can seek advice at any stage, in a comfortable, familiar setting.

- **Planning of development (road, dumps, etc.):** demonstrates the need for improved planning to solve the issue of inappropriate development that results in the depletion of natural resources. This will require decision makers to seek specialist advice before developing infrastructure such as roads and solid waste dumps. This solution will enable adequate monitoring to be conducted which will ensure that rehabilitation of disturbed sites (for example quarries after building roads) to prevent issues such as soil erosion and land degradation.

- **Single farmers association:** builds onto the solution of "integration of actors" as a means of breaking down the communication and collaboration barrier apparent in the area. A single farmers association will also encourage knowledge sharing and training between rural and commercial farmers. There are currently farmer associations for commercial farmers and rural farmers, but a single association would solve many of the challenges facing the area and have positive spinoffs for the natural resources.

- **Strengthening of government structures (training)**: indicates the need to enable government sectors to make improved decisions through skills development to solve the issue of incorrect government spending as well as the lack of adequate implementation of laws.

It is evident that one of the most predominant solutions as perceived by groups of participants is that of education and training for the rural community (Figure 4.2). It is thought that such training can be conducted through workshops and education interchange between commercial and rural farmers, and ongoing training for farmers through an improved extension service. Such practical skills will assist the local farmers to improve the efficiency of their methods and positively benefit the natural resources. Conservation farming methods are practiced by commercial farmers, indicating that a training interchange will enable rural farmers to the same. Such methods will mitigate soil erosion and land degradation, and improve the condition of the water systems in the area. This indicates how the implementation of a solution can spark other solutions and thus result in multiple benefits.
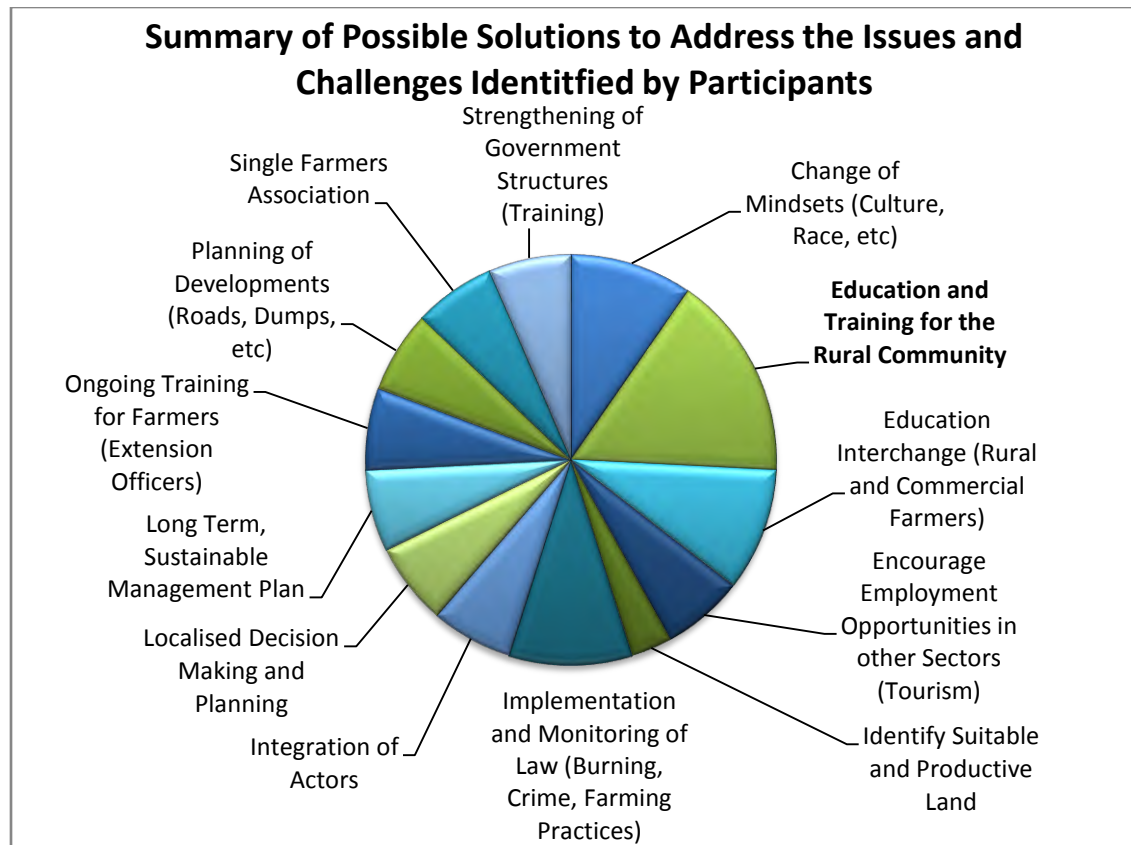
**Figure 4.2: Pie Chart demonstrating the summary of possible solutions to the issues and challenges as perceived by participants (based on Table 4.2 results)**

The change of mindset of actors in the area was perceived as a possible solution to solve the communication issues experienced and having positive spins off for other challenges. As previously indicated, the change of mindset notion would need to stem from an internal source such as a local community representative, tribal authorities and even local actors themselves. It was thought that an external influence would not be accepted by the locals and therefore needs to come from within. Such changes in mindset would include the alteration of cultural norms such as the value cattle holds in the Zulu heritage. Over grazing, management and density of cattle is perceived as one of the main reasons for soil erosion and land degradation in the area which is negatively affecting the functionality of the water systems due to siltation. Therefore, by altering the cultural wealth of cattle, stock sizes would decrease and consequently reduce their impact on the natural resources. This may benefit other types of farming practices by highlighting the benefits of indigenous farming methods and combining them with those introduced by commercial (conservation) practices. A change of mindset is perceived to degrade the racial boundaries that are embedded in many communities in South Africa as a result of its historical political state. Such a breakdown would again encourage interaction between different types of farmers and allow for improved communication and collaboration between all.

The final key solution that was highlighted by various groups of participants was that of implementation and monitoring of the law as a means of mitigating illegal activities affecting the community and the natural resources they depend on. Stricter law enforcement could be implemented to decrease criminal

activities such as stock theft and trade of illegal goods that are not only affecting the livelihoods of the locals, but result in land degradation due to mountain passes being eroded and intensified. It was noted by several groups of participants that such criminal activities affect the tourism industry, particularly for activities relying on the mountainous regions for hiking, tours, horse riding and other outdoor activities. Not only does the current situation create an unsafe environment for tourists but also the degraded land decreases the appeal of the area and therefore the tourism product.

Law enforcement needs to be put in place to mitigate ad hoc burning by ensuring the correct management and control of burning, as a means of 'renewing grasslands'. This would require locals to be involved in the decision making and management of burning so that there is a cooperative management plan that all stakeholders agree upon. Participants perceived that actions outside of this plan would result in harsh consequences. A localised burning management plan would consequently decrease soil erosion and its negative implications on the water system.

Most of the above can be classified as medium term solutions, while a possible long term solution (raised in two of the focus group game workshops) is the need for a sustainable land management plan. As previously indicated, such a plan would incorporate the majority of solutions proposed, and create a management framework for the community to use to guide their practices for decades to come. A group of participants indicated the necessity for having both short and long term solutions in place to ensure that goals are met and improvements seen the short term to give the community a sense of achievement, while long term solutions are put in place to ensure the ongoing management. The participants perceived it as important to integrate all solutions as focusing on challenges and issues in isolation is unrealistic and impossible.

### 4.2.3. Bodies Responsible for Implementation of Proposed Solutions

Once participants were provided with the opportunity to discuss the key challenges and issues affecting the area and highlight possible solutions for each, they were asked to identify who the responsibility should fall on to implement such initiatives. Table 4.3 below indicates the sectors, actors or organisations that participants viewed as responsible and demonstrate which groups agree with each other. Those options marked in green indicate the main party/parties that participants consider responsible for implementing solutions.

**Table 4.3: The perceived responsibility to implement proposed solutions as indicated by participants during the focus group workshops (green indicating the main responsible body/ies)**

| Proposed Responsible Party | Group | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | |
| | Rural Dev. | Local Com. | Conserv. Auths. | Conserv. & Agric. | Gov. Dept | Local Gov. | |
| Government Sectors | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 |
| Environmental Government Organisation | | ✓ | ✓ | | | | 2 |
| Local Community (Tribal Authorities) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 6 |
| Non-Governmental Organisations | ✓ | ✓ | ✓ | ✓ | ✓ | | 5 |

*Rural Dev.: Rural developers, NPOs, NGOs, researches and planners; Local Com.: Local rural community; Conserv. Auth.: Conservation authorities; Conserv. & Agric.: Conservation authorities and agriculture developers; Gov. Depart.: Relevant government department; Local Gov.: Local Municipality and tourism representatives*

An explanation of each type of responsible sector, organisation or group is as follows, based on the perceptions of participants as demonstrated during the debriefing conducted during the *AmanziGame* focus group workshops:

- **Government sectors:** all government departments that influence decisions made in the area. This is inclusive of local and district municipal departments as well as other influential departments with the knowledge to implement solutions.

- **Environmental Government Organisation:** a body that is currently active in the area and, as perceived by participants, has a strong relationship with the local community. It was noted that the organisation has been involved in the area for several years and have become a well-known, trusted organisation.

- **Local community (tribal authorities):** the community that inhabits the area (in rural, commercial and urban areas) and includes the management body of tribal authorities.

- **Non-Governmental/Profit Organizations:** the organisations that have been working in the area and gained the trust of the local community. Such organizations were perceived as important bodies to include because of their knowledge in the sector of natural resource management and their perceived ability to effectively implement the solutions discussed.

It is evident that participants did not select a single sector as the responsible body for implementing solutions discussed (Table 4.3 and Figure 4.3). For the most part, participants agreed that no single body should be held solely responsible, but rather that it needs to be a collaborative effort. This reiterates the need for improved communication and collaboration among actors in the area. It is evident that the main bodies who should be implementing such solutions are government sectors, the local community and NGOs/NPOs (Figure 4.3).

The Pie Chart shown in Figure 4.3 below gives a visual representation of the participants' perception of the organisation, sector or group that should be responsible for implementing the proposed solutions.

## Summary of Responsible Bodies Identified by Participants to Implement Proposed Solutions
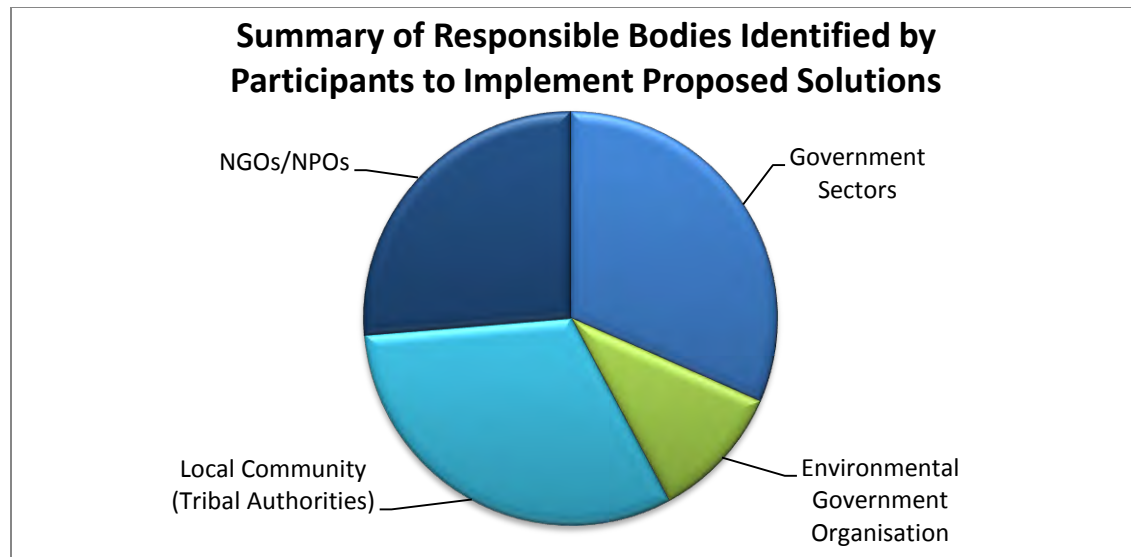
**Figure 4.3: Pie Chart demonstrating the summary of responsible parties identified as perceived by participants (based on Table 4.3 results)**

NGOs/NPOs were highlighted as key implementers due to their specialised knowledge in the field of natural resource management and existing strong relationship with the local community. NGOs/NPOs are perceived as being a practical implementer of the decisions made by the local community. The environmental government organisation was seen as the responsible body by two groups of participants, mainly due to their provincial power and their existing relationship with the local community.

In summary, the general view of participants is that government sectors should play the managerial and organisation role, while the local community should be responsible for decision making. Such decision making, as well as implementation, should be assisted by organisations with specialised knowledge such as NGOs/NPOs and the environmental government organisation.

### 4.2.4.    Current Initiatives Evident in the Case Study as Identified by Participants

In the final stages of each focus group workshop, participants were asked to indicate current NRM initiatives, projects and programs that are being conducted in the Okhahlamba Local Municipality. The aim was to not only understand what is being carried out in the area, but to demonstrate which of the initiatives are successful or not, and the reasons for this. Such information could then be used to guide future projects by learning from the failures and successes of existing initiatives. Table 4.4 below gives a simplified summary of the initiatives discussed, a short description as understood by participants, their status (successful or unsuccessful) and the reason for their success or failure.

**Table 4.4: Current initiatives being conducted in the LM and their status based on the perceptions of participants during the workshops (see colour key below table)**

| Initiative/ Organisation | Description | Status | Reason |
|---|---|---|---|
| **Active NPO** | -On the ground, active through community representatives<br>-Good relationship with environmental government organisation (funding and work together) | -Successful | -Good approach (gain trust of community) constant<br>-Stewardship type programs |
| | -Various projects (planting trees, recycling in exchange for food, seeds etc.) | -Successful | -Funding from government<br>-Forced to work because of strict monitoring and reporting requirements<br>-Constantly involved in area, gained trust and developed a strong relationship with community |
| **Active NGO** | -Extension officers<br>-Working on communication between two tribal areas<br>-Good relationship with environmental government organisation (funding and work together) | -Successful | -Good approach (gain trust of community) constant<br>-Stewardship type programs |
| | -Extension officers (leave behind trained individuals in the area). Plots of land (local) that are used as an example to others | -Successful | -Ongoing example that is within walking distance for local community |
| **Various NGOs/NPOs (Unspecified)** | -Donga rehabilitation<br>-Alien invasive eradication | -Successful during program but temporary (stone packs fill up fast) | -Limited donga rehabilitation (30 people) |
| | -Soil erosion rehabilitation (stone packs)<br>-Plant short thorn tress and Vetiver/ Kikuyu grass | -Temporarily successful | -Community do not build stone packs when not paid<br>-Can only plant trees/grass when funding is available |
| | -National environmental NGO acts as a resource provider to small NGOs/NPOs | -Successful | -Set realistic expectations that can be met (positive association) |
| **National government job creation project** | -Natural resource management<br>-Aims to create jobs<br>-Alien Species Eradication | -Successful | -Use waste/ materials from one program to benefit another (e.g. wood for alien eradication to develop community)<br>-Strict monitoring and report requirements ensures results<br>-Large training aspect, locals encourage to become entrepreneurs |

| Initiative/ Organisation | Description | Status | Reason |
|---|---|---|---|
| **Government initiative programme** | -Not detailed | -Not specified | -Not specified |
| | -Involved in donga rehabilitation | -Successful | -Support by provincial and national departments |
| **Community-based national government programme** | -Rehabilitation | -Not specified | -Not specified |
| **Government funded local environmental committee** | -Fire breaks and management | - Successful but limited | -Is working but does not stop *ad hoc* burning |
| **Environmental government organisation** | -Firebreaks (manage burning) | -Not very successful | -Difficult to manage large area, lack of cooperation |
| | -Good relationship with NGOs and NPOs (funding and work together) | - Successful | -Good approach, gain trust of community, constant -Stewardship type programs |
| | -Alien Species eradication | -Not specified | -Not specified |
| **National government programme** | -Alien Species eradication -Donga rehabilitation | -Not specified | -Not specified |
| **Government funded local community project (1)** | -Promote cultural heritage as a tourism product | -Not specified | -Not specified |
| **Government funded local community project (2)** | -Not specified | -Successful when funded | -Not specified |

*Rural Dev.:* Rural developers, NPOs, NGOs, researches and planners*; Local Com.:* Local rural community*; Conserv. Auth.:* Conservation authorities*; Conserv. & Agric.:* Conservation authorities and agriculture developers*; Gov. Depart.:* Relevant government department*; Local Gov.:* Local Municipality and tourism representatives

Participants (Table 4.4) have heard of or knew of projects, committees, organisations, programmes or initiatives being conducted in the area but, in most cases, were not aware of the objectives or status of these initiatives. This reiterates the challenge that actors and stakeholders in the area face limitations due to their lack of communication and integration. It is evident that there are a large variety of initiatives in the area, with the majority of focus being on land rehabilitation and alien species eradication. Key NGOs/NPOs working in the area and government funded projects, programmes and organisations were identified by participants. Despite the success of many of the initiatives, it is evident that the main limitation they face is the temporary time scale of projects and the lack of incentives for locals to use the skills developed in the post-project phase. The initiatives that are successful are due to their constant involvement with the community which has resulted in a strong relationship being developed.

It was interesting to note that none of the current initiatives in place involved the improvement of farming techniques or training, which is one of the key solutions that were raised during the debriefing sessions in most of the focus group workshops. It became apparent that the majority of programs in

place aim to mitigate the challenges or issues, for example donga rehabilitation, rather than address the source of the issue which is the poor farming techniques and incorrect grazing management.

It was perceived by one group of participants that the majority of the current initiatives in place are not successful in the long term due to "the lack of integration and the sheer scale of the problems" that they are facing. It was further reiterated that programs that are designed to teach the local community skills such as building stone packs, are only temporarily successful during the time in which people are paid. Therefore such skills are not put in place voluntarily, even though the local community recognises the benefits of such techniques. It was indicated that there are no incentives to participate in such initiatives despite it being an income opportunity. During the workshop with the local community, this was reiterated as they indicated that they will not voluntarily put rehabilitation infrastructure in place because it will result in the loss of possible future income as there will no longer be a need for programs in their area.

One participant in the local community focus group workshop indicated that initiatives put in place are limited by the fact they are governed and controlled by politics rather than by the concerns of the natural environment or its people. The other participants agreed by indicating that most of the initiatives are put in place in the other tribal area, Amazizi, rather than in Amangwane, simple because the main tourist route runs through the Amazizi community and they want the area to have an appeal for visitors.

The integration of actors was identified as a key component in creating a successful initiative, therefore demonstrating the need for the involvement of government sectors, NGOs, tribal authorities and local communities. This indicates the need to find a collective forum so that all actors are working towards the same goal by following a structured guideline.

Another common theme between initiatives that have been successful in the area is the strict requirement to conduct monitoring and reporting. This ensures that aims and objectives of the initiative are met as an unsuccessful report would result in a termination of funding. This incentive demonstrates the success of the project to those implementing it and provides a positive attitude to all those involved while ensuring that funding is being spent wisely.

### 4.2.1.   Conclusions of Testing Phase (2)

It was perceived by participants during the workshops that the RPG, in combination with the debriefing conducted was an effective means of capturing the thoughts and ideas of groups of stakeholders. Despite the isolated means in which the workshops were conducted, it was interesting to note the similarities that arose during all the workshops, indicating that all stakeholders have a similar view of the issues and solutions for the case study.

### 4.2.4.1.    Key Challenges and Issues Identified by Participants for the Case Study

The key challenges or issues resulting in land degradation are mainly driven by poor communication and collaboration of actors resulting in a lack of integrated decision making. Other key drivers are the lack of education and training particularly related to farming activities. Such conditions have resulted in the challenges that the area faces such as land degradation and poor water quality. All the challenges and issues indicated by participants were linked and it was generally agreed that the lack of coordination among actors was the source of the majority of these downfalls.

### 4.2.4.2.    Proposed Solutions to the Challenges and Issues Identified

During the discussion of solutions portion of the workshop, it was clearly indicated by the majority of participants that there is the need for training and education, particularly related to farming practices. Such skills development can be achieved through a variety of means ranging from knowledge sharing between rural and commercial farmers to workshopping and creating local examples. Another key solution for many of the challenges that the area faces is the need for law enforcement to address criminal activities, ad hoc burning and the general practices of all farmers in the area. There is a notion that all types of land users need to be 'dealt with' in the same way and have similar consequences for their actions despite their status. A further key solution highlighted by participants is the integration of actors in the area, through combined forums, such as a single farmer association, as a means of creating collaboration and coordination among locals. It is evident that the drivers of issues, such as education and communication, need to be addressed rather than attempting to mitigate the resulting problem, such as land degradation through rehabilitation.

### 4.2.4.3.    Proposed Responsible Bodies to Implement Proposed Solutions

It was unanimously agreed that the responsible party for implementing such solutions should be a combined effort rather than the sole responsibility of a single body. Participants saw it as key that the local community be the drivers of decision making while government sectors where highlighted as a managerial body to head the initiatives. The involvement of NGOs and the environmental government organisation that have specialised knowledge of natural resource management must be integrated as a result of their knowledgeable insight about the issues discussed. This process must not exclude other existing managerial bodies such as tribal authorities. Through the integration of actors, a single solution can be created to ensure all parties are working toward the same long term goal that can be reached in a sustainable manner.

### 4.2.4.4.    Status Quo of Current Initiatives Identified by Participants

Current initiatives and their statuses were discussed with participants as a means of not only gauging the programs and projects being conducted in the case study, but to enable actors to identify and learn from their reasons for success or failure. This exercise demonstrated the grey areas evident as a result of a lack of communication and collaboration, resulting in the details and statuses of many projects or

programs being unknown. The majority of existing initiatives are addressing issues of land rehabilitation and alien invasive eradication, but interestingly not education and skills development. Although some projects were identified as having training aspects, this was not their sole purpose, indicating that the key challenge in the case study is not being addressed. This indicates that projects are in place to mitigate the existing problems rather than to address the driver of the issues. During this exercise, it was revealed that the main limitation of current initiatives is that they are only successful during the time in which funding is available. Even the local community revealed that their participation in rehabilitation programs is simply for the economic gain rather than the incentive to improve the state of their natural resources.

Current successful programs achieve their objectives by building a relationship with the local community and having an ongoing presence in the area through extension officers and community representatives. Therefore, such an approach needs to be implemented into future initiatives combined with the integrated approach previously highlighted. Finally, participants indicated that there is a need for an applied monitoring and reporting element, which is defined and strictly implemented in such initiatives. This is perceived as an essential ingredient for effective sustainable management interventions.

The focus group workshops gave various sets of participants the opportunity to voice their opinions and concerns without being overpowered by other sectors. The use of the RPG was perceived as an ideal tool for getting participants to think in an integrated manner and revealed not only the physical challenges that the region faces, but also demonstrated the social limitations and integrated dynamics that are evident within a community. This enabled participants to be placed outside of their comfort zone and to see challenges and issues from a different perspective and consequently make decisions that incorporate the needs of the entire community. These workshops enabled structured results to be formulated that can be utilized in the other elements of the *Afromaison* project and provide guidance to the way that future initiatives should be approach.

The outcome of this phase of the *AmanziGame* was used in the development of the integrated strategy for the case study, thus demonstrating its contribution to the overall *Afromaison* project. In the section that follows, Application Phase (3), a detailed outline of the final RPG session will be demonstrated. This final session enabled key stakeholders to test challenging elements of the draft *Afromaison* strategy that was developed during a stakeholder workshop.

## 4.3.   Application Phase (3)

The application phase demonstrates the key implementation of the *AmanziGame*, with the previous phases being the basis and build-up to this chapter. However, the *AmanziGame* is not the sole influencer of this phase as the outcomes of other work packages (WPs) of the *Afromaison* project were integrated in this final session. As evident on the design (1) and testing (2) phases, the findings of other WPs have been integrated into the *AmanziGame* and this phase is no different.

Between the testing and application phases, the main case study 'Drafting of the Strategy' workshop was held. During this workshop, the outcomes of all of the WPs were integrated to formulate a draft

*Afromaison* strategy with stakeholders. This workshop was successful in terms of mapping out actions spatially and across time scales, and included stakeholders from a large range of sectors. One of the main outcomes of the workshop was the identification of a key limiting component of the strategy which was how and who would implement the *Afromaison* strategy.

Within South African, implementation is a limiting factor in any management plan due to a lack of capacity in many sectors. As a result of this downfall, a debriefing session was held during the case study workshop to discuss possible institutional mechanisms for the implementation of the *Afromaison* strategy. Based on the minutes of the case study workshop, the following institutional mechanisms were proposed:

- **Single representative body:** One representative from each sector be present on a single committee that meets several times a year to discuss management, implementation and actions that need to be taken. Each representative disseminates the plan to others in their sector.
- **Joining of existing management bodies:** sub-committees based on associations and groups already present (for example, joining of rural and commercial farmers associations to make one farming committee).
- **Localized committees with external integrators:** geographically located sub-committees (for example, all upstream users meet together) with external bodies such as government sectors, and tribal authorities, to integrate the actions of all sub-committees.

The above mirrors the discussions held during the *AmanziGame* phase 2 (testing) focus group workshops. As a result of the acknowledgement of implementation being a challenging element of the strategy, this aspect was chosen to be tested in the final application phase of the *AmanziGame*. As the RPG demonstrates a simulation model of the region, testing institutional mechanisms through the game was an ideal platform for assessing which of the proposed mechanisms would be most successful, efficient and appropriate for the case study. This enables mechanisms to be tested through the game and demonstrates the interactions between stakeholders and the affects that they will have on the natural environment.

### 4.3.1.   Developing the Final Testing Game

The development of the final game in which various institutional mechanisms would be tested through the RPG was a relatively simple process. As no new actions, roles or elements were added to the model, the refined *AmanziGame* from the testing phase (2) was used as the basis for this session. The only changes that were made were the structures of management for implementation based on the institutional mechanisms proposed. These structures were demonstrated by changing the scenario of each round of the game as evident in Table 4.5.

**Table 4.5: Outline of round scenarios used in the final *AmanziGame* session to test proposed institutional mechanisms for implementation of the *Afromaison* strategy**

| Round 1 | Round 2 | Round 3 | Round 4 |
|---|---|---|---|
| **Business as usual** | **Single representative body** | **Join of existing associations etc.** | **Localized committees with external integrators** |
| • Individual actions<br>• Existing managerial roles<br>• Existing associations (e.g. commercial farmers association) | • One representative from each sector on a committee<br>• Meet at the start of the round<br>• Representatives disseminate plan to others in sector | • Rural and commercial farmers associations<br>• Government and Environmental officers<br>• Sub-committees to meet once before round | • Geographic location sub-committees<br>• Meet once before round<br>• Tribal authority and government and environmental officers act as integration body |

At the beginning of each round, participants managed their actions through various institutional structures as a means of assessing their applicability, efficiency and overall success.

### 4.3.2.  Framework of the Final *AmanziGame* Session

The following demonstrates the structure planned for the final RPG workshop.

- **General introduction:** presentation briefly outlining the *Afromaison* project, progress thus far, the current phases and the steps to follow
- ***AmanziGame* introduction:** brief outline of the game and its development, how it is played and institutional mechanisms for each round.
- **Play the *AmanziGame*:** playing of the game, beginning with a 'business as usual' scenario to ensure all participants are confident with playing, followed by three 'testing institutional mechanisms' rounds
- **Debriefing:** discussion on the advantages and disadvantages of each round including the discussion about funding such implementation mechanisms

Due to the thorough testing and alterations made in the previous testing phase (2), feedback on the *AmanziGame* was not conducted during this session (in addition, the majority of participants were involved in the phase 2 focus group workshops). The focus here was on the discussion of institutional mechanisms and therefore such feedback on the *AmanziGame's* accuracy was not required.

Monitoring of the session was conducted by the facilitator during the playing of the *AmanziGame* which described the actions taken by players as well as the interactions between participants when playing different scenarios. After the playing of the *AmanziGame*, participants were requested to discuss the advantages and disadvantages of each round scenario (institutional mechanisms) as well as discuss the realistic element of funding such management structures. The outcomes of observations and debriefing are demonstrated in the following sections.

### 4.3.3.   Participants of the Final *AmanziGame* Session

In the planning of the final *AmanziGame* session, it was highlighted that key stakeholders from a large range of sectors needed to participate in the session. It was also thought that such participants should have been previously involved in the *Afromaison* project and, ideally, have been part of the testing phase (2) of the game. These participants should have a good understanding of the region so as to give insight of high level and localized implementation mechanisms. The following is a list of organisations/sectors which a representative (or two) from each attended the final *AmanziGame* session:

- NGO
- A private consultancy
- Two relevant government departments
- Non-Profit Company (NPC)
- NGO/Local Community
- Environmental government organisation

All of the participants were involved in the *Afromaison* project, having attended a large portion of the workshops for the project and had a good understanding of region's dynamics and mechanism. It is evident that a range of types of stakeholders were involved (government, private, community, NGOs and NPCs); however the session lacked commercial farmer and municipal representatives. The majority of participants (Figure 4.4) had been involved in the previous phase of the *AmanziGame* and were therefore familiar with the process.



**Figure 4.4: Participants involved in the final *AmanziGame* session**

### 4.3.4. General Monitoring of the Final *AmanziGame* Session

Monitoring of the session was not conducted by an additional facilitator as was done during the testing phase (2) as this was not the key focus of the session. However, the session was video recorded and important aspects captured after the workshop. A brief description of the actions and management practices taken in each round are indicated in Table 4.6 below.

**Table 4.6: General Monitoring conducted per round of the final *AmanziGame* session**

| Round: Scenario | Actions Taken by Players |
|---|---|
| **1: Business as usual** | <ul><li>Each player individually chose their actions</li><li>Communication between players was simply related to queries about how to play the game and not related to management or coordination of actions</li><li>Some communication occurred between neighbours when there was a need for labour</li><li>Governmental and environmental officer simply observed for the first round</li><li>The tribal authority did not manage the activities of the rural farmers</li></ul> |
| **2: Single representative body** | <ul><li>Players communicated amongst themselves by sector about their current issues, the drivers of the issues and solutions they would like to propose in the main meeting</li><li>A representative from each sector met as a decision making body</li><li>A long time was spent negotiating and discussing a plan of action – this was cut short by the facilitator</li><li>Players then disseminated the plan to others in their sector but it was evident aspects of the plan were lost in communication and not all the chosen actions were implemented</li><li>Despite having the plan, some players chose to do their own activities anyway, especially rural farmers who were afraid they would not make enough money</li><li>Several rehabilitation mechanisms were implemented</li><li>The governmental and environmental officers were very reluctant to spend their budget which limited the activities planned</li></ul> |
| **3: Joining of existing associations etc.** | <ul><li>The discussions and planning was much quicker in this round as players did not have to move to discuss activities</li><li>The government official and environmental officer tended to assist the rural farmers (with the assistance of the tourism manager) but did not focus on the commercial farmers</li><li>One of the commercial farmers was very proactive and willing to spend his money upstream and therefore approached the roaming integrators (governmental or environmental official for example)</li><li>Many rehabilitation techniques were implemented in this round</li><li>The tourism sector started working with neighbouring rural farmers and encourage tourism activities in areas outside the nature reserve to ensure their protection</li></ul> |
| **4: Localized committees with external integrators** | <ul><li>Players did not want to adopt this implementation mechanism because they were satisfied with the approach of round 3 – however they were encouraged to for testing purposes</li><li>Players felt limited in that they could no longer communicate with players outside their geographic location and indicated that there needed to be more external integrators to make the process work</li><li>The communication between individuals in each sector was evident but players did not spend much time discussing actions because the internal communication was never a limiting factor</li><li>This round had good outcomes although it was indicated that this was the result of the activities and practices implemented in previous rounds and not necessarily an indicator of the processes taken in this round</li></ul> |

Participants were each given a two page questionnaire regarding the session and the *AmanziGame*, however, the majority did not complete the forms and therefore its outcomes are not indicated. The general monitoring indicated above gives one a clear, outline of the activities taken by participants in each round.

### 4.3.5.   Feedback from the Final *AmanziGame Session*

Although a formal feedback session on the *AmanziGame's* accuracy and suitability was not conducted, participants freely recommended elements that may be interesting to include in future game sessions. These recommendations were either verbal (highlighted during the playing of the game or during debriefing and discussions) or were noted on individuals' questionnaire. The following briefly demonstrates ideas that were suggested:

- Greater role, impact and dynamic of towns (as a representation of local municipalities).
    - Highlight issues such as effluent, flooding and demand (market)
    - As a means of indicating that the local municipality (LM) needs to take charge of water purification (for example, waste water treatment).
    - Possibly even have a LM role in the game.
- Variation of wetland functioning– those in the upper catchment tend to be benefited more than those in the mid and lower regions.
- Inclusion of effluent units (pollution) especially as water flows past towns and commercial farms (previously noted that this may be important for whole DM, but was not significant enough for the OLM)
- Incorporation of a fluctuating market which affects farming practices, employment and labour price.

The above recommendations could be taken into account in future game sessions if situation warrants it. For example, if effluent waste and pollution are not considered as major issues in the specific region, their inclusion are not necessary and will only complicate the game. It is important to remember that a RPG is designed to be an abstraction of reality which only includes elements of the real world that are relevant for the particular focus.

### 4.3.6.   Debriefing and Discussions in the Final *AmanziGame Session*

As a means of assessing the applicability and success of each implementation scenario or mechanism, each round was discussed individually before looking at the overall situation and funding elements. The first round, 'Business as usual', demonstrated that besides the benefit of individual freedom, there were prominent challenges and limitations experienced in the region, particularly highlighting the issues of a lack of collaboration, coordination and communication. The second round, 'Single representative body', demonstrated the communication benefits of the scenario which allowed for transparency and shared knowledge of the system. However, it was perceived that this may be an unrealistic due to the large geographic extent of the region, limiting such effective collaboration. Round 3, 'Joining of existing

associations', displayed mostly positive feedback, exhibiting that it promoted communication and elaboration, and reduced conflict.  The main critique of the scenario was in terms of bias of government spending and the dominance of resource rich individuals. Lastly, round four, 'Localised committees with external integrators', displayed an effective communication solution due to the reality of the geographic extent of the region, however players felt limited in that they could not interact with those outside their area. Table 4.7 below provides the positives, negatives and comments provided by participants on each round of the game, followed by an in-depth discussion on the outcomes.

**Table 4.7: Outcomes of debriefing and discussion during the final *AmanziGame* session**

| Round: Scenario | Positives | Negatives | Comments |
|---|---|---|---|
| **1: Business as usual** | • Freedom of speech and decision making (not forced)<br>• Commercial farmers choose to practice conservation farming from beginning (benefited land) | • Government not effective (not spending) – needed to be involved upfront<br>• No collaboration<br>• Negative impacts for rural farmers | • Awareness and communication is unrealistic (commercial farmer and NGO link) |
| **2: Single representative body** | • Gave a good understanding of greater picture – easier to make decisions<br>• Good engagement and willingness to contribute<br>• Communication!! – especially between neighbours (rural and commercial farmers)<br>• Knowledge sharing and assistance (helping out)<br>• Transparency resulting in opportunities for improvement<br>• Sharing or 'pooling' of resources (especially that government does not always have)<br>• Develop body of knowledge (know all issues)<br>• Stacking of benefits (upstream and downstream) | • May be unrealistic as a much larger scale exists in reality (more people to disseminate to)<br>• Time consuming process<br>• Misunderstandings between reps and rest of sectors (before and after meetings) results in confusion, information loss and errors<br>• Needed more time to develop a body of knowledge and understanding of issues<br>• Unrealistic that commercial farmer would be so willing to offer funding | • As round progressed, the body of knowledge would have increased and actions improved as a result |
| **3: Joining of existing associations etc.** | • Useful: collaboration of rural and commercial farmers<br>• Concentrate on farming downstream while | • Actions controlled by resource rich individuals and influences the actions taken<br>• Governmental and | • Need for training element (mismanagement is not intentional)<br>• Rural farmers do not understand their options |

| Round: Scenario | Positives | Negatives | Comments |
|---|---|---|---|
| | upstream converted for tourism<br>• Communication – benefits the management of land tenure dynamics<br>• Reduce conflicts between rural and commercial farmers<br>• Educate rural farmers about alternative options – information!!<br>• Governmental and environmental officers had good communication (pooling of resources and combined planning) | environmental officers focus on rural farmers – little focus is given to commercial farmers (not proactive) | and need external help (have to see actions in practice)<br>• Commercial farmers suggetsed plans to Governmental and environmental officers – not realistic |
| 4: Localized committees with external integrators | • Worked well by encouraging various actors to interact<br>• Upstream rural farmers engaged with tourism sector – change of land use<br>• Commercial farmers teaching rural farmers conservation practices | • Downstream users (commercial farmers) were not aware of what was happening upstream<br>• Need for communication across up, mid and downstream regions (not entire region but at least more than one geographic sector) – cannot be too localized | • Player felt frustrate that they could not interact with those outside their geographic area but acknowledged that it was realistic |

The obvious limitations shown in round 1 (business as usual) replicate the current issues in reality related to a lack of communication and collaboration, demonstrating how this negatively affects the natural environment. In contrast, round 2 (single representative body) showed an improvement in collaboration and created an understanding of the challenges and issues that the region faces. The greatest benefits of a single representative body (round 2) were perceived as being the knowledge sharing and communication between different sectors. However, it was acknowledged that this is a time consuming mechanism and, in reality, may not be easy to disseminate plans effectively. Funding for such a body may be a challenge, which is discussed in the following section. Round 3 (joining of existing bodies) highlights the most positives of all the scenario tests, demonstrating effective communication, information sharing, pooling of resources and conflict resolution. Due to management being both localised and integrated (by external bodies), planning could occur at all levels and allow for sectors to change their actions (for example from upstream rural farming into tourism enterprises) through negotiation and collaboration. This mechanism was perceived as beneficial due to the economic practicality as such management bodies and associations already exist and therefore limited the need for new funding sources. Another positive aspect of this mechanism is the knowledge sharing that occurs when different sectors communicate, for example commercial farming teaching rural farmers conservation farming practices. The occurrence of external bodies (for example, governments and

NGOs) working together as implementers allows for a 'stacking of benefits' and effective management through the joining of resources. However, it was noted that caution needs to be taken with such a management approach as decisions and activities many be controlled by those with more resources. Therefore, an external regulator or manager will need to be present when existing bodies meet. Round 4 (geographic based bodies) demonstrated many of the communication and collaboration benefits of the other mechanisms, however players felt limited by not being able to communicate with those outside their geographic zone. It was acknowledged that this may be the most realistic of the scenarios as geographic location does limit collaboration, however due to the lack of capacity in government sectors (who would act as the external coordinator), effective integration is unlikely to occur.

From Table 4.7 above and the discussion provided, it is evident that each implementation mechanism comes with its own suite of positives and negatives, indicating that no structure is perfect. Each mechanism needs to be approached with caution and an acknowledged understanding of the possible downfalls and limitations, particularly related to time and economic resources.  However, based on the feedback from participants during the testing of implementation mechanisms, it can be concluded that the most appropriate, economically efficient and realistic means would be through the joining of existing associations and bodies (scenario 3). This mechanism would require a strong external integration body that would be responsible for overseeing the plans and activities occurring in each subcommittee.

### 4.2.4.5.     Debriefing the Funding of the Implementation Mechanisms

Realistically, the issue of funding such implementation mechanisms can pose as a limitation and structures will not function successfully without adequate funding. For example, if a single representative body was chosen as the desired implementation mechanism, transport costs of getting representatives together would need to be factored in. This is particularly relevant for rural communities who are unable to fund such costs and often reside in remote areas. Physical presence (as opposed to telephonic communication) has proved to be a more successful communication mechanism and without that physical interaction, such meetings are limited.

There is a high transactional cost associated with any form of collaboration and implementation structure. Such costs need to be accounted for in implementation planning and ideally be split amongst economically resource rich bodies. As a means of mitigating high costs and meetings expenditure would be to have single roaming coordinator (resource broker) that can disseminate information and plans. This role will act as the missing link in collaboration across the large range of stakeholders.

### 4.2.4.6.     Recommendations for Implementing the Afromaison Strategy

This section demonstrates the issues raised by participants which would need to be addressed before any implementation mechanism can be adopted. For example, the political uncertainty (such as the fear of land claims) cause commercial farmers to plan in the short term and does not account for environmental degradation because of land tenure issues. They do not want to make long term

investments into conservation farming practices (large cost) as the farm may be subject to land claims. Therefore there is a need for government stability and security of all sectors so that focus is placed on environmental sustainability rather and economic security.

Another recommendation made by participants is the larger role that local municipalities need to play in the implementation of strategies. Their mandate indicates that they are the link between district level management and on-the-ground local stakeholder. They have a key role to play to ensure that plans are followed through by providing support, assistance, information sharing and monitoring. By increasing their role, localised management will improve and create a greater body of knowledge about the region.

### 4.3.7.    Conclusions of Application Phase (3)

The process of testing implementation mechanisms through the *AmanziGame* RPG simulation model proved to be an extremely effective means of understanding the dynamics, benefits and limitations of each scenario. Not only did the testing create an effective 'picture' during the playing of the game, but it also created an excellent platform for discussion of the various mechanisms. This enabled participants to create a comparison between approaches without having the timely process of implementing them in reality. The discussion sparked other elements of concern that could be integrated into the future of the *AmanziGame* such as issues related to effluents, waste water management and the role of local municipalities. Such elements are not only important for the *AmanziGame* development, but also as issues evident in the region and need to be incorporated into future planning.

It is evident that with each implementation mechanism, there are limitations which can only be addressed through effective management and planning. The discussion on funding was also extremely valuable as it enabled participants to think realistically about implementation as opposed to an ideal reality where resources are not limited. This is particularly important within South Africa as capacity and funding currently limit management and will affect the future implementation of the *Afromaison* strategy.

Throughout the testing, debriefing, discussion and analysis, it was evident that participants perceived the most effective, efficient and successful implementation mechanism as the joining of existing managerial bodies. This is economically efficient as such bodies already exist and their integration will result in management across sectors and geographic locations. It was acknowledged that external moderators (such as government and NGOs) need to coordinate and pool resources to ensure the success of the implementation mechanism. Limitations of this have been highlighted (especially those related to dominance by resource rich individuals or sectors) and need to be considered in the planning, monitoring and coordination of implementation.

## 4.4.    Limitations

The *AmanziGame* encountered several limitations throughout its design, testing and application. These limitations were mainly related to engaging with stakeholders and their participation in game session workshops. These included:

- Stakeholder availability caused difficulties in setting up workshops and attendance of participants at game sessions
- The scale of study meant that some participants had to travel long distances to attend workshops which in some cases was not possible or financially viable
- Due to the high number of workshops in the *Afromaison* project, stakeholder fatigue occurred towards the end of the *AmanziGame* process, resulting in difficulties in setting up and conducting game session workshops

Such limitations were evident as there was an inability to conduct a game session/workshop with all of the desired sectors. For example, the inability to set up a workshop with commercial farmers, who represent a large and important part of the region and whose opinions and insights differ greatly from other stakeholders and sectors. A similar occurrence was experienced with the tourism sector, where representation was limited and did not involve the majority of tourism stakeholders which would have been more satisfactory.

Another indication of such limitations was evident as the final session (testing of institutional mechanisms) was only conducted once - preferably it would have been better to repeat this process with other stakeholders to ensure accuracy and to ensure that a range of participants are involved in the process. Although the workshop consisted of a range of key stakeholders, a variety of stakeholders conducted through several sessions is always preferable, however this was limited by the time remaining on the project.

A final challenge identified when setting up game sessions with stakeholders was the terminology of the tool. The notion of 'gaming' is often considered as an informal, non-scientific mechanism and was therefore not taken seriously by stakeholders. In many cases, the use of the term 'simulation model' was more widely accepted and resulted in stakeholders being more willing to participate as the term makes the tool seem more scientifically based.

## 4.5.    Conclusion of Results

Several *AmanziGame* focus group workshops were conducted in the testing phase (2), producing useful outcomes for the *Afromaison* project. Not only did this process allow a range of stakeholders to be involved in the project, but also enabled them to gain a rapid understanding of their complex region and identify the challenges and issues that their region faces. From this, discussion was generated, proposing solutions to such limitations. In addition, stakeholders could discuss current initiatives taking place in the case study, learning from their success and downfalls. These outcomes were generated through a series

of short (half day) workshops and were fed into the *Afromaison* project to be used in the development of the project's strategy.

The final stage of the *AmanziGame* development and application involved the testing of implementation scenarios proposed in the draft *Afromaison* strategy workshop. Stakeholders identified that the key limitation of the strategy was who and how it would be implemented, resulting in the need to test various mechanisms for doing so. This was included in the game by creating scenarios for different rounds that could be played out by key stakeholders. The final game workshop enabled participants to rapidly understand the likely outcomes of each scenario, generating discussion about the limitations and benefits of each and the critical components such funding.

The application of the tool was perceived as largely beneficial, cost effective and time efficient, not only benefiting stakeholders but also providing useful outcomes for the *Afromaison* project. Due to the large number of workshops hosted by the project, stakeholder fatigue was evident in the final stages of the *AmanziGame* application, resulting in the difficulties in setting up game workshops and including key stakeholders. Despite this limitation, the tool was still perceived as an effective means of engaging with stakeholders, testing unknown components and enriching the project as a whole.

## 5. DISCUSSION

The discussion reveals the main findings of the research, first through an assessment of the effectiveness of the RPG tool (the *AmanziGame* based on the WAG guideline) for INRM and its ability to compliment the objectives of the *Afromaison* projects; and second the applicability and success of the tool as an effective participatory and decision making tool. To access the above, links between the findings of the literature review and the results of the application of the *AmanziGame* are discussed. Furthermore, a critique of the use of the tool, followed by the proposed future application of the tool, is demonstrated.

To ensure the structure of this discussion, specific elements that the *AmanziGame* has achieved have been pinpointed. This is particularly important when challenges associated with the *Afromaison* projects approaches or with the theory of simulation modelling have been identified in the literature, as a means of clearly demonstrating how each component has been addressed (or not) by the tool.

### 5.1.   Effectiveness in Meeting *Afromaison* Project Approach Objectives

The *Afromaison* project aimed to develop an adaptive, integrated toolbox and strategy for NRM as a means of addressing challenges in a holistic manor. The approaches adopted to achieve this include a meso-scale, ecosystems services and adaptive management approach. To assess the applicability of the RPG tool in meeting the projects' objectives, evidence of the tool complimenting INRM are unpacked. Ochola *et al* (2010) indicates the following capabilities of INRM, which are evident in the RPG tool as demonstrated below:

- Integrated various levels of analysis
  - o The simulation spans across vertical and horizontal scales by including a range of stakeholders (local communities to district level actors), sectors and areas. This enabled various levels to be housed under a single management plan to incorporate a range of levels.
- Empower relevant stakeholders
  - o A tool allows all stakeholders to participate in the management of their system, empowering them to be involved and have their opinions and concerns incorporated into the INRM plan. As a tool simplifies complexity, it enables all stakeholders to be involved, cutting across specialist, language and professional boundaries.
- Generated institutional and policy options for stakeholders
  - o The RPG was a key tool in the development and testing of the *Afromaison* strategy, enabling stakeholders to be involved with future management and planning through their inclusion in exploring various policy and institutional options.
- Accommodate complexity by focusing on the key elements
  - o The complexity is reduced as the *AmanziGame* created an abstracted, simulation model of the system, allowing ease of understanding and the ability to zone in on key

issues. Implementation was perceived as the underlying, key challenge, which resulted in a game session focusing on testing and resolving this issue. This final game session enabled various implementation mechanisms to be tested and conclusions to be made that were used in the refinement of the *Afromaison* strategy.

- Conflict resolution among stakeholders
  - The tool abstracts reality to eliminate tensions and conflict evident in the real world which enables a range of stakeholders to discuss, raise issues and collaborate without conflict arising. In addition, the notion of 'role playing' enables participants to see situations from various perspectives, opening the minds of stakeholders to eliminate conflict that inherently exists in reality.
- Merge perspectives stemming from various disciplines
  - The *AmanziGame* effectively enables various stakeholders to participate in a single tool which highlights challenges and promotes discussion, enabling all perspectives and opinions to be voiced and included in the management plan.

The tool provides a relaxed, fun and interactive environment in which all stakeholders can engage and discuss, without conflict and tension, thereby effectively contributing to an integrated plan. This assists in eradicating the challenges that are associated with INRM and the difficulties that the approach typically faces. The key challenge that the tool eliminates is the temporal lag of natural systems. The time delay of INRM results in its outcomes (success) to only show their effects after a prolonged time span. This is likely to makes them susceptible to social and political influences, and possibly result their demise. The RPG tool creates a sped up simulation of the reality to demonstrate the likely outcomes of scenarios as a basis for decision making. In additional, the tool enabled the socio-economic benefits of INRM to be displayed without waiting years to see such benefits in reality. Therefore, the instantaneous experimentation ability of the tool eliminates this temporal lag as well as displaying the benefits for all sectors.

It is evident that the RPG tool is successful in meeting the key objectives and addressing the main challenges of INRM. What follows is an in-depth analysis of the tools' ability to support the *Afromaison* projects' approaches to INRM.

### 5.1.1.  Meso-Scale Approach

A meso-scale approach is considered as the scale at which natural and administrative elements are incorporated to achieve a holistic management plan. The approach attempts to overcome limitations associated with traditional management and administrative systems, which are isolated by scale and span. The meso-scale is large enough to include natural systems, such as catchments, while staying within political boundaries that connect all administrative levels.

The *AmanziGame* supports this approach as the model is based on the political delineation of the Okhahlamba Local Municipality (OLM) while including several smaller catchments which form part of the important uThukela Catchment. However, it important to note that the OLM was selected as a

representative model for the uThukela District Municipality (UDM), enabling the tool to be easily upscaled to a district level that includes a larger portion of the catchment. Therefore, the UDM is considered as the meso-scale used for the *Afromaison* project, with the tool being a representative model that incorporates the key elements, dynamics, challenges, stakeholders, activities and issues associated with the UDM. It was realised in the planning stages of the *AmanziGame* development that designing a RPG for the district municipality would not be feasible as the range of stakeholders, activities, geographic diversity and span would be too large to be adequately captured in the model. Therefore the RPG was designed so that it can be adjusted to suit the conditions of the other local municipalities within the UDM, and thus support the meso-scale approach of the *Afromaison* project.

The meso-scale is conducted to mitigate limitations associated with poor coherency between stakeholders and sectors. The key benefit of adopting a meso-scale approach is the ability to enable horizontal and vertical integration. The *AmanziGame* achieves horizontal integration by involving a range of stakeholders, from commercial and rural farmers, to tourism enterprises, district and local governments, environmental practitioners and researchers, amoung others. On the other hand, vertical integration was promoted through the tool by enabling local (farmers, local municipalities, tourism enterprises), regional and provincial (environmental government organisation, district municipality), and national (government) level stakeholders to interact and engage. The *AmanziGame* brought such stakeholders together in a relaxed, fun and interactive environment, encouraging discussion and overall integration. In addition, the abstraction from reality resulted in the elimination of conflict and tension that are evident in reality.

This integration and cross-sector approach enables planning and management to be localised and specific for the region while still being in line with national guidelines and regulations.  In this way, the district municipality has the ability to adopt policies to their unique conditions. This notion was highlighted in the *AmanziGame* as the national and provincial standards (usually implemented by the role of the government official) were included, while still displaying evidence of the unique characteristics of the region. This enables stakeholders to freely make management decisions while still being governed by legal mandates. In addition, if there are specific legal mandates or conditions that need to be adhered to or addressed, the tool has the ability to easily incorporate them.

The key challenge or issues identified through the various game sessions was that of effective integration of stakeholders to implement the *Afromaison* INRM. As a result, this issue was addressed through the use of the *AmanziGame* (Phase 3). Various implementation mechanisms where tested by creating different conditions and structures for each round of the game. Therefore, the act of integrating stakeholders was used to address that very challenge. It is important to note that during the final *AmanziGame* (Phase 3), stakeholders were requested to address the issue from a local and district scale, reiterating the tools ability to address challenges at the meso-scale.

It is evident that the RPG compliments the meso-scale approach adopted by the *Afromaison* project; however the key value in the tool is its ability to address the challenges and limitations usually associated with the approach. The key challenge identified with the integration of stakeholders is finding a point of departure where a compromise can be made. The *AmanziGame* enabled stakeholders to see

and recognise all opinions and perceptions to unify their understanding, and thus produced a benchmark for integration. The abstraction from reality and enhancement of communication and collaboration contributed to overcoming this challenge.

The following challenges and limitations were identified in the literature review (Ballamy, 2005) and are overcome through the adoption of a RPG through the following means:

- Balancing triple bottom line focuses (business and industrial development with environmental and social constraints)
  o The *AmanziGame* includes environment (catchment, resources), economic (monetary value and profits, assets, expenditure) and social (human requirements, interactions) elements into a single tool where their dynamics and relationships are understood. The first and second phase of the game development was particularly vital in generating this understanding and accurately simulating these dynamics so that an effective balance could be found for management and planning. This was evident in the game as the destruction of the natural environment resulted in economic loss as well as social conflict and tension, indicating the complex relationship of the three sectors.
- Dealing with the interconnected and complex dynamics of NRM at a regional scale (large variations)
  o The *AmanziGame* created a simple, abstracted version as a means of 'spelling out' the complex reality, enabling all stakeholders to understand the integrated system. Participants were also able to play out this complexity to increase their understanding, thereby easing their ability to manage the complex system.
- Complex transboundary problems (possibly working across political boundaries)
  o Although this challenge was not directly relevant in the case study as the region fell within political boundaries, it is evident that the tool has the ability to address similar challenges. For example, the game addressed the lack of coordination and collaboration between the district and local levels, thus bridging localised political delineations.
- Bridging previously divided sectors and spheres
  o This challenge was clearly addressed, as evident in the discussion above. The *AmanziGame* enabled effective stakeholder interactions across a range of sectors, levels and spatial areas.
- Managing contrasting perspectives, ideas and visions of sectors involved in the process
  o This was solved by placing participants in a relaxed, fun and interactive environment where abstraction from reality is conducted to mitigate conflicts and tension. It is evident that the tool enabled all stakeholders to partake in the same process as the RPG provides a 'language' that everyone can understand and relate to.
- Includes a range of focuses, from local stakeholders to national and even international sectors (focused approach but still inclusive of the broader picture)
  o Demonstrated in the tools ability to be developed and applied at the meso-scale, and enhanced by its effectiveness in bridging previously divided sectors and spheres.
- Designing specific NRM plans while still fulfilling national mandates

- o Reiterates the ability of the *AmanziGame* to achieve the triple bottom line and meso-scale approach. The triple bottom line considers the natural environment as well as the socio-economic requirements, while the meso-scale ensures that localised planning is in line with national mandates.

- Environmental protection without demeaning economic and development growth
  - o Following on from the point above, the game effectively considers the environment with socio-economic requirements to achieve effective INRM. Due to the projects focus on NRM, the natural environment and its protection is key, however the social, economic and development needs for the case study were not disregarded but rather perceived as an integral part of the protection and management of resources.

- Integration of varying knowledge systems (traditional and indigenous knowledge combined with holistic and scientific approaches)
  - o Traditional and indigenous knowledge systems (particularly rural subsistence farming and management techniques) were captured through the actions and practices in the game, as investigated during the research phase (1) of the *AmanziGame* development. Such actions were combined with scientific approaches, particularly in commercial farming areas where conservation farming practices are evident. This enabled various types of knowledge systems to be housed in a single tool, which allowed for the benefits of both types to be demonstrated.

- Resource constraints (ownership of resources, external uses, regulator powers, etc.)
  - o Such conditions were demonstrated in the *AmanziGame*, for example the limitations associated with communal ownership of land in rural areas, water regulations imposed on commercial farmers by government and external markets regulating sectors. There constraints were incorporated into the model so that they could form part of the greater management plan for the area.

The *AmanziGame* not only follows the meso-scale approach in terms of stakeholder interaction, bridging formally divided sectors and achieving cross level collaboration, but is effective in mitigating the challenges and limitations that are commonly experienced with the approach. The literature demonstrated that the challenges associated with a meso-scale approach can be overcome through effective and regular communication, which is a key objective of a RPG. It is evident from phase 3 of the game development that not only is the tool an effective means in encouraging stakeholder integration, but can be used to plan and experiment with various mechanisms of achieving collaboration. Therefore the tool has a two-fold means of addressing the overarching challenges of a meso-scale approach.

### 5.1.2. Ecosystem Services Approach

The *Afromaison* project adopted an ecosystem services approach as a means of prioritising resources to focus and direct management. The key element of the approach is to understand the relationship between natural resources and the role they play in supporting human wellbeing and economic prosperity. The *AmanziGame* unpacks and simulates this relationship to enable an understanding of this dynamic, and demonstrates this understanding to stakeholders and actors in the region. The

participants of the game act as the human component of the dynamic, while the game board and elements, such as water, soil and land, are the natural resources. The economic element of the game is generated through the interaction between the players and the natural resources, thereby simulating the reality. For example, where players did not use the natural resources sustainably, they were unable to meet their needs to survive or generate an income from their action. Therefore, the *AmanziGame* was able to explain and demonstrate the dependence that humans have on their natural environment, thus supporting the notion of the approach, demonstrating that ecosystem services are the driving force behind economic stability (Cork *et al*, 2007). It is evident that the RPG intends to 'show' stakeholders how this complex relationship works by 'paying out' reality to achieve effective INRM.

There is much evidence to indicate that the RPG supports the notion of an ecosystem services approach, aiming to achieve the integration of ecological, social and economic dimensions. The *AmanziGame* was able to identify and classify the benefits that humans gain from ecosystems as players use natural resources to maintain their livelihoods, replicating the complex reality. Another aim of the approach is to describe and communicate these benefits in a language that can be broadly understood. It is evident that modelling is a language that all stakeholders can understand, breaking down complex processes, dynamics and systems, and replicating the outcomes into reality. The tool enabled participants to gain an understanding of the dynamics of ecosystems as the *AmanziGame* 'plays out' reality in a simplified, abstract manner to enable and understanding of these dynamics.

In addition to the above, the *AmanziGame* was successful in addressing the common challenges associated with an ecosystem services approach to INRM. Cork *et al* (2007) highlights the following challenges, which were addressed through the use of the RPG tool:

- Consideration of a full, holistic range of services rather than focusing on a few specialised ones
    - o The game has the ability to look at the system as a whole, encapsulating its dynamics and complexity. However, the model enables participants to pinpoint the key services that need to be prioritised.
- Adequately assessing the state of the ecosystem services
    - o Throughout the *Afromaison* project and in the development phase (1) of the *AmanziGame*, extensive research as well as several interviews and workshops were conducted to understand the current state of the ecosystem. This understanding was captured in the game, enabling stakeholders to play a simulation model that adequately represents their system. In addition, a greater understanding was developed during the second, testing phase (2) where stakeholders were provided the opportunity to alter the model based on their own understanding and perceptions of the case study. Despite the above, it is important to note that addressing this challenge was not a primary objective of the tool and thus this element was not fully pursued. The tool intends to create an abstraction of the reality and therefore aims to understand the dynamics and elements of the system rather than assessing its current state.

It is evident from the literature review that the key intention of an ecosystem services approach is to highlight human dependence on natural resources, which is adequately captured through the

*AmanziGame*. The tool enables players to play out this dynamic to both understand the system as well as unveil mechanisms for prioritising elements of the ecosystem as a means of achieving INRM.

### 5.1.3.  Adaptive Management Approach

The *Afromaison* project is based on the notion that it is impossible to acquire all the information ideally needed to develop a holistic management plan, thus adopting a 'willingness to learn' approach (Johnson, 1999). An adaptive management approach enables the plan to be altered as information is uncovered and it is evident that the RPG tool is in line with this thinking.

The 3 phases (design, testing and application) of the games' development demonstrate this approach being applied. The *AmanziGame* was updated and altered throughout its development, as new information was unveiled. For example, at the end of the testing phase (2), where the tool was run with various groups of focus group stakeholders, the outcomes of the phase were used to update the existing findings of the *Afromaison* project and feed into the strategy development.  In addition, these findings were used to update the *AmanziGame*, for its use in the 3$^{rd}$ phase (application), whose outcomes, in turn, fed into the *Afromaison* project. Thus, not only did the game development follow an adaptive management approach, but also the outcomes of the *AmanziGame* were used to add to the project as a whole.

Key evidence that the RPG supports this approach is its ability to mitigate the challenges typically experienced with an adaptive management approach, as identified in the literature review. Challenges associated with the approach include:

- Costly and time consuming
    - The RPG mitigates such costs as the tool uses simplistic materials such as paper, tokens and stones, which are easily available. Although the game development can be a time consuming exercise, once it has been developed, its implementation and updates are time efficient. As is evident from the *AmanziGame*, half day workshops were sufficient for implementation, reiterating its time efficiency.
- Experimentation challenges
    - In line with the point above, finding an effective means of experimentation can be a limitation of an adaptive management approach. The RPG simulated reality, creating a sped up version of reality where experimentation can take place, which is time and cost effective. In addition, information that is uncovered through experimentation can be obtained without the risk associated with experimenting (trial and error) in reality.
- Limited to the assessment phase
    - In many cases, an adaptive management plan is not taken beyond the assessment phase due to the lack of commitment by stakeholders to participate in a constantly changing and reworked plan. There is evidence of stakeholder fatigue, reiterating the need for a tool that is time effective to mitigate this problem which, as demonstrated above, is a challenge that the *AmanziGame* eliminated. In addition, the RPG can be easily updated

and implemented as new information is uncovered, enabling it to be used beyond the assessment phase of an adaptive management plan. For example, the *AmanziGame* was used throughout the development of the *Afromaison* strategy, even enabling implementation challenges to be addressed through the games' application.

Johnson (1999) demonstrated that many of the challenges associated with an adaptive management approach stem from the lack of commitment by stakeholders to participate in a constantly changing plan. The *AmanziGame* actively involves stakeholders in a relaxed, fun and interactive manner to eliminate the effort associated with updating an adaptive management plan. This encourages stakeholders to participate, involving them in the process and ensuring they 'buy-in' to the management plan. This involvement is likely to ensure the success of adaptive management, indicating how the RPG is a useful tool to compliment this approach.

## 5.2.   Success as a Participatory Modelling Tool

Daniell (2008) defines participatory modelling as a process that enables various perceptions to be captured and assessed by stakeholders through a set of 'semi-structured decision cycles'. It is evident that the *AmanziGame* achieved this by creating an environment in which stakeholders were able to freely voice their opinions and create an open platform for discussion and decision making.

The *AmanziGame* fulfils the key elements of a successful participatory model (Daniell, 2008), as demonstrated below:
- Gain a range of perspectives
  - The results provided in various summary tables in Section 4 (Results) demonstrate the perceptions of a range of stakeholders from various sectors were adequately captured during the *AmanziGame* workshops. By playing the game, stakeholders' were able to identify their own concerns, perceptions and opinions, as well as those of the other players. The discussion session after the game created a semi-structured process in which each participant was provided the opportunity to voice their perspectives, which were captured and feed into the *Afromaison* strategy development.
- Openly represent those perspectives
  - As evident in the point above, stakeholders identified their perspectives through the *AmanziGame*, which creates a free and open environment, void of the conflict and tension associated with the reality. In addition, each participant was individually asked to give their perspective, ensuring that dominant stakeholders did not overshadow others.
- Collectively reflect on perspective with a group of stakeholders
  - Collective reflection was conducted during the *AmanziGame* workshops, not only during the play of the game, but also during the discussion and debriefing sessions conducted afterwards. This enabled stakeholders to hear the perspectives of others and freely discuss them as a group.
- Conduct a series of semi-structured decision cycles

o   Each game session (or workshop) acted as a semi-structure decision cycle, as stakeholders were able to reflect and make decisions, such as recommending means of addressing the identified key challenges through proposed solutions for the region. In addition, the key stakeholders that partook in the final *AmanziGame* workshop (Phase 3: Application), were able to play the game under a different scenario, adding another layer to the process.

Not only was the *AmanziGame* successful as a participatory modelling tool, but it was able to meet the key elements of the definition, reiterating is success as an effective stakeholder engagement tool.

## 5.3.   Overall Success of *AmanziGame*

The success of the *AmanziGame* as simulation model can be assessed against the key objectives of RPGs and the challenges typically experienced with the tool against the purpose of the tool for the *Afromaison* project. De Fooij (2011) demonstrates that the RPGs intend to aid stakeholder participation and to gain an understanding of a complex, dynamic system, while the project adopted the tool to aid stakeholder involvement and integration of the projects' findings.  There are four main types of RPGs as defined by Ferrand *et al* (2008), of which the *AmanziGame* fulfils three, namely:

- Common Pool Resources Management Game:
   o   Enabled on-the-ground stakeholders to acknowledge and understand the role they play in managing resources, promoting discussion and negotiation for decision making and management purposes.
- Experimental Game
   o   Created a specialised, controlled model to enable stakeholders to analyse and understand the consequences of their collective and individual actions. The *AmanziGame* enabled experimenting with various scenarios, as was conducted in the application phase (3) where implementation mechanisms were tested.
- Policy Simulation Game
   o   Used various scenarios to unpack a means of managing a system, particularly addressing problems that stakeholders are faced with.

It is therefore evident that the *AmanziGame* fulfilled the objectives of three main types of RPGs, further enhancing its success as it cuts across more than a single objective and addresses a suite of challenges. It is evident from the case studies explored in the literature review that RPGs that extend across various types tend to cover a greater foundation and enhance their usefulness, supporting the notion of the *AmanziGame's* success.

The motivation for adopting a RPG determines the success of the tool, particularly its intended purpose for the project. The tool was adopted for the *Afromaison* project to achieve integration and stakeholder involvement as a means of enhancing the strategy development. The *AmanziGame* fulfilled the following motivations for adopting a RPG, as defined by Barreteau *et al* (2001):

- Research
    - Particularly in the design and testing phases (1 and 2), the *AmanziGame* was used to unpack the complexity, dynamics, actions and relationships evident in the case study. In addition, the experimentation conducted in the testing and application phases' (2 and 3) game sessions added to the growing body of research and complimented the findings of the *Afromaison* project. Therefore, the game is able to rapidly demonstrate complexity and results of experimentation to enhance the research component of the project.
- Decision Support
    - The *AmanziGame* encouraged stakeholders to be involved in discussions which supported decisions regarding INRM. It is evident that decisions are no longer based on a single individual or perception, but rather an integration of a range of these, making the tool particularly useful for this purpose.

Barreteau *et al* (2001) highlights *training* as a key motivation for adopting a RPG and, although it was not the intention within the *Afromaison* project, it is possible for the *AmanziGame* to be used for this purpose. Such an extension of the tool will be discussed in the 'going forward' section (5.5) to follow.

Last, the success of the *AmanziGame* stems from its ability to address the challenges that are typically experienced when adopting a RPG. Barreteau *et al* (2001) and Rydannykh (2011) indicate the following challenges, which are addressed through the tool as follows:

- Difficulty in reproducing results, particularly when wanting to make systematic comparisons as there are too many uncontrolled elements
    - The outcomes of the *AmanziGame* fed into the strategy of the *Afromaison* project to ensure that its outcomes were incorporated into the INRM plan, thus bridging this commonly experience limitation. The key challenges and their drivers supplemented the exiting knowledge base of the project, while the proposed solutions were used in the development of the *Afromaison* strategy for the case study.
- Limited in its ability to be replicable as those who have played the game more than once will have learnt aspects from previous sessions that cannot be forgotten, altering the context of the session
    - No stakeholders played the same version game more than once, as the game conditions (scenarios) were altered for various purposes, thus eliminating this challenge. Therefore, stakeholders were unable to 'learn' the game as each session posed a new set of scenarios that resulted in different process and approaches.
- The model (game) is never really complete, perfect or ideal as each session is, in itself a test, and alterations can constantly be made to improve its accuracy and applicability.
    - This was evident in the *AmanziGame*, as even in the final game session workshop, stakeholders still proposed alterations to the game. However, participants were urged to focus on addressing the challenges in reality (by an appropriate strategy implementation mechanism) and not the accuracy of the game, which enabled

discussion that complemented the project rather than being caught up in the development of the game.

- The perceptions of the players will affect the design of the tool which can be laborious when dealing with a range of stakeholders.
  - o To mitigate this challenge, the development of the *AmanziGame* involved focus groups workshops where different stakeholders were able to voice their opinions without being outweighed by other sectors.  In addition, this limitation was avoided by giving participants the opportunity to voice their opinions about the design of the tool, after which they were urged to move away from this component and focus on addressing the NRM challenges raised during the game session.
- In some cases, the outcomes of the model will demonstrate a specific set of circumstances which makes it difficult for the outcomes to be replicated back into reality.
  - o As previously indicated, the outcomes of the *AmanziGame* were fed directly into the strategy developed by the *Afromaison* project, enabling them to gain traction in reality. This meant that the findings which stemmed from the game sessions were not lost, but rather used to complement the existing body of knowledge and contribute to a NRM strategy for the case study.
- A lack of robust scientific assessment methodology which could be used to evaluate the impacts of RPGs process
  - o As is conducted through this research, an evaluation of the impacts of the *AmanziGame* was conducted by assessing the tools' ability to compliment the approach of the project and thus understand the impacts that the process had.

The ability of the *AmanziGame* to meet the objectives of RPGs and address the challenges commonly experienced with the tool demonstrates its success as a participatory simulation tool. The successes of the A*manziGame*, combined with its ability to mitigate challenges commonly experienced with participatory modelling, NRM and stakeholder engagement, demonstrate its ability to contribute to the relevant literature. Therefore, by using the findings of the literature review in the development and application of the tool, many of the challenges experience could be addressed and mitigated.

## 5.4.  Critique

The *AmanziGame* could be criticised as being a time consuming process, particularly during the development phases. Several testing games were conducted with university students before the game could be run and tested with stakeholders, which not only took a significant time to run, but the alterations to the tool were also time consuming.

Lastly, towards the end of *AmanziGame* application, stakeholder fatigue became evident. However, this may not have only been due to the game session workshops, as there were several other workshops being conducted with stakeholders as part of the *Afromaison* project. Therefore, the issue of stakeholder fatigue may not have primarily been as a result of the game application.

## 5.5.    Going Forward

As was evident in the application phase, where the scenarios of the *AmanziGame* were altered based on testing requirements highlighted from the draft strategy, the tool can be easily adapted for specific requirements. Therefore, the game can be used in the future to test a range of management actions and scenarios, speeding up the experimentation process and engagement with stakeholders.

In addition, the *AmanziGame* could be developed to fulfil more of the needs that RPGs can achieve. Barreteau *et al* (2001) demonstrates several motivations for adopting a RPGs and, as previously indicated, the *AmanziGame* already achieves most of these. However, going forward, the *AmanziGame* has the ability to be used for training purposes. Therefore, the model can be used for training and education purposes to enable stakeholders to gain a greater understanding of, and improve their knowledge of, INRM.

In conclusion, it is evident that the *AmanziGame* was not only successful in involving a range of stakeholders from various sectors, but was also able to address the challenges commonly experienced with public participation, RPGs and INRM, with particular focus on the approaches adopted by the *Afromaison* project. Therefore, the tool was able to meet its primary objective of effectively involving stakeholders, while also complementing the *Afromaison* projects approach to INRM. *AmanziGame* provided a mechanism for achieving stakeholder involvement that avoided tension and conflict typically experienced. This enabled the key concerns, perceptions and ideals of those on the ground. Without this engagement, several outcomes may not have been dealt with, thus limiting the project's ability to effectively create a holistic INRM strategy for the local case study. Finally, the *AmanziGame* provides an inexpensive, time efficient and simplistic tool that can be used in future planning and management.

## 6.  CONCLUSION

Stakeholder engagement is not only legally required within the field of integrated environmental management (IEM) (NEMA, 1998), but it is a critical component of achieving a holistic management plan. For the *Afromaison* project, a Role Playing Game (RPG) was developed as a tool to effectively achieve stakeholder involvement in INRM for a local case study.  The success of the tool was assessed, not only in its ability to involve a range of stakeholders, enabling them to gain an integrated understating and be part of the management of their system, but also in the tools ability to compliment the approaches taken by the project. The means adopted by the *Afromaison* project to achieve INRM were a meso scale, adaptive management and ecosystem services approach. The overall effectiveness of the tool was assessed in terms of its ability to address the challenges commonly experienced within the field of INRM and within the approaches adopted. Finally, the success of the RPG was evaluated in terms of its ability to mitigate the challenges typically experienced with stakeholder engagement, and more particularly those experienced with RPGs.

The INRM *Afromaison* project aimed to provide local decision makers with a tool box and strategy for future planning. Within South Africa, a meso-scale is considered to be at district municipality level at which national and provincial mandates are disseminated while still being localised enough to address on-the-ground activities. The uThukela District Municipality was selected as the case study for the project due its importance in terms of being home to the source of the uThukela River, which is a vital water source at a regional, provincial and national level. A component of a project was the development of a RPG as a stakeholder engagement tool as well as a means of integrating the various elements of the project. The RPG was designed for the Okhahlamba Local Municipality, which acted as a representative portion of the case study.

The *AmanziGame* RPG was developed as a participatory integration tool for the South African case study of the *Afromaison* project, based on the Wat-A-Game (WAG) guideline. Its development was based on the existing knowledge of the case study and continued to be altered and adapted as new information and knowledge was developed. The process was not a static, systematic one but rather a circular, dynamic progression that allowed for continuous updating. This enabled the model to change with the project and the processes occurring in reality. The RPG demonstrates a simplified, abstract version of the reality by capturing the challenges and issues currently facing the area. Realistic relationships, limitations and dynamics are used as a means of testing various scenarios put forward through the *Afromaison* project to highlight the probable outcomes of management activities.

The development of the RPG, *AmanziGame,* occurred in three main phases: Design, Testing and Application.

### 6.1.   Development of the RPG Tool - *AmanziGame*

***Design Phase (1)***

The design phase was conducted through a series of workshops and game testing while being based on data as well as the perceptions of stakeholders. The Self-WAG guideline was used to systematically

breakdown the complex processes of reality through the development of relationship and usage models. Calibration of elements represented in the game were conducted to ensure that the model was as realistic as possible while still being an abstract representation. The RPG was tested with groups of university students to ensure its flow and playability as well as groups of key stakeholders to ensure its accuracy and suitability. Once the RPG for the South African case study was refined, a final *AmanziGame* was developed that was used in the following testing phase.

### Testing Phase (2)

The testing phase is where the majority of stakeholder participation and involvement was conducted through the application of the *AmanziGame*. During this phase, several game sessions were conducted with focus groups of stakeholders from a range of sectors. Each game session consisted of only one sector to ensure that the perceptions, opinions and concerns of each sector were accurately captured without being overpowered by other sectors. The workshops conducted during this phase ranged from government departments and NGOs to local communities, enabling the perceptions of a range of stakeholders to be captured. During this phase, participants were provided the opportunity to comment on the accuracy and applicability of the RPG, after which the *AmanziGame* was refined based on this feedback. This again indicated the *AmanziGame* is dynamic enough to be altered according to the opinions and perceptions of stakeholders. The main value of these sessions was the debriefing and discussion conducted after playing the RPG, which demonstrated key issues (and their drivers), possible solutions, stakeholder involvement and lessons learnt from other interventions. These outcomes were analysed and fed into the rest of the *Afromaison* project and finally the drafting of the strategy for the district.

### Application Phase (3)

The final stage of the RPG development was the main purpose of its development and aimed to test challenging elements of the *Afromaison* projects; strategy for the case study. During the workshop in which the strategy was populated, the issue of mechanisms of implementation was discussed in detail with various options being proposed. However, no final conclusion about an ideal implementation mechanism was indicated which resulted in the *AmanziGame* being the ideal tool for testing the various proposed approaches. The refined RPG from the testing phase was used as the basis for the final workshop in which the various scenarios based on the implementation discussion were used to guide management and planning. Three various mechanisms were tested namely (1) a single representative body (2) the joining of existing management bodies and (3) localized committees with external integrators. The outcomes of the final workshop demonstrated that each mechanism has its own sets of positives and negatives which created much discussion between the participants (key stakeholders). In addition, considerations about resource limitations and realistic conditions were acknowledged during the discussion. It was concluded that the joining of existing management bodies (scenario 2) would be the most effective, realistic and efficient means of implementing the *Afromaison* strategy. This was based on the notion that management bodies already exist and that their union would be economically efficient while still enabling actors in various sectors to interact and collaborate. External integrators such as NGOs and government officials would be the key drivers of the process, not only as the

communication link between different management bodies but also to ensure that dominance by sectors would not occur.

The *AmanziGame* initially acted as an ideal tool for the integration of existing data and information and continued to add to this body of knowledge through stakeholder participation. As it developed, the *AmanziGame* integrated all the elements of the *Afromaison* project and fed directly into the development of the strategy for the case study. Finally, it acted as the ideal tool to test the challenging aspects related to institutional mechanisms for implementation and provides, not only a probably solution, but also a set of conditions that need to be accounted for when the process is initiated. One of the greatest benefits of this process is the large success the tool has had in capturing, unpacking and analysing a range of stakeholders' perceptions, concerns, opinions, ideas and visions. It is vital that the strategy and its implementation plan is one that stakeholders have a sense of ownership over. Without this personalisation, those on the ground are not likely to implement the strategy effectively, if at all. Therefore, the development of the RPG for the South Africa case study acted as an ideal tool to involve stakeholders and capture their ideas into *Afromaison* project strategy.

## 6.2.    Effectiveness in Meeting the *Afromaison* Projects' Objectives

To assess the effectiveness of the *AmanziGame* tool, an assessment of its ability to compliment the INRM approaches adopted by the *Afromaison* project was conducted. In this way, its applicability for INRM was evaluated, followed by its ability to be applied at the meso-scale for an ecosystem-services and adaptive management approach.

### Integrated Natural Resource Management

INRM is defined as a scientific and technical principle which forms the foundation of sustainable management and governance of natural resources. The *Afromaison* project aimed to address current environmental challenges in a holistic manner though the concept of INRM. The approach is receiving growing acceptance internationally although its implementation lacks traction due to its incoherent integration vertically and horizontally.

The *AmanziGame* promotes stakeholder engagement in a non-formal manner and in a 'language' that stakeholders can understand. By doing so, stakeholders are given the opportunity to voice their opinions, concerns and ideas and thus effectively contribute to an integrated plan. This also assists in eradicating the challenges that are associated with INRM and the difficulties that the approach typically faces. The key challenge that the tool eliminates is the temporal lag of natural systems. The time delay of INRM actions results in the success and outcomes to only be evident after a long time span, often making them susceptible to social and political influences, and likely result in its demise. The *AmanziGame* creates a sped up simulation of the reality to demonstrate the likely outcomes of plans as a basis for decision making. In addition, the tool enables the socio-economic benefits of INRM to be displayed without having to wait years to see such benefits in reality. Therefore displaying the instantaneous experimentation ability of the tool eliminates this temporal lag as well as displays the benefits for all sectors.

### Meso-Scale Approach

A meso-scale approach is considered as the scale at which natural and administrative elements are incorporated to achieve a holistic management plan. This approach attempts to overcome limitations associated with traditional management and administrative systems, which are isolated by scale and span. The meso-scale is large enough to include natural systems, such as catchments, while staying within the political boundaries that connect all administrative levels. The *AmanziGame* supports this approach as the model is based on the political delineation of the Okhahlamba Local Municipality (OLM) while including several smaller catchments which form part of the important uThukela Catchment.

The *AmanziGame* not only followed the meso-scale approach in terms of stakeholder interaction, bridging formally divided sectors and achieving cross level collaboration, but was also effective in mitigating the challenges and limitations that are commonly experienced with the approach. The literature demonstrated that the challenges associated with a meso-scale approach can be overcome through effective and regular communication, which is a key objective of a RPG. It is evident from phase 3 of the game development that not only is the tool an effective means in encouraging stakeholder integration, but it can also be used to plan and experiment with various means of achieving collaboration. Therefore the tool has a two-fold means of addressing the overarching challenges of a meso-scale approach.

### Ecosystem-Services Approach

The *Afromaison* project adopted an ecosystem services approach as a means of prioritising resources to focus and direct management. The key element of the approach is to understand the relationship between natural resources and the role they play in supporting human wellbeing and economic prosperity. The *AmanziGame* unpacks and simulates this relationship to enable an understanding of this dynamic, and demonstrates this understanding to stakeholders and actors in the region.

The key intention of an ecosystem services approach is to highlight human dependence on natural resources, which is adequately captured through the *AmanziGame*. The tool enables players to play out this dynamic to both understand the system as well as unveil means of prioritising elements of the ecosystem to achieve INRM.

### Adaptive Management Approach

The *Afromaison* project is based on the notion that it is impossible to acquire all the information ideally required to develop a holistic management plan, thus adopting a 'willingness to learn' approach. The adaptive management approach enables the plan to be altered as information is uncovered. It is evident that the *AmanziGame* is in line with this approach as the tool was updated and altered throughout its development, as new information was unveiled. Therefore, the three phases (design, testing and application) of the game development demonstrate this approach being applied.

Many of the challenges associated with an adaptive management approach stem from the lack of commitment by stakeholders to participate in a constantly changing plan. The *AmanziGame* mitigates this by actively involving stakeholders in a relaxed, fun and interactive manner to eliminate the effort associated with updating an adaptive management plan. This encourages stakeholders to participate,

involving them in the process and ensuring they 'buy-in' to the management plan. This involvement is likely to ensure the success of adaptive management, indicating how the *AmanziGame* complimented this approach. Therefore, the *AmanziGame* was not only successfully in meeting the objectives of the project but also in assisting to mitigate the challenges commonly associated with the approaches adopted for INRM.

## 6.3.    Applicability of the RPG Tool - *AmanziGame*

The final component of this research was to evaluate the overall applicability of the *AmanziGame* as a participatory modelling tool as well as its ability to address challenges commonly experienced with stakeholder engagement, and more specifically RPGs. Participatory modelling is a process that enables various perceptions to be captured and assessed by stakeholders through a set of "semi-structured decision cycles". It is evident that the *AmanziGame* achieved this by creating an environment in which stakeholders were able to freely voice their opinions and create an open platform for discussion and decision making.

The success of the game as a simulation model was assessed against the key objectives and challenges of RPGs as well as the purpose of the tool in the *Afromaison* project. RPGs are intended to aid stakeholder participation and gain an understanding of complex, dynamic systems. The project adopted the tool for this purpose, as well as integrating the various components of the project. It is evident that the *AmanziGame* is able to meet the objectives of RPGs and address the challenges commonly experienced demonstrating its success as a participatory simulation tool. In addition, the tool enabled effective stakeholder engagement while integrating and complimenting that various components of the *Afromaison* project.

Despite the benefits of the tool, the *AmanziGame* was criticised as being a time consuming process, particularly in the development of the tool when testing and alterations to the game were being conducted. Although this is a vital component of developing a RPG, it can be perceived as a negative component which is likely to be prominent in a country such as South Africa where diversity is predominant, resulting in many contrasting views and perceptions that prolong this development. Stakeholder fatigue was noted as a limitation of the games' application, however this may not have only stemmed from the game session workshops but also chiefly as a cumulative consequence of the engagement conducted by other components of the *Afromaison* project.

The key value of the *AmanziGame* is its ability to be used for future application as a planning and stakeholder engagement tool for INRM. It is also evident that the model can be easily altered for application areas with similar conditions, demonstrating its dynamism. Not only was the tool effective in engaging with stakeholders, but also in meeting the objects of the *Afromaison* project and mitigating many of the challenges commonly experienced with the approaches adopted, stakeholder engagement and RPGs in general. For the South African context, the tool created an ideal vehicle for stakeholder engagement that was inexpensive, time efficient, fun, interactive and void of the conflicts and tension evident in reality.

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## APPENDIX 1

The appendix demonstrates the *AmanziGame* elements and components of its development.

### 1. Game Board

The following demonstrates the process taken to develop the *AmanziGame* game board.

- Drawing a simplified map of the case study using a topographical map
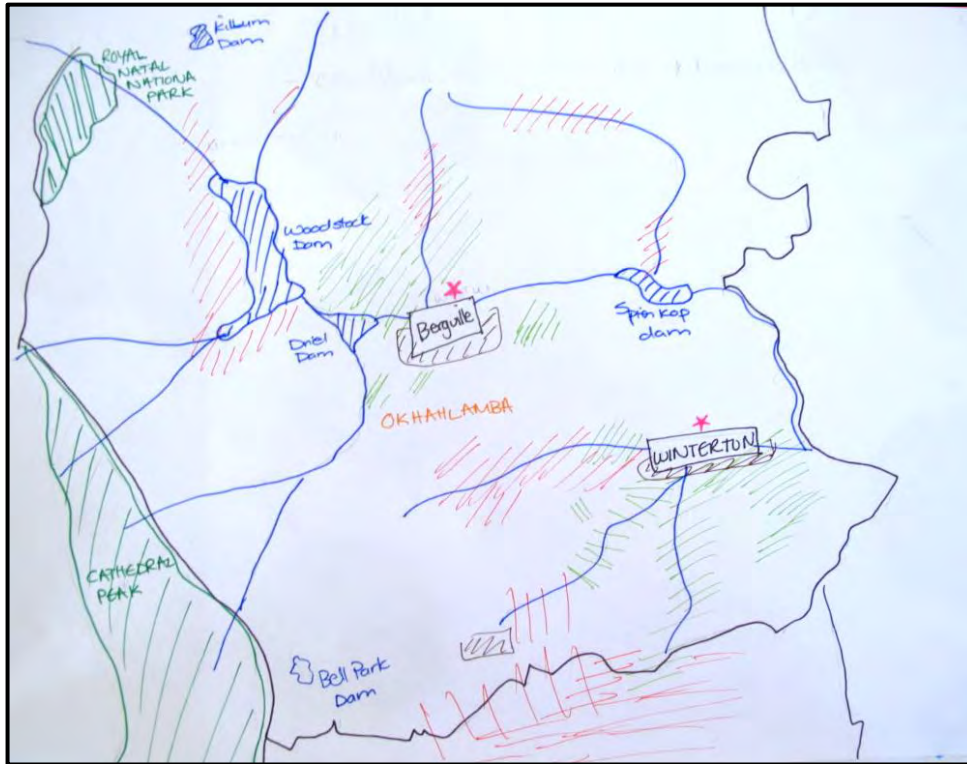


- Establishing erosion potential bands using topography (contour) categories
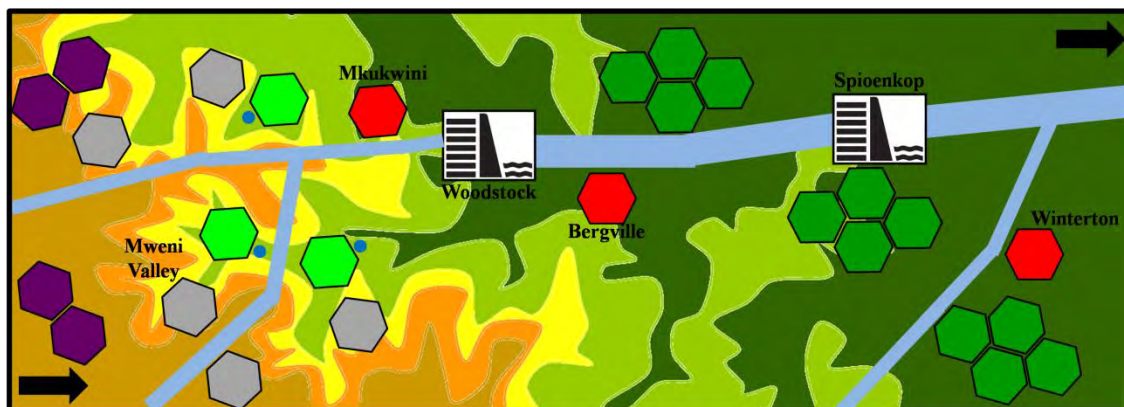


| ■ >2000m (1) | ■ 2000-1750m (2) | □ 1750-1500m (3) | ■ 1500-1250m (4) | ■ 1250-1000m (5) |
|---|---|---|---|---|
| ● Rural Settlement | ● Town | ● Grazing Land | ● Commercial Farm | ● Nature Reserve |
| ● Rural Cropping Land | ● Borehole | ✤ Money Unit | ✤ Clean Water Unit | ✤ Silted Water Unit |
| ○ Labour Unit | ● Green Credit Unit | | | |

## 2. Role Playing Cards

| | **COMMERCIAL FARMER** |
|---|---|
| **Description** | You are representing a group of commercial farmers. Your aim is to gain a high profit margin while ensuring the functionality of your farm. Your activities will affect the soil condition of the land plots as well as the quantity and quality of the water system. |
| **Objectives** | • Gain profit in the form of money units<br>• Pay tax to government official – 10% of profits/round (minimum of 1Money Unit/round) |
| **Assets** | • Determine the number of cattle and labour you wish to start with<br>• Ownership of the commercial agriculture land within your farm boundary |
| **Access Rights** | • Water Units: from river or dam<br>• Access of 10 water units (WU) per round |
| **Manage** | • Choose type of agriculture you wish to do: Dairy, beef, soya beans, winter wheat, maize or a combination of activities.<br>• Choose to conventional or conservation agriculture practices<br>• Develop your farm as you desire<br>• Purchase irrigation systems from the facilitator |
| **Specific Rules** | • Labour that you do not use can be hired out to other players (negotiate a price). If they remain unemployed, you will pay 2 Money Units to support them in that round<br>• The government official may dispute any labour dismissal<br>• Temporarily employ (for one round) more labour from the facilitator at a cost of 2 money unit/1 labour, or from another player at a negotiated price<br>• Buy cattle from the facilitator or from other players if desired, at a negotiated price<br>• If cattle are not sold or used in a round, they will die<br>• Convert your wetland into agricultural land at any stage at an initial cost of 2Money Units (labour and draining equipment cost)<br>• Build a new dam if desired, legally by gaining permission from the Environmental Officer, or illegally from the facilitator at a negotiated price<br>• Keep track of your actions with your monitoring sheet |

| | **ENVIRONMENTAL OFFICIAL** |
|---|---|
| **Description** | You are an environmental official that represents non-governmental organizations, university researchers and various other institutions that work on soil conservation and rehabilitation in the area. You are not based in the area and therefore sit at a different table and plan your activities. |
| **Objectives** | • Implement rehabilitation techniques<br>• Employ local labour<br>• Manage the actions of commercial farmers |
| **Assets** | • A variable budget in each round |
| **Manage** | • Divide budget up amongst activities<br>• Employ labour to achieve desired activities<br>• Implement permanent fixtures (gabions, vetiver grass) or teach rural farmers techniques (stone packs, etc)<br>• Fine or give incentives to the commercial farmers based on their practices<br>• Permits for commercial farmers to build a new dam |
| **Specific Rules** | • Negotiate the payment of labour with the community or the specific rural farmer<br>• You are only allowed to play once per round (at the beginning of a round) due to transport costs and time limitations.<br>• If you wish to pay more than once per round, you will have to pay an extra 3Money Units per Action Card<br>• Keep track of your actions with your monitoring sheet |

## GOVERNMENTAL OFFICIAL

| Description | You are a representing the local government department, responsible for supporting members in the area and selling water to external buyers. |
|---|---|
| Objectives | • Assist in the sustaining of the rural community and tourism industry |
| Assets | • 10 money units at the start of the game<br>  → Variable budget thereafter<br>• Tax: tourism managers and commercial famer<br>  → 10% of their total profits/round<br>• 1 Money unit/Wilderness Land Plot Card that has more than 8 Organic Units/round<br>• 1 Money unit/1 Water unit at the end of the system (selling of water or hydropower) |
| Manage | • Support families that are unable to sustain themselves<br>• Maintain and develop infrastructure in the area<br>• Sell access water in dam to gain an income<br>• Give fines to commercial famers based on farming practices<br>• You are responsible for the labour protection<br>  • Enforce penalties for labour that are wrongfully dismissed<br>  • Support unemployed - 2Money Unit/Labour Unit |
| Specific Rules | • Keep track of your and other players' actions with your monitoring sheet |

## RURAL FARMER

| Description | You are representing many rural subsistence farmers, relying on crop production and cattle grazing to sustain your family (labour and dependent members). Your activities will affect the soil condition of the land plots that you use and will influence your food outputs. |
|---|---|
| Objectives | • Gain Money Units to sustain family: 1 Money Unit labour/ dependent member<br>• Keep cattle alive (cultural wealth) |
| Assets | • 4 labour<br>• 1 herd of cattle<br>• 3 dependent family members |
| Access Rights | • Water Units: from borehole or river<br>• Access to communal Graze and Crop Land Plot Cards within you area (upstream, midstream, downstream) |
| Manage | • Graze cattle on desired Graze Land LPC<br>• Select type of crop (Maize, Legumes or Vegetable) for Crop Land<br>• Release Organic Pollution Units and Water Units based on chosen activity<br>• Support family members with Food Units |
| Specific Rules | • Cannot do an activity (crop or grazing) on a Land Plot Card with insufficient organic credit (less than indicated on activity card)<br>• Labour can be employed to earn Food Credits (Environmental Officer, Tourism Manager)<br>• If you do not fulfill the needs of the Activity Card, the activity fails and you do not receive the outcomes<br>• Excess Money Units (MU) can be stored for the next season (round) or exchanged with other players for other benefits<br>• You may relocate to any area of the game board at the start of a round, if you desire<br>• The facilitator acts as an external market where you can buy and sell cattle to<br>• Keep track of your actions with your monitoring sheet |

## TOURISM MANAGER

| | |
|---|---|
| **Description** | You are representing managers of tourism facilities within the nature reserve that is concerned with attracting tourists and conserving the region through a variety of activities. |
| **Objectives** | • Increase profit (Money Units) |
| **Assets** | • Nature Reserve Land Plot Cards within your reserve<br>• An initial income of 10 Money Units (MU) |
| **Access Rights** | • Water Units: to provide for tourism industry<br>• Use of Wilderness Land Plot Cards if desired |
| **Manage** | • Employ Labour at a negotiated cost with rural farmers<br>• Assist Environmental Official with rehabilitation, if desired |
| **Specific Rules** | • Cost of labour can increase or decrease depending on negotiations with rural famers<br>• 10% of profits must be given to the Governmental Official at the end of the round<br>• Keep track of your actions with your monitoring sheet |

## TRIBAL AUTHORITY

| | |
|---|---|
| **Description** | You are a representing the local tribal authority, in charge allocating land to rural farmers and implementing management practices. You must also coordinate with the government official and environmental officer on projects and systems they want to put in place. |
| **Objectives** | • Manage the rural community and communicate with external actors |
| **Assets** | • The communal area in the catchment |
| **Manage** | • Allocate grazing and farm land to rural farmers at the beginning of the game<br>• Ensure the rural farmers are not imposing on other players' land<br>• Manage the use of the land in the catchment<br>    • Coordinate the activities of the government and environmental officials |
| **Specific Rules** | • Keep track of the player's actions with you monitoring sheet and map<br>• Make suggestions to the government and environmental official about how to spend their budget and make the most out of their funding |

### 3. Action Cards

| Role | Action Card Name | Action Card |
|---|---|---|
| **Rural Farmer** | Maize – Zone 0 |  |
| **Rural Farmer** | Maize – Zone 1 |  |
| **Rural Farmer** | Maize – Zone 3 |  |
| **Rural Farmer** | Legumes – Zone 0 |  |

| Rural Farmer | Legumes – Zone 1 |  |
|---|---|---|
| Rural Farmer | Legumes – Zone 2 |  |
| Rural Farmer | Vegetables – Zone 0 |  |
| Rural Farmer | Vegetables – Zone 1 |  |

| Rural Farmer | Vegetables – Zone 2 |  |
| Rural Farmer | Graze: 1 herd – Zone 0 |  |
| Rural Farmer | Graze: 1 herd – Zone 1 |  |
| Rural Farmer | Graze: 1 herd – Zone 2 |  |
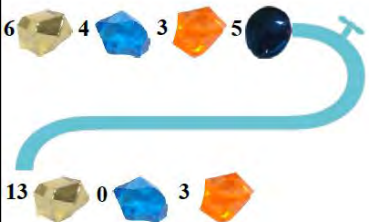
Assessing the Effectiveness of a Role Playing Game as a Stakeholder Engagement Tool for Integrated Natural Resource Management                                                                137

| | | |
|---|---|---|
| **Rural Farmer** | Graze: 1 herd – Zone 3 | RURAL FARMER Graze: 1 herd — 1 5 1 / 0 4 4 |
| **Rural Farmer** | Graze: 2 herds – Zone 0 | RURAL FARMER Graze: 2 herd — 2 4 1 / 0 3 2 |
| **Rural Farmer** | Graze: 2 herds – Zone 1 | RURAL FARMER Graze: 2 herd — 2 5 1 / 0 4 2 |
| **Rural Farmer** | Graze: 2 herds – Zone 2 | RURAL FARMER Graze: 2 herd — 2 6 1 / 0 5 3 |

| Rural Farmer | Graze: 2 herds – Zone 3 |  |
| --- | --- | --- |
| **Rural Farmer** | Free Graze: 1 herd – Zone 0 |  |
| **Rural Farmer** | Free Graze: 1 herd – Zone 1 |  |
| **Rural Farmer** | Free Graze: 1 herd – Zone 2 |  |

| | | |
|---|---|---|
| **Rural Farmer** | Free Graze: 1 herd – Zone 3 | **RURAL FARMER** Free Graze: 1 herd <br> 1 🔵 6 🟠 0 ⚫ <br> 0 🔵 5 🟠 2 🟤 |
| **Commercial Farmer** | Maize | **COMMERCIAL FARMER** Crop: Maize <br> 3 🟤 3 🔵 3 🟠 2 ⚫ <br> 5 🟤 1 🔵 1 🟠 |
| **Commercial Farmer** | Dairy | **COMMERCIAL FARMER** Graze: Dairy <br> 5 🟤 6 🔵 5 🟠 4 ⚫ <br> 10 🟤 2 🔵 2 🟠 |
| **Commercial Farmer** | Soya beans | **COMMERCIAL FARMER** Crop: Soya beans <br> 3 🟤 3 🔵 4 🟠 2 ⚫ <br> 5 🟤 1 🔵 1 🟠 |

| | | |
|---|---|---|
| **Commercial Farmer** | Wheat | COMMERCIAL FARMER<br>Crop: Wheat<br>2 · 1 · 3 · 2<br>3 · 0 · 1 |
| **Commercial Farmer** | Beef (Graze ) – 1 herd | COMMERCIAL FARMER<br>Graze: Beef  1 herd<br>4 · 2 · 2 · 3<br>7 · 0 · 1 |
| **Commercial Farmer** | Beef (Graze ) – 2 herds | COMMERCIAL FARMER<br>Graze: Beef  2 herds<br>6 · 4 · 3 · 5<br>13 · 0 · 3 |
| **Commercial Farmer** | Crop Rotation | COMMERCIAL FARMER<br>Crop Rotation  Crop<br>+1 · +1<br>+1 · +1 · -1<br>This card adds to your existing activity: use a different Crop each round, get card from facilitator |

| Commercial Farmer | Organic Soil Cover |  |
|---|---|---|
| Commercial Farmer | No Tillage |  |
| Commercial Farmer | Central Pivot |  |
| Tourism Manager | Guided Hiking Tour |  |

| Tourism Manager | Horse Riding |  |
| --- | --- | --- |
| Tourism Manager | Bird Watching |  |
| Tourism Manager | Hiking |  |
| Tourism Manager | Hotel |  |

| | | |
|---|---|---|
| **Tourism Manager** | Rock Art Tour |  |
| **Tourism Manager** | Backpackers |  |
| **Tourism Manager** | Camping |  |
| **Tourism Manager** | Educational Tour |  |

| | | |
|---|---|---|
| **Government official** | Fine - Excess Water Pumped | **GOVERNMENTAL OFFICIAL** Fine: Excess Water Pumped ❌ 2 / 5 Paid by commercial farmer to government official |
| **Government official** | Fine: Wrongful Labour Dismissal | **GOVERNMENTAL OFFICIAL** Fine: Wrongful Labour Dismissal ❌ 3 / 1 Paid by commercial farmer to government official if labour is wrongfully dismissed or not supported by farmer |
| **Government official** | Grant: Unemployment | **GOVERNMENTAL OFFICIAL** Grant: Unemployment 2 / 1 May be paid by government official to rural farmer if labour is unemployed |
| **Environmental Officer** | Low Tillage: Crops | **ENVIRONMENTAL OFFICER** Low Tillage: Crop 1 1 → -1 Get card from facilitator, it can be reused once per round by the farmer |
| **Environmental Officer** | Contour Ploughing: Crops | **ENVIRONMENTAL OFFICER** Contour Ploughing: Crop 0 1 → -1 Get card from facilitator, it can be reused once per round by the farmer |

| Environmental Officer | Vetiver Grass | ENVIRONMENTAL OFFICER Vetiver Grass  3  1  →  -3  Get card from facilitator, it cannot be reused, remove after the round |
| Environmental Officer | Stone Pack | ENVIRONMENTAL OFFICER Stone Pack  2  1  →  -2  Get card from facilitator, it can be reused once per round by the farmer |
| Environmental Officer | Gabion | ENVIRONMENTAL OFFICER Gabion  8  0  →  -4  Get card from facilitator, it cannot be reused, remove after the round |
| Environmental Officer | Alien Species Eradication | ENVIRONMENTAL OFFICER Alien Species Eradication  1  3  →  -2  Get card from facilitator, it cannot be reused, remove after the round |
| Environmental Officer | Fine - Wetland Destruction | ENVIRONMENTAL OFFICER Fine: Wetland Destruction  5 / Destroyed Wetland  Fine paid by commercial farmer to environmental officer, farmer pays 7 money units to rehabilitate wetland |

| | | |
|---|---|---|
| **Environmental Officer** | Fine - Excess Water Pumped |  |
| **Environmental Officer** | Fine - Excess Organic Pollution |  |
| **Environmental Officer** | Fine - Illegal Dam Construction |  |
| **Environmental Officer** | Permit - Dam Construction |  |
| **Tribal Authority** | *None – simply a managerial role* | - |
| **Facilitator** | Unoccupied Crop Land – Zone 0 |  |

| | | |
|---|---|---|
| **Facilitator** | Unoccupied Crop Land – Zone 1 |  |
| **Facilitator** | Unoccupied Crop Land – Zone 2 |  |

## 4. Event Cards

**Rural Farmer**

| | | | |
|---|---|---|---|
| RURAL FARMER ☺ Bonus: Gain 2 Money Units | RURAL FARMER ☺ Inheritance: Gain 1 cattle herd | RURAL FARMER ☺ Bonus from Gov.: Gain 2 Money Units | RURAL FARMER ☺ Foreign Investment: Gain a borehole where desired |
| RURAL FARMER ☹ Death in Family: Pay 2 Money Units for funeral | RURAL FARMER ☹ Stock Theft: Lose 1 cattle herd | RURAL FARMER ☹ Disease Outbreak: Lose 1 cattle herd | RURAL FARMER ☹ Disease Outbreak: Lose maize harvest profit |
| RURAL FARMER ☺ Family Member Grows Up: Gain 1 Labour Unit | RURAL FARMER ☺ Broken Borehole: Ask Gov. to assist, 4 MU for repair | RURAL FARMER ☹ Crop Hail Damage: Lose 1 Money Unit | RURAL FARMER ☺ Social Grant: Receive 1 Money Unit |
| RURAL FARMER ☺ Excellent Harvest: Gain 2 Money Units | RURAL FARMER ☺ Social Grant: Gain 3 Money Units | RURAL FARMER ☹ HIV/Aids: Lose 1 Labour Unit | RURAL FARMER ☺ Good Crop Harvest: Gain 1 Money Units/ Crop AC |
| RURAL FARMER ☹ Disease Outbreak: Lose 1 Money Unit/Crop AC | RURAL FARMER ☹ Stock Theft: Lose all cattle herds | RURAL FARMER ☺ Good Harvest: Gain 2 Money Units | RURAL FARMER ☺ Inheritance: Gain 2 cattle herds |
| RURAL FARMER ☹ Destruction: Lose 1 Rehabilitation Technique | RURAL FARMER ☹ Death in Family: Pay 3 Money Units for funeral | RURAL FARMER ☺ Income from Migrant Worker: Gain 3 Money Units | RURAL FARMER ☹ Good Harvest: Gain 1 Money Unit |

**Commercial Farmer**

| | | | |
|---|---|---|---|
| COMMERCIAL FARMER ☺ Bonus: Gain 2 Money Units | COMMERCIAL FARMER ☺ Good Crop Market: Gain 2 Money Units/ Crop AC | COMMERCIAL FARMER ☺ Water Allowance: Extra 3 water units in next round | COMMERCIAL FARMER ☹ Erosion Control: Pay 2 Money Units |
| COMMERCIAL FARMER ☹ Theft: Lose 3 Money Units | COMMERCIAL FARMER ☹ Market Decrease: Lose 4 Money Units | COMMERCIAL FARMER ☹ Taxes: Pay 3 Money Units/ Stock AC | COMMERCIAL FARMER ☹ Stock Theft: Lose 1 cattle herd |
| COMMERCIAL FARMER ☹ Inherited Stock: Gain Cattle Herd | COMMERCIAL FARMER ☹ Fence Vandalism: Pay 2 Money Units for repair | COMMERCIAL FARMER ☹ Equipment Maintenance: Pay 3 Money Units for repair | COMMERCIAL FARMER ☹ Crop Disease: Pay 1 Money Unit/Crop AC |

| COMMERCIAL FARMER ☺ Farm Bonus: Gain 4 Money Units | COMMERCIAL FARMER ☺ Good Harvest: Gain 2 Money Units | COMMERCIAL FARMER ☺ Inheritance: Gain 6 Money Units | COMMERCIAL FARMER ☹ Tractor Repair: Pay 2 Money Units |
|---|---|---|---|
| COMMERCIAL FARMER ☹ Death: Lose 1 labour unit, pay 4 money unit to family | COMMERCIAL FARMER ☹ Stock Theft: Lose 2 cattle herds | COMMERCIAL FARMER ☹ Disease outbreak: Lose 4 money units | COMMERCIAL FARMER ☺ Irrigation Repair: Pay 1 Money Unit |
| COMMERCIAL FARMER ☺ Permit from Government: to build a new dam | COMMERCIAL FARMER ☺ Tax Payout: Gain 4 Money Units | COMMERCIAL FARMER ☺ Good Dairy Market: Gain 2 Money Units/Dairy AC | COMMERCIAL FARMER ☹ Crop Hail Damage: Lose 3 Money Units |

**Environmental Officer**

| ENVIRON. OFFICIAL ☺ Government Bonus: Gain 4 Money Units | ENVIRON. OFFICIAL ☺ Research Bonus: Gain 3 Money Units | ENVIRON. OFFICIAL ☹ Budget Cut: Lose 2 Money Units |
|---|---|---|
| ENVIRON. OFFICIAL ☺ Additional Transport Cost: Pay 2 Money Units | ENVIRON. OFFICIAL ☺ Admin Fee: Pay 2 Money Units | ENVIRON. OFFICIAL ☹ Increase Transport Cost: Pay 3 Money Units |

**Governmental Official**

| GOV. OFFICIAL ☺ Bonus: Gain 2 Money Units | GOV. OFFICIAL ☺ Bonus: Gain 4 Money Units | GOV. OFFICIAL ☺ Tax: Receive 1 Money Unit from each Com. Farmer |
|---|---|---|
| GOV. OFFICIAL ☹ Budget Cut: Lose 4 Money Units | GOV. OFFICIAL ☹ Building Maintenance: Pay 3 Money Units | GOV. OFFICIAL ☹ Road Damage: Pay 2 Money Units for Repair |
| GOV. OFFICIAL ☺ Dam Maintenance: Pay 4 Money Units | GOV. OFFICIAL ☺ Research: Give Environ. Officer 3 Money Units | GOV. OFFICIAL ☺ Compulsory Grant: Give any player 2 Money Units |

**Tourism Manager**

| TOURISM MANAGER ☺ Bonus: Gain 2 Money Units | TOURISM MANAGER ☺ Tourism Increase: Gain 3 Money Units | TOURISM MANAGER ☺ Government Bonus: Gain 3 Money Units |
|---|---|---|

| TOURISM MANAGER ☹ Vandalism: Pay 4 Money Units | TOURISM MANAGER ☹ Tourism Decrease: Lose 2 Money Units | TOURISM MANAGER ☹ Taxes: Pay 1 Money Unit/AC to Gov. Official |
|---|---|---|
| TOURISM MANAGER ☺ Admin Fee: Pay 2 Money Units | TOURISM MANAGER ☺ Vandalism of Rock Art: Pay 2 Money Units for repair | TOURISM MANAGER ☺ Accommodation Upkeep: Pay 3 Money Units |

## 5. Calibration

**Area of the Okhahlamba Local Municipality:** 187619ha ≈ 180 000ha

*To increase accuracy, minus percentage of nature reserve from area*

- Approximately 8% of region is nature reserve: 180000/8% = 14400ha.
- Therefore remaining region used by humans: 180000-14400 = 165600ha

*Approximate area of LPC by simply dividing area by the number of LPCs in the model*

- ± 25 LPCs therefore 165600/25 = 6624ha/LPC
- ≈ 7000ha/LPC *(naive calculation)*
- *But this is an unrealistic management size therefore divide by 7 = **1000ha/LPC***

*Calculate LPC based on land use type (area in reality)*

- Commercial Farm ≈ 500ha  (1000ha/500ha = 2) = **2CFs/LPC**
- Rural Farm ≈ 20ha (1000ha/20ha = 50) =  **50RFs/LPC**
- Towns ≈ 2000ha *(Bergville 2800ha, Winterton 1600ha)* (1000ha/2000ha = 1/2) = ½Town/LPC

    *But, a town does not need to be more than 1 management unit because it is a single entity with limited activity choices therefore* = **1Town/LPC**

- Nature Reserve: only a portion of the nature reserve was represented in the game, generalised as 2 NR LPC: no calculation was done to estimate this representation.

Therefore the calibration of LPC representation area was calculated though the estimated area of different land use types while applying a logical management unit size to the calculated outcome.

## 6. Monitoring

Individual monitoring sheet were generated for each role.

**RURAL FARMER: Monitoring Sheet**                    Name: _____

| Round | Labour | Money Unit Need | Extra Money Units | Herds of Cattle | Comments |
|-------|--------|-----------------|-------------------|-----------------|----------|
| 0 | | | | | |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

**COMMERCIAL FARMER: Monitoring Sheet**                    Name: _____

| Round | Labour | Herds of Cattle | Arable CLs | Wetland LPCs | Dams | Profit (MU) | Comments |
|-------|--------|-----------------|------------|--------------|------|-------------|----------|
| 0 | | | | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

**GOVERNMENT OFFICIAL: Monitoring Sheet**                    Name: _____

| Round | Budget (MU) | Spent (MU) | Tax Income (MU) | No. of Fines Given | Unemployed Labour | Comments |
|-------|-------------|------------|-----------------|--------------------|-------------------|----------|
| 0 | | | | | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |

| ENVIRONMENTAL OFFICIAL: Monitoring Sheet | | | | Name: _____ | |
|---|---|---|---|---|---|
| Round | Budget (MU) | No. of Players Assisted | Success of Activities (Good/Average/Poor) | No. of Fines Given | Comments |
| 0 | | | | | |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

| TOURISM MANAGER: Monitoring Sheet | | | | Name: _____ |
|---|---|---|---|---|
| Round | Development Paid For | No. of AC's Played | Average Labour Cost | Profit (MU) | Comments |
| 0 | | | | | |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

| Tribal Authority: Monitoring Sheet | | | Name: _____ |
|---|---|---|---|
| Round | Money Invested in Community (MU) | Players Assisted | Comments |
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

## 7. External Monitoring

The following the external monitoring template completed by an additional facilitator/note taker during each game session.

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**Skeleton External Monitoring Template**

**1.   GENERAL**

    **1.1. Game Details**
- Date
- Location
- Category of participants
- Facilitators and their roles
- Number of participants
- Language

    **1.2. Participants** - list

**2.   SOCIAL STRUCTURE**

    **2.1. Composition**
- Gender division
- Dominate participants
- Interaction between participants
- Perceptions of participants towards others present
- How participants have located themselves in the room and around the game board

    **2.2. Discussion Process**
- How did participants voice their opinions (discussion, raising hands, dominant voices)

**3.   ROLE PLAYING GAME**

    **3.1. Introduction**
- Use of PowerPoint Presentation
- Outline of *Afromaison* Project (European based research of Natural Resource Management)
- Location and particulars of case study
- Where the game is headed: visioning idea, build plans and actions based on discussions with various actors
- How the game is played, elements, cards, process
- Observations: concentration of players (interest in presentation), comments and queries raised by participants
- Time (min)

    **3.2. Game Description and Trial Round**
- Informal discussion about how the game is played
- Trial round to ensure players know how to play
- Assist participants that don't understand elements
- Observations: ability of presentation to describe how the game is played, comments and queries from participants, common points of confusion and areas lacking clarity, participants initial response to the game

    **3.3. Playing the Game**
- Describe actions players take
- Players response – quick, slower
- Position of the facilitator during the game
- Who processes activities

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- Flow of game (smooth, staggered, etc)
- Duration of rounds (min)
- Attitude of participants
- Language used
- Complete General Monitoring sheet
- Ensure that players are completing their own monitoring sheets – indicate which do it automatically and which do not

### 3.4. Focal issues revealed through the game

- Where do issues stem from
- Who do the players blame
- Management actions taken during the game
- Discussion between participants and collective decisions
- Participants involved in discussion – who is most verbal

### 3.5. Observations

- Main issues raised - who agreed it was an issue
- Conflicting issues - issue and its contrasting perspectives, between who
- Time (min)

## 4. WRAP UP OF SESSION

### 4.1. Feeling of players in their role

- Variation of players' response to their role in the game
- How they felt as that player as opposed to others
- Most important moment during the game for players
- Who is dominant during the discussion – does everyone get a chance to voice their opinion?

### 4.2. Applicability of game

- Accuracy of dynamics and situations in comparison to reality
- Possible bias of the game
- What needs to be corrected or altered
- Does it accurately indicate who makes decision about land use and planning

### 4.3. Use of game

- What has been useful for players personally
- Introduce next steps envisioned by *Afromaison*
- Did they change their perspective in playing a different role, being taken out of their comfort zone and forced to change their mindset
- Time (min)

## 5. DEBRIEFING

### 5.1. Select focal issues – use of flip chart

- Common issues
- Conflicting issues
- How were differences resolved
- Main issues/ challenges

### 5.2. Discuss source of issues

- Conflicting/common perceptions

### 5.3. Mapping

- Players asked to point out the state on natural systems on an orthophoto
  - Constant, declining or improving

       ○ For example: areas of most degradation, siltation in water system, alien invasive species, etc.

**5.4. Ecosystem services demand**
- Which systems are most important to you

**5.5. Ecosystem services supply**
- Why the change in the state of resources? (politics, socio-economics, culture, tourism, development, infrastructure, poverty, population growth, breakdown of social systems, poor land management, etc.)
- How are the changes affecting wellbeing, economic status, etc.

**5.6. Initiatives/management measures in the area**
- What are they and who implemented them (fire management, erosion protection, minimum tillage, carrying capacity, etc.)
- Which of them are working and why?
- Which of them aren't working and why?
- Are there any dis/incentives to manage resources? Are they successful or not? Why?

**5.7. Visioning/ Solutions**
- What changes would you like to see in the area
- What activities would need to be done or put in place to achieve this vision
- Who should be implementing these various activities
- Time scale of activities – short, medium or long term
- What will the benefits of these activities be

**5.8. Main results**
- Attempt to summarise results to have a clear understanding of the participants vision
- Highlight particular areas of focus that the group indicated are priority

**5.9. Observations**
- Dominate participants
- Coordinated by facilitator? Do participants actively involve themselves or is it a verbal discussion?
- Time (min)

## 6. SESSION DETAILS

**6.1. Positive Aspects (examples)**
- Equal discussion – all participants involved
- Common issues raised with similar visions
- All participants provided with opportunity to explain situation from their perspective
- Adequate discussion time
- Participants easily got into the game
- Good, organised facilitations
- Adequate time to set up and prepare game

**6.2. Negative Aspects (examples)**
- Dominant participants controlling discussion
- Lack of common vision between participants
- Time was limited – specific aspects
- Unorganised facilitation  - not well presented
- Game not adequately understood easily by all participants

## 7. PERSONAL REFLECTION AFTER GAME SESSION

**7.1. Main outcomes**

**7.2. Main conflicting issues**
**7.3. Positives or Downfalls of session**
- Accuracy of the game
- Acceptance of game by the participants
- Effective introduction
- Value of issues raised and discussions
- Applicability of strategies (short, medium and long term)
- Participant composition
- Focus of participants
- Time allocation and precision
- Enjoyment of participants during the session
- Attitude of participants towards game
- Attitude of participants towards other participants
- Facilitation

**7.4. Visioning workshop feedback**
- Ask a participant to assist in creating a brief feedback for the visioning workshop
- Perhaps present it with me
- Effective and personalise way of showing others that the visioning process has already begun and people are starting to think about it

**7.5. Aspects of the game that need to be altered**
**7.6. Report of game session – final product**