DRUSSA

Development Research Uptake in Sub-Saharan Africa

Handbook Series:

Developing a stakeholder engagement and science communication plan:

Two case studies

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INTRODUCTION

The goal of the DRUSSA programme is strengthened university Research Uptake capacity for individuals and universities so as to better meet the demand for better utilisation of research findings.

In September 2013, the DRUSSA team at the University of Stellenbosch's Centre for Research on Evaluation, Science and Technology (CREST) presented a 4-day workshop during which two research project teams from participating universities were equipped with key skills to produce a research uptake case study with a particular emphasis on developing stakeholder engagement and science communication plans. The outcome of the workshop was a draft plan prepared by each team.

The plan set out the process and actions to engage with key stakeholders such as the community where the research was being undertaken, interested public and policy makers and funders. It also set out the processes through which the research project team would communicate the their research findings to these stakeholders.

Over the period September 2013 to September 2014 the case study teams interacted closely with the CREST team to write up an account of their experience of developing and refining these plans and on how they have proceeded to implement them.

The first section of this document reviews theoretical and practical frameworks and approaches for stakeholder identification, analysis to establish 'fit for purpose' for the context in which the research was taking place, and analysis of the engagement and communication plan development that was presented at the conclusion of the workshop in September 2013. This section therefore comprises a section on the practicalities and "how-to's" of the process of developing a stakeholder engagement and science communication plan.

The following two sections then describe the experience, learning, practical difficulties and successes encountered by two case-study teams.

The first case study provides an analysis and overview of a complicated (at times) stakeholder engagement planning process, and its communication plan. The project aimed at quantifying and uncovering the movement of sediments and agrochemicals found under various types of mulches in coastal, hilly, food production areas in Mauritius.

The second case study has a science communication focus and provides insight into a project that established the risk of a common method of malaria diagnosis and considers an alternative malaria test, in the Ugandan context.

THE STAKEHOLDER PARTICIPATION PROCESS AND PRACTICAL FRAMEWORKS

Many studies in the literature provide guidance on the available methodologies and approaches towards stakeholder participation. From a practical perspective, the following reasons may suffice for developing a stakeholder participation plan (University of Kansas, 2014):

- Firstly, to involve stakeholders in planning an intervention such as a community intervention. Here the knowledge gained by engaging with the various stakeholder groups may prove to be very valuable for ensuring your approach is sound and that the right groups are involved in the process.
- Secondly, if research is to be conducted in participation with stakeholders through participatory action research, for example, stakeholder involvement may be useful for ensuring that the relevant parties understand the research process.

"Validating different knowledge systems: Stakeholder analysis can provide a meeting ground for various systems of knowledge. In recognising the value and relevance of both popular and scientific knowledge, and in focusing on the implications of such knowledge for management, it creates bridges between two systems of knowledge that seldom communicate, thus providing the basis for dialogue and cooperation in management." (Renard, 2001)

According to Eden and Ackermann (2013) the process is useful as it:

- Guides us in applying clear and useful definitions of stakeholders which pertains to the uniqueness of the stakeholders;
- Assists in analysing and defining the relative significance of the stakeholders;
- Assists the project manager in effectively managing the multiple and interdependent linkages with and between stakeholders and potential stakeholders;
- Helps with planning how and when to intervene, when appropriate, in order to develop or change the underlying reasons for stakeholder significance.

Table 1 below displays three excerpts from the literature that outline the various steps towards developing, implementing and evaluating a stakeholder participation process.

Table 1: Stages and phases for the stakeholder participation process

Stakeholder identification	Defining the area and its users Identifying stakeholders	Determine need for planning process Stakeholder identification
Stakeholder characterisation Stakeholder structuring	Introduction of the notion of interdependencies Bringing conflicts and interdependencies into the open	Stakeholder mobilisation Stakeholder analysis
Choice of participation techniques		Definition of mechanism for stakeholder participation and process to be used to arrive at decisions and solutions Identification of problems, issues, and needs Definition of goals and objectives Collection of information on which to base decisions
Implementation of participatory techniques	Negotiating options for improved Natural Resources Management Implementing and adjusting action plans.	Analysis and sharing of results with stakeholders Identification and assessment of options Negotiation Formulation of decisions and agreements
Evaluation		Monitoring and Evaluation

As far as practical frameworks are concerned, Luyet et al. (2012) provide a useful process framework for guiding the stakeholder participation (and considered by the authors to be comprehensive in terms of the

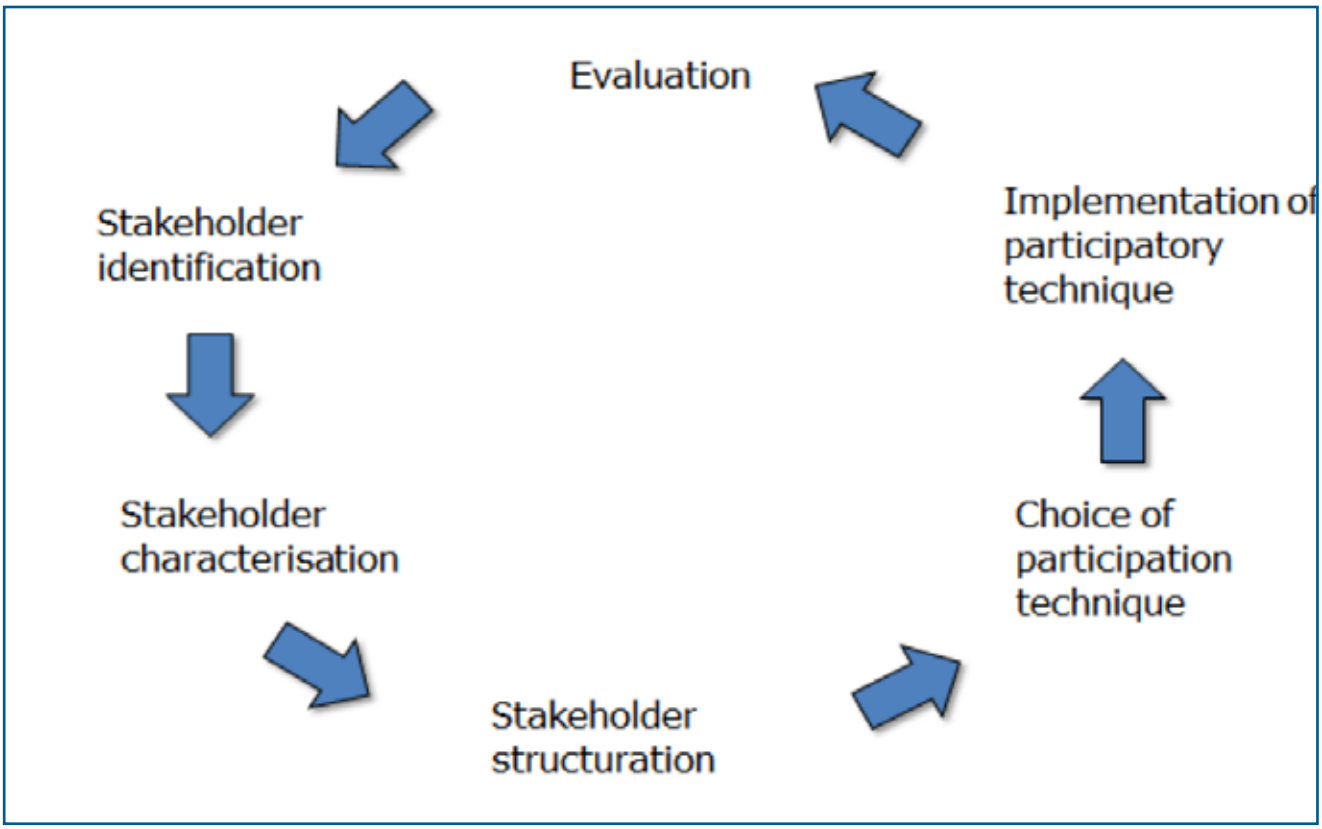
process), which includes the following steps:

In this section we focus on the first five steps namely:

- Stakeholder identification
- Stakeholder characterisation
- Stakeholder structuring
- Choice of participatory technique
- The participation plan.

STAKEHOLDER DEFINITION AND IDENTIFICATION

Figure 1: The stakeholder participation process (Redrawn from Luyet et al (2012)



As the identification of all relevant stakeholders is one of the principles of successful participation, failure to identify the stakeholders may mean that some bias is introduced into the process and the following stages of the project. It may also result in certain stakeholders being added to the engagement process later on, which may have a negative effect on the project's progress. In order to effectively complete this step in the process, the following actions must be taken:

- Agree on how to define stakeholders;
- Develop mechanisms through which a stakeholder list can be developed, for example, a set of questions based on the stakeholder definition.

The nature of stakeholders can be defined according to stakeholders and their relationship to the project in question (University of Kansas, 2014), as described in Table 2 below.

Table 2: A summary categorisation of stakeholder definition and identification categories

Category	Descriptions of stakeholder categories
Primary stakeholders include the beneficiaries or targets of the effort	Beneficiaries are those groups that stand to gain something from the effort, be that knowledge, advice, skills, money, goods, or connections to organisations; Targets are those who stand to gain personally or whose activities will result in a benefit to a specific population or community.
Secondary stakeholders	Those groups or individuals who are involved with or responsible for the beneficiaries or targets. In other words, this includes the organisations or individuals who are living with, caring for or provide services to the beneficiary groups; Those whose livelihoods or existence may be affected by the process or implementation of the effort. Some of this group's stakeholders may overlap with the above-mentioned group.
Key stakeholders	Government officials and policymakers: These are individuals who are in a position to devise, pass and enforce laws or regulations; these groups or individual's actions will have either the effect of fulfilling the goals of the effort or completely cancelling it out; This group includes those who may influence others; Those with an interest in the outcome of the effort. These people or groups may be unaffected by the process or outcome of the project, but who may care about the cause and be willing to work towards achieving the objectives. This includes individuals with a natural constituency such as academics, senior business people or activists.

How do you identify stakeholders?

The process of identifying stakeholders needs to involve the careful consideration of all the potential stakeholders, whoever needs to be involved to further the project goals.

Luyet et al. (2012) suggest that the stakeholder identification process should include a heterogeneous group of persons in order to ensure that the risk of failing to identify crucial stakeholders is minimised. It must, however, be kept in mind that a greater number of stakeholders may result in a more complex and more costly process. Therefore, the choice of method for stakeholder identification will largely depend on the context of the project, the phase of the project and the resources available (Luyet et al., 2012).

Mechanisms

Various mechanisms are suggested for identifying stakeholders. These include:

- Brainstorming: The team members all sit together and call out names and groups of stakeholders;
- Focus group: A smaller group brainstorm about the stakeholders, their interests, influence and other attributes, and categorise them;
- Semi-structured interviews: Interviews are conducted with a cross-section of stakeholders to check or supplement the focus group data;
- Snow-ball sampling: Individuals from initial stakeholder categories are interviewed to identify new stakeholder categories and contacts;
- Stakeholder map: A map or chart visually representing the various stakeholders and their relevant categories may prove useful.

STAKEHOLDER CHARACTERISATION

According to Luyet et al. (2012), the size and complexity of the project will determine to what extent the stakeholder identification and analysis process will take place. The characterisations of stakeholders have been discussed at length in the literature (Luyet et al., 2012). Some of these characteristics include (Rist et al., 2007):

- The various attitudes of stakeholders towards a project;
- Potential conflicts and coalitions between stakeholders;
- Interest in the project;
- Access to resources;
- Political influence over the project;
- Degree of implication;

- Power, stakeholder urgency, proximity and legitimacy; and
- Scale of influence.

Stakeholder classes can be divided into groups: direct and indirect, primary and secondary, internal and external (Bailur, 2007; Karlsen, 2002).

In the natural resource management literature some very useful lists of questions have been developed to assist in the stakeholder characterisation process. Typically, a stakeholder analysis exercise will aim to answer questions such as (Reed, 2008; Reed et al., 2009):

- What are the current and future interests of the various stakeholders in the use and management of the resource? What are their needs and expectations? How do they use the resource and what benefits do they derive?
- What are their past and current power, rights and responsibilities, both formal and informal? What are the networks and institutions of which they are part?
- What are the social and environmental impacts, both positive and negative, of their past and current uses of and relationships with the resource?
- How ready and willing are they to participate in and contribute to the management of the resources?
- What are the potential areas of agreement and shared interest upon which consensus and collaboration can be developed?
- What are the human, technical and financial resources that they are prepared to contribute to the management process?

Mechanisms

As suggested by Karlsen (2002) an option for classifying stakeholders is along two dimensions, namely the potential that they have to affect the project and their potential to collaborate with project staff. Various mechanisms have been developed for stakeholder analysis through which characterisation can be done:

- Power versus interest grids: Interest-Influence matrices where a 2-by-2 matrix is used to represent characteristics of stakeholders;
- Stakeholder maps through which links, connections and relationships can be visualised;
- Interest-Influence matrices: Stakeholders are placed on a matrix according to their relative interest and influence;
- Stakeholder-led categorisation: Stakeholders themselves categorise stakeholders into categories which they have created;
- Q methodology: Stakeholders sort statements drawn from a concourse according to how much they agree with them. The analysis of this allows social discourses to be identified;
- Radical transactiveness: Snow-ball sampling can be used to identify fringe stakeholders, followed by the development of strategies to address their concerns.

However, there does not seem to be a single systematic approach through which stakeholder characterisation takes place. Luyet et al. (2012) state that it seems to depend very much on the project's context and complexity.

The process of ranking stakeholders by their various characteristics may be affected by subjectivity, and thus it may be advisable to engage a range of individuals in the process of ranking stakeholders.

Table 3: Stakeholder characteristics

Stakeholder	What are the stakeholder's (potential) interests in your research?	What resources does the stakeholder possess that could help you in disseminating your research/ planning for its uptake?	Can those resources be mobilised quickly?	What is the stakeholder's position on your research?

STAKEHOLDER STRUCTURING AND DEGREE OF INVOLVEMENT

The aim of this step in the process is to assign stakeholders to groups and to assign each group to a planned level of involvement. Luyet et al. (2012), use the following degrees of involvement for each stakeholder group for their process:

- Information: Explanation of the project to the stakeholders;
- Consultation: Presentation of the project to stakeholders, collection of the suggestions, and then decision making with or without taking stakeholder input into account;
- Collaboration: Taking the stakeholder's views into account and then making decisions based on that;
- Co-decision: Cooperation with stakeholders towards an agreement for solution and implementation; and
- Empowerment: Delegation of decision making over project development and implementation to the stakeholders.

Mechanisms

- Eden and Ackermann (2013) describe a range of practical frameworks that have been developed to assist in the stakeholder structuring process:
- Stakeholder influence diagrams: Stakeholders are tabled onto a two-dimensional matrix and their relationships described using codes;
- Social Network Analysis: This is used to identify the network of stakeholders and to measure the relational ties between stakeholders by means of a structured interview/questionnaire;
- Knowledge mapping: This involves semi-structured interviews to identify the interactions and knowledge of stakeholders and is used in conjunction with SNA; and
- Radical transactiveness: Snow-ball sampling is used to identify fringe stakeholders and to develop strategies to address their concerns.

PLANNING PARTICIPATION

Choice of participatory techniques

To support the participation process the participation technique needs to be agreed on. This is dependent on the objectives and the appropriate degree of participation that have been defined with the stakeholder group (Reed, 2008). A wide range of techniques have been defined in the literature but there is currently no standardised approach. The choice of participation technique may depend on:

- Degree of involvement;
- Type of stakeholders (prior knowledge and experience, time available, interest, etc.);
- Local cultural and social norms;
- Past events (history of development, etc.);
- Intended timing of the use of the techniques within the project; and
- Knowledge and experience of the project manager/facilitator.

Reed et al. (2009) provide the following table for supporting the choice of participatory technique:

Table 4: Participatory techniques according to degree of involvement

Participation technique	Information	Consultation	Collaboration	Co-decision	Empowerment
Newsletter	X				
Reports	X				
Presentations, public hearings	X	X	X		
Internet webpage	X	X			
Interviews, questionnaires and surveys	X	X	X		
Field visit and interaction	X	X	X		
Workshop		X	X	X	X
Participatory mapping			X	X	X
Focus group			X	X	X
Citizen jury		X	X	X	X
Geospatial decision support system	X	X	X	X	
Cognitive map	X	X	X		
Role playing			X	X	X
Multi-criteria analysis			X	X	
Scenario analysis		X	X	X	X
Consensus conference		X	X	X	X

The participation planning matrix

The participation planning matrix below (Table 5) combines the levels of participation, which range from a minimum of simply informing stakeholders through to empowerment in which the stakeholders or some subset of them are given final decision-making authority. Each level has a different goal and makes a different kind of promise -implicitly if not explicitly.

Table 5: A Participation planning matrix

Stakeholder group	Objective of their Intervention	Approach to Participation (information generation/ sharing, consultation, collaboration or partnership) and Depth	Participation Methods (e.g., workshop, participatory assessment, survey, community mobilisation or service provision by CSO, participatory M&E)		Timeline		Resources required
	Why included		Method	Who is responsible	Start date	End date	
Government							
Civil Society							
Private Sector							

PLANNING COMMUNICATION IN SCIENCE

Communication does not happen by itself, or by accident (Gascoigne & Metcalfe, 2012). Without careful planning and resourcing, it will feature as an afterthought to the research process, or may even be totally ignored. Riise (2008) stresses that science communication has evolved from an optional extra to something that has to be planned and accounted for from the very beginning of a research project.

Communicating scientists understand the value and role of communication in the research process. They plan and budget for it in the same way that they plan and budget for research. They allocate time and money to communication and get help from professional science communicators to make their science exciting and accessible to a variety of audiences.

There are opportunities for communication throughout the lifecycle of a research project. For example, the start of an important new study, an award of major funding, the publication of a scientific paper, reports or policy briefs or a keynote talk at a high-profile conference. Science-communication planning must therefore be integrated into the research as a strategic component of the research plan, not as an afterthought.

A communication plan sets out how researchers will communicate the right messages to the right people at the right time. It defines one's communication objectives and the groups one wants to engage with. It also lists the key communication activities, along with timeframes and the resources (skills, expertise and money) required to implement the plan. Such a plan should be dynamic and flexible, because communication needs and priorities will change throughout the lifecycle of a project.

A science communication plan should include the following components (Gascoigne & Metcalfe, 2012):

- Situational analysis of the current context, communication climate, competitors and challenges;
- Identification of key stakeholder groups, as well as their communication needs and preferences;
- Development of strategic messages for each stakeholder group;
- Ways to engage with audiences, including making the most of existing and new communication platforms and partnerships; and
- Declaration of communication values and style (for example a commitment to friendly, open, transparent, pro-active and honest communication).

A science communication plan in support of a specific research project will typically aim to:

- Demonstrate the success and impact of the project;
- Sustain public, political and funding support for the project on a local, regional, national or even global level;
- Attract partners, collaborators, students and possibly more funding;
- Change behaviour and perceptions where necessary; and
- Help mitigate risks to the project, for example risks that may result from funding cuts and negative public opinion.

The seven steps in science communication planning will answer the following questions:

1. Who do we want to reach? (Key groups and individuals).
2. What do we want to achieve? (Why communicate?)
3. What do we know about key audiences? How can we get to know and understand them better?
4. What are our key messages? (Clear and consistent messages about benefits, impacts, opportunities, and more.)
5. How will we reach them? (Tools, tactics, activities.)
6. Roles, resources and timeframes: Who will do what, and when? What do we need to implement this plan in terms of skills, expertise and budget?
7. Implementation and evaluation plan.

CASE STUDY 1: QUANTIFICATION AND MOVEMENT OF SEDIMENTS AND AGROCHEMICALS UNDER VARIOUS TYPES OF MULCHES IN COASTAL, HILLY FOOD PRODUCTION SYSTEMS IN MAURITIUS

Raj, a planter from the South-Eastern part of Mauritius, had a serious problem with his onion field. His field lay on the coastal belt and was bordered by hills. Every time it rained heavily, soil from the hills came down the slope and washed his fertile topsoil away, dumping it into the sea that bordered his field. The soil from the hills, as well as from his fields, had large amounts of organic material, fertilizers and pesticides, all of which landed up in the sea water. So although Raj lost fertile soil, the pesticides in this soil killed the fish and other sea life affecting fishermen.

We decided to help Raj and his fellow planters by showing them how to protect their soil by covering it with a layer of unused maize stalks that were left over from the previous season's harvest, or even banana leaves or coconut leaves, if he had them in sufficient quantities. This practice, known as mulching, prevents the soil from being washed away. It also keeps the soil cool and moist and prevents weeds from growing. At the same time, it considerably slows the rate of movement of the fertilizers and pesticides downwards towards the sea. After we had demonstrated this practice to him, Raj was convinced of the benefits of this method.

Today, Raj applies a layer of maize stalks every season to protect his soil. However, he does so based on the quantity he has available. As scientists, we need to know what amount and which type of mulch should be applied in order to prevent fertilizers and pesticides from running off the land into the sea. We also need to study if other agricultural practices, e.g. ploughing the field, have an effect on this downward movement of fertilizers and pesticides. We are also monitoring the effects of the farmers' field activities on the fish catch in the nearby lagoon.

BACKGROUND OF THE PROJECT

Mauritius and its dependency island of Rodrigues have hilly topographies, and agricultural production in these regions is accompanied by problems of soil erosion, landslides, loss of agriculturally fertile topsoil, very rapid water and agrochemical runoff. In the sloped fields close to the coastal belt the situation is further aggravated by the fact that all the soil, sediment, water, pesticides and fertilizers flow into the lagoon, with serious negative impacts on fish populations and the other aquatic life. Hence, cultivation on sloping lands on or adjoining the coastal belt is poses a challenge for the farmers and the fishermen in the region.

It is therefore imperative that agricultural technologies are developed that can halt or reduce the downward flow of soil, water and agrochemicals into the lagoon, and to promote their use among farmers in these regions of Mauritius and Rodrigues. The present study has, as its ultimate aim, the development and promotion of appropriate mulching and conservation agriculture (CA) technologies that would be optimum in terms of their erosion reducing effects, and also be beneficial in terms of their other impacts on the overall health of the soil, the crop, and the terrestrial and lagoonal environment in general.

THE SCIENCE

'Mulching' is a good agricultural practice that involves laying down a thick layer of organic or inorganic material (called the 'mulch') on the surface of the soil before planting a crop. Possible mulch materials include straw, wood shavings or chippings, crops residues such as leftover maize stalks, banana leaves, sugarcane leaves, coconut leaves, and the like. Mulching has been shown to benefit the soil by keeping temperatures stable, preventing drying out, reducing erosion, keeping weeds down and thereby helping the crop to grow better. Mulching can result in higher and more stable crop yields. However, the degree of success of the mulching technology depends on the type of mulch materials used as well as the quantity of mulch applied. Moreover, it is not well known if mulching has an effect on how plants take up nutrients and water from the soil. And if it does, then which conditions have the most impact – e.g. amount of mulch applied or the quality of the mulch.

Conservation Agriculture (CA) is a farming method where the soil is not ploughed (tilled) prior to planting. This approach results in minimum mechanical disturbance to the soil, thereby reducing loss of soil moisture, reducing erosion, reducing loss of organic matter, and reducing disturbance to the soil biodiversity. While CA has been shown to be beneficial for soil health, it is not well known if it has an effect on how plants take up water and nutrients from the soil.

It has also not been established if and how mulching and CA interact with each other to cause changes to the carbon in the soil, to the organisms in the soil, and also to the greenhouse emissions from the soil.

This study aims to fill these knowledge gaps through scientific investigation and field trials. These studies are being carried out with the use of isotope-labelled fertilizer that can be detected even in very small quantities. The labelled fertilizer is applied just as a normal one, and the plant takes up the nutrients in the fertilizer in the normal way. The labelled fertilizer can then be detected in the plant with the help of sensitive instruments, and this shows how and how much of the nutrients the plant has taken up. Comparing the nutrient uptake in mulched and unmulched field plots, and in tilled and untilled field plots, will provide a better understanding of the effect of different quantities of mulch in a variety of different tillage practices on the uptake by the plant and on the final yield.

THE DEVELOPMENT OF A STAKEHOLDER ENGAGEMENT AND SCIENCE COMMUNICATION PLAN

The development of a stakeholder engagement plan began with the identification and characterisation of the different levels of stakeholders. By listing their potential interests in our research, their position vis-à-vis our research programme, and the resources of each stakeholder, we could establish how they could help us in disseminating our research results and contribute to its uptake. This exercise also included identifying the best way of informing them about the aim and objectives of our research in order to ensure their active participation and eventual adoption of the recommended technologies.

A key lesson we learnt from this exercise is that different audiences view the same problem and the same solution differently from the researchers and scientists, and require different approaches to ensure their continued acceptance and engagement in the implementation process. For this reason this case study places a lot of emphasis on the aspect of stakeholder engagement in the project.

STEP 1: IDENTIFYING STAKEHOLDERS AND THE ROLE THEY PLAY

The different stakeholders were identified and listed following a brainstorming session by the researchers and partners involved in the project. The following groups were identified as the key stakeholders: farmers and fishermen, farmer and fishing associations, agricultural extension personnel, researchers, decision/ policymakers (Ministry of Agroindustry & Food Security; Ministry of Fisheries), consumers (of agricultural produce and fish), the general public, food processors, agrochemical industry, and the media. Their categories and roles were described as follows:

Target groups: Farmers and fishermen

- In the short term, farmers and fishermen will have to use fewer pesticides and fertilizers which will result in reduced production costs;
- In the medium term, as the environment improves, so will the quality of the produce, which would then become eligible for certification as 'Organic' or 'LEISA' (Low External Input Sustainable Agriculture), and this could result in producers obtaining premium prices, or higher yields as there would also be more fish in the lagoon;
- In the long term, there would be improved soil health and increased farming productivity, and a higher income from a larger fish catch.

Beneficiaries

- Consumers and the general public will benefit from this study through being able to purchase safer foods (with fewer pesticides) and food will be more plentiful as more fish become available;
- Food processors will benefit from this project as there will be greater quantities of agricultural produce and fish available that could increase the volumes they process;
- Agricultural extension staff will benefit from better understanding of the role and science of mulching and CA and will thus be better able to advise farmers;
- Researchers may benefit from a better understanding of the role and science of mulching and CA.

Potential obstacle:

- Agrochemical industry: The adoption of mulching and CA by a large number of farmers will improve soil health and fertility; reduce the pest- and disease damage to the plants, thereby reducing the need for fertilizers and even pesticides. This may impact negatively on the sales figures of agrochemical firms, who are likely to be affected by the large scale implementation if the outcome of this project influences farmers against the use of these technologies.

STEP 2: STAKEHOLDER CHARACTERISATION

The stakeholders were characterised based on various criteria, such as the impact of the situation on them ('interest') and their potential to influence the situation significantly ('influence') (Table 6), their potential interest and involvement in the research and the resources they could contribute (Table 7), their relationship with the research institution (Table 8). This kind of analyses helped to categorise and prioritise the stakeholders and enabled better resource mobilisation and utilisation (e.g. form and frequency of communication), which was very important in view of budgetary, time and resource constraints.

Preparing the stakeholder analysis matrix allowed us to categorise the various direct and indirect beneficiaries of the project, as well as those who will be affected positively or negatively, and to better understand their level of influence on the project as well as on the technological and policy changes that the project aims to achieve.

Table 6: Stakeholder analysis matrix based on influence and interest

	High Influence	**Low Influence**
High Interest	• Extension personnel • Ministry of Agroindustry & Food Security • Ministry of Fisheries • Farmer associations	• Individual farmers and fishermen • Fishing associations • Researchers •
Low Interest	• Media • Agrochemical suppliers	• Food processors • Consumers • General public

As we saw from the matrix, our obvious main stakeholder was the farming community, given that the farmers would be the ones to adopt and apply the technologies in their fields. However, the small number of individual farmers who formed part of the project, although having major importance, was unlikely to bring about major change unless all or at least a large part of the farmers adopted the technologies. The farming association, on the other hand, was likely to have a much greater influence on its members, through their various activities, monthly meetings, annual general assembly, among other activities. Given the location (on the coastal belt) and sloping topography of their land, the farmers' agronomic activities would inevitably impact on the adjoining lagoonal ecosystem and thereby on the fish catch of the fishermen. But the fishermen had practically no voice or say in this situation, being totally unable to prove that the present farming practices were responsible for their declining fish catch.

The extension officers would have the important responsibility of disseminating our research results correctly and as widely as possible, in order to ensure that a large number of farmers adopt our technologies and use them appropriately. Hence it was necessary that they were well versed in the technologies recommended and understand its science sufficiently to be able to explain its application to the farmers. With the support of the decision-makers and policymakers, the technologies could be incorporated in the official technical guide provided to farmers for the growing of specific crops.

We argue that other researchers would not have a strong direct influence on this particular project; however, they could build on our results and conduct more in-depth studies to advance knowledge in this field even further.

The agrochemical firms were likely to play a negative role in this scenario, given the potential impact of the research uptake should it result in lower sales of pesticides. The media, while not being impacted in any way, would have a major role to play in the extent of the dissemination and adoption of the technology. The consumers, on the other hand, would have little direct influence in the short and medium term, but if the media were effective in information dissemination, the consumer could have a higher influence on farmer's practices through their consumption patterns and the resulting market demand.

All this indicated the need to develop tailor-made strategies for the participation of, and communication with, each category of stakeholder.

Table 7: Stakeholder analysis based on interest and involvement

Stakeholder	*Stakeholder's (potential) interest in the research*	*Stakeholder resources that can help in disseminating research/ planning for its uptake*	Speed of resource mobilisation	Stakeholder's involvement in project
Farmers	End-user	Formal farmer associations; Informal farmer groups	Quickly	End-user
Fishermen	Impact on fish catch	Formal fishing associations; Informal fishing groups	Depends on the impact on their fishing activities	Beneficiary
Extension Officers	Advising farmers	Well-organised structure with good facilities for advising and educating farmers	Quickly	Beneficiary
Researchers	Publishing scientific papers	Publications, presentations	Intermediate	Data generation and technology development
Agrochemical Industry	Negative effect on business	Trained salespersons and advisory logistics	Depends on the impact on their business	Potential obstacle
Food Processors	Product Quality	Feedback to farmers/suppliers and decision-makers	Slowly	Beneficiary
Decision-makers	Health of the Population and the Environment	Meetings, seminars with relevant stakeholders	Intermediate	Facilitator
Consumers	Quality of food	Feedback	Slowly	Beneficiary
Media	Material for stories/ news	Newspapers, radio, TV	Quickly	Facilitator

Table 7 only provided the list of stakeholders and indicated their level of importance and influence. We now go a step further and put forward out analysis of exactly how each stakeholder would be impacted by our research, and the nature of their involvement. We developed a stakeholder analysis based on their interest and involvement, and also included the resources each stakeholder could contribute to the project and whether it was possible to tap into these resources within the project timeframe.

This was very helpful for identifying the strengths and weaknesses of each stakeholder in terms of resource availability for dissemination. Moreover, it enabled us to develop a participation plan that would draw on the strengths of each stakeholder, thereby bridging the gaps in each other. Considering all the resources available, we were able to develop a communication plan that covered all the feasible pathways appropriate to the participants of a research project of this nature.

Table 8: Stakeholder role and relationships

Stakeholder	**Role**	**Stakeholder relationship with the /UoM**	**Their expectation from the research/UoM**
Farmers	End-user	As end-user of UoM research. UoM provides training to farmers	Scientific and technical advice and demonstration
Extension Officers	Advisory	As intermediary between UoM and farmers. UoM provides training to Extension Officers.	Scientific and technical advice and demonstration
Decision- and Policymakers	Regulatory body	UoM provides expert advice and training. Policymakers look to UoM for research-based evidence to underpin policy	Technical reports, policy briefs, and advice
Agrochemical industry	Sellers of fertilizers and pesticides to farmers	UoM provides training and expertise Industry looks to UoM for validation of technologies imported by the agrochemical industry	No negative impact on their sales figures
Consumers	Impacted Group	UoM helps to conducts awareness raising Consumers look to UoM for expert advice	Scientific and technical advice

While it is good to conduct stakeholder analysis, and develop theoretical participation and communication plans on paper, the actual implementation of the plans and their success thereafter depends considerably on the credibility of the researchers, and the trust placed in them by the stakeholders. It was therefore important for us to gauge the perceptions of the various groups of stakeholders about the researchers and the research institution. We did this through informal talks and interviews with individuals and in some cases (e.g. farming and fishing associations) through focus group meetings. Their response was highly reassuring, since they perceive the University as a good and credible teaching and research institution, and this means they are more likely to listen to us, to partner with us, to accept our advice and to follow our recommendations.

We also asked them about their expectations from us and the project, and this also helped us to decide how we would disseminate our results to them. For instance, it would be important to reassure the agrochemical industry, and point out the opportunities our research could present to them in terms of new products and services they could develop for the farming community. The decision and policymakers expected us to provide policy briefs, technical reports and advice when they felt it necessary.

STEP 3: STAKEHOLDER PARTICIPATION AND COMMUNICATION OBJECTIVES

Once characterised, the next step was to ensure that stakeholders would respond positively towards the research. This involved opening appropriate channels of communication and developing messages that were suitably tailored for each category of stakeholder to communicate the research objectives and the results correctly, in a form that was easily comprehensible and acceptable to the receiver, and that would stimulate the start of the uptake process. This was done by defining the objectives of the communication with each stakeholder and their expected response (Table 1.4).

Table 9: Objectives to achieve for expected response for key stakeholders

Stakeholder	Objectives to achieve for stakeholder	Key messages to stakeholder
Farmers	Need to use mulching and no-till technologies as normal agricultural practice	Change conventional agricultural practices to more environmentally-friendly ones such as mulching and no-tillage.
Extension Officers	Need to train and educate all farmers on the correct use and important benefits of mulching and no-tillage	Ensure implementation of mulching and no-till recommendations by all farmers; Conversion of all farmers towards more sustainable agriculture
Decision-makers	In the short and medium term, need to provide incentives to encourage adoption of mulching and no-till technologies; In the long term, need to introduce regulations to enforce mulching and no-till technologies	Improve agricultural productivity and food security; Improve in soil health and fertility, and ensure sustainable land management
Consumers	Need to provide feedback to farmers and decision-makers on food quality	Help to reduce chemical residues in food and improve food quality

STEP 4: DEVELOPING A SCIENCE COMMUNICATION PLAN

The discussions, brainstorming and the development of the stakeholder analysis and engagement plans gave us a better understanding of the profile of each stakeholder, their interests and potential level of participation in and commitment to the research project, and the need for appropriate communication strategies. The next step in the process was to develop and implement an appropriate science communication plan based on all the information gathered, and the need to reach out to all the key stakeholders effectively and efficiently.

We had another brainstorming session with all the partners to list the possible forms of communication that we could use to disseminate the research results and to raise their awareness of the need to adopt sustainable agricultural technologies. The appropriateness and possible efficacy of the various forms of communication for each stakeholder group was determined (Table 10). An attempt was made to ensure that the key stakeholders identified as having high levels of importance and influence could be reached through a multitude of approaches for maximum coverage and a longer-lasting effect. The different ways in which stakeholders normally communicate with each other were also discussed and analysed (Table 11). Based on all these analyses and gathered information, a communication plan was developed (Table 12).

Table 10: Forms of communication appropriate for each stakeholder group

Form of Communication	Stakeholder Group							
	Farmers	Fishermen	Farming and Fishing Associations	Extension Officers	Researchers	Decision makers	Media	Consumers
Stakeholders website			X	X	X			
Research Journals				X	X			
Meetings/ Presentations/ Workshops	X	X	X	X	X	X	X	
Policy brief					X	X	X	
Scientific Conferences/ Seminars				X	X			
Social network								X
Media	X	X	X	X	X	X	X	X
Field Demonstration	X			X	X		X	

Given that several farming and fishing associations have organisational websites, these platforms will be used to upload briefs, articles, and other informational material for their members to consult. Of course, this would be done through their website administrators. Since a sample of farmers and fishermen were directly involved in the project, some of these people would be persuaded to write about their own perceptions, experiences and lessons learnt from the project, and upload this on the website. We expect that this would be more interesting and helpful to the farming and fishing community than our talks and presentations. Similarly, the extension services webpage of the Ministry of Agroindustry and Food Security would be used to disseminate our research findings. Permission for this would have to be sought from the appropriate authority. The website of University represents the easiest online platform not only for dissemination of our work, but also as an interactive, conversational forum, that would enable us to respond to the questions and comments of any stakeholder.

Publishing findings in research journals is the standard communication format for researchers, and one that other researchers and extension officers commonly use to get more scientific, up-to-date knowledge on any topic.

We also decided that we would organise meetings with each category of stakeholder separately to explain the research findings and the science behind it. The form of the meeting (formal or informal), the venue (at University of Mauritius, in the farmers' fields, or in the community centre, etc.), the language used (English, French or the local creole), the level of complexity (simple, layperson terms for the policymaker, or more applied rather than scientific, etc.) would be tailored for each group of stakeholder.

Later in the project, policy briefs would be prepared for the policymakers. These would be short articles explaining the problem, the background, our recommendations, and the potential benefits of their implementation to the farming and fishing community, to the consumers, and to the environment in general. We would also indicate how our research would help the country meet its international obligations, e.g. the MDGs (and soon the SDGs), reduction in greenhouse gas emissions, e.g. from nitrogenous fertilizers (an obligation under the United Nations Framework Convention on Climate Change).

The University regularly organises scientific conferences and research seminars for academics and researchers from universities and research institutions. These fora represent useful platforms for dissemination and discussion of ongoing and completed technical and scientific projects, and other issues pertinent to the country. A two-day National Scientific Conference on Agriculture, Life and Ocean Studies is will be held later this year, and a presentation on the findings of this project is scheduled.

Demonstration plots are an inherent part of the project. We use one or more farmers' fields to demonstrate the technologies to the farmers that form part of the project.

The Faculty of Agriculture has its own blog where news, snippets of interesting information, experiences are shared among the bloggers, which includes the past and present students of the University, all past and present staff as well as many other stakeholders. The blog is regularly used to broadcast news and events, short articles of agricultural interest, interviews, comments, pictures and photos. Information about the project

and its findings and recommendations will be put up on the blog, and is expected to stimulate interesting online discussions.

The various forms of popular media will be used, namely TV shows and/or debates, radio interviews, newspaper and magazine articles, which are expected to reach the different categories of stakeholders. Visits to the demonstration plots could also be organised for extension officers, researchers and even the media to help them better understand the project and to contribute to its use and dissemination for a larger audience (to other farmers, in the case of extension officers, and to consumers and the general public, in the case of the media).

Table 11 Different communication activities used by different stakeholders

Farmers	Extension officers	Agrochemical industry	Policy makers	Consumers	Media
Group discussions in formal and informal forums; Letters to policymakers (usually through their associations); phone calls to extension officers.	One-to-one and focus group meetings with farmers; Scientific/ technical presentations; Reports; Short training courses for farmers.	One-to-one and focus group meetings with farmers; Meetings with policymakers for lobbying.	Meetings; Strategy and Action Plans; Reports; press releases; press conferences; media interviews.	Letters; Reports; Formal/informal meetings; Articles in media.	Press briefs/ releases, Newspaper and magazines articles, Radio interviews, TV shows.

This table helped us to understand the most common and popular method of communication used by our identified stakeholders. Farmers communicated best when in a group, whether a formal organised group such as a meeting of the farming association, or informal gatherings in the pub or under a tree. We therefore adopted the same approach for communicating with them. We found that an “apparently” informal noon meeting, with a light lunch provided, was the best way to attract a large number of farmers, who were then more open to our talk and suggestions, partly since the lunch break did not take them away from their fields for an additional length of time, and partly due to the free lunch.

Extension officers communicated with their ‘clients’ (the farmers) either on a one-to-one basis or in formal meetings. They also prepared scientific publications, annual reports, technical bulletins, etc. for information to other relevant departments of the Ministry as well as for researchers. The Extension Services also conducted short training courses for farmers. By convincing them of the soundness of our technologies, we would ensure that they would be more likely to include our recommendations in these various publications and also in the syllabi of their training courses.

The agrochemical firms normally meet with farmers individually to convince them to purchase their products. They also meet policymakers to lobby for policy decisions in favour of their products. In addition to our own direct interaction with the agrochemical salespersons, we hoped to persuade them through the farmers and policymakers, by convincing the latter stakeholders of our technologies.

Policymakers normally communicate their decisions through publication of strategy and action plans which are made available on their website, and also in the form of newspaper interviews, TV/radio programmes, and press conferences/press briefs. Being part of the team of experts that contribute to the development of the strategy and action plans would help us ensure that these recommendations were included in these national development plans.

It would be difficult for us to engage directly with consumers as part of this project, but hoped to reach them indirectly through the popular media.

Interaction with the media is fairly simple and easily done through radio/TV shows/interviews, press releases, press conferences, etc. and also by inviting media reporters and journalists to our various research seminars and conferences. This would be done for the forthcoming national conference and through press releases at a later stage in the project.

Table 12: Developed communication plan

Activity	Audiences	Responsible/ Lead person	Timelines	Cost (Euro)
Demonstration plots and meetings	Farmers and Extension Officers Media	BL and SF	Ongoing on seasonal basis since Jan 2012	8,000
Production of technical and progress reports	Researchers	BL	6-monthly between Jan 2012 and Dec 2016	500
Development of policy briefs	Decision-makers	BL and SF	2 in 2016	500
Press releases	Consumers and general public through the media (the science pages in newspapers)	BL and SF	1 in 2015 and 1 in 2016	2,000
Publications in peer-reviewed journals	Researchers, extension officers	SF	2 between May 2014 and May 2016	1,000
Scientific conferences/ Seminar/ workshop	Researchers, Extension officers, Decision-makers, Media	BL and SF	1 each in 2014, 2015 and 2016	7,500
Talks, short training courses	Farmers, fishermen, decision-makers, consumers, food processors	BL and SF	1 each in 2014, 2015 and 2016	3,000
Development of a link on the UoM website. **Social media (the existing Faculty of Agriculture blog managed by the Faculty)**	Farming and fishing associations, extension service, researchers, decision-makers, consumers, food processor, general public	BL with the help of ICT Dept. of UoM	By August 2015	300
Media support:				
Articles in the science pages of newspapers/ practitioner magazines,	Farmers, farming and fishing associations, extension service, researchers, decision-makers, consumers, general public	BL and SF	1 each in 2014, 2015 and 2016	0
Press releases	Consumers and general public	BL and SF	1 in 2015 and 1 in 2016	0
Video	Farmers, farming and fishing associations, extension service, researchers, decision-makers	BL and SF	1 in 2016	2,000
Talks on radio and TV in the monthly programme for farmers	Farmers, farming and fishing associations, consumers and general public	BL	1 on radio and 1 on TV in 2016	0

Different activities were proposed, with greater emphasis being placed on the key stakeholder, namely the farmers, who would adopt and apply the technologies recommended. The extension personnel represent another key stakeholder, as they will ensure the continued dissemination of the technologies and convince a greater number of farmers to adopt the technologies.

Given that farming practices are dictated by public demand (and also by food processors for a certain category of farmers) for quality vegetables and fruit, the consumer and food manufacturers also need to be sufficiently sensitised about the production aspects of produce. The media plays an important role in reaching these two groups of stakeholders. Validation of results will be assured through peer-reviewing in national and international scientific journals, and presentation at conferences. Policy briefs are important to get the message across to decision-makers, who do not have sufficient time to read or understand highly technical or detailed reports of scientific journal papers, or even technical articles in the press. A short, succinct policy brief written in simple, easy-to-understand lay terms, giving the main crux of the message with sufficient justification and evidence, is the best way to communicate with policymakers.

The communication plan also specified the person responsible for each proposed activity, as did the timeline and budgetary requirements (Table 1.7).

STEP 5: IMPLEMENTING THE PLAN AND TRACKING PROGRESS

While it was important to develop a communication plan, it was equally critical to make sure that the plan was fully and effectively implemented. A series of key performance, objectively verifiable indicators were developed in order to ensure the correct and timely implementation of the communication plan (Table 13).

Table 13: Monitoring and evaluation of the developed communication plan

	During Project Implementation	After Completion of Project
Indicators	• Scientific papers published in peer review journals; • Technical bulletins and articles published in farmer practitioner magazines; • Number of meetings with stakeholders; • Reports prepared for national and funding bodies; • Number of media communications (newspaper articles, radio/TV programmes, etc.; • Feedback received from various stakeholders, e.g. through the developed websites and social media.	• Technology included in national extension guides; • Adoption of mulching by farmers; • Scientific papers published in peer review journals; • Technical bulletins and articles published in farmer practitioner magazines; • Number of meetings with stakeholders; • Reports prepared for national and funding bodies; • Number of articles and press releases published in newspapers and practitioner magazines, , number of times the radio/TV programmes are broadcast, etc.; • Feedback received from various stakeholders, e.g. through online newspaper websites and the Faculty of Agriculture blog.

The activities are being implemented more or less on schedule:

- Field demonstration plots have been set up in farmers' fields in Mauritius and Rodrigues. Regular meetings with farmers are held to update them about the project and to share the results with them. These meetings also enable us to get feedback from the farmers on the various aspects of the project and the technologies they are using.
- Since the projects are being funded by international donor agencies, the technical and progress reports are prepared and submitted as per their specified schedules.
- A national scientific conference is being organised for later this year (2014) to celebrate the centenary of the Faculty of Agriculture. This forum will be used to present a scientific paper and disseminate the results and the experiences we have had with the farmers. This forum will also include extension officers, fellow researchers and media, and represents a good forum for disseminating our research findings.
- A series of five short training courses were conducted on Rodrigues for farmers and extension officers during 2014 on the different technologies recommended, and the benefits of their adoption. The farmers were very enthusiastic and open to our recommendations, and willing to try them in their respective fields. Moreover, the local radio interviewed BL about the aim, objectives of the training, and the project in general. This helped raise awareness of the project and resulted in attracting more farmers to subsequent training sessions. The training was also extended to extension officers, and the overall response of the farmers and the extension officers was very positive. When we went over to Rodrigues for the 4th and 5th course, we were very happy to see that several of our suggestions on mulching had already been implemented by some of the participants from the earlier courses. We saw a similar response among the farmers in Mauritius too, with several farmers, not only adopting our advice, but going a step further, e.g. using old household textiles as a mulch instead of the banana and coconut mulch we had recommended, with fairly good results.

CONCLUSION: WHAT WE LEARNT REGARDING COMMUNICATION

All the stakeholders identified have their respective roles and positions, and all are catered for in terms of the type, form and frequency of communication. However, the farming community remains the key stakeholder that needs to be convinced and converted to adopt the recommended farming technologies. Hence, the communication has to be developed in a way that is not only easy to understand, but is sufficiently compelling to encourage them to change their present farming practices.

As scientists and researchers, we could explain the science and technology, but there were other considerations that needed to be taken into account, in particular certain human foibles, such as selfishness, jealousy and egoism, with some farmers not wishing to share the resources given to them as part of the project with their peers, and others not wishing to share their experiences or sometimes even knowledge of the project.

We learnt that the communication and uptake could be better assured by linking it to a monetary incentive (a certain sum given for every new farmer participant brought into the project). We learnt that while different people need different types of incentives, financial reward remains the main and the most long-lasting of all possible incentives for most people. Other incentives include the sense of importance they get within the community at being our contact person, or other tangible or intangible benefits they may get, or expect to get, from us as researchers. Some tangible incentives we provided to the farmers directly involved with us in the project included farm inputs, farm implements, tools and equipment, a 4x4 field vehicle, seeds, compost, fertilizers, and pesticides. While many farmers appreciated this, some preferred getting cash. In Rodrigues, we paid the participants' transportation costs for the first day of the course in order to encourage them to attend the training. Thereafter, their interest was sufficiently raised and they attended the rest of the course without this monetary incentive. One key farmer perceived us as academics as being useful to her for other projects she wished to work on, and was therefore fully cooperative and willing to adopt our recommendations on this project.

Although we had some leeway in this particular project in that we were able to provide monetary incentives to stakeholders, this is understandably a difficult issue in other projects. One option would be to build this factor into the project budget upfront (to a reasonable extent), or to try to get additional sponsors for this aspect alone (e.g. service providers that would benefit from the adoption of the technologies), or to explore in-kind, non-cash incentives appropriate to the particular category of stakeholder.

CASE STUDY 2: SAVING LIVES OF CHILDREN WITH PROPER MALARIA RAPID DIAGNOSTIC TESTS

Kakozi was a 3-year-old girl who was living in Kazo, a village of Uganda where malaria is quite common. When she got fever in January of this year, she was brought to a health centre and malaria was diagnosed, based on the use of the HRP2 malaria rapid test. She was treated and cured.

One month later she got fever again. Using the same test, malaria was again diagnosed and she received antimalarial drugs. But this time she died two days later!

Unfortunately it was not malaria – the fever was due to a different illness that was never treated because of the false positive given in the malaria test result. The reason for this is that the test used gives positive malaria results for up to one month after a child has been treated for an earlier malaria infection.

We therefore wanted to understand why instead of saving lives a rapid test can actually threaten it. We were interested in understanding what alternative there is for this type of malaria rapid test.

BACKGROUND OF OUR PROJECT

Epicentre was created in 1987 by doctors from MSF (Medecins Sans Frontiers), a non-profit association and WHO (World Health Organisation) collaborating centre. Our missions include research through the design and promotion of original operational medical projects in MSF intervention settings, or similar environments, and training of MSF teams in conducting operational response. Epicentre works on the most common diseases found in Africa such as malaria, tuberculosis, HIV infection, children malnutrition, but also on diseases with epidemic potential (cholera, meningitis, measles, and haemorrhagic fevers like yellow fever, Ebola, Marburg) and others diseases (Buruli ulcer, psychological care and sleeping sickness). The research done by Epicentre aims to change policies, guidelines and practices to improve medical practice, especially in resource-limited settings and emergency medicine.

Malaria is a disease that affects mainly poor countries and is one of the key diseases that MSF and Epicentre focus on. Its diagnosis and treatment are key to solving part of this high burden on countries where resources are limited. Initially a disease for the poor and most commonly found in developing countries, globalization has resulted in malaria also becoming a concern to Western travellers when visiting countries where malaria is endemic. The millions of people who die from malaria on an annual basis has raised attention worldwide, thus the stakeholders' identification process that we went through for this study resulted in a very wide range of stakeholders across geographic and interest levels. Following the WHO recommendations, all treatment for malaria must be based on laboratory confirmation, either by microscopy or rapid test. However MSF's health workers in the field realised that certain children who test positive for malaria through the rapid test do not show clinical symptoms of malaria. This growing concern of MSF was shared with Epicentre and led to a proposal of a study to compare the time required for two types of malaria rapid test (HRP2 and pLDH) to become negative after a child has been treated and cured for malaria.

In this case study we share the planning of our pathway from completing the study in the field to the impact of research findings on the community. It is indeed a long process from the "great" scientific results up to the point to where there is a change in policy, and this includes using the right communication tools to ensure you address stakeholders in their own language.

THE SCIENCE

Malaria RDTs (rapid diagnostic tests) rely on the detection of plasmodial antigens circulating in the blood. The vast majority of RDTs currently on the market detect the histidine-rich protein II (HRP2) and/or the plasmodium lactate dehydrogenase (pLDH). The HRP2 is produced by Plasmodium falciparum and allows for the detection of this species only. The pLDH is produced by all four human malaria species (P. falciparum, P. vivax, P. Ovalae and P. malariae) and thus allows the detection of all Plasmodium spp.

We evaluated the performance of two HRP2 and one pLDH malaria (RDT) in high- and low intensity malaria-transmission settings to understand if and how much time was required to produce a negative result after parasite clearance. It is essential for clinicians to know that they can rely on the results of an RDT regardless of the level of malaria transmission. To estimate the time it takes for a test to become negative after treatment for malaria we compared the RDTs results of more than 5000 children from two settings in Uganda - Kazo (a high malaria-transmission setting) and Mbarara (a low malaria-transmission setting) - using blood smear microscopy as the gold standard. In each locality, a subgroup of 212 children who tested positive for both RDTs

and microscopy were followed-up with repeated RDTs and microscopy at a fixed interval for 42 days after their first episode of malaria.

We found that the median time it took for the tests to become negative was 35 to 42 days for the HRP2-test and 2 days for the pLDH-test¸ Specificities were 79.7% and 80.7% for the HRP2-tests and 93.9% for the pLDH-test in the low and 98.9%, 98.8% and 99.7% in the high transmission setting respectively. Sensitivities ranged from 98.4% to 99.2% for the HRP2-tests and 94.7% to 96.2% for the pLDH-test in both settings.

This shows that the so-called “HRP2” test, the test currently most frequently used, may return positive results for several weeks after the patient has been cured from the malaria infection. It therefore gives a false positive result when children who have had malaria in the previous six weeks subsequently present with a fever. This means that any fever could be misdiagnosed as malaria, and implies that some children are being treated with antimalarial drugs while suffering from different life-threatening disease such as pneumonia. The consequences are twofold: the incorrect management of fevers that could lead to death and also the overuse of antimalarial drugs which leads to drug resistance.

However a choice has to be made between using an HPR2 test with the consequence of over-treating patients, and using a pLDH-test with risk of missing malaria cases with low parasitaemia. The choice of RDT should perhaps be considered according to the transmission intensity.

THE DEVELOPMENT OF A STAKEHOLDER ENGAGEMENT AND SCIENCE COMMUNICATION PLAN

The process of developing a stakeholder engagement plan started with their identification and characterisation, which then allowed us to build a plan for communication with messages to target each stakeholder individually. The communication plan and its implementation followed this analysis. Although the process is still ongoing, there have already been promising results, including a change of policy for the management of malaria by including the pLDH.

The main lesson learnt from this process is the need to change the stakeholders’ mind-set from a research-oriented to a community-oriented perspective that would include politicians and others who may have no interest or knowledge of research but would like have reliable information for managing their communities’ interests.

STEP 1: IDENTIFYING STAKEHOLDERS AND THE ROLE THEY PLAY

The first step of the stakeholder identification process was to think about the people who asked for our study and those who could benefit from the results. It was obvious that the key stakeholders were MSF, the sponsor of our study, and also the Ministry of Health who might change their policy based on our findings. Epicentre is a WHO collaborating centre which makes the WHO an important stakeholder of almost all Epicentre studies as well.

Considering that the end-users of our research findings are critical stakeholders it was important to perform a proper analysis/identification in order to design an adequate communication plan. The second step of the analysis was therefore the identification of the beneficiaries of the research. These include countries where malaria is endemic (in Africa and Asia), public health service providers and policy specialists (hospitals, ministries, nongovernmental organisations, primary health care services, health professionals (doctors, nurses and paramedical officers), traditional healers and tourists.

To classify the stakeholders we used a 2x2 matrix interest-vs-influence grid. Based on their importance and influence we divided our stakeholders into four categories, as shown below (see Table 14).

Table 14: Identification of stakeholders

Box A: high importance/high influence	Box B: high importance/low influence
MSF WHO MoH (Minister and Ministry) Manufacturer/ distributors Peer researchers	Health workers Community Industrial companies
Box C: low importance/high influence	**Box D: low importance/low influence**
Politician (local and traditional, MP) Media National drug authority CPHL	Traditional healers

Reflecting on the analysis of stakeholders helped to broaden the spectrum of the end-users of our research findings. It was clear that it would be important to characterise them and determine the appropriate messages that would address their interests. This is a shift for researchers who usually only aim to address their peers with a single message that is understood by the research community and to add to the knowledge base rather than to have impact on the community.

STEP 2: STAKEHOLDER CHARACTERISATION

Having identified the stakeholders, we followed categorising them using a stakeholder characterisation matrix. This helped us to consider the nature of various stakeholder groups as well as their impact on the implementation of our research findings.

This exercise helped us to prioritise the stakeholder in terms of communication, especially as we had budgetary constraints.

Although the community and the patients represent the end-users, we decided not to consider them in the analysis and just to focus on the key stakeholders, including MSF (study sponsor), the WHO, the MoH, the rapid test manufacturers and distributors, politicians and the media. This analysis allowed us to clarify their potential interest in our research and also their resources that we could later use to disseminate and implement our research findings. From our analysis, it was clear that the MSF was the main stakeholder on account of their interest in the research and also their resources for disseminating the results (website, mass communication). We then had to reassess our relationship with the other stakeholders in order to define our communication approach towards them. With these roles in mind we reviewed the stakeholder interests, resources and position on our research (Table 15).

Table 15: Stakeholder characterisation

Stakeholder	What are the stakeholder's (potential) interests in your research?	What resources does the stakeholder possess that could help you in disseminating your research/ planning for its uptake?	Can those resources be mobilised quickly or slowly?	What is the stakeholder's position on your research?
MSF	Use results in field activities	Advocacy Website, blogs Scientific conference Working group	Quickly	Sponsor/ end-user
MoH/WHO	Integration of result in new policy	Policy experts Diffusion to health workers	Slowly	End-user
Manufacturer/ distributors	Feedback on their product Strategic marketing	Sponsor events Website	Quickly depending on interest	End-user

Politician	Health of population	Meeting organisation Network	Quickly depending on interest	Intermediate between us and Community
Media	Selling papers to our audiences	News paper Radio show	Quickly	Intermediate

STEP 3: STAKEHOLDER PARTICIPATION AND COMMUNICATION OBJECTIVES

The main challenge in the stakeholder analysis was to ensure that the proposed messages were in keeping with the stakeholder's roles and responsibilities as far as malaria is concerned. For example, while peer researchers who validate the integrity of our research findings would understand the scientific message, politicians may be more interested in the impact of our research on their constituency, their budget and the implications for potential re-election. The strategy thus has to be specific to each target and the communication plan as detailed as possible. The challenge here was to present the same findings in different registers: political, for humanitarian purposes, business and lay terms.

To achieve this, it was critical to first define the objectives of communication with each stakeholder, whether it was to get validation of our results from our peer researchers, or to convince the manufacturers of the risk of promoting only one type of test (HRP2). In the same way, it was important to clearly define the objectives of our study sponsor, MSF, knowing that they were interested in changing the policy on malaria management. For them, the message was how to use appropriate rapid tests for the proper management of fevers in malarial areas. The analysis and messages for stakeholders are presented in Table 16

Table 16: Stakeholders' key messages

Stakeholder	Objectives to achieve for stakeholder group	Key messages to stakeholder group
MSF	Advocate for use of pLDH at international level Change practices in the MSF missions Change supply practices towards pLDH	Issue with management of fever and diagnosis of malaria Need to change the policy Use pLDH RDT instead of HRP2 especially in high transmission settings
WHO	Recommend use of pLDH in high transmission areas Recommend replacing HRP2 RDT in high transmission areas Ensure implementation of recommendation at international level	Issue with management of fever and diagnosis of malaria Long time to become negative of HRP2 RDT (42 days) Unreliability (low specificity) of HRP2 RDT especially in high transmission settings
MoH	Change policy for malaria treatment and management of fever at national level Change practices in health facilities Chain supply/request from the health workers to ensure they request the pLDH-test	Issue with management of fever and diagnosis of malaria Misdiagnosis of malaria due to use of HRP2 RDT especially in high transmission settings High risk of mortality of children with bacterial infections diagnosed with positive malaria RDT
Politician	Ensure change of policy by lobbying Support implementation of policy in constituency Supervision of DoH on the follow-up of the implementation of new guidelines	Issue with management of fever and misdiagnosis of malaria Need to reduce death rate of children due to wrong diagnosis of malaria Use pLDH RDT, especially where malaria is common
Peer researchers	Validation of the study findings Scientific support Results sharing	Advocate for more studies on same test in adult populations Support the change from HRP2 to pLDH in their network
Manufacturers	Promotion and marketing of pLDH-test for high malaria settings Improve pLDH performance for low malaria settings	Poor performance of their HRP2 test in high malaria endemic settings Legal risk due to consequences of incorrect diagnosis of children

The main learning point from this analysis was that messages need to be tailored to their target audiences. As researchers we are used to writing academic journal articles and making presentations to the scientific community. The format of the message is usually the same and well defined by scientific journals and

conference organisers. However, here we needed to address people based in Geneva (WHO) as well as politicians based in Uganda who have many different challenges to deal with at the same time. They have to choose how to allocate limited resources and place each demand within the larger context. Such stakeholders must compromise and deal with questions related to the bottom line such as:

- If we have a limited budget what should we treat?
- Should we invest in malaria only while people are also dying of pneumonia, tuberculosis and HIV?
- What would the optimal solution be for the larger health policy environment?

This important variety of stakeholders' objectives was critical for designing the communication plan.

STEP 4: DEVELOPING A SCIENCE COMMUNICATION PLAN

Realising that none of our keys stakeholders identified are part of our scientific community highlighted the necessity to reach out to them. The identification of the area of influence and a better understanding of their objectives helped us to design our communication plan (Table 17). Indeed, the plan involved contacting several people and institutions around the world. Time and budget were the main constraints, so it was important to carefully plan and prioritise activities, defining tasks and considering the resources (expertise, time, money, and infrastructure).

The communication plan was to follow the process of validation, dissemination and discussion. However, the three steps did not follow each other chronologically but were undertaken more or less at the same time, although the validation came first. There were two possible ways of obtaining scientific validation of our results by our peer researchers: either by publication in a peer-reviewed journal or by presenting at scientific conferences. The next step is to disseminate the findings. This has to start with the sponsor of the study, in our case MSF, and then the main end-users - the Ministry of Health and WHO.

As our objectives were to changes policies and guidelines it was critical to involve the politicians who would be able to enact legislation and support the MoH management. Considering that politicians are also leaders of their communities, we decided to address both the politicians and communities by means of popular media, the newspaper. Again this exercise of planning was interesting as we had to define the time frame, the person involved in the process, and most importantly, the budget. The latter was challenging because research budgets generally do not include the funding for communicating the results. However, this plan was useful for adjusting the budget before it was finalised.

This was another great lesson learnt in terms of planning research: start with the end in mind. From the beginning we needed to know who would benefit from our findings and how we would reach them. Although science of communication is usually not part of the research plan, this exercise showed how critical it is if one wants to have an impact on the community where the research is being done.

The following table outlines the detailed communication plan that we developed for our programme:

Table 17: Communication plan

Activity / tasks	Audiences	Responsible lead person / team	Time frame / deadlines	Cost in USD
Resources				
International Scientific conférence	Researchers, WHO, distributors, MSF	FG YB	Epicentre France June 2013	
Oct 2013 (MIM South Africa)	2000 USD			
5000 USD				
Publication in peer review journal (could be used as press release)	Researchers	FG	February- March 2014	2000
Production of report	MSF WHO MoH	FG YB JAM	February- March 2014	200
Dissemination to MSF	Medical doctors, researchers	FG JFE YB	Ongoing since Oct 2013	Free
Dissemination to MoH				
Meeting/workshop / conferences which each department	Medical doctor, lab professional, policymakers, logisticians	YB, DN, JAM	Started with scientific conferences in Uganda (UMLTA, MUST, Epicentre Day)	200
Dissemination to WHO	Policymakers, researchers, medical practitioners	EB, JFE, YB, FG	June 2014	1000

Contact politicians	DHO, Minister of Health, LC	YB JAM	Starting in December with Epicentre Day in Uganda	200
Disseminate result in websites	Entire population, researchers, medical practitioners	AN, FG, YB	February- March 2014	FREE
Disseminate results in newspaper, radio	General population, politicians	YB, JAM, SB	February- March 2014	500
Malaria day event (press release)	Community, politicians, entire population		25 April 2014	1500

As for both the intervention and activities, we also drew up an assessment plan to see how the research and communication would have an impact. The process of the evaluation is presented in Table 18. The first part of the evaluation was the definition of indicators (SMART) specific to our intervention, measurable, achievable, relevant to our stakeholders and time-bound. Although the process is ongoing, we already have some indicators. For example, the study was sponsored by MSF and therefore the priority was the report given to them and the subsequent change in their practice in the field. As mentioned earlier the MoH was also a key stakeholder. Therefore the meeting with their official was an indicator of means, while the change of policy is an indicator of results.

Several meeting have taken place and the new malaria policy is being completed with changes in line with our findings, for example, to use the pLDLH rapid test in the tests recommended for diagnosis of malaria. The scientific validation has started with presentation at several international conferences, while the process of peer review is ongoing.

Table 18: Impact assessment plan

	Activities	Status
During	• Presentation in international conference • Paper published in peer review journal • MSF lobby activity at national and international level • Number of meeting with stakeholders • Report sent (MSF, WHO, MoH…) • Meeting taken place (MSF, WHO, MoH, Politician) • Communication ongoing (website, newspaper, radio) • Follow-up meetings with stakeholders • Meeting outcomes • Evaluation of quality of communication during process (ask feedback after every meeting/support).	• Done • Manuscript done and submission ongoing • Not yet • Done • Ongoing • Done • Ongoing • • Press release during Malaria day
After	• Number of meeting with stakeholders • Use of pLDH tests in MSF field • Recommendation from WHO • Change in national policy/guidelines with integration of pLDH-test (Uganda mainly) • Change in practice by evaluating in the field the use of pLDH Vs HRP2 (Uganda mainly)	• Not done • Ongoing • Not yet • Ongoing • • Not yet

STEP 5: IMPLEMENTING THE PLAN AND TRACKING PROGRESS

After completing the analysis of stakeholders and developing a communication plan we initiated the implementation process. Key activities that we embarked on included:

- The sponsor MSF received the report that resulted from our study and participated in the writing of a scientific paper, which is been submitted to a peer-reviewed journal for consideration.
- Our scientific peers were engaged with and informed regarding outcomes of our research through a series of scientific presentation at conferences (the annual meeting of Uganda Paediatric Association in Kampala, Uganda July 2012, 6th MIM Pan-African Malaria Conference in Cape Town Oct 2013, the Uganda Medical Laboratory Technology Association in Mbarara, Uganda November 2013, the 3rd African Epidemiology Con-

ference in Yaoundé, Cameroon June 2014, Epicentre Scientific Day in Paris, France June 2013 and June 2014).

We also had an opportunity to launch a media release for World Malaria Day 2014. Here we found that the actual implementation of the plan needed extra skills and competencies. We prepared a press release based on our study and that was published in the newspaper in Uganda (Newvision) that has the largest circulation figures. This required the support of a specialist science communication expert (Marina Joubert), who helped to prepare a message that would address the community and politicians (Figure 2.1). Newspapers are the key source of information in Uganda, more so than any other media, and this was an interesting moment of our communication.

After contacting the Newvision editor and agreeing on the terms and condition of the press release, the actual writing was a bit more complex. The battle between the researchers and their scientific message and the communication specialist was the main challenge. A key question we were required to answer was how to touch the reader without compromising the scientific integrity. After a number of back-and-forth versions of the press release, it was published on Malaria Day 25 April 2014.

In the release we tried to share our story with the community while emphasising the challenges of malaria and its diagnosis and the alternatives. Therefore, the first part was dedicated to the story and the research findings, and the second was giving more fact on the burden of malaria. The feedback and reaction from this article was really interesting. First of all, the staff from our research institution responded via email and sent messages of appreciation for being part of the project and an outcome that was reaching the entire country. A second group of stakeholders reached were lay people who learnt about the work of the Epicentre. Also, last but not least, positive feedback was received from some members of the MoH, our key target audience in the country. This reinforced our message and built upon the previous meeting we had with them and helped to give them more confidence in our research findings.

We also completed a range of presentations to representatives of the Ministry of Health in charge of the Malaria programme. We presented our results to several stakeholders in the MoH and were invited to contribute to the new Uganda malaria control policy. The policy has now been adjusted to include the use of pLDH rapid test as a confirmatory test prior to malaria treatment.

Moreover, we had some discussion with radio media (Radiowest) following a UMLTA conference in November 2013. An interview with Dr Yap and Dr Juliet on malaria, its diagnosis and treatment was done both in English and Ryunankole, the local language. Radiowest covers the South-western region of Uganda, which includes Mbarara where our research centre is located. It was an interesting moment as it required (like for the discussion with politician) to find simple words to explain science to lay people.

Figure 2: Article prepared for the Newvision newspaper (Please go to http://www.drussa.net/getfile.php?id=2559 to download this document)

CONCLUSION: WHAT WE LEARNT ABOUT COMMUNICATION

Reflecting on our key learning point of communicating with an intelligent, lay audience is that the message addressed to the community must be specific. The scientific message has to be “translated” into a language that will be understood by a lay audience in order to ensure it reaches its target. It was a very interesting experience of re-thinking how we explain our work, and it was definitely more challenging than communicating with peer researchers.

The most important difference was to consider the implications of the research, rather than the actual results. As researchers we are interested in the facts. The HRP2 RDT stays positive for up to 42 days after proper malaria treatment and we described the sensitivity and specificity of the test. However, lay audiences are interested on the impact of the findings and how it might affect them. That means asking the question “so what?”. So we had to point out to the politicians (or decision-makers) that the use of a RDT that remains positive for an extended period would lead to the overuse of antimalarial drugs. The implication of this is that it would be possible for them to significantly reduce their budget for antimalarial drugs just by using an RDT that was appropriate to the locality. Secondly, children treated with antimalarial drugs while suffering from another life-threatening disease will die. People from their country or district will die because of the use of an inappropriate RDT. In other words, by using the appropriate RDT, which is similarly priced to the other test, lives would be saved and there would be a cost saving too. When communicated in this way, politicians would be interested in our findings. Thus the relevance of the findings for each specific target audience must be clear for successful communication to take place.

In this way, we learnt to change our frame of reference and become part of the community once again.

Kakozi could have been alive today! Based on research we now know that there is a pLDH-test does not give wrong results after 3 days and which does not cost more. That is why we (MSF/Epicentre researchers who performed this research for years) recommend that doctors make use of the pLDH malaria rapid test if a child has a fever, especially in villages where malaria is common.

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