Food and Water for Millions
Participatory Communication for Land and Water Management

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Food and Water for Millions
Participatory Communication for Land and Water Management

Edited by Annie Mear
Montréal, Canada
2005

A Publication Funded by
the International Development Research Centre
Ottawa, Canada

In memory of Yacouba Konate
who passed away during
the preparation of this publication.
A. M.
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Acknowledgements

Editing a book provides a welcomed opportunity to thank the many collaborators. My first debt of course is to the ten authors who shared their experiences with me. Their generosity and patience made my work a very pleasant learning experience. My exchanges with them helped give shape to the idea that participatory communication strategies can empower rural communities in Africa and the Middle East to manage their land and water resources efficiently in the face of adversity.

This publication is the outcome of a roundtable entitled Participatory Communication for Natural Resource Management in Africa and the Middle East. The roundtable, which took place in Barcelona in July 2002, was funded by the International Development Research Centre (IDRC) of Canada. The ten authors who contributed a chapter to this publication were all invited to the roundtable to present their respective research projects. Each of the research projects applied some form of a participatory communication approach to enable the rural populations in their respective countries to manage their own land and water resources. The ten projects were all, at least partially, funded by IDRC which is to be commended for its progressive vision of development.

The ten contributors to this publication invited by IDRC to the roundtable were: Fadel DIAME from the West Africa Rural Foundation in Dakar, Senegal; Malalyn DIATTA and Safietou FALL from the Senegalese Institute for Agricultural Research in Dakar, Senegal; Nlombi KIBI from the University of Ouagadougou in Ouagadougou, Burkina Faso; Yacoubia KONATE from the Permanent Interstate Committee for Drought Control in the Sahel in Ouagadougou, Burkina Faso; Drake MUBIRU from the National Agricultural Research Organization in Ntebbe, Uganda; Amadou NDIANG from the International Centre for Research in Agro-Forestry in Bamako, Mali; Souleymane OUATTARA from the African Journalists for Development Network in Ouagadougou, Burkina Faso; Charles QUANSAH, from the International Water Management Institute, in Kumasi, Ghana; Rami ZURAYK from the American University of Beirut, in Beirut, Lebanon.

To all of them, my deepest gratitude for the stimulating presentations and the lively discussions, which are now recorded in this book.

I would also like to express my warmest thanks to Guy Bessette, Olanrewaju Smith and Luis Navarro at IDRC. All three of them were instrumental in promoting the roundtable. I owe a special debt of gratitude to Guy Bessette who championed the project from beginning to end. His tireless collaboration made this publication possible.

A number of other people at IDRC, the University of Montreal and the International Association for Media and Communication Research (IAMCR) contributed either directly or indirectly to the success of this enterprise: Karen Trebert and Rachel Bouchard at IDRC; Myriam Amzallag at the University of Montreal; Frank Morgan, Thomas Jacobson, Anders Hansen and Rita Mastromonaco at IAMCR. Many thanks also to Lucie Brunel who tended to the final incarnation of this publication. Finally, I give special thanks to Tricia Bell for her patience and dedication through the numerous revisions of this book.

Montréal, Canada
May 2005
Foreword

Participatory Research and Communication in Natural Resource Management

Unless people themselves are the driving force of their own development, no amount of investment or provision of technology and inputs will bring about any lasting improvements in their living standards.

(Jacques Diouf, Director-General, FAO, 1994)

Participatory Research and Communication

During the last 25 years, the evolution in the concepts of development and development research has put participation up-front. But the concepts of participatory research and participatory communication still need to be fully implemented in the field.

This is particularly true in the field of natural resource management. Some researchers and practitioners alike believe they are using a participatory approach when community groups are involved in different activities such as information collection, experimentation of techniques, or dissemination. In such situations, the researcher drives the process from the outside and produces research results out of it. But participation demands more: it asks for involvement in the decision-making process. It seeks to put community members first, with the researcher as the facilitator of such a process.

Such a communication process includes objectives related to a) increasing the community knowledge-base (both indigenous and modern); b) changing common practices related to water use and soil treatment, in order to manage natural resources more efficiently; c) building and reinforcing the community asset base; d) approaching local and national authorities, policy makers and service providers.

New Roles for Stakeholders

This evolution from a top-down transfer of messages by agricultural technicians to farmers, and a one-way design of natural resource management research by researchers, to a social process integrating these two dimensions of participatory research
and communication and bringing all stakeholders in a multi-way sharing of knowledge and intentions supposes new roles for everyone involved in the process.

First, this dimension of participatory research and communication introduces a new role for the researcher or for the practitioner: the role of a communication actor. It demands establishing a dialogue between researchers, community members, and all other stakeholders involved: development practitioners active in the community, local and national policy-makers, etc. It also means engaging local people in the process of conceiving, planning, implementing and evaluating a natural resource management initiative. Finally, it also demands a link with the process at work at the community level to the policy-making or policy-implementing level as well as the dissemination of results to various categories of stakeholders.

Members of research teams need to be able to work within a framework of participatory research, to use communication tools and strategies to facilitate participation and to promote the utilization of research results. Local communities also need to develop their capacity to participate in the identification of natural resource management problems and potential solutions as well as in the participatory research process itself. For this to happen, they also need to build skills of consensus-building and collective action.

For development practitioners or other stakeholders such as local media or resource persons associated with such efforts, there is also the need to develop their own capacity to engage in a participatory research process. Finally, decision-makers at various levels must be open to understand the needs of local communities, to be informed of their on-going initiatives to cope with natural resource management problems and to identify how they could support such a process.

Challenges for Natural Resource Management Researchers and Practitioners

There are absolutely no recipes with participatory research and communication. Of course there are conceptual and methodological tools as well as various techniques that can be utilized. But as each context is different, the way ahead will also be different. The process also demands a change of attitudes from researchers and practitioners as well as the learning of new roles. Finally, communities and other stakeholders, who have not been engaged before in such a process, must also learn participation. It is a new culture of inter-engaging with different stakeholders, who each have their own interests and perceptions, not to mention different social and political status.

The process of participatory research and communication is not easy and certainly not automatic. Readers will see in the different case studies presented in this publication that researchers and practitioners alike are trying hard to learn the process of participatory research and communication and to put it in practice. How can researchers and practitioners improve communication with local communities and other stakeholders? How can two-way communication enhance community participation in research and development initiatives and improve the capacity of communities to participate in the management of their natural resources? How can researchers, community members and development practitioners improve their ability to effectively reach policy-makers and promote change?

In addressing those questions, these case studies should help research teams, community groups, governmental services, and development organizations active in the field of environment and natural resource management to improve effective two-way communication, as well as participatory research processes with local communities and other stakeholders.

Guy Bessette
International Development Research Centre (Canada)
Food and Water for Millions  
The Attainable Dream

Annie Mear  
Université de Montréal  
Montréal, Canada

Abstract

This chapter provides an overview of food and water insecurity in the world and in Africa in particular and it presents the ten case studies undertaken to overcome agricultural adversity through a variety of participatory communication approaches. The first section describes the main parameters of food and water insecurity in the world and in Africa. The second section reviews some of the environmental factors that undermine agricultural production in Africa and the Middle East, namely desertification and salinization, as well as the socio-economic context. The third section introduces the ten case studies carried out in Africa and the Middle East, reported in this book. The conclusion argues that food is a basic human right recognized by the United Nations and, as such, it should be guaranteed to each and every individual.

1 Annie Mear, Département de communication, Université de Montréal, Montréal, Canada H3C 3J7. Email: annie.mear@umontreal.ca or annie.mear@videotron.ca
Introduction

Current levels of food production and water availability in the world are sufficient to meet the needs of all the people on the planet for many years to come. Yet, many countries face a serious food and water crisis that threatens the physical well-being of a large percentage of their population. According to the Food and Agriculture Organization (FAO), there are over 800 million people in the world that are undernourished. Most of them live in developing countries and they cannot afford the most basic foods required for sound health and growth. They also suffer from vitamin and mineral deficiencies, which often result in stunted growth, weakness and heightened susceptibility to illness. Undernourishment can even hinder fetal development and contribute to mental retardation in newborn babies (FAO, 2003).

In Africa, for example, people are dying of hunger because they lack the most basic food and water requirements in order to survive. They are dying despite the well-intended declarations and programmes of a number of national and international organizations. Thousands of children are particularly vulnerable because they do not have enough food and water. This unbearable situation begs a poignant question: why do people and especially children, have to die of hunger and thirst in a world replete with agricultural resources?

This chapter purports to: 1) analyze the parameters of food and water insecurity in the world and in Africa, in particular; 2) outline the main environmental causes of the food and water insecurity in Africa, namely desertification of the lands and salinization of the soils and waters, as well as the socio-economic context; 3) introduce the ten case studies, carried out in Africa and the Middle East, that are reported in this book. Each of the case studies tackles one specific agriculture-related problem, in one area of Africa or the Middle East, by implementing a unique participatory communication approach. The ultimate objective of the ten projects is to give the local populations the tools required in order to improve crop and cattle production thereby increasing their own food security for a healthy and productive life.

Food Insecurity in the World

The World Food Summit (1996) defined food security as a condition in which all people and all households at all times have physical, social and economic access to sufficient, safe, and nutritious food over a given period to meet dietary needs and preferences for an active and healthy life. Food security implies, of course, access to clean and potable water. The UN has identified a particularly severe threat to food and water security in Southern Africa due to its reduced agricultural capacity resulting mainly from desertification, salinization, land degradation, overgrazing, water shortages etc. After reviewing food and water insecurity in the world, this section describes some of the parameters of food insecurity in Africa.

Today there are around 6.3 billion people in the world. Approximately 1 billion, or less than one-sixth of the world's population, live in the 50 most industrialized countries. Less than half a billion live in the countries considered in transition: the Baltic States, the Commonwealth of Independent States and Eastern Europe. The remaining 5 billion people live in 125 developing countries that have a very low standard of living and lack the goods and services of the high income countries. In the developing countries, over 1.2 billion people live below the international poverty line, earning less than a dollar a day. They even lack the basic resources necessary to provide adequate and nutritious food for themselves and their families. As a result, around 24 000 people die everyday either from outright starvation or from hunger-related diseases (Bread for the World, 2001).

The FAO is continually alerting the world to the plight of the developing world through its annual report, State of Food Insecurity in the World. According to its latest estimates, in 2000-2002, there were 852 million undernourished people in the world, 815 million of them in developing countries (FAO, 2004). Over the decade between the World Food Summit baseline period of 1990-1992 and 2000-2002, the number of undernourished people decreased by only 9 million. What is even more alarming is the fact that during the last half of the decade, the number of chronically hungry people increased at the rate of 4 million per year, wip-
ing out two-thirds of the 27 million reduction that had been achieved during the first half of the decade (FAO, 2004).

The problem of food insecurity is especially dire in South Asia and East Asia. In South Asia 280 million people are malnourished, and in East Asia the number of malnourished people stands at 240 million. Approximately one-third of the world’s malnourished population lives in India alone (Mittal, 2003). The food insecurity situation is equally alarming in some regions of Latin America, the Middle East and North Africa (Pinstrup-Andersen, 2002). The Bread for the World Institute concurs that Asia is the region of the world most affected by food shortages (Bread for the World, 2001).

Water Insecurity in the World

According to the United States Environmental Protection Agency (EPA), a person can live about a month without food, but only about a week without water (EPA, 1995). Therefore, it seems equally urgent to provide all individuals, not only with adequate access to food, but also with easy access to safe water for a healthy and productive life. According to James Wolfenson, ex-president of the World Bank, more than 1.5 billion people in the world do not have access to a safe and adequate water supply (Wolfenson, 1998). World Health Organization (WHO) experts estimate that most water on earth, i.e. 97.5%, is salt water and of the remaining 2.5%, some 70% is frozen in the polar icecaps. The remaining 30% lies in underground aquifers and in soil moisture. Water experts also stress that hardly 1% of the world’s fresh water supply is readily available for human consumption at an affordable cost as it is channeled from lakes, rivers, reservoirs and underground aquifers (WHO, 2003). The WHO warns that unless immediate action is stepped up to remedy the situation, the number of people without adequate access to safe water could increase to 2.3 billion by 2025 (WHO, 2003).

Water access and security is a particularly pressing challenge for developing countries where population growth increases demand for clean and safe water. Since 1970, global demand for water has increased by approximately 2.4% a year (Clarke, 1993). Consequently, the World Bank estimates that approximately 60 to 70% of the rural populations in the developing world do not have easy access to potable water or to satisfactory means of waste disposal (WHO, 2003). Moreover, in developing countries, poor people who are not connected to municipal water networks usually pay 12 times more for a litre of water than urban residents who receive city water (World Commission on Water, 1999). Women and children have to collect the water from distant and often polluted sources (WHO, 2003). Water systems fail at a rate of 50% or even higher (Katz and Sara, 1997). WHO experts estimate that every individual needs around 4 or 5 gallons of water per day in order to survive. Whereas the average American uses between 100 and 176 gallons of water each day, the average African family has only 5 gallons of water per day at its disposal (World Resources Institute, 1999). Urbanization, population growth as well as irrigation demands are the major factors increasing demand for water in developing countries.

The situation is even more critical in the world’s largest cities, such as Beijing, Buenos Aires, Dhaka, Lima and Mexico City, which depend heavily on groundwater for their water supply. According to water experts, it is unlikely that aquifers, which take many years to renew, will generate enough water over time to meet the growing demand for exploding urban populations (Global Development Research Centre, 1999).

The Food and Water Crisis in Africa

Right after Asia, Africa ranks second in terms of the severity of its food and water shortages. In sub-Saharan Africa, for example, 180 million people are malnourished. In Malawi, 3 million people are on the brink of starvation; whereas in Zimbabwe they number around 7 million; in Ethiopia, 11 million; and in Eritrea, 3 million. Moreover, the food crisis is expected to worsen in sub-Saharan Africa over the next 20 years (Bread for the World, 2001). Among the victims of malnutrition, children are of particular concern to the WHO. Pregnant women and new mothers breastfeeding babies are also particularly at risk (WHO, 2003).
The UN warns that the situation could even worsen dramatically in the coming months as a severe food crisis seems to be developing in the Sahel region, particularly in Mauritania, Niger, Mali, and Burkina Faso due to the locust invasion in 2004. The locust invasion, the worst in 15 years, which was accompanied by a severe drought, devastated the crops throughout the region. The farmers lost most of their crops to the locusts, which led to severe food shortages in the affected communities. As a result, the farmers had to leave their families and villages to search for work and food in order to survive.

**Environmental Factors**

The desertification of the lands as well as the salinization of the waters and soils are some of the crucial factors that contribute to land degradation, poor crops, and food and water insecurity. The following paragraphs provide an overview of the problems related to desertification and salinization.

**Desertification**

Among the environmental conditions that have contributed the most to undermine food production in Africa and the Middle East, desertification is certainly one of the most critical. Desertification has been defined by the United Nations Environment Programme (UNEP) as the degradation of land in arid semi-arid areas resulting from the gradual erosion of the topsoil and the vegetative cover (UNEP, 1996). The erosion is usually the result of climatic variations such as recurring droughts and floods. The term desertification itself does not refer to the spreading of existing deserts but rather to the degradation of existing ecosystems, resulting from extreme climatic conditions, such as long periods of drought, in arid and semi-arid regions. In the areas affected by desertification, the topsoil, the crops, the pastures, the woodlands and the vegetation covers all but vanish.

The process of desertification is particularly acute in Africa because over-cultivation, deforestation, overgrazing, bad irrigation practices, political instability and poverty have combined with a prolonged scarcity of rain precipitation and an exploding population to produce an environmental bankruptcy affecting most of the continent. Consequently, desertification has severely impaired the biological potential of the African continent and the ability of the African populations to produce enough food.

It has been estimated that 34% of the African continent is under threat of desertification. Nowhere are the effects of desertification more deeply felt than in the arid and semi-arid lands (ASALs) bordering the two great deserts of the continent, namely the Sahara and the Kalahari. Three regions are particularly at risk, namely the Mediterranean region, the Sudano-Sahelian region and the area south of the Sudano-Sahelian region. The dry lands, including the hyper-arid deserts, cover approximately 70% of the continent. The hyper-arid deserts themselves cover one-third of the area. The remaining two-thirds of the dry lands consist of arid and semi-arid lands (ASALs). That is where the majority of Africans live, in the ASALs, under the constant threat of recurring droughts. In the ASALs, the annual rain precipitation varies between 100 mm and 600 mm and the ecology is largely based on crop and livestock farming activities. According to the UNEP's 1991 assessment of desertification in Africa, 73% of the agricultural lands in the ASALs are affected by land degradation and soil erosion (1991).

One of the major causes of desertification in Africa is the drought which invariably brings with it severe food shortages. Almost every year, there is a major drought in some area of the dry lands. Some of the droughts last for several years, as was the case in 1968-73, 1982-85 and 1990-92. In the past, the affected areas used to recover within a relatively short period of time after the long dry spells. That no longer seems to be the case. At present, with every drought cycle the process of land degradation accelerates and when it lasts for several years, it exacerbates the effects of soil erosion and desiccation, increasing markedly the food shortages for the affected populations. Unless they are properly managed, the dry lands affected by the winds and the waters take ages to recover and regain their full biological and economic potential.

The second major cause of environmental degradation in the dry lands is the rapidly increasing human and animal population leading to the overexploitation of water, land, forest and pasture resources. It is estimated that the human population in Africa's dry
lands has doubled over the past three decades. Moreover, the population continues to expand at the rate of three percent a year, which translates into an additional 12 million people to feed year after year. Therefore, Africa with two-thirds of its territory consisting of deserts and dry lands as well as its exploding population is particularly at risk of desertification. In fact, for most of the 400 million Africans living in the Sub-Saharan region, food security currently remains an impossible dream.

**Socio-Economic Context**

Besides the environmental and climatic elements mentioned in the preceding paragraphs, a number of human practices also contribute to exacerbating food insecurity in Africa. Over-cultivation, overgrazing, deforestation and poor irrigation practices due to both ignorance and economic pressures, for example, can have long-term devastating effects. Such human practices cause the food and water supplies to dry up thereby threatening entire populations with famine and economic instability. This often leads to mass migrations. In fact, according to population experts, 135 million people, the approximate equivalent of the combined population of France and Germany, are currently threatened by displacement due to desertification. These experts predict that between 1997 and 2020, around 60 million people will leave the desertified areas of Sub-Saharan Africa and move to North Africa and Europe.

Compounded with these environmental and human constraints are a number of factors related to the global socio-economic context, which contribute to food insecurity: poor economic policies, growing population pressures, civil strife, and inadequate governance among others. Such conditions have all contributed to create an unstable social and political environment in Africa, thus impeding economic growth, undermining agricultural production, and ipso facto exacerbating food insecurity.

**The Ten Case Studies**

Each of the case studies conducted in Africa and the Middle East, in its own way, proposes a blueprint for change through the lens of the participatory communication strategies they implemented in a series of rural communities. Each of the research teams tackled one specific agriculture-related problem, in one area of Africa or the Middle East, by implementing a unique participatory communication approach. The ultimate objective of all ten projects was to give the local populations the required tools to improve not only their own food security but also their human and social well-being.

The research projects presented in the book deal with the improvement of land management technologies in Ghana, farming practices in Mali, live-
stock feeding practices in Senegal and banana production in Uganda. Some of the questions asked by
the researchers can be stated as follows: How can we improve rice production in Senegal, where the
coastline is being submerged by the sea? How can we alleviate the water-related conflicts in the villages
of Burkina Faso? How can we prevent roving animals from destroying crops in Mali? How can we
overcome the impact of growing desertification in Burkina Faso? How can we improve community par-
ticipation for rural development in Lebanon? Organizational, ethnic as well as professional parameters
of culture and communication provided the matrix for designing and implementing appropriate partici-
patory communication strategies.

The main objective of the research projects presented in this book was to experiment with a number of
communication strategies in order to control the environment and improve agricultural production
with the cooperation of the local communities. Most of the problems tackled in the various research proj-
ects involved land degradation, salinization, desertification and soil fertility. The aim was similar in all the
projects, namely to allow the local communities to identify the problems affecting agricultural produc-
tion. Researchers wanted to help the local population design and implement the solutions that would
improve agricultural production while preserving the environment. Each project resulted in better access
to food and water for the local populations and thereby alleviated food insecurity and poverty.

For each of the ten researchers involved in these projects, food security and poverty alleviation
through improved and sustainable agricultural production were the main development challenges. All
ten of them outline, in their respective reports, the specific communication strategies they devised and
implemented in order to increase agricultural production and, by the same token, improve access to
food and water.

Conclusion

Africa does not have the necessary agricultural resources to feed its exploding population. Over the
last decade, over 25 countries in Africa have experienced severe food and water shortages because of
the extended drought, the degradation and depletion of natural resources as well as the unfavourable
socio-economic and political context. In many areas, desertification has led to significant losses in bio-
mass and soil productivity, thereby jeopardizing agricultural production, food security, environmental
protection and sustainable development. The reduced food production brought famine and starva-
tion to millions of people. Many died of starvation and those who survived, children and teenagers in
particular, will suffer from impaired health for the rest of their lives, with serious consequences for the
overall productivity of the continent.

Ending the food and agricultural crisis is one of the most pressing challenges facing African communi-
ties, their governments and the international community. Reaching that goal depends critically on the
self-reliance of the local communities who must be given the necessary tools to identify the parameters
of the food and agriculture crisis they are facing in order to design and implement the necessary grass-
roots solutions. The local communities must face the fact that the droughts and ensuing famines are the
result not only of insufficient rainfall, but of a combination of human activities and climatic variations.
Numbers and statistics may help us grasp the scope of the problems associated with food and water
insecurity in Africa. One must not, however, let the statistics overshadow the ethical considerations
raised by the stark living conditions of most African communities.

The food crisis in Africa has now reached such proportions that the rest of the world has to provide
the aid necessary to help Africa improve the stark living conditions of its people. The United Nations
recognizes the right to adequate food as a fundamental human right and a collective responsibility.
The 1948 Universal Declaration of Human Rights stipulates that everyone has the right to a stan-
dard of living adequate for the health and well-being of himself and of his family, including
food... Therefore, since most countries in the
world recognize the right of individuals to adequate food, it should be their responsibility to ensure that people, everywhere on the planet, are free from hunger caused by drought, natural disasters, wars or poverty. In order to ascertain universal access to human, social, economic and political progress, the world community must find the ways to ensure that every nation in the world enjoys the resources necessary to make food and water security, through agricultural development, an attainable dream.

References


Abstract

This chapter describes the communication component of a project funded by the International Development Research Centre (IDRC). The project aimed to analyze the changes, trends and sustainability of farming systems in Aarsal, a traditional Lebanese mountain village. It also sought to improve the prospect for sustainable community development. The results demonstrate that participatory communication can improve people's well-being if the communication tools and activities are adapted to the specific culture. Participatory communication between local communities and development researchers was achieved through the establishment of a Local Users' Network (LUN).

The LUN brought together various stakeholders including researchers, decision-makers at the local and national level as well as representatives of different socio-economic groups in the community. The LUN aimed at providing a space for dialogue where the stakeholders could design, implement and evaluate appropriate development initiatives in Aarsal. The traditional Majlis structure, common to the Arab world, relying primarily on face-to-face interaction, inspired the LUN framework. The LUN proved to be both innovative and effective in its formulation of a platform for participatory communication. The LUN successfully promoted economic development, socio-political empowerment. It also exposed Aarsal to other development projects. Finally, the LUN has had a lasting influence on community participation in other rural development initiatives.
Introduction

Before 1950, villages located in the mountains of the Eastern Mediterranean region, including Turkey, Syria and Lebanon, subsisted on agro-pastoralism based on subsistence farming (primarily pulses and cereals) as well as goat and shepherding. However, important structural changes have occurred in the past 50 years, such as the development of a market-oriented economy, a sharp decline in purchasing power and intense migrations towards urban centres. Rapid socio-economic and political change also disrupted rural Middle Eastern societies by significantly increasing urban migration (Sanders, 1996). In other rural mountain environments (the Andes, for example) economic changes and market forces have played a similar role in the destruction of the sustainability and productivity of traditional agricultural systems (Altieri, 1996). Structural changes have drastically impacted people’s well-being and their ability to manage natural resources. The result is that sustainable use of natural resources and long-term viability of agriculture in these areas are both at risk.

Lebanon is a small country of only 10 452 square kilometres. From north to south, it extends 217 kilometres and from east to west, it spans 80 kilometres. It shares a border with Syria in the north and east and with Israel in the south. Lebanon’s topography consists of four parallel belts that extend northeast to southwest. They include a narrow coastal plain along the Mediterranean shore, the Lebanon mountain range, the Beqaa plain and the Anti-Lebanon mountain range.

The country has experienced significant changes during the past 50 years, which include the end of colonialism, the establishment of laissez-faire economic development, and 17 years of war. The agricultural sector has undergone major changes and this has resulted in intense migration, both voluntary and forced. The people in the mountain ranges of Lebanon, such as the village of Aarsal, have suffered the brunt of these changes.

Aarsal is a semi-arid village, typical of the Eastern Mediterranean Mountains and located on the slopes of the Anti-Lebanon Mountains. The village covers more than 300 square kilometres and receives an average rainfall of 300 millimetres annually. Aarsal is an isolated community of approximately 35 000 residents. It has one of the largest small ruminant flocks (goats and sheep) in Lebanon (60 000 heads). A large percentage of the Aarsali population is involved in agriculture due to poor off-farm income opportunities. In addition, the majority of the village labour force is unskilled and works outside the village doing seasonal labour or transhumant shepherding. Due to its remote location, Aarsal has received little or no development intervention. Furthermore, its isolation coupled with limited rainfall has forced farmers to rely on agricultural systems that require limited input of water and agro-chemicals.

Beginning in 1952, the land area in Aarsal experienced an expansion of fruit tree production. It is estimated that 2 million trees have been planted since 1952, mainly cherry trees and apricot trees. The reasons for the shift in farming systems include the flooding of the market with cheap grain and dairy imports from the U.S. and Europe and land abandonment due to the migration of farmers to urban centres in search of other opportunities. Since fruit trees were planted in areas that had once been used for annual crops, the traditional cereal and livestock based production system in Aarsal was disrupted. For example, animals that used to feed on crop residues and fertilize the soil in return were kept out of the orchards. In addition, establishing orchards disrupted traditional grazing routes, which meant that fruit tree production and grazing competed for the same land. As a result, herders were driven towards poorer lands in Aarsal, or forced to move to distant pastures and agricultural fields in the central and southern Beqaa. Due to these pressures, land degradation has become a significant problem in Aarsal today.

In 1992, the Aarsal Rural Development Association (ARDA), a local non-governmental organization, approached researchers at the American University of Beirut to address the issue of land degradation. During the meeting, ARDA expressed the need to improve the management of Aarsal’s natural resources. After the meeting, consultations were carried out with the different social and resource user groups in the Aarsal region, including women and marginal groups. The consultations led to the development of a research agenda, which community members and researchers formulated jointly. The
research agenda included the following priorities and activities. The group conducted an inventory and assessment of the existing resource base, and then examined the social, economic and political forces dictating land use in Aarsal. The group also analyzed the farming systems in Aarsal to understand their limitations, and then developed an optimal land use plan. They introduced sustainable agricultural practices, such as the promotion of proper water resource management through rainwater harvesting. Finally, the group facilitated agreements between land users who were in conflict and they attempted to understand gender dynamics in the community.

The research agenda described above enabled the research team to prepare a research proposal for the IDRC’s People Land and Water (PLaW) programme. PLaW provided the necessary funds between 1995 and 1998 and supplementary funds between 2000 and 2003. The project was entitled Sustainable Improvement of Marginal Lands in Lebanon: Aarsal, a case study. The main objective of the project was to create a forum where the local population could collaborate with researchers in order to protect the community’s natural resources, enhance economic development, as well as support the socio-political empowerment of marginal groups such as women and livestock herders.

The case study focused on the importance of participatory communication for development research projects. This chapter reports on the communication strategies and practices scientists, members of the local community and policy makers used during the project. The chapter seeks to demonstrate that participatory communication can be an effective tool to improve people’s livelihood if the communication strategies and practices adopted are specific to the local culture.

**Theoretical Context**

Communication is inherent in rural development. Often researchers have considered communication as a tool for one-way technology transfer from development workers to the local community. A brief review of the recent Food and Agriculture Organization (FAO) literature about communication and development reveals that communication is often confused with dissemination of information. Despite the current emphasis on participatory approaches, our analysis shows two common errors in the implementation of communication strategies. First, there has been an overemphasis on communication tools, such as the media, at the expense of other communication strategies (Dajani, 2003). Second, there is a bias in favour of one-way communication between the teacher, such as the extension agent or the researcher, and the pupil, such as the farmer or the local resident. The policy is particularly evident in the over-reliance on one-way communication tools, such as videos, flip charts, etc. Information and communication technologies (ICT) have dominated communication development work and are still largely concerned with the dissemination of information: they do not promote dialogue between researchers and the local population about community development (Decock, 1996).

The basic philosophy guiding the LUN project was that a successful participatory communication development initiative needs to establish a forum for dialogue where all the stakeholders can participate in the entire research process: proposal, research design, project implementation, and evaluation. The research process must be participatory, interactive and flexible to promote continuous learning. The forum for participatory communication should enable information exchange and knowledge sharing between the different actors involved in the research project: Northern development agencies, Western academics, and rural communities. The researchers argued that in the marginal communities of the rural South, existing traditional communication channels were highly effective for discussion, dialogue and knowledge sharing about development issues. Therefore the participatory communication strategy must incorporate traditional methods of communication already in use by the local population if it is to succeed in promoting sustainable land management practices.

**Methodology**

In order to select an appropriate communication strategy, the research team conducted a brief review of literature relevant to communication and development in the Arab world. In addition, they reviewed non-documented communication practices, such as family planning in the Arab world. The
personal experiences of the researchers also helped shape the communication strategy since many of them came from similar rural communities and had been working in participatory development research for at least ten years.

Published information related to communication and rural community development in the Arab world is scant. One key contributor in this field is Acunzo who planned a communication strategy for natural resource management in the Syrian Steppe, i.e. the dry plains that extend from Northeast Lebanon all the way to Iraq and Jordan. In that region, the environmental and socio-economic conditions are very similar to those in Aarsal (Acunzo, 1998). Acunzo provides a perceptive analysis of the social factors that have led to resource degradation. He attributes the major share of the problem to a breakdown in the traditional tribal-based rangeland management model known as the Hema system. The Hema system is an ancient traditional practice of nomadic Arab origin, designed to protect both cultivated and uncultivated resources (Draz, 1987). Shoup described the Hema practice as the original form of a communal property system developed by the nomadic pastoralists that was also used by non-pastoralists. It was a system by which lands were held in a reserve protected by customary law for specific purposes or seasons of the year and involved land use regulation for grazing, areas reserved for drought times, and the maintenance of land productivity (Shoup, 1990). Acunzo recommends establishing a consultative decision-making body, which would involve local groups, tribes, cooperatives and the State, to address problems of land degradation and propose methods to improve natural resource management (Acunzo, 1998).

In the Arab world, the traditional method of communication and conflict resolution has been based mainly on face-to-face interaction. Tribal majlis allow issues to be raised face-to-face in the community, usually in the house of the community leader. The majlis are local assemblies consisting of the head of each of the most important families in a tribe. They meet on a regular basis and serve as a decision-making group for community planning and conflict resolution. A variation of the majlis face-to-face approach was used successfully in Nasser’s Egypt to promote family planning. Under Nasser’s regime, clerics addressed worshippers during Friday’s prayer and conveyed information about family planning. Midwives also conveyed information orally about family planning while assisting women during their pregnancy.

In the LUN project, researchers relied heavily on their past experiences as well as their understanding of the social systems in the rural communities of Lebanon in order to develop a participatory communication strategy. They decided that the communication strategy should be based on face-to-face interaction at informal group meetings similar to the traditional tribal majlis. The meetings needed to extend beyond the community and to include all the stakeholders involved in the development process, namely, the local population, researchers as well as government officials. The philosophy guiding the initiative was that a participatory communication strategy must bring together various cultural groups and different organizational cultures. The research team brought together, for example, the traditional Sunni Muslim rural community of the Arab Eastern Mediterranean region living in Aarsal as well as the development researchers and support staff who are highly Westernized. The following section details the participatory communication framework the researchers established and implemented, based on methods that incorporated traditional aspects of communication among Arabic people.

**Implementation of the Local Users’ Network**

**Definition of the Local Users’ Network**

Considering the parameters required for implementing an effective participatory communication strategy, the researchers established the Local Users’ Network (LUN), which brought together various stakeholders. The stakeholders included researchers, decision makers at the local and national level as well as representatives of different socio-economic groups in the community. The aim of the LUN was to provide a space for dialogue where stakeholders could design, implement and evaluate appropriate development interventions in Aarsal. In essence, the LUN constituted a participatory interactive forum for
communication about community development initiatives. The platform facilitated both information flow and knowledge sharing between all actors involved in the project. Moreover, it helped identify problems and conflicts in the community, as well as develop appropriate solutions and methods to resolve conflicts.

**Evolution of the Local Users’ Network**

Interaction between farmers and other groups such as researchers, scientists and non-governmental organizations (NGOs), is essential in order to analyze the local situation and develop a common understanding of both the research and development needs as well as the potential solutions. Since there was no extension structure, which normally would have served as a communication forum between development workers and the local population, the research team established the LUN to communicate with farmers.

At the project’s inception, the Aarsal Rural Development Association (ARDA), a local NGO, assisted with the introduction of the research team into the community. They identified representative groups of farmers who would help define the project’s research needs and objectives. Researchers introduced non-monetary incentives in order to help increase the initial involvement of the local population. The non-monetary incentives available to farmers included the distribution of adapted fruit trees and shrubs, veterinary care, training in improved livestock management practices and installation of soil conservation structures. Fruit growers requested specific technical information related to standard orchard management and pest control techniques. Livestock owners requested specific technical expertise about ways to improve the productivity of their flocks in areas of animal health, feed resources and rangeland rehabilitation.

The farmers who initially participated in the project eventually became the main members of the LUN. Follow-up consultations with the local authorities and the NGOs helped define the parameters of the LUN as a communication forum and ensured that there was adequate representation of the various groups in the community. The research team identified various socio-economic groups and invited selected members to participate in the LUN. The LUN structure was flexible so as to ensure that the participants could change their approach as needed.

As the LUN evolved, specialized working groups sharing specific interests emerged and later developed into three sub-groups. Two of the sub-groups were involved in the main productive sectors in the village, namely livestock and fruit production. The third sub-group addressed women’s need for non-agricultural income-generating activities. Each person could be a member of more than one sub-group. The researchers designated local coordinators to direct the activities of each sub-group. The livestock and fruit growing sub-groups of the LUN designed and implemented specific on-farm trials. They experimented with new varieties of forage plants and methods to improve animal health. The sub-groups for livestock herders and fruit growers included research and development actors from the northern Beqaa region. The LUN also included local authorities, regional deputies, and representatives from the Lebanese Agricultural Research Institute, the International Centre for Agricultural Research in Dry Areas (ICARDA), the Ministry of Agriculture, the International Fund for Agricultural Development (IFAD) and the United Nations Development Programme (UNDP).

The first priority of the livestock and fruit growing sub-groups was to draft a list of recommendations and sector-specific action plans pertinent to each productive sector. The list included recommendations and action plans related to improving animal feed and health, integrated livestock-crop production, tree vitality, soil erosion, pest management as well as soil fertility management and marketing. The sub-group related to women’s needs brought together women from different socio-economic and political groups in the village as well as gender researchers and trainers from the project team. The priority of the sub-group was to explore gender-related issues while focusing on improving the socio-economic status of women and promoting their empowerment. The sub-group provided women with the opportunity to discuss potential income generating activities. These discussions led them to establish carpet and rug weaving as well as food processing facilities.
Activities of the Local Users' Network

The LUN organized the following activities: regular, issue-centred, roundtable meetings of the various sub-group members; community outreach activities by university students during their training programmes in agriculture; live in the village experiments that allowed researchers and students to spend extended periods of time with selected families and work with the farmer experiments that allowed students to participate in harvest and land preparation activities. The LUN also established a field implementation of good practices in natural resource management, such as the building of terraces, which involved LUN members and people from the Aarsal community. The LUN produced short video documentaries, newsletters, and website information about natural resource management issues. The LUN organized a series of workshops on various themes related to natural resource management and community development on topics such as soil and water conservation, crop-livestock integration, building of managerial and technical capacities, marketing and income generation. Finally, the LUN was a forum used to assess and evaluate the communication activities proposed and implemented by the participants. The research team organized workshops at least twice a year in an effort to involve a larger number of participants and monitor the progress of the LUN.

Community Participation

Right from the beginning of the project, researchers ensured that LUN members were representative of the various groups of herders and fruit growers in the community. Adequate representation ensured that the needs of all community members would be voiced in the forum, which in turn meant that the solutions developed through the LUN would be relevant to the entire community. Community representatives communicated information about development issues to the remainder of the local population, which promoted widespread dissemination of the information generated in the LUN.

Researchers created a unit of the LUN called the Environmental Forum (EF), which consisted of Aarsal youth whose specific purpose was to communicate research results to the entire community. The project team trained the EF members in natural resource management practices developed during the LUN meetings. Then EF members disseminated the information to the local population. To achieve their mission they relied primarily on face-to-face interaction with the end users during the critical periods, such as harvests or animal vaccination sessions. In addition, EF members used material to complement the face-to-face interaction, such as the best practice booklet, which the LUN developed in order to summarize and simplify the project's findings in a language accessible to farmers. The EF also functioned as a two-way communication channel between the community and the LUN. The objective was to identify any constraints that could interfere with the widespread adoption of good practices or suggested remedial measures. Finally, the EF raised young people's awareness about their community's ability to manage their own natural resources and attempted to involve them in the promotion of sustainable development.

Results

The LUN was an effective participatory communication strategy because it utilized culturally appropriate methods of communication. It enabled face-to-face dialogue between all the stakeholders involved in the development project, and it improved people's well-being. More specifically, the LUN established various institutional frameworks for participation. It empowered marginal groups, promoted economic development, enabled conflict resolution, fostered collaboration between various actors within the community, focused research on community needs, developed and implemented sustainable natural resource management practices, and exposed Aarsal to a number of development agencies. The following sub-sections provide additional information about each specific outcome.

Socio-Political Empowerment of Marginal Groups

The LUN facilitated the establishment of two cooperatives, one for livestock herders and the other one for women. The cooperatives provided an institutional framework, which could facilitate communication about improved natural resource management practices.
Women and livestock herders are marginal groups in Aarsali society. Organizing both groups into cooperatives gave them the opportunity to communicate with decision-makers. It also allowed them to express their needs and to discuss various methods to fulfill those needs. At present, four years after its implementation, the livestock cooperative has become independent from the LUN, but remains extremely active in development work. It participates in nationwide initiatives such as the implementation of the Lebanese National Action Program for Combating Desertification led by the Ministry of Agriculture.

**Economic Development**

The women's cooperative manages two income-generating facilities, namely a rug weaving facility and a food processing facility. Both started as small-scale projects and both have added value to the products of other production systems. Wool provided by livestock herders has been used in carpet making, while cherries and apricots provided by fruit growers have been used in food processing, for example. The LUN enabled the women to express their training needs, which led LUN members to recruit a designer to conduct workshops in carpet and rug design. The United Nations Development Fund for Women (UNIFEM) also offered training in entrepreneurship and accounting for women. Moreover, the LUN helped the women's cooperative establish contact with potential marketing outlets, such as Artisanat du Liban and Conserves Chtoura, which greatly increased the output of the cooperative. Today more than 40 women are regularly involved in the cooperative and they derive a significant income from those activities. Finally, key members of the cooperative are being hired to offer training in their areas of expertise to other women's groups in villages throughout Lebanon.

**Conflict Resolution**

As noted previously, the transition, which occurred in the 1950s, from agro-pastoralism based on seasonal transhumance and annual crops, to a more sedentary agricultural system based on fruit tree cultivation has created conflicts over land use, between livestock herders and fruit growers. Pastoralists, who used to roam freely, have been forced to utilize marginal lands. The LUN was instrumental in resolving the conflicts because the needs of both parties could be voiced, and compromises could be explored. The LUN discussions led to the adoption of vetch in the orchards. Vetch is a legume crop that was planted under the trees. It enhanced soil fertility, protected the soil from erosion, and could be harvested as animal feed. Finally, vetch provides supplemental animal feed and therefore compensated for the loss of grazing land due to the rise of fruit tree cultivation.

**Fostering Collaboration within the Community**

The LUN collaborated with ARDA in order to become a more effective partner in research and development. Members of the LUN were trained to participate in the implementation of the surveys and evaluations required to achieve the project's objectives. The LUN members were also trained to implement participatory research methodologies, such as the Participatory Rural Appraisal and the Farming Systems Analysis. Finally, the LUN members helped gather information through research and surveys about issues such as the assessment of the nutritional status of women and children and the evaluation of methods of soil conservation.

In addition, the LUN allowed its members to reach an agreement about their local needs and to develop local action plans. The LUN meetings provided an opportunity to communicate with decision-makers about the action plans. For example, the LUN organized a workshop about livestock and range resources in June 1999. Local authorities, government representatives as well as 150 farmers attended the workshop. The participants agreed on a list of recommendations and follow-up actions. The LUN then formed a follow-up committee including scientists, government officials, and farmers in order to implement the recommendations.

**Focusing Research on Community Needs**

In general, development research expertise in Middle Eastern academic institutions is rather weak. Most researchers do not receive adequate training in order to tackle the real-life problems that face them. The LUN addressed the problem by setting up participatory development training workshops. Training enhanced the interdisciplinary skills of the project
team and eventually resulted in shaping the research agenda according to local needs. Each researcher was called upon to contribute according to his expertise. Soil scientists, range specialists, horticulturalists, socio-economists, nutritionists, and gender specialists all worked together to focus their research on people rather than resources. Although most researchers had traditionally focused on resource conservation, they did not always take the local population into account. As communication evolved during the LLN meetings, the need for a people-centred, integrative approach became apparent. Therefore, the LUN members adopted a new framework for action, which was called sustainable livelihood. It put people at the centre of the development initiative and it currently forms the basis of research plans, objectives, implementation and evaluation.

**Sustainable Natural Resource Management Practices**

The LUN constituted the main vehicle to address the natural resource management needs in Aarsal. The LUN also linked the community to the technical and financial resources they required. The LUN members initiated a participatory land management method, which was a collaborative decision-making process about planning land use in the village. A participatory land management method that the LUN members developed and implemented was the range management and rehabilitation programme. It included the establishment of a nursery for forage shrub production, range protection and rehabilitation agreements with the municipality, and growing vetch under fruit trees in orchards. Finally, LUN members developed and introduced rainwater and snowmelt harvesting techniques, which have been tested in several locations.

**Discussion of Results**

In order to be sustainable, resource management must rely on communication channels that allow all stakeholders to participate in the process. Moreover, it must be based on an analysis of the needs of the community and use the appropriate language and tools for participatory communication (Ramirez, 1997). A thorough understanding of the various methods of communication in a specific community is extremely important. A common error in development projects has been the universal application of communication approaches without considering how local conditions may change from one village to another (Dajani, 2003).

The LUN was an effective participatory communication forum designed to exchange information, share knowledge, and develop specific action plans in order to improve natural resource management in Aarsal. Although the LUN had some success, it requires improvement. The researchers’ evaluation of the LUN’s influence in Aarsal confirmed its achievements, but also revealed some of the obstacles to overcome in order to improve the LUN as an effective participatory communication forum.

One obstacle consisted of familial and tribal conflicts that prevented members, who were on non-speaking terms, from communicating and collaborating in the LUN in order to address their natural resource management problems (Baalbaki, 2002). Researchers aim to ensure that the LUN remains active in the community after the project ends. Therefore the project team has presently commissioned an external consultant to evaluate the LUN in order to assess its viability as a participatory communication forum for future development projects. The following subsections highlight additional issues that need to be resolved in order to improve the functioning of the LUN as a participatory communication forum.

**Land Tenure**

Communication is only one component of development; other requirements must be satisfied in order to ensure the success of a development project. For example, in the case of Aarsal, lack of land tenure constitutes a major obstacle when attempting to address land use issues, conflicts and identify possible solutions. Dialogue within the LUN would have been more productive if land tenure issues had been resolved.

**Lebanese Government**

The Lebanese government has no comprehensive development policies and regional planning authorities do not exist. Therefore, there is little room for national adoption of any action plan that
has been developed at the community level. Centralized decision-making within government institutions in Lebanon means that government officials do not communicate well with technical and field personnel, who are represented in the LUN. LUN members tried to overcome the problem by disseminating information specifically targeted to government decision-makers through newsletters, websites, and conferences. LUN members also attended seminars and workshops where government decision-makers were keynote speakers in order to provide information to them. Their efforts have led to positive outcomes. For example, LUN members halted the implementation of a government plan to establish large-scale quarries in Aarsal. The plan would have destroyed parts of the mountains and was opposed by the community. Development workers in the field must strengthen communication and collaboration with national government officials.

**Conclusion**

Information is not knowledge. People cannot work together if they do not plan together, and they cannot plan together if they do not have the opportunity to share knowledge. Information sharing is at the heart of any participatory process. The LUN in Aarsal, based on traditional methods of communication, proved to be a successful participatory communication tool. The LUN allowed knowledge to be shared regardless of the cultural origin of the members. Through the LUN, members were able to achieve a common vision, set shared agendas and achieve joint success in promoting sustainable natural resource management practices and ultimately improving the physical and social well-being of the local population.

**References**


Land Degradation in Western Kenya
Participatory Communication Remedial Strategies

Amadou Niang¹, Mary Nyasimi, Tina Sven Hansen
International Centre for Research in Agro-Forestry (ICRAF)

Michael Odongo, Aggrey Otieno
Kenya Forestry Research Institute (KEFRI)

Abstract

Researchers set out to address past failures of development projects that did not permit farmers to participate in the design, selection and implementation of appropriate technology to improve soil fertility in Kenya. Soil degradation, food insecurity and poverty impact the majority of small-scale farmers in Western Kenya. Although many small-scale rural farmers understand the importance of agricultural inputs, such as fertilizer, or other soil fertility management practices, such as applying crop residues to their land or leaving land fallow, they are unable to implement such strategies because they are consumed by their immediate survival needs. Therefore the research team conducted a participatory soil fertility project in Western Kenya in order to promote farmers’ participation in the entire research process, but especially in the dissemination of agro-forestry methods, and to improve the social and physical well-being of the most vulnerable members of the population.

Researchers collaborated with farmers to identify the resources available in rural villages as well as the pre-existing local groups, which organized discussions and actions to address problems of soil fertility. The research team and the farmers engaged in a wealth ranking exercise to determine the various categorizations of wealth and determine the links between wealth and soil fertility management practices. Researchers and farmers then collectively assessed farmers’ methods of soil fertility management practices in each village in order to generate strategies to improve the adoption rates of agro-forestry methods aimed at increasing soil fertility. The research team learned about the heterogeneity of the rural villages studied as well as the importance of gender analysis. The project successfully fostered collaboration with rural farmers in order to assess the problems related to soil fertility and devise strategies to overcome land degradation.

¹ Amadou Niang, International Centre for Research in Agro-Forestry (ICRAF), P.O. Box 320, Bamako, Mali. Email: a.niang@cgiar.org
Introduction

The regions studied in the Soil Fertility Project of Western Kenya are in the highlands and constitute 15 percent of the total area of the country. They also represent 40 percent of the country’s population. The regions have a high population growth, over 3.4 percent per annum and a high population density, which ranges from 500 to 1200 persons per square kilometre. Farm sizes vary between 0.5 and 2.0 hectares and the average is 1.2 hectares (David and Swinkels, 1994). Despite adequate and reliable rainfall, between 1500 and 2000 millimetres per year, degraded soils negatively influence agricultural productivity and income generation. Therefore, soil degradation also influences poverty in Kenya; more than 53 percent of the farmers in the western province and 42 percent of the farmers in the Nyanza province were classified as absolute poor in 1998 (Ministry of Planning and National Development, 1998).

Low levels of phosphorus, nitrogen and potassium in the soil throughout Kenya constitute a widespread problem. About 80 percent of the farms in the Vihiga, Siaya, Busia and Kisumu districts are severely deficient in phosphorus. Many farmers in Western Kenya understand that fertilizers compensate for the soil’s nutrient depletion due to harvesting, crop residue removal, erosion and leaching, but many small-scale farmers cannot afford to purchase fertilizers. Approximately 40 percent of small-scale farmers use mineral fertilizer, but they use it at a lower rate than recommended and often not at the most critical times. The problems of poor soil fertility, lowered levels of agricultural productivity, food insecurity, and poverty all interconnect because farmers often cannot afford agricultural inputs, like fertilizer, to improve degraded soil and increase income generation possibilities. Therefore, impoverishment and food insecurity increase while soil fertility continues to decrease.

The research team set out to address the failures of past development projects that did not involve farmers in the design, selection and implementation of appropriate methods to improve soil fertility in Kenya. Conventional approaches to development often failed to ensure that the local population adopted the appropriate technology to improve the soil fertility in their communities because extension workers disseminated technology through top-down methods. A top-down approach consists of development experts dictating to farmers the technology they should adopt without taking into account farmers’ perspectives about the appropriateness of the technology.

A simple definition of agro-forestry is the use of trees on farms. More specifically, the International Centre for Research in Agro-Forestry (ICRAF) defines agro-forestry as a dynamic, ecologically based, natural resource management system that, through the integration of trees on farms, diversifies and sustains production for increased social, economic and environmental benefits for all land users. The ICRAF began research about the potential of agro-forestry to improve soil fertility in 1978 and in 1991 began receiving financial and technical support from the Consultative Group for International Agricultural Research (CGIAR).

Between 1992 and 1997, the number of farmers participating in on-farm research through experiments conducted with farmers on their plots about the potential of agro-forestry to improve soil fertility, increased from 700 to more than 7,000 (Denning, 2001). In 1997, researchers from the ICRAF, the Kenya Agricultural Research Institute (KARI) and the Kenya Forestry Research Institute (KEFRI) collaborated with farmers to develop methods to disseminate information about the promising agro-forestry methods they developed through the on-farm experiments. The on-farm experiments integrated organic inputs, such as improved fallow of Crotalaria, Tephrosia vogelii and Sesbania or biomass transfer of Tithonia diversifolia, and inorganic inputs, such as Minjingu phosphate rock. The experiments demonstrated that the technology was low-cost and complemented farmers’ local conditions. Researchers recognized that to facilitate the adoption of agro-forestry technologies, farmers needed to be involved throughout the entire research process. Therefore, the research team began the development project from the premise that the design, implementation and dissemination of agro-forestry technology must draw from the diversity of farmer’s indigenous knowledge, capacities, and perceptions as well as the resources available in the rural villages. The primary objective of the project was to improve
the food security and the socio-economic situation of resource-poor farmers and the most vulnerable members of the community by increasing household incomes for example. Researchers attempted to achieve this objective by developing and implementing agro-forestry methods to improve soil fertility, which would enhance agricultural productivity and promote long-term sustainable farming.

Researchers implemented the following participatory communication strategies to achieve the project's objectives. They collaborated with farmers to identify the resources available in rural villages as well as the pre-existing local groups, which organized discussions and actions to address problems of soil fertility. The research team and the farmers engaged in a wealth ranking exercise to determine the various categorizations of wealth and determine the links between wealth and soil fertility management practices. Researchers and farmers then collectively assessed farmer's methods of soil fertility management in each village before generating strategies to improve the adoption rates of agro-forestry methods aimed at increasing soil fertility.

This chapter outlines the participatory communication methods the researchers designed and implemented as well as the results. The chapter highlights the importance of participatory communication methods to achieve the project's goals of enhancing soil fertility and the well-being of the local population, in particular the most vulnerable groups in the society.

**Participatory Communication Strategies**

The researchers asked the following methodological questions at the beginning of the project. How can researchers involve farmers, especially the poorest, in the process of agro-forestry technology development and dissemination? How can technologies be developed that incorporate the diversity of socio-economic and environmental conditions that individual farmers face? How can researchers promote and facilitate farmers' access to knowledge about methods and technologies aimed at improving soil fertility in the current situation where mainstream extension services are poor and deteriorating? How can researchers ensure that dissemination of information moves beyond the village level to the regional level? The following paragraphs outline the methods researchers used to select the villages to be studied and the participatory methods to be implemented.

**Selection of Pilot Villages**

The researchers selected pilot villages through a process, which consisted of gathering information about the western region of Kenya including demographic characteristics, levels of rainfall, soil types and cropping systems. The research team then complemented this information with an analysis of the different ethnic groups in each region (Bradley, 1991; Carter, 1995). Researchers learned that strongly leached acid acrisols and ferralsols existed within the western highlands of the Rift Valley and of Mount Elgon. They found some more fertile soils in the northern region of Kenya while the northwest region, consisting of several river valleys, had predominantly hydro-morphic gleys. In the Kisii highlands, the vertisols and nitosols dominated the area with isolated swampy areas. The poorest soils, acid, infertile, shallow, stony and often lateritic, were in the Siaya district. Farming systems and land use varied throughout Western Kenya. Twelve types of farming patterns existed according to the types of production, such as cash crops or subsistence crops. Demography, migration patterns, labour availability and environmental conditions, such as rainfall, slope and elevation also influenced the type of farming system in each region (Carter, 1995).

The researchers identified five ethnic groups living in Western Kenya. The Luhya-speaking people constituted the majority in the region and inhabited the northern part; the Luo-speaking people lived in the south, southwest and in some parts of Kakamega. The Iteso-speaking ethnic group inhabited the western region near the border with Uganda. The Kalenjin-speaking (Nandi) ethnic group lived in the eastern region and finally the Abagusii-speaking ethnic group lived in the south. The process allowed researchers to select three villages engaged in subsistence farming in order to implement the project aimed at disseminating information about agro-forestry methods for improving soil fertility.
Concept

Participatory communication ensured collaboration in the research process between farmers, researchers and development agents in order to design, implement and disseminate agro-forestry technologies that were suitable to farmers. Participatory methods allowed researchers to combine indigenous knowledge about agro-forestry practices with scientific knowledge. The research team ensured that the participatory communication research approach was flexible enough to allow farmers and researchers to evaluate the research process and make changes as necessary. A key methodological component researchers promoted was fostering an environment based on respect and recognition of the value of indigenous expertise in order to resolve problems related to soil degradation. The participatory research approach increased farmers' awareness of natural resource management strategies for improving soil fertility. It also fostered confidence in the project because farmers felt that their contribution and knowledge were important.

Many of the methods used to disseminate information about agro-forestry technology and improve soil fertility were visual methods, such as maps and diagrams, in order to facilitate communication and information exchange between members of the research team and the farmers who were illiterate. The research team and the farmers collectively identified the various natural resources and different groups in each village attempting to address problems related to soil degradation. The participatory research approach increased farmers' awareness of natural resource management strategies for improving soil fertility. The process of developing a pictorial map allowed the farmers to identify and define the resources in their village as well as the problems related to natural resource management. Moreover, researchers required the farmers to participate in the identification of soil types and the causes of land degradation in order to implement appropriate solutions to overcome soil degradation and poor soil fertility.

Project Implementation

The following paragraphs describe the implementation of the participatory methods used to improve the adoption rates of agro-forestry practices in an effort to improve soil fertility, food security, and ultimately the social and physical well-being of the local population in Western Kenya.

Identification of Village Resources

The initial research step consisted of researchers collaborating with farmers in each village to construct a pictorial map depicting the boundaries of each village and the natural resources, such as the type of land, livestock, trees and water. Farmers were responsible for drawing the maps and identifying the village population’s knowledge and experience about natural resource management strategies (Pachico et al., 1998). The farmers determined the territorial boundaries, identified the soil types and outlined the causes of land degradation for each village. The farmers then marked the map with this information. The process of developing a pictorial map allowed the farmers to identify and define the resources in their village as well as the problems related to natural resource management. Moreover, researchers required the farmers to participate in the identification of soil types and the causes of land degradation in order to implement appropriate solutions to overcome soil degradation and poor soil fertility.

The researchers needed to understand the methods of communication farmers used to address problems in their communities. The traditional method to address and resolve problems was used by farmers when they organized themselves into social groups, formed according to issues such as land management practices on communal land in order to implement appropriate actions. Social groups varied in size from a few members to the entire village and in most cases the membership remained within one village, but in some instances it included people from surrounding villages. If farmers did not belong to a social group in a village they probably belonged to a clan, which constituted a group of people who would meet to discuss problems in their village and strategies to overcome them. The researchers asked the farmers to identify the social groups and clans in each village in order to connect with the groups who were working to overcome the problems of soil degradation.

Wealth Ranking

Wealth ranking was important to understand the indicators of wealth that farmers identified and categorize farmers in each village according to different levels of wealth. Farmers, mainly the Luo and Luhya ethnic groups, from 12 different villages identified
indicators of wealth during a meeting that the research team organized. Farmers grouped each household from their village into a wealth category according to the quantity and quality of the resources each farmer had access to as well as the farmers' control over the management of natural resources in their village (Grandin, 1988).

Wealth ranking was an important exercise because wealth correlated with a farmer's ability to implement natural resource management practices. Poor farmers had more difficulty implementing methods to improve soil fertility and could not take risks to test new technologies because they were completely dependent on their farm income. Therefore the exercise pinpointed the most vulnerable people in the village who required assistance to implement soil fertility practices and to improve their food security.

Soil Fertility Management Practices

The depletion of soil fertility contributes to declining crop productivity, which results in food shortages three to five months per year in each household (Niang et al., 1999). As noted previously, farmers understood the importance of soil fertility for crop production, but the high cost of inorganic fertilizers prohibited most farmers from using any inputs, which in turn contributed to low crop yields. A few farmers used organic manure, yet it was either limited in its amount or inappropriately stored before its application on the fields. Small-scale farmers owned one or two heads of livestock, such as cattle, sheep, goats and chicken, that were poorly fed and therefore did not produce enough manure that could have been used as an organic fertilizer. Moreover, the livestock grazed freely along roadsides making the collection of their manure impossible. Finally, small-scale farmers utilized their crop residues as a source of fuel and therefore they did not put the residues on their land to improve its soil fertility. Researchers needed to collaborate with farmers in order to determine the methods of soil fertility management they implemented and then determine how to improve soil fertility management.

Adoption of Agro-Forestry Innovations

In the past, extension workers disseminated research results regarding improved soil fertility practices (Bohringer et al., 1998). Although disseminating information through extension workers has not always been effective because the scientific results are often too complicated for extension workers and farmers. Moreover, the traditional approach is top-down, which means that farmers do not have input into the design or selection of appropriate methods to improve soil fertility in their village. In addition, in the last 20 years developing countries have decreased government-funded services for rural farmers, including the availability of extension personnel. In Western Kenya, there is only one extension worker for 1600 farm-holdings. Finally, the problems associated with using extension workers to disseminate information about soil fertility management practices also include high operational costs, such as staff salaries or the purchase of vehicles, a lack of objectives specific to different regions or villages, poorly-trained field staff, and the failure to provide a forum where farmers can share information about successful methods of soil fertility management. The following paragraphs detail the strategies researchers implemented in order to overcome the problems associated with disseminating information to farmers through extension workers.

The researchers analyzed the dissemination strategies utilized by non-governmental organizations (NGOs) and community-based organizations (CBOs) operating in the region, rather than relying only on the traditional extension services of the Ministry of Agriculture. They compiled a list in order to identify all the development agencies operating in the area. At the same time, researchers assessed the population size, the number of field-based staff and the intervention strategies of the development agencies operating in Western Kenya. Then the three organizations, ICRAF, KEFRI and KARI, established a framework to collaborate with the development groups and outlined the roles and responsibilities of each group in their efforts to facilitate communication and exchange information with rural farmers as well as initiate strategies to overcome land degradation.

The researchers also initiated training for development workers, developed extension manuals, organized visits to farms in villages for extension staff, and produced radio and TV programmes in order to disseminate information to farmers about agro-forestry methods to improve soil fertility. The research team
also organized annual meetings to foster information exchange about problems related to decreasing soil fertility and develop methods to improve the dissemination of information about soil fertility management practices.

The researchers wanted to create a forum where rural farmers could access the researchers' findings about improved soil fertility management practices, such as agro-forestry methods. The research team set out to strengthen the technical and administrative skills of local social or clan groups in order to facilitate information exchange about soil fertility management among farmers within one village or between villages and between farmers and development researchers. Researchers prompted farmers to elect a member from each of their social or clan groups as a representative to a village committee, which was responsible for addressing problems related to soil degradation and decreasing soil fertility. The village level committees collaborated with the project researchers in order to plan and implement activities related to the dissemination of agro-forestry methods, such as on-farm tests with specific seeds and tree species. They also organized field visits to communicate with farmers and training sessions about agro-forestry methods aimed at farmers in different villages.

**Results**

The following paragraphs outline the project's results, including the information gathered about each village, the relationship between wealth and soil fertility management practices, the types of soil fertility management practices and methods used to improve dissemination of soil fertility management practices.

**Farmers' Assessment of the Villages**

The farmers' pictorial representations of the villages revealed that soil fertility management practices differed according to the soil type and village location. For example, limwamu, or the black soil in the Luhya community, was rich in organic matter. Maize, beans, bananas and vegetable yields were good in this soil type. Farmers then identified villages that showed signs of land degradation and soil erosion, which enabled researchers to identify areas that required information about soil fertility management practices, such as agro-forestry. Researchers then conducted transect walks, which involved walking through each village, to confirm whether the information farmers provided was accurate.

Men and women drew village maps separately. Men typically had more knowledge about village boundaries, such as who owned which piece of land, farm boundaries and roads. Women typically were more knowledgeable about the soil types, characteristics, quality, workability (easiness to plough or weed) and the level of soil fertility. Women have this knowledge since they are mainly responsible for subsistence needs and therefore have greater agricultural responsibilities, such as planting, weeding and harvesting (Sharland, 1989). Researchers also discovered that women had the greatest source of indigenous technical knowledge about soil fertility management and appropriate crop selection according to the type of soil. Therefore women's knowledge about soil fertility must be taken into account when determining improved methods of soil fertility management.

Overall, farmers displayed great enthusiasm when discussing their environment and most often reached a consensus about appropriate natural resource management practices. Although farmers often knew how to improve soil fertility, researchers learned that they did not have the income required to implement improved soil fertility methods, such as constructing soil conservation structures to limit soil erosion.

**Wealth and Soil Fertility**

Farmers identified the following wealth indicators: the size of a farm in a village; the use of organic and inorganic fertilizers; the type of house farmers lived in; the breed and number of cattle; the physical appearance of household members; the number of times a family eats each day and the type of food eaten; the level of income; the source of household fuel; the existence of hired labour for farm activities; the educational level of the parents as well as the children; and the frequency of contact with extension staff. Other indicators of wealth included: the number of wives a husband had; the type of kitchenware or furniture in the home; or the presence of radios, television or newspapers.
Wealth indicators differed according to gender. Women in the Maragoli ethnic group identified the physical appearance and health of the household members, the type of food and number of meals eaten each day, whether there was harmony within the household, and the sources of fuel available as indicators of wealth. In contrast, men identified the type of housing, the size of the farm and the number of livestock as indicators of wealth. In general, men considered income-generating activities, such as growing cash crops as important; whereas, women focused on the importance of subsistence needs. Men's assessment of wealth also focused on material goods, such as land; whereas, women focused on non-material indicators of well-being, such as having harmony within the household (Nielsen et al., 1995). Men and women both agreed that livestock was important to generate additional income, in order to pay for school, hospital fees, household commodities and farm inputs.

The researchers discovered that typically female-headed households were poorer than male-headed households, which meant that women had more difficulty implementing natural resource management practices. Researchers also learned that sometimes poor farmers had to take drastic measures to deal with decreasing agricultural productivity due to a lack of soil fertility. A high population density in the Luhya region meant that poor farmers sold their land and migrated to urban centres to try and earn a better living. The rich farmers bought their land and improved the soil's fertility by constructing soil conservation measures to limit soil erosion and applied organic as well as mineral fertilizers. The situation differed in the Luo region because farmers would not sell ancestral land, therefore rich farmers and poor farmers could have poor or fertile soils.

**Soil Fertility Management Practices**

The researchers established three categories of farmers according to their soil fertility management practices. The first category of farmers were considered good soil fertility managers because they could afford to apply inorganic and organic fertilizers. They implemented soil conservation methods on their farms, practiced crop rotation, had little or no parasitic weed infestation, used pesticides and fungicides on vegetables and accessed soil fertility management information through extension services. The second category of farmers were poor soil fertility managers because they could not afford to purchase fertilizer, could not invest in methods of composting or leave their land fallow to regenerate the soil's fertility. In addition, the poor soil fertility managers' land had a lot of striga weed. They planted and weeded too late in the growing season as they were working on wealthier farmers' land to generate additional income. Finally, the poor soil fertility managers had little contact with the extension staff who typically visited farmers who had resources and could risk investing in the new technologies that they promoted. The third category of farmers were average soil fertility managers because they implemented some of the methods that good soil fertility managers practiced. Preliminary results revealed that 14 percent of the farmers in the Sarika village were good soil fertility managers, 22 percent were average and 64 percent were poor managers of soil fertility.

The researchers also learned about the presence of some weeds or plants and their relationship to soil fertility. Decline in crop yields and soil fertility occurred due to large amounts of striga, couch grass (Digitaria scalarum) and white cotton weed (Xanthium pensylvanicum) in the villages. Farmers revealed that soil fertility declined because of continuous cropping with little or no fertilizer inputs, a lack of crop rotation, poor planting seeds, the presence of eucalyptus trees that caused the depletion of nutrients and water from the soil as well as soil erosion. Finally, the researchers learned that soil fertility management practices and level of soil degradation differed from one village to another. Moreover, they learned that universal recommendations to improve soil fertility were not appropriate because communities were heterogeneous. They also realized that recommendations to improve soil fertility must take into account socio-economic factors, such as income potential, access to inputs and access to extension services.

**Farmers' Organizations**

The following paragraphs provide information about the social and clan groups that farmers identified. The farmers noted the activities of each group, and especially income-generating activities, the frequency of group meetings, who attended the meetings as well
as each group's ability to offer credit. The research team learned that the villages in the Luhya region had fewer farmer organizations than the Luo region. In the Luhya region, the majority of farmers belonged to a clan or church group, while farmers in the Luo region typically belonged to women's groups or social welfare groups. The research team learned that the number of farmers not affiliated to any groups in Luhya villages was higher, 14 percent, than in Luo villages, 5 percent. In the Luero village of the Luo region, all the farmers belonged to at least one group and on average each farmer belonged to four groups. In contrast, in the Luhya region each farmer belonged to an average of two groups. Poor households in all regions typically belonged to church groups.

Previous studies revealed that larger communities tended to be more heterogeneous and therefore the chances were greater for disagreements about community action and activities needed to overcome land degradation (Edward and Jones, 1976). The on-farm research confirmed that heterogeneous communities posed difficulties when attempting to reach a consensus in the community about action. Research results demonstrated that the number of farmers willing to test improved fallow technologies over the past 18 months remained limited in the Luhya region, which is densely populated and more heterogeneous in terms of clan composition than the Luo region. Another factor influenced the adoption of improved soil fertility methods in the Luhya region, namely the migration of males to towns and cities in search of additional income. Finally, researchers learned that the most vulnerable farmers were often not members of any social group.

Dissemination of Agro-Forestry Practices

The Ségou Region in Mali adapted the same approach to disseminate strategies to improve soil fertility practices through existing development organizations operating in the area. More than 34 development organizations operated in the Ségou region, including the Ministry of Agriculture and non-governmental organizations (NGOs), but the NGOs were mainly concentrated around the cities. Therefore, only the extension department of the Ministry of Agriculture provided services to farmers in rural regions. In an effort to connect development organizations in Mali, the researchers organized meetings to exchange information, plan, monitor and evaluate research activities about soil fertility improvement. They also sought to promote public awareness about research results and to apply for additional funds. Despite the efforts to foster collaboration between the existing organizations, the meetings did not address the fact that the Ministry of Agriculture provided very few field-based extension workers to farmers. The ratio was one extension worker for 2000 farmers. Therefore, researchers decided to test and implement an approach to connect with farmers in rural areas through their existing social groups.

The researchers identified social groups in 28 villages and compiled a list of each group's membership and activities. Farmers then nominated and elected representative farmers for village and regional level committees. Farmers chose representatives who were respected in the community and able to interact with diverse groups of people, for example, poor, rich, widows or youth. In addition, the representatives of the village committee had to be trusted by the community members for their commitment to improving conditions in the village for everyone. The village committee constituted a forum where farmers could collaborate with researchers and extension workers to disseminate agro-forestry technologies.

Previous studies revealed that women, and particularly widows, were poor and did not receive extension visits because they were unable to invest in the technology extension workers offered. Women were typically members of social groups that assisted them with subsistence farming activities such as ploughing, weeding and harvesting. The village and regional committees allowed women to participate in discussions about agro-forestry methods aimed at improving soil fertility. In two of the regional committees, Sauri and Jina, the representation of women was higher than in the other three. Overall, 57 percent of the members of the village committee were women and 43 percent were men. In the regional committees, 54 percent of the members were women and 46 percent were men. Therefore, the researchers ensured that the women's perspectives on soil fertility management were represented. Finally, the researchers implemented the following communication strategies to facilitate access to
information and promote dissemination about agro-forestry methods to improve soil fertility: they produced written material, radio and TV programmes in local languages about agro-forestry methods and they organized field visits and tours to areas that had successfully improved soil fertility.

**Conclusion**

The research project demonstrated that a participatory communication approach is very important in order to facilitate the wide-scale adoption and dissemination of agro-forestry methods aimed at improving soil fertility. The researchers involved in the project found that participatory approaches not only increased adoption of technologies, but also increased knowledge and information sharing within local communities. The challenge that remains is to find ways to spread the adoption of agro-forestry methods beyond the community where a development project occurs towards surrounding communities with different socio-economic and environmental conditions.

**References**


Improving Banana Production in Uganda through Participatory Communication

Wilberforce K. Tushemereiwe, Drake N. Mubiru, Esther L. Ssemakula, Moses Buregyeya, Enoch Lwabulanga
National Agricultural Research Organization (NARO)
Kampala, Uganda

Abstract

Ddwaniro sub-county of Rakai district is one of Uganda’s leading banana producing areas. However, yields in the region have sharply declined in recent years due to poor soil and water management, declining soil fertility as well as socio-economic problems. Rural farmers lacked access to technical knowledge about natural resource management techniques as well as a forum to share information with other farmers in their community about their constraints and opportunities.

A project team, comprising communication experts, natural resource management scientists and a field extension worker, developed and implemented a participatory communication approach in Ddwaniro sub-county that promoted collaboration between farmers and researchers in order to improve natural resource management strategies, increase banana productivity and ultimately improve rural livelihoods in the region. Researchers and farmers collaborated to define the various problems related to land degradation and decreased banana productivity, including how other productive activities, and socio-economic factors such as gender and wealth influenced natural resource management practices. After assessing the problems that influenced decreasing banana productivity, the farmers organized themselves into three groups. The focus group discussions allowed farmers to identify the main problems they faced and devise potential solutions to overcome them.

The farmers implemented the strategies they devised and improved banana production in Ddwaniro sub-county. Despite the project’s success several challenges remain, including the rural farmers’ lack of resources, the difficulty of conceptualizing scientific principles and problems related to male domination.

1 Drake Mubiru, Soils and Soil Fertility Management Programme, National Agricultural Research Organization (NARO), P.O. Box 7065, Kampala, Uganda. Email: banana@mul.com
Introduction

Uganda has 58 decentralized local government administrative units (districts). Each district comprises several sub-counties, which on average have about 25,000 people. Rakai district is located in southwestern Uganda and it is one of the smallest districts in Uganda, with an area of approximately 4989 square kilometres. The district is divided into three main topographic zones: the Lake Victoria shore, the northeastern and the western hills, and the northwestern plains. Ddwaniro sub-county falls within the northeastern and the western hills. Rakai district, and Ddwaniro sub-county especially, is the leading banana producing area in the country.

Banana cropland covers 1.3 million hectares, or 33% of all agricultural land in the whole of Uganda. Since 1996, annual production has been over 9 million ton per year, while per capita consumption has been over 200 kg per year (Tushemereirwe et al., 2001). Bananas constitute the primary subsistence crop. With suitable spacing between trees and an appropriate pruning scheme that maintains a collection of suckers emerging from the mother plant to make up three generations, there is food all year round. Banana production contributes up to 22 percent of the rural population’s revenue and alternates with coffee as a leading source of family income (Bagamba, 1994; Embrechts et al., 1996). Nearly all the bananas sold by farmers supply the Ugandan market for local consumption.

Banana crop productivity has undergone a drastic decline since the early 1970s. In the traditional banana growing areas of central Uganda, such as the Ddwaniro sub-county, productivity is approximately 6.0 tons per hectare per year, while in western Uganda it is approximately 17.0 tons per hectare per year. In 1992-93, a preliminary study was funded by the International Development Research Centre (IDRC) and the Rockefeller Foundation to determine the causes of decreased banana productivity. Declining banana productivity was attributed to poor soil and water management, pests, diseases as well as socio-economic problems. In addition, rural farmers were unable to access technical support from government extension workers. The results of the preliminary study prompted the implementation of a participatory research approach to improve soil and water management in Ddwaniro sub-county.

In 1998, the Rockefeller Foundation (U.S.), IDRC (Canada) and the Department for International Development (DFID, UK) provided financial and technical assistance to implement a project that would experiment with various promising natural resource management methods, such as the construction of water channels, mulching and composting, in order to improve banana productivity. The project team aimed to improve the adoption rates of successful natural resource management methods by rural farmers. Some experiments occurred at agricultural research stations, while other experiments occurred on farmer’s plots. A review of the development literature revealed that conducting experiments on farmers’ land was a successful strategy to determine improved methods of natural resource management and then disseminate the information to other rural farmers.

The project researchers selected three sub-counties, which represented various economic problems to conduct on-farm experiments in collaboration with the local farmers. The sites were Ntungamo district in western Uganda, Kisseka of Masaka district in central Uganda and Bamunanika of Luwero district in central Uganda. By the year 2000, the farmers identified and implemented the following methods of managing natural resources: trenches to prevent soil erosion and water run-offs; composted manure combined with mulch to improve soil fertility and water retention in severely degraded regions; the application of mulch to regions with moderate land degradation; and a pruning scheme that left three banana plants per mat from three generations to optimize the plant density and reduce competition for soil nutrients and light. Each method proved successful in the effort to improve banana productivity.

Introducing the results of the experiments to other regions and villages throughout Uganda became the new challenge for the research team. Traditionally, government extension workers have been responsible for the dissemination of development research results to small-scale farmers, but unfortunately extension services in Uganda have not always been successful. Structural adjustment policies have
caused a shortage of extension workers, one extension agent for every 5000 farmers in Uganda; decreased training for extension workers; and reduced agricultural subsidies for small-scale farmers as well as decreased access to credit.

Extension programmes have also failed because extension agents used top-down methods to disseminate information about natural resource management. Top-down methods of disseminating information often fail because they do not allow farmers enough input into the selection of natural resource management methods of natural resource management nor do they provide a forum for farmers to exchange information about the successful methods of natural resource management they already use. Consequently, researchers determined the need for a participatory research approach, which would foster rural farmers' participation in the selection, implementation, and evaluation of appropriate natural resource management strategies. In addition, a participatory research approach ensures that farmers are involved in the process of dissemination to share information about these methods with other farmers (Bessette, 2001).

A research team from the National Agricultural Research Organization (NARO) received financial support from the International Development Research Centre (IDRC), to initiate a participatory research project in Ddwaniro sub-county of Rakai district in Uganda. The project Improving Banana Productivity in Uganda through Participatory Communication had a primary objective of increasing banana productivity. The project team and the farmers developed other objectives, including identifying the causes of decreasing banana productivity as well as potential solutions, fostering collaboration with the local population to meet their natural resource management needs and collaborating with other development organizations to improve methods of dissemination about natural resource management practices.

Methodology

The research team considered the following questions before implementing the project. What factors influence banana productivity? How do small-scale farmers acquire knowledge about natural resource management practices? What techniques do they use to cope with problems of decreased soil fertility? What do small-scale farmers need to know or do to maintain and improve soil fertility? Finally, what communication strategies can foster information exchange about the improved natural resource management methods within rural villages? The following paragraphs outline the methods researchers used to select the site to study, identify the range of natural resource management problems the local population faced, organize focus groups, select appropriate communication strategies and monitor the research process.

Site Selection

Initially, a team comprised of a socio-economist, a communication specialist, a soil scientist, and an extension agent already working in the community toured Rakai district and then selected Ddwaniro sub-county for the study. The team selected Ddwaniro sub-county because banana production constitutes the primary agricultural crop in the area, it has a relatively good road network, the farmers are hard-working; and banana productivity has been decreasing. The team chose three parishes, Buyamba, Ddwaniro and Kayoonza, to represent the different altitudes in the sub-county, the major enterprises aside from banana production, the various natural resources in the region as well as the extent of soil degradation. The project team began by organizing a series of consultative meetings with district, sub-county and opinion leaders as well as extension workers before approaching the farmers. The preliminary meetings familiarized each group with the project's goals and attempted to attain each group's support of the project.

Identification of Management Problems

Researchers asked members of Ddwaniro sub-county to identify natural resource management problems related to banana production as well as their causes and potential solutions. Researchers conducted individual interviews with men and women from various households as well as group discussions to learn more about banana production. Researchers complemented the information they gathered during interviews with a literature review of the socio-cultural, environmental, such as land degradation, and political factors that
influenced banana production. The key influences on natural resource management strategies included: the type of resources in each region, such as water sources, forests, hills, soil types; whether agricultural production was subsistence or cash crops; the availability of extension services; and wealth.

Organisation of Farmer Groups

Under the guidance of the research team, farmers formed focus groups from 12 pre-existing farmer groups in Buyamiba, Ddwaniro and Kayoonza parishes. Researchers invited five representatives from each focus group to attend a workshop at the sub-county headquarters. At the workshop, the representatives organized themselves into three groups according to the natural resource management problems they identified and then prioritized the problems. The farmers established objectives to address each need and then determined strategies to achieve the objectives. Farmers noted that the strategies must be easy to use, manipulate and sustain. In addition, the communication strategies must be adaptable and have low production costs (Bessette, 2001).

Participatory Communication Strategies

The research team designed plans to facilitate community participation in the development and selection of communication strategies. The researchers pre-tested the communication strategies to evaluate their content, clarity, relevance and visual appeal (Bessette, 2001). They asked community members who had some artistic talent in still photography, for example, to contribute to the process of developing methods of communication to disseminate information about improved natural resource management practices. The research team then developed a plan to share information about improved soil and water management practices within neighbouring communities.

The project team ensured that the communication strategies were appropriate. For example, they selected communication strategies about methods of natural resource management that were appropriate for community members who were illiterate. In addition, the project team wanted to ensure that the community continued with activities to improve methods of natural resource management and therefore increase banana productivity after the development project ended.

Participatory Monitoring and Evaluation

To monitor and evaluate the project’s progress, the research team and the farmers elected seven people who formed a committee in order to determine the relevancy of the collected information in relationship to the problems the farmers identified. The committee reviewed the strategies that the farmer groups developed to disseminate natural resource management strategies. The committee also identified people in Ddwaniro sub-county and outside the sub-county who could benefit from improved natural resource management techniques and if possible requested their participation in the project. Finally, the committee prepared reports for the various development partners, such as donors, policy makers and NGOs.

Project Implementation

The research team collaborated with the rural farmers in Ddwaniro sub-county to identify the causes of land degradation and the major enterprises aside from banana production in the region. In addition, researchers and farmers identified the women’s and men’s roles in agricultural production and compiled a list of wealth indicators to determine the influence of wealth on agricultural productivity.

Causes of Land Degradation

Soil degradation occurred due to overgrazing and bush burning, which provided new pastures for livestock. Soil degradation also occurred from tilling practices that did not incorporate measures to control soil erosion, such as grass bunds and trenches, or mulching. Grass bunds are rows of grass or shrubs planted along contour lines or the perimeter of agricultural crops in order to protect the soil from being washed away while trenches ensure that rain water collects in the crop field. Mulching utilizes decayed vegetation matter to improve soil fertility. Finally, soil degradation occurred due to continuous farming with no periods of fallow. Charcoal and brick burning also caused soil degradation in Ddwaniro sub-county. Farmers noted that these activities decreased soil fertility because of the exces-
sive heat generated in the burning process. In addition, bricklaying destroyed the relatively fertile topsoil and left behind less fertile soil.

Major Enterprises in the Sub-County

The research team and the farmers collectively identified the key enterprises in the sub-county and prioritized their importance. The process confirmed the research published by Rakai District in 1994, which stated that agriculture constituted the main economic activity (Rakai District Policy Guidelines, 1994). More than 80 percent of the population engaged in agricultural production, although other major enterprises included local beer brewing, cattle raising, trade and fishing.

The research team and farmers assessed the prioritization of other productive activities in order to understand the influence on natural resource management methods. For example, farmers in the Buyamba parish ranked cattle raising second to farming. Since farmers in this region used animal manure to improve soil fertility, cattle ownership afforded the community greater food security and better livelihoods. Farmers in the Kayoonza parish ranked fishing second to farming because of their proximity to the lake. Researchers learned that fishing had a negative impact on the livelihood of people in Kayoonza parish because they invested a lot of time in fishing but their catches were sometimes very low. Therefore the time dedicated to fishing compromised the productivity of their gardens and decreased food security in the region.

Gender Analysis

During their meetings with women as well as men, researchers asked them to describe their responsibilities regarding family care, the types of farm activities they engage in, the natural resource strategies they implement and whether they had any input in decision-making about natural resource management at the village level. Women revealed that they were responsible for most domestic activities, such as family care, as well as managing the family’s subsistence crops. Men noted that they were mainly responsible for the cash crops, such as bananas, coffee and maize. Researchers learned that women are responsible for more labour in most enterprises.

In addition, gender influenced access and control over resources and their benefits. Men controlled almost all the family resources, even in cases where they were not the major contributors to the labour that generated the resources. Men were, in most cases, the voice of the household, which meant that they represented the household at public gatherings. At the group meetings the research team organized, attendance by gender was, in most cases, approximately 98 percent men. Although the meetings were not well attended by women, some women did attend and furthermore some of these women had positions of responsibility on the local councils.

Wealth Ranking

Through a consensus decision-making process, the farmers compiled a list of indicators of wealth which included: income; farm size; assets, such as car, house, number of cattle; methods of farm maintenance, such as applying agricultural input; ability to meet household needs, such as the children's education; number of coffee trees; and size of a household's banana plantation. An analysis of the wealth indicators revealed that most farmers were not wealthy. Land fragmentation has occurred over the past two decades and has decreased most rural farmers' standard of living. Land fragmentation is a common occurrence throughout Uganda. It involves breaking up communal land holdings into small privately-owned land holdings. This has resulted in smaller land holdings for rural farmers in Uganda and fewer coffee trees, smaller banana plantations, lower incomes, and an inability to combine livestock production and farming.

Results

During the group meetings farmers first identified the constraints that influenced decreasing banana productivity. Then farmers formed three focus groups according to their specific soil fertility management needs. The focus groups permitted farmers to share their opinions about the problems related to natural resource management as well as potential solutions. The following paragraphs provide details about the factors responsible for the low banana production as well as the results of the focus groups.
Reasons for Decreasing Banana Production

Farmers identified poor soil fertility as the major cause for decreased banana productivity. Poor soil fertility exists because of phosphorus deficiencies, aluminum toxicity and drought (Logan, 1990). In addition, a high population density has contributed to land degradation and therefore decreased soil fertility since some farmers could not afford to leave their land under fallow, which could restore soil fertility. Drought also influenced banana productivity because the soil in Ddwaniro sub-county has a low water retention capacity. Although many farmers applied mulch to their plots in an effort to retain water in the soil, their efforts have not increased banana productivity substantially. Researchers noted that mulch alone was not enough to increase banana productivity because the degraded soil required nutrient supplements, such as manure or inorganic fertilizer (Zzake, 1993). Therefore, the research team and the farmers decided that mulch should be applied in combination with manure in order to improve banana productivity.

Poor soil fertility and decreased banana productivity were also linked to problems of soil erosion. Ddwaniro sub-county consists mainly of hills, although there is a flat plateau towards Lake Kijanebalola. The majority of farmers established the banana plantations in the valleys and on the flat plateau, which contained relatively fertile soils. However, improper soil management practices and continuous farming have degraded the soil in these regions. Therefore, some farmers shifted their plantations to the steep slopes of the hills where the soil was prone to erosion due to the high-speed surface runoffs. Moreover, most farmers lacked the labour skills necessary to make trenches in order to prevent soil erosion on the steep slopes. The group meetings ensured that farmers could discuss appropriate and cost-effective ways of making the required trenches.

In addition, farmers lacked knowledge about modern soil and water management methods because the extension system in Uganda was poorly funded. Rural farmers often have valuable indigenous knowledge about methods of improving soil fertility and, therefore, banana production, but had been unable to share this information with other rural farmers or access information about methods to improve soil fertility through radio programmes or newspaper articles. Finally, small-scale farmers had difficulty accessing credit because of high interest rates and short repayment terms, which prevented them from purchasing agricultural inputs to improve soil fertility.

Farmer Focus Groups

In the three parishes of Ddwaniro sub-county, 12 farmer groups participated in the project. During group meetings, the farmer groups organized themselves into three focus groups according to their common needs and objectives. The first focus group, the soil fertility and moisture management group, consisted of farmers faced with declining soil fertility and conditions of drought. The farmers in this group decided to rejuvenate their land by applying organic fertilizer or mulching to conserve soil moisture. The second focus group, the soil erosion management group, consisted of farmers with plantations in the hilly areas prone to soil erosion. The farmers in this group decided to monitor water runoffs from hilltops in order to prevent soil erosion and crop damage. The third focus group, the soil fertility, moisture, and erosion management group, decided to enhance the soil's nutrients and organic matter in order to improve their soils' water retention capacity. The following paragraphs review the strategies and activities each group implemented in order to improve soil fertility and banana productivity in Ddwaniro sub-county.

Soil Fertility and Moisture Management Group

The main objectives of this group were to conserve soil and water and increase food production as well as family incomes. In order to achieve these objectives farmers discussed the skills and knowledge they had to acquire. Farmers noted that they required skills for making and applying compost manure and they required knowledge about appropriate methods of mulching. Farmers also wanted access to credit institutions that offered favourable lending terms to small-scale farmers and information about marketing outlets. Farmers wanted information about banana-based intercropping methods, such as intercropping banana with beans or banana with coffee, and they wanted to combine indigenous knowledge with modern technology. Finally,
farmers required knowledge about appropriate methods of handling perishable farm produce.

The group suggested organizing training sessions, including demonstrations, about compost manure and appropriate methods of mulching for rural farmers. Farmers suggested using brochures, photographs, videos, posters, newspapers, newsletters and exhibitions to facilitate the training. The group also suggested organizing visits to farms within the community that practiced successful methods of composting and mulching. If visiting farms was not possible, the group suggested providing information to rural farmers about farmers who had success in improving soil fertility through videos, photographs or newspapers.

The farmers wished to receive training in applying for loans in order to facilitate their access to credit with favourable lending terms. They also suggested facilitating meetings between farmers and credit institution managers so that farmers could learn about the lending process as well as the terms of credit. The group recommended providing information to rural farmers about market outlets through newspapers, radio, posters or agricultural shows.

In order to acquire knowledge about banana-based intercropping methods, the group noted that farmers required training. The group suggested providing training for rural farmers through brochures, radio programmes, videos or photographs. Moreover, farmers noted the importance of combining indigenous and modern methods of improving soil fertility. They needed to establish a forum which would allow them to acquire information from scientists about methods to improve soil fertility as well as share the information with other farmers in their community. Finally, the group recommended training sessions to facilitate rural farmers' knowledge about methods to handle perishable farm produce after harvest. The training could occur through the use of brochures, photographs or videos.

Soil Erosion Management Group

The group's main objectives consisted of increasing food production as well as household incomes, developing and implementing improved soil fertility management practices and pooling their resources to access credit or create a bigger market outlet through group sales. In order to achieve these objectives the group discussed the skills and resources to be acquired. The group concluded that rural farmers needed knowledge about constructing appropriate and cost-effective water trenches in order to prevent soil erosion. They also noted that rural farmers required access to affordable agricultural inputs to improve the soil's fertility. Finally, the group determined that rural farmers needed to have a forum to access information about improved soil and water management methods as well as exchange information with other farmers in their community. The rural farmers needed technical information about soil erosion and water runoffs as well as the benefits of constructing water trenches. In order to provide rural farmers with the skills required to construct appropriate and cost-effective water trenches, the group recommended establishing a training programme to provide information about the benefits of water trenches as well as the skills required to build them. The training sessions could use brochures, photographs, videos, posters, radio broadcasts or visits to other farmers who had experience in the construction of water trenches.

The group suggested establishing a cash-round, or pooling of funds to facilitate rural farmers' access to affordable agricultural inputs. They also recommended requesting assistance from credit institutions, NGOs, government-funded development programmes to acquire agricultural inputs, such as hoes, machetes, improved seeds or fertilizer. Rural farmers could acquire information about the value of pooling resources to access credit or gain more bargaining power in the market through radio broadcasts or face-to-face meetings.

In order to facilitate information exchange among rural farmers, the group suggested organizing group meetings at the village level to discuss problems related to soil fertility as well as potential solutions or methods currently practiced to overcome poor soil fertility. The farmers recommended utilizing traditional methods of communication at the meetings, such as poetry, song, or theatre. In order to facilitate information exchange between farmers and researchers, the group suggested organizing agricultural training programmes where researchers could
share the technical aspects of improved soil fertility management with rural farmers.

**Soil Fertility, Moisture and Erosion Management Group**

The group's main objectives consisted of increasing food production and improving the well-being of the local population. The group outlined the resources and skills that rural farmers required, but their prioritization differed slightly. The main priority was for the farmers to acquire knowledge about methods of soil and water management to improve banana productivity. The group also noted the importance of affordable agricultural inputs, knowledge about intercropping bananas with other crops, such as coffee, integrated pest management and appropriate methods of handling of perishable farm produce after harvest.

In order to facilitate knowledge about natural resource management practices to protect and improve crops, soils, and water systems, the group recommended organizing training workshops for rural farmers. Farmers wanted training in banana intercropping, compost and mulching methods as well as appropriate and cost-effective ways of constructing water trenches. The group suggested that the training workshops could utilize brochures, photographs, videos, posters, radio broadcasts or visits to other farms to learn about farmers' successful practices.

**Conclusion**

Although farmers required resources, such as agricultural inputs or credit, to improve banana productivity, this initiative focused on communication needs of rural farmers, such as training and information exchange. The project successfully involved farmers and facilitated their participation in the effort to improve banana productivity. Moreover, the three focus groups implemented the strategies they devised to improve natural resource management practices and banana production did increase. Despite the success of the project, some important challenges remain.

Most farmers now know about methods to improve their soil and water management practices, but they lack the resources to implement them. Rural farmers in Uganda need money to buy agricultural inputs, such as mulching materials or fertilizer, and to hire labour for certain activities, such as weeding and pruning. Although farmers have proposed approaching credit institutions to finance their material and labour requirements, the credit institutions still have unfavourable lending terms, such as high interest rates and short re-payment schedules, that prevent small-scale farmers from borrowing. In that regard, the research team is planning to hold a meeting between the farmers and credit institutions to discuss the issue. They also plan to produce a video about small-scale farmers' need to access credit and disseminate it to the top managers at credit institutions as well as policy makers at the Ministry of Finance.

Moreover, many farmers have difficulties conceptualizing scientific principles, such as the active ingredients in fertilizers. The research team is faced with the challenge of how to illustrate scientific information in a simple manner so that farmers can grasp the concepts and later be able to exchange the information with other farmers.

An additional challenge relates to the fact that in most communities women tend not to speak at meetings if men are present or if the meetings bring together large groups of people. Women feel that men, or their leaders, must always speak for them. Yet, in most cases, women's views are the most important ones since women carry out most of the farming activities. The research team feels that to overcome this challenge, there is a need to organize meetings with women's groups and make home visits in order to engage in informal conversation with women.

A final challenge that the research team did not overcome will require a long-term commitment to influence social and cultural patterns. It relates to the fact that men control income, while women carry out most of the farm activities. The result is that the resources that should be re-invested into farm activities are dedicated to less critical areas, such as men’s leisure.
References


The main objective of the project was to recover the salinized soil of the west coast of Senegal in order to allow for agricultural and livestock production. The researchers set out to achieve that objective by planting a mix of salt tolerant trees and fodder that would improve the soil’s fertility. They recognized the need to involve the local populations, and particularly women, in the design and implementation of socially compatible and economically rewarding technologies that would address the land salinization problem. They aimed at identifying and implementing activities that would encourage ongoing community participation, such as the construction of dams, the planting of shrubs and trees as well as the cultivation of vegetables and rice.
Introduction

Soil degradation impedes attempts to improve agricultural production. The problem of soil degradation also interferes with the efforts of the local populations to address poverty, improve food security and promote income-generating activities. An increase in the soil’s salt content is one of the major factors contributing to soil degradation. Researchers estimate that 160,000 hectares of soil become salified every year (Barrow, 1987, 1991). Salty soils cover about 53 million hectares in Africa and approximately one million hectares in Senegal (Lal, 1984; Pereira, 1985; Middleton and Thomas, 1997).

In West Africa, people have experienced soil salinization for decades (Massibot and Carles, 1946), but in recent years the problem has become much worse. In all the collection basins of the Sine Saloum and Casamance regions, for example, the salinization and hyper-acidification of the soil are responsible for the complete disappearance of the mangrove in the upper streams and their tributaries. In the past, the mangrove played a very important part in agricultural production. It protected the crops from salt water, prevented the soil from eroding, and the sand from accumulating in the tributaries, thus ensuring fresh water irrigation.

In order to counter the effects of salinization, the Salinization and Soil Recovery Project was recently implemented in the Sine Saloum Basin. The climate in the region is of the Soudanian tropical variety with two strongly differentiated seasons: a long (8 to 9 months) dry season and a short (3 to 4 months) rainy season. Since 1971, however, the Sahel region has been hit by severe periods of drought, thereby shortening even further the already short rainy season. In addition, the Saloum River and its tributaries influence the agricultural production in the region. Under the influence of climatic pressure, the course of the tributaries was inverted thus bringing sea water upland. Under the sea water which covered large areas, the forest vegetation all but disappeared and any kind of agricultural production became practically impossible in the Sine Saloum region.

Socio-Economic Context

The farmers in the region have attempted to overcome the negative effects of salinization in two ways: first by using organo-mineral fertilizers and secondly by building small dams in order to collect rainwater and reduce the flooding of the land by sea water. Despite the farmers’ efforts to overcome soil salinization, the results have been disappointing in the face of the magnitude of the problem. Since 1965, the government has also been involved in the construction of large anti-salt dams in order to overcome the negative effects of land degradation. Unfortunately, the projects were usually carried out in a very technocratic manner without allowing any input from the local populations. The local populations were not even consulted about the usefulness of the dams, nor were they asked to contribute to their maintenance. As a consequence, the large-scale dams exacerbated the problem of soil salinization and acidification, instead of alleviating it. Moreover, forestry researchers also conducted studies on salty soil and on the behaviour of a salt tolerant species (i.e. lignin). Neither state initiated projects nor forestry researchers’ efforts halted soil salinization. As a consequence, critical questions emerged about research design and methods in the areas impacted by soil salinization. Past failures to overcome the salinization of land confirmed the need for an integrated, multidisciplinary, and participatory approach. In other words, the local populations and especially the women had to become involved.

Salt and toxic products from the sea have caused massive destruction to the vegetation cover, which in turn has led to a dramatic loss in bio-diversity. Land degradation negatively impacted the food security of the local populations who rely on subsistence farming. Women are particularly affected as they are the main producers of the subsistence crops of rice, millet, and sorghum.

It has now become quite apparent that the soil in the Sine Saloum region requires immediate regeneration in order to enable sustained agricultural activity, reduce existing land conflicts between farmers and herders as well as prevent any further migration from the villages. The research project presented in this chapter clearly demonstrates that in order to successfully regenerate the land and improve soil
fertility the local populations have to become involved. The following section outlines the main objectives of the Salinization and Soil Recovery Project.

The main objective of the project was to recover the salinized soil of the west coast of Senegal in order to allow for agricultural and livestock production. The researchers set out to achieve this objective by planting a mix of salt tolerant trees and fodder that would improve the soil's fertility. They recognized the need to involve the local populations, particularly women, in the design and implementation of socially compatible and economically rewarding technologies that would address the land salinization problem. They aimed at identifying and implementing activities that would encourage ongoing community participation such as the construction of dams, the planting of shrubs and trees as well as the cultivation of vegetables and rice.

**Participatory Planning**

The project involved three research institutions, namely the Senegal Institute of Agricultural Research, the Institute of Environmental Sciences and the International Program of Cultures in Arid Zones as well as one NGO, Africare Senegal. All four institutions focused on participatory technology development, social development through adult education and training as well as the health of the people in areas impacted by soil salinization.

Initially the researchers from the three research institutions reviewed the existing literature about previous soil salinization research projects conducted in Senegal, and elsewhere in Africa. After the literature review, they decided to conduct an evaluation of the situation at various locations in the villages of the Saloum Delta region. The researchers decided to study this region for the following reasons: low agricultural productivity and loss of biodiversity in the Saloum Delta region due to soil salinization. In addition, the local population experienced additional problems, such as a lack of food security related to land degradation.

The research team initiated the project by participating in Local Development Committee (LDC) meetings, which function as the local administrative structures at the district level. The LDC meetings allowed the researchers to discuss the results from their preliminary analysis with the administrative authorities and the local groups. The LDC meetings proved an excellent opportunity to exchange information about the issue of land degradation with the village leaders as well as the rural counsellors.

A number of ideas to address the problem of soil salinization emerged at the LDC meetings. The participants decided to combine mechanical (dams) and biological (plants) methods in order to overcome soil salinization. The participants decided to build small dams with the available labour power, in order to stop the flow of the salt water. The participants also emphasized that the dams had to be stabilized with plants which would provide a good vegetative cover, so that the rain and the livestock would not damage the dams. The plants would also regenerate the vegetative growth and help improve soil fertility. The participants recommended planting trees that could resist flooding by sea water and would remove excessive salt from the surface of the soils. Finally, the participants decided to select herbaceous plants that would provide good soil coverage as well as good fodder for the livestock.

An additional concern related to women's needs emerged during the LDC meetings. The women noted that it was difficult for them to contribute to long-term programmes to address soil degradation, as their main preoccupation was survival. Consequently, they suggested a variety of action plans in order to help them achieve sustainable revenues, such as vegetable and rice production. The women agreed that the land had to be recovered but their first priority was to provide for their family's subsistence.

**Project Implementation**

The project team worked with a series of organizations: women's and men's as well as mixed gender groups. The consultations showed that, although land salinization mainly impacted women because they are responsible for their family's subsistence needs, it is nevertheless important to involve men because building dams is a labour intensive activity which cannot be performed by women alone.
The researchers learned that the local population shared most of their information verbally, in face-to-face meetings or celebrations, for example. In order to discuss the issue of soil salinization with farmers, they asked the LDC members when farmers would be available to meet and how often. Researchers also considered activities such as weekly markets, gathering of water and firewood, food preparation and cooking, cultural and recreation activities, to ensure that meetings did not conflict with these activities. Then the research team facilitated visits for the committee leaders at the experimental plots (Ndiaffate) and at farmers’ plots in other villages. Visits were organized twice each year. The project team also took advantage of training that was already occurring in the villages about methods to control soil salinization. Researchers attended the training meetings to share their ideas about methods which could be useful to improve soil fertility, such as building dams or planting trees.

The first priority of the project was to halt soil salinization. To that end, the researchers organized the farmers in teams so that they would build mud dams around existing plots. The dams served as retention basins for rainwater. The farmers also planted various shrubs that were resistant to salt. The trees helped to decrease the salty water layer through a process called evapo-transpiration, which refers to water loss through plant transpiration. In addition, the tree roots dug into the soil and created canals, which further accelerated rainwater infiltration.

The researcher's experiments confirmed that the dams should be planted with a fast growing, salt resistant shrub such as Atriplex lentiformis, in order to make them more stable. The researchers also determined that 20 percent of the region devoted to rice production should be planted with Distichlis spicata, which is an herbaceous salt-tolerant fodder plant in order to drain the salt from the surface of the soil. Moreover, the research team proposed planting a third salt resistant species, in order to help reduce soil salinity as well as wind and water erosion. In addition to pursuing the long-term goal of regenerating salinized land, the local population also collaborated with the researchers in order to implement a series of activities that would improve the immediate food security of households. The activities included improving vegetable production, such as okra, onions, tomatoes, eggplant, and cabbage, and forest fruit tree production, such as Ziziphus, grenade, etc.

Overall, the rate of participation was good, especially among women. This clearly demonstrated that the local populations were very interested in learning about methods aimed at halting soil salinization. The researchers had to remind them, however, that the project's objectives would probably not be met in the short term, and that the effort to overcome soil salinization would probably require a long-term commitment.

Results

The following paragraphs outline the results of the project designed to overcome the problem of salinized land and in the process improve soil fertility, as well as increase the physical and social well-being of the local populations.

Regeneration of Land

Building dams regenerated the salinized lands and led to the reappearance of spontaneous vegetation. At the beginning of the project, the researchers accounted for three species of plants in the region that had a coverage rate of less than 1%. After three years, they accounted for 100 species that had a coverage rate of 33%. Furthermore, the bio-mass production was insignificant at the beginning of the project and at the end of the project it had reached an estimated level of three tons per hectare.

Salt Resistant Plants and Trees

The lignin species, Tamarix aphylla var erectus, responded well in salinized soil. The average survival rate is now 62 percent and it has satisfactory growth; after 24 months, its average height is between 4 to 6 metres and its diameter is approximately 1.7 centimetres. One could probably reforest large portions of salty lands in Senegal with Tamarix aphylla. The other experimental species, Distichlis spicata and Atriplex lentiformis, did not respond well in a salty environment and therefore it was replaced with a different salt tolerant species. The local populations and
the researchers decided collectively to test *Vetiver zizanoides* instead of *Atriplex lentiformis* to see if it would protect the dams. During the project, the researchers and the local populations conducted a search for a different herbaceous fodder plant in order to replace *Distichlis spicata*. Finally, the trees planted on the experimental plots confirmed the hypothesis that they maintained the salinized soil at a level underground that did not affect agricultural activity.

**Improving the Skills of the Local Population**

During the research project, the farmers acquired knowledge about soil salinization and the action required to overcome the problem. Farmers learned how to build dams and which salt-resistant plants to grow. The researchers predicted that the local populations would not be able to grow rice on the experimental plots until four years after implementing methods to halt salinization with dams and salt resistant plants and trees. After only two years of experimenting with potential solutions to halt soil salinization in the Saloum Delta region, however, the farmers attempted to grow rice in the regions where the researchers had conducted their experiments. The farmers did not harvest much rice, but they were still quite satisfied because the land that was abandoned showed signs of possible recovery.

**Dissemination of the Research Results**

In 1999, the researchers held discussions with decision-makers including the Minister of Agriculture and Livestock, the agricultural adviser to the Prime Minister, the President of the Administration Council of the Senegalese Institute of Agricultural Research (SIAR), and the Governor of the Kaolack Region. Researchers also held discussions with media representatives from television, radio and newspapers. The Senegalese Radio and Television group allowed the research results to reach a wider audience. 'The project team presented the participatory strategy to address land salinization and the preliminary results to the African Ambassadors Committee at a UNESCO meeting in Paris in March 2000. Ambassadors from other African countries in regions affected by salinization, such as Gambia, Guinea Conakry and Guinea-Bissau, were very interested in the *Salinization and Soil Recovery Project* and promised to discuss the issue of soil salinization with their government officials. The members of the team also organized meetings with scientists from Israel, the U.S., and France, as well as national research scientists. French scientists were interested in the project and agreed to help design a project to recover pastures on salinized soil. Two scientific papers have already been published about the topic.

Agricultural and forestry development agents working in the area contacted the project team to exchange information and develop a partnership in the struggle against land degradation. In addition, nine students and trainees from various agricultural schools and universities completed thesis work on the topic of soil salinization and have disseminated their research about salinization in the national scientific community. Finally, the researchers planned to organize a closing seminar where a large number of people would be invited at the end of the fourth year (for example, decision-makers, community members, local community groups, NGOs, government development agents, donors, etc.). They also planned to disseminate the final report widely. Finally, they planned to produce a 30 minute documentary in order to disseminate the results at the regional, national, and international level about the project to halt soil salinization.

**Conclusion**

Collaboration between the development organizations and the local populations proved to be necessary in order to promote a participatory approach to resolve the problem of land degradation, even though participatory methods require more time. Research projects that foster exchange with the local populations are indeed necessary because the researchers need to leave their laboratories and learn about the dynamics of the local problems they are studying. In the project aimed at recovering the salinized lands in Senegal, the researchers attempted to foster collaboration between scientists and members of the local populations in order to promote sustainable management of natural resources. The *Salinization and Soil Recovery Project* demonstrated that the expertise of researchers and scientists must be combined with the knowledge and expertise of community members in order to achieve the objective of improving soil fertility and ultimately the population's physical and social well-being.
References


This chapter describes the grassroots communication approaches the West Africa Rural Foundation (WARF) implemented to assist inhabitants of the Djibanar valley in Western Senegal to overcome land degradation due to salt water flowing inland from the sea. The objective of the project was to mobilize the local population and build on the administrative and technical capacity of local organizations to rehabilitate their land and secure improved agricultural production. WARF implemented a participatory approach that successfully gathered and mobilized populations in the village and throughout the Djibanar valley: they generated an ongoing dialogue about natural resource management. The objective was to build and restore dams to halt salinization and test new varieties of rice that would be more likely to thrive in a salty environment. The project successfully led to the rehabilitation of 200 acres of degraded land, which then was equitably distributed among the farmers who participated in the project. Researchers learned the value of collaborating with multiple development organizations as well as the private industry in order to implement participatory methods and develop a resource management plan for communities suffering from severe land degradation and food insecurity.

1 Fadel Diame, West African Rural Foundation (WARF), P.O. Box 13, Dakar, Senegal. Email: warf@syg.sn
Introduction

The Djibanar valley is located in the River Casamance Basin of Western Senegal. The Djibanar valley belongs to the administrative region of Kolda in the south of Senegal, which is the smallest administrative division in Senegal. Seven villages share the basin slope and their populations range from 250 to 2000 inhabitants. The main productive activities in the region are related to agriculture. Local production systems used to consist of women harvesting rice twice each year in the valley and men growing millet, groundnuts and maize in the plateau areas. The combination of rice cultivation and millet, groundnuts and maize used to satisfy local food needs, but rain deficits and increased salinity have decreased food security thereby forcing the local population to search for alternative strategies to produce enough food.

For several decades, the valley regions have experienced land degradation. The salinity of valley lands has reached the highest level to date. The elevation of rivers in the Djibanar valley is approximately at sea level. Consequently, cyclical phenomena such as drought, rain deficits and high evaporation rates caused river levels to drop, allowing sea water to surge inland and leave salty deposits in low-lying rice growing areas. Salt sediments have degraded valley lands and made the cultivation of traditional rice crops almost impossible. The valley lands needed protection from salinization and rice production needed restoration. Some development organizations tried to mobilize the local population to build anti-salt dams in the valley, but since they lacked sufficient resources the projects did not always succeed. The failure of past projects created a sense of great disappointment among the local population. Therefore, the project Participatory Technology Development in the Djibanar valley of Senegal began because members of the local population wanted to remobilize their community to collaborate with development groups and rehabilitate the valley lands. Local leaders in the Djibanar Valley requested help from the West Africa Rural Foundation (WARF), which then initiated a collaborative effort to rehabilitate degraded rural land and implement improved natural resource management practices.

This chapter outlines the participatory communication methods and strategies used to facilitate the remobilization of the local population and develop partnerships with external institutions to overcome land degradation in the Djibanar valley. The project successfully led to the rehabilitation of 200 acres of degraded land, which was then equitably distributed among the farmers who participated in the project. Researchers learned the value of collaborating with multiple development organizations and the private industry to implement participatory methods and develop a resource management plan for communities suffering from severe land degradation and food insecurity.

Participatory Communication Strategies

The Djibanar valley project illustrates WARF’s general approach. WARF, based in Dakar, Senegal, is an African-staffed foundation that provides grants and technical support to grassroots organizations in five countries: Senegal, Gambia, Guinea, Guinea Bissau, and Mali. WARF aims to mitigate the negative impact of cutbacks in state services to rural regions by improving the technical and administrative capabilities of local organizations as well as working with the local population to design remedial projects. WARF’s mission consists of supporting rural populations to become self-sufficient. WARF also strives to empower local populations by establishing participatory frameworks that allow experimentation with innovative solutions to overcome various crises.

WARF asserts that research and development programmes in rural Africa often fail because the researchers and technical staff who intervene continue to hold the decision-making power. Researchers and development workers often do not foster mutual dialogue with peasants; instead they view peasants as passive recipients of the innovations they bring. The consequence has been poor adoption rates of the methods and technologies that development organizations bring to the rural communities. Therefore, researchers and technicians require training in participatory technology development methods. The fundamental principle of participatory technology development
is that the development workers and the local populations have to share the decision-making power about which technologies to implement in the community.

The participatory technology development research process must include the following elements: the researchers must negotiate the conditions of collaboration between the research team and the local population from the outset of the project. They must listen to peasant farmers in order to understand the constraints they face in agricultural production and to identify potential solutions. The assessment of constraints in agricultural production must be participatory; researchers and farmers must collaborate as equal partners in the process. Finally, the local population and the researchers must collaborate in the implementation of the solutions, the follow-up as well as evaluation of the results.

Implementation of the Project

The following paragraphs describe the implementation of the participatory assessment of the Djibanar valley, the organization and mobilization of the local population to implement technical solutions in order to overcome the problem of salinization and ensure that local farmers' organizations are able to sustain a land management approach and develop partnerships with development groups working in the region on similar issues of land degradation.

Participatory Assessment

A multidisciplinary team of researchers, from universities and research institutes of various nationalities, completed a training session on participatory assessment methodology before initiating the Djibanar valley project. WARF's main focus consisted in building the capacity of local organizations to negotiate with other development groups and government departments to achieve project development goals, such as rehabilitating degraded land. The participatory assessment method required researchers and farmers to work together in a village for several days to collectively assess the problems and constraints associated with agricultural production. Participatory methods forced researchers and farmers to confront each other's perspectives and most importantly the researchers' perspectives were not privileged in the assessment.

The researchers triangulated the preliminary assessment information to ensure its validity using the following methods: Researchers observed the physical environment by conducting village transect walks, assessed the social environment through an analysis of health, and identified and prioritized the needs of the local population. The preliminary assessment enabled researchers and the local population to develop an action plan that could overcome the problems they identified. Following the preliminary assessment, the team concluded that the Djibanar valley needed a land management approach that would encompass the technical aspects of land rehabilitation as well as water conservation and that local farmers' organizations required support to sustain an ongoing natural resource management programme. Therefore, the next step was to remobilize and organize the local population.

Grassroots Participation

The participatory assessment concluded with an inter-village workshop and each village from the Djibanar valley had representation at the workshop. One of the most important conclusions from the meeting was the need to create an institution that would connect the various local organizations in the valley with development organizations already working in the region. Following the workshop, a series of informal or formal meetings occurred between the various stakeholders, such as the traditional chiefs, leaders of farmers' organizations and state administrative authorities. A leader from a farmer's organization facilitated the meeting and since the different stakeholders rarely had an opportunity to discuss development programmes in the valley, it proved useful. The village workshops facilitated interaction between various organizations working in the Djibanar valley region and helped strengthen the local organization's ability to protect and enhance the natural resource base, adopt appropriate technological solutions to overcome land degradation and improve agricultural productivity and food security.

The inter-village workshop as well as the formal and informal meetings led to the creation of the Community Based Committee of Dialogue between Producers in Balantacounda (CBCP). At a general assembly meeting of the CBCP, which included
about ten organizational groups, each group elected an executive bureau to define action plans to restore degraded land and improve natural resource management practices in the Djibanar valley. WARF and CBCP then collaborated to initiate a project to rehabilitate degraded land in the valley. The formation of the CBCP fulfilled a critical component of WARF’s participatory approach in this project. WARF asserts that the local population must receive the technical, financial and administrative support that they need in order to sustain action after the project finishes. In other words, the local population must be able to continue to apply participatory methods in order to resolve problems related to land degradation in the Djibanar valley resulting in decreased agricultural production and a lack of food security.

WARF and CBCP designed the project according to the following principles: They agreed that the valley lands needed rehabilitation and they sought to reach that objective by improving local knowledge about natural resource management. CBCP and WARF were both committed to a progressive approach, which meant the farmers’ organizations would direct the project. The Mandingo principle doman doman, which translates into little by little, served as a reference for research action during the project. The representatives in both groups agreed to start with small initiatives and proceed slowly in order to ensure that they overcame obstacles, involved all stakeholders in the process, maintained flexibility to alter the approach as needed, and attained the project’s objectives. Moreover, after each phase of the project, researchers and the local population gathered to collectively evaluate their efforts; the goal was to assess their methods, identify constraints, failures or successes and adjust their methods accordingly.

The CBCP members and the researchers from WARF went to each village to facilitate grassroots participation in the project; they explained the objectives of the rehabilitation project and invited villagers to participate. Researchers then created nine village committees (VC) to mobilize and facilitate community participation in the project’s land rehabilitation activities. Only one village did not establish a village committee because two ethnic groups had pre-existing conflicts and refused to work together. The project team plans to hold a workshop in order to define the roles and responsibilities of each village committee. In addition, the meetings between members of the nine village committees will allow different villagers to reach an agreement about the scope of the problems related to land degradation in the Djibanar valley, the constraints they face, and the action required to rehabilitate the valley land. Grassroots involvement in the project allows people to share their ideas and perceptions about the constraints influencing agricultural production in the entire valley. Researchers noted the importance of bringing together WARF researchers, farmers’ organizations, such as the CBCP, and the grassroots population to pinpoint the commonalities between different villages as well as understand the differences that exist in order to implement an appropriate land rehabilitation project.

Development Organizations

Prior to WARF’s intervention in the Djibanar valley, the local population encountered other development research and extension organizations. Many past organizations failed due to their interventionist methods, which constituted a top-down imposition of community development. WARF recognized the problems associated with top-down methods of development and therefore implemented participatory research methods, which fostered equitable research partnerships in order to empower the local population to define problems related to land degradation, potential solutions, and the skills to initiate action to rehabilitate their land.

WARF emphasized that the representatives of research institutions must listen to farmers for successful collaboration. Listening meant that researchers and extension officers recognized the limits of their scientific background and learned more about the value of indigenous knowledge. The concept of listening also meant that researchers lived in the same conditions as peasants during their stay. The interview schedules remained flexible to ensure that they did not interfere with people’s daily obligations. The researchers respected the local customs, practices and agricultural techniques. Effective collaboration meant that the local population felt as though they owned the project and therefore shared responsibility for its success or failure.
The following paragraphs review the methods WARF used to foster an equal research partnership between farmers and researchers. The rehabilitation of the deteriorated lands required certain types of interventions, such as building small dams and testing rice cultivation on the recovered lands. Local organizations needed resource people, such as hydrologists and agronomists from both the private and public sector, to help identify the factors influencing land degradation in the valley and to provide technical support. The role of WARF was twofold; first, they provided the financial resources needed for the commitment of skilled people who would provide technical assistance and second, they supported the process to monitor the quality of technical services. CBCP leaders hired a local hydrologist from the private sector to build anti-salt dams and also negotiated with the Senegalese Institute of Research in Agriculture (SIAR) officials in order to determine the level of support they would provide for the rice variety experiments. WARF then organized workshops to facilitate collaboration between farmers' organizations and development organizations in order to design and build the anti-salt dams as well as establish the research parameters for the rice cultivation experimental plots. The farmers' knowledge, the rigour of the participatory research methodology as well as the technical expertise of the local hydrologist were all important. During the workshops, farmers shared information about their methods of rice cultivation in the low-lying areas of the valley susceptible to salinization. Researchers and farmers then formulated objectives related to improved rice cultivation and determined which experimental methods to apply to achieve the objectives, such as which crop varieties to select, how to conduct tests and who would conduct them. Farmers and researchers also planned the monitoring and evaluation components of the research process, which comprised workshops where farmers could express their opinions about the appropriateness of the methods selected to address salinization in the Djibanar valley.

**Results**

**Construction and Repair of the Dams**

The nine village committees provided free labour and local materials, such as gravel, sand and water in order to repair four pre-existing dams, which had deteriorated due to lack of maintenance, and to build two new anti-salt dams. Each dam stood over a sub-basin, which was shared by several villages. The various production activities, such as plateau, sediment, and shallow rice growing, fruit arboriculture, gardening and animal breeding, demonstrated the heterogeneity of land use as well as the different water needs of the farmers. Therefore, the functioning of the dams had to be coordinated with the varying land and water requirements for divergent production activities in the Djibanar valley. The reconstruction of the four dams and the construction of another two dams in the valley contributed to the recovery of 200 hectares of salinized land.

**Management of the Local Water Resources**

The local hydrologist who was hired to do the technical work proposed a water management model. Members of the nine village committees gathered at a workshop in order to study the management model and make modifications to the model if necessary. They decided to test the water management model the hydrologist proposed for a period of time and then meet again to discuss its effectiveness. The workshop to discuss the proposed water management model stimulated dialogue among farmers and enhanced their perspective of resource management beyond their village to include other villages in the Djibanar valley.

**Reallocation of the Rehabilitated Lands**

Nine villages in the Djibanar valley collaborated during the project even though some villages were more negatively impacted by degraded land. To prevent potential conflicts regarding the reallocation of the rehabilitated lands the village Chiefs, former landowners and government authorities implemented a consensual approach, which resulted in a decision to lift the former owner’s rights
and allow a commission to reallocate the lands
equitably between all the people who contributed
to the rehabilitation project.

**Rice Cultivation Experiments**

Building new dams and fixing pre-existing dams
resulted in the rehabilitation of land, the improve-
ment of the farmers' technical skills and the reduc-
tion of food insecurity. With the support of SIAR
researchers, farmers in the Djibanar valley then tested
ten varieties of rice in the different ecological set-
tings of the valley to determine the best yields on
the rehabilitated land. Farmers selected three of the
ten varieties that had the highest production yields.

**Lessons Learned**

The research project team demonstrated the impor-
tance of facilitating collaboration between the pro-
ject's researchers, the technical experts, the local
population and the development organizations
working in the region. The involvement of the local
population helped save money for labour and mate-
rial costs as well as the costs involved in conducting
rice variety tests because farmers gave researchers
access to their land and assisted with the experi-
ments. The nine village committees provided the
forum to generate dialogue among farmers about
natural resource management problems throughout
the entire valley. Village committee meetings also
promoted the visibility of CBCP and fostered mutual
trust between local organizations. However,
researchers also learned that establishing a forum for
dialogue between various local organizations was
not simple because farmers from different villages in
the valley had divergent problems and needs, which
could raise conflicts of interest. Therefore researchers
determined that they had to try and balance the pri-
orities in a specific village or of specific farmers with
the different priorities that influence natural resource
management of the entire Djibanar valley.

The project demonstrated that relations with the pri-
ivate sector were simpler than with SIAR researchers.
Researchers and farmers provided private consult-
ants precise direction and then paid for their techni-
cal expertise and services. In contrast, SIAR provided
input into the objectives farmers and researchers
determined, which meant that they had to negoti-
ate with SIAR to justify their methods. For example,
CBCP leaders expected researchers to test methods
of rehabilitating degraded land only in the context
of the Djibanar valley, but SIAR proposed solutions
that could extend to other valleys. Collaborating
with SIAR meant that researchers and farmers need-
ed to reconcile diverging ideas about the project's
objectives to ensure the project progressed.

**Conclusion**

The project to rehabilitate degraded land in the
Djibanar valley demonstrated that participatory
communication methods can foster collaboration
between researchers, technical experts, the local
population and the development organizations
working in a region. Strengthening the organiza-
tional and technical skills of local organizations can
mobilize local populations to address problems of
land degradation. Research and development proj-
ects in rural areas must facilitate and mediate the
local population's participation in the design, imple-
mentation and evaluation of the project. Finally, the
local population must be able to continue applying
participatory methods of resolving problems related
to land degradation in their communities after the
development project concludes.
Participatory Communication for Improving Crop-Livestock Production in Senegal and Gambia

S. Fall
Senegalese Institute of Agricultural Research
Dakar, Senegal

O. Smith
International Development Research Centre
Ottawa, Canada

O. Akinbamiijo
International Trypanotolerance Centre
Banjul, Gambia

Abstract

Senegal's population does not have adequate access to food. Meat and milk need to be imported because current levels of agricultural and livestock productivity cannot meet the population's basic food requirements. A lack of adequate animal feed constitutes one of the main reasons for poor livestock productivity. Therefore, the Senegalese Institute of Agricultural Research (SIAR) and the International Trypanotolerance Centre (ITC), with the financial support of the International Development Research Centre (IDRC), have been working in laboratories and on local farms to enhance scientific knowledge about improved agricultural and livestock methods of production.

Researchers from SIAR and ITC conducted two projects in three regions of Senegal within the nutrition research programme of SIAR. The regions included the Niayes zone on the Atlantic coast, the Groundnut Basin located in the central region of Senegal, and the Senegalese River Valley close to the northern border of Mauritania. The objective of the first project was to integrate livestock feed with cereal crop production in order to improve meat production in the areas of Bambey, Dakar and Saint-Louis. The second project aimed to improve agricultural production by integrating horticultural and livestock production in and around the cities of Senegal and Gambia. This chapter presents the communication strategies the research project team used to disseminate the project's results.

The two projects allowed researchers to identify animal feed that improved beef production and then they trained selected farmers to disseminate the results to other farmers. The communication strategies to disseminate the project's results consisted of radio broadcasts, television documentaries, an international workshop and publication of the research results for both farmers and scientists.

1 Safietou Fall, Senegalese Institute of Agricultural Research (SIAR), B.P. 2057, Dakar, Senegal. Email: dgisra@isra.sn
Introduction

Various factors affect livestock productivity in Senegal, which is the most western sub-Saharan African country. A review of current literature reveals the diverse potential of certain methods of agricultural production, such as milk and meat production, in tropical areas that researchers have developed to improve food security for the population. Animal nutrition has been a priority of past development projects with the objective to evaluate the quality and biomass of animal feed in laboratories. Additionally, animal feeding techniques and methods have been tested on farms in sub-Saharan Africa. However, the effectiveness of past development projects has been questioned because of a changing socio-economic environment marked by drought and economic crises and the fact that African farmers most often have not had input into development projects within their communities (Fall and De Zeeuw, 2001).

In addition, a lack of appropriate technology and an absence of effective strategies to communicate successful methods of improving crop and livestock productivity to other farmers contributed to poor crop and livestock productivity in semi-arid regions of Africa. Research results are easily accessible to scientists but their rate of transfer and adoption into rural communities remains low despite research extension programmes currently operating in West Africa.

To address this problem the Senegalese Institute of Agricultural Research (SIAR) and the International Trypanotolerance Centre (ITC), with financial support from the International Development Research Centre (IDRC), have been working in the laboratory as well as with farmers directly in order to improve the dissemination of information about animal feed as well as methods of crop and livestock integration. Initially, participatory communication was not a component of the research design, but a review of past research activities revealed the need for farmer participation in all levels of the research process, and hence the need for participatory communication. During the development stage of the project, researchers also understood the need to involve farmers in order to improve the dissemination of information about appropriate animal feed as well as crop and livestock integration. Therefore researchers implemented participatory communication strategies at each stage of the research process because the success of the research and development objectives depended on the participation of the local population.

Research Objectives

The overall objective of the project was to develop animal feed that could help farmers improve meat production in different regions of Senegal and Gambia. This chapter provides an overview of the two projects in order to illustrate the effectiveness of the communication strategies the research team implemented. The project occurred in Gambia and the following regions of Senegal: The Niayes zone, the Groundnut Basin, the central part of Senegal and the Senegalese River Valley.

The objective of the first project consisted of developing livestock feed that would integrate livestock and cereal crops in order to improve meat production in the Bambey, Dakar and Saint-Louis regions. Researchers produced animal feed from crop by-products and livestock manure to achieve this objective. The objective of the second project was to improve agricultural production in and around the cities of Senegal and Gambia through an integration of horticultural and livestock production. To achieve the second objective researchers suggested applying recycled crop by-products from animal feed and manure to farmers' land.

The purpose of this chapter is 1) to provide information about the on-station and on-farm experiments as well as the research results; and 2) to evaluate the communication strategies used to improve the transfer of the agricultural technology and facilitate its adoption by the local population. The researchers developed communication strategies that allowed them to collaborate with the local population in order to determine appropriate methods for improving meat production. The communication strategy then entailed sharing the research findings with the remainder of the local population. The researchers implemented the following activities in order to reach those objectives: first, they conducted a preliminary survey of the potential sites; then they set up experiments at research stations and on farm sites; lastly, they monitored and evaluated the experiments and disseminated the research results.
to the people who could benefit from information about ways to improve animal feed on the one hand and ways to integrate crop and livestock on the other hand.

Research Methods

The following paragraphs describe the methods used to examine the potential experimental sites, select the pilot farms for on-site experiments and experiment with animal feed.

Identification of the Potential Sites

The researchers began by surveying various regions in order to determine the agricultural production methods used by the local population. They identified the positive aspects and drawbacks of current agricultural methods as well as the optimal feed required for the animals. They inquired about farmers' production priorities, whether it was milk, meat or both. They also analyzed the farmers' knowledge about livestock and feeding techniques as well as their recommendations for the project's objectives. The multidisciplinary project team consisted of agronomists, animal scientists, sociologists, soil and environmental scientists who conducted surveys with approximately 500 farmers in the three study sites.

The project team used rapid rural appraisal methods for the surveys: multiple site visits to interview members of the local population such as farmers, both men and women, government agents, and young people. The research team consulted with various local assemblies and social groups, such as women and young people, in order to obtain information about the region, the size of farms, the crop and livestock production methods, the crop types, the livestock products, the systems of ownership, the potential and drawbacks of the current agricultural production system.

Pilot Farm Selection

The research team identified potential farm sites to study in collaboration with the local population. The researchers visited the regions many times and held discussions with members of the local population in order to reach a consensus about the potential experimental farm sites. They presented their research objectives and methods at a general training session for the farmers. The training session was aimed at building a trusting relationship between the researchers and the farmers in order to promote collaboration between the two groups and ensure that the farmers had input into the selection of the pilot farms.

Animal Feed Experiments

The following paragraphs describe the methods used to experiment with animal feed technology both in the SIAR laboratories and on pilot farm sites. The research team conducted a series of experiments at the SIAR experimental station, Sangalcam, in order to test various forms of animal feed rations in terms of their safety and effectiveness. The rations consisted of locally available feed resources including Leucaena leucocephala tree leaves, cereal straw, rice, millet bran, molasses, cotton seeds as well as mineral supplements. The researchers conducted on-station experiments at the SIAR laboratories to test the effectiveness of different ration types. In the case of the Leucaena leucocephala tree leaves, the researchers had to experiment with various compositions in order to establish an optimal feed level for cattle and sheep since an arbitrary inclusion of the leaves can lead to toxicity in animals, caused by mimosine, a chemical substance that may be lethal. The research team also conducted studies on farm sites in order to compare the research results with the station controlled findings. They made minimal changes to the research methods in order to reduce the number of measurements. For example, they monitored the live weight changes monthly instead of weekly in order to adapt to the lack of research facilities. They also conducted 20 feed trials on-site to test the various ration types, consisting of cereal straw, tree forage and local agro-industrial by-products.

The research team developed several methods of ruminant feed preparation in order to improve meat production and foster environmental protection around cities. The first experiment focused on feed rations for cattle and sheep. The feed rations consisted of cereal straw and were tested daily. The second experiment focused on feed consisting of a wider mix of agro-industrial by-products such as groundnut cake, molasses, rice, millet bran, Acacia leaves and
fruit, Leucaena leaves as well as horticultural residues from green beans and tomato crops. The researchers measured the animals’ feed intake, their rate of growth and general health as well as the animals’ ability to digest the rations (Fall et al., 1997).

Results

Experiment Results

The results showed that the intake varied between 89.5 and 116 grams per kilogram of metabolic body weight and the ingestion of the cereal straw-based diet was lower than the mixed feed. The researchers analyzed the rations consisting of Leucaena leucocephala leaves very carefully in order to demonstrate to the farmers that they could help them improve their livestock productivity; if they applied strict dietary restrictions, they could improve the live body weight of the animals while preventing their exposure to mimosine. The researchers determined during the experiments that the optimal levels of Leucaena leaves in sheep and cattle rations were in the order of 30 and 50 percent respectively.

The researchers conducted 20 trials and each trial was completed with an economic analysis in order to demonstrate its profitability. They recorded an increase in body weight as well as high survival rates in the animals. They also performed a cost/benefit analysis, which demonstrated the effectiveness of the tested rations. Overall, the experiments demonstrated that the rations were not poisonous, that they had a positive effect on animal growth and finally they were ingested quite well by sheep and cattle (Fall et al. 1997, 2000). The experiment demonstrated the value of daily rations based on local resources available to farmers.

The researchers and farmers learned to calibrate the rations for animal feed through a careful analysis of the diseases that the animals developed during the experiments. Stress constituted a major cause of mortality at the beginning of the experiments. The animals also suffered from digestive disorders due to rumen acidity. The researchers and farmers overcame these problems by including hydroxyquinolene and straw in the rations in order to improve their digestibility.

Storage and management of organic matter constituted an additional concern for the farmers. The researchers measured the total fecal output at two farms, Keur Seck and Sebikotane, in order to determine the value of composting. In Sebikotane the output was 12.5 tons over 100 days from 12 cattle confined to a stable. The farmers spread the organic matter on the soil in order to improve the horticultural productivity of the land. They composted part of it before they spread it on the soil. The results proved that composting improved soil quality and horticultural production in Sebikotane. In Keur Seck, on the other hand, the total fecal output was 6.5 tons, under the same conditions. The farmers stored the fecal matter outside during the dry season. At the beginning of the wet season they spread the fecal matter on their fields. The researchers determined that composting in Keur Seck improved the productivity of approximately 2 hectares of soil and that the millet yield increased by 75 percent.

Monitoring and Evaluation

The technicians, researchers and farmers used participatory communication methods in order to monitor the experiments. Weekly meetings constituted the participatory forum where technicians, farmers and researchers collectively analyzed the research results in order to determine the impact of the rations on livestock productivity in specific regions. The weekly meetings allowed the researchers and the local populations to exchange information about the lessons learned from the experiments at the SIAR experimental station as well as on the pilot farm sites. The visits to the pilot farm sites allowed the research team to evaluate the strengths and weaknesses of the experiments. The visits involved farmer organizations and were conducted as open air laboratories, which meant that the field classes introduced novel technologies to potential end users as well as to field technicians.

Dissemination of Results

The research team developed a number of communication strategies in order to disseminate the results from the on-station and on-site experiments to the local farmers. The communication strategies included radio broadcasts, TV documentaries, an international workshop, focus groups as well as published
Diisoo, which means communication in the local language, was the name of a weekly radio programme that broadcast the project's findings to the rural population. The radio programme provided information to farmers about how to use crop residues and agro-industrial by-products for ruminant feed. The radio programme, Dissoo, proved to be a successful communication strategy because farmers liked the medium. Moreover, the operational costs were quite low as most households owned a radio. The research team also collaborated with the farmers in order to produce four video documentaries, which could be viewed on national television, in order to disseminate information about the project results. The documentaries covered four topics: 1) a method of animal feed based on cereal straw for cattle production in the three target regions; 2) a discussion of the advantages of organic matter inputs for agricultural productivity; 3) the advantages of tree cropping for urban farmers; and 4) the importance of crossbred cattle for peri-urban dairy farming.

The researchers learned that the farming communities in urban and peri-urban areas appreciated the documentaries. The rural populations, on the other hand, had only limited access to the documentaries because of the poor reception of television signals in the countryside. Since a large proportion of the stakeholders were small-scale farmers with less than ten cattle, annual incomes of around two thousand U.S. dollars and very low literacy rates, the researchers designed their communication strategies accordingly. They initiated face-to-face meetings in the local language, for example, in order to foster the farmers' participation in the project. The research team also organized two international workshops in order to evaluate the project's results with researchers from 12 countries. The proceedings of the workshops were published in the SIAR Proceedings Series. The workshops gathered between 20 and 55 scientists from African countries in order to discuss the research results, which were published as books distributed worldwide and available on the Internet (Fall and Faye, 1999; Fall and Fall, 2001; Akinbamijo, Fall et al., 2002). The participation of scientists from various African countries helped to disseminate the research results throughout Africa and allowed research teams from different geographic locations to collaborate on similar research topics.

The research team also organized focus groups, which assembled people from the regions and enabled them to identify and prioritize their problems as well as the potential solutions. The focus groups also allowed the participants to voice their disagreements as well as to discuss the impact of the project. The researchers organized larger meetings once or twice a year in order to present the project's results to the entire community in a region. They invited the local authorities to attend the larger meetings. The presence of a wide spectrum of the population, including farmers and politicians, enabled the researchers to brainstorm about the project with different actors in a region and then make the necessary adjustments. Finally, the larger group meetings provided an opportunity to sensitize politicians, government officials and local authorities about the importance of the project in order to improve animal feed and agricultural productivity in Senegal and Gambia.

The research team utilized various tools to disseminate information among farmers and widen the scope of the project to other regions. Individual interviews facilitated direct exchanges between farmers and technicians. The researchers also conducted interviews to engage the people, such as women and young people, who might feel intimidated in a group setting. Moreover, in some villages women do not speak to men who are not part of their family. Consequently, women researchers interviewed them separately from the men.

Researchers developed several written tools in order to disseminate the project's results. They compiled technical sheets, which presented the research results in a simple format. The technical sheets were useful to farmers as they provided a description of the technologies to be applied by farmers in order to improve their agricultural productivity. The researchers also wrote articles and book chapters for scientific publications (Fall et al., 1997, 1998).

The research team combined written text and audio-visual materials in order to compile a complete set of tools to foster effective communication with the farmers. Researchers learned that they must select appropriate communication tools according to the groups who participate in a given research project. Focus groups, farmers' meetings,
technical sheets and radio materials proved to be the most useful tools to disseminate information about the project’s results to rural farmers. Experts in government departments as well as the urban populations preferred audiovisual materials, while scientists preferred scientific publications and workshops. The choice of communication tools and strategies depended not only on the research objectives but also on the participants. Therefore, the researchers must adopt multiple participatory communication strategies in order to ensure success of the project.

Discussion of Results

This section emphasizes the importance of gathering preliminary data and identifying community needs in order to carry out a successful participatory communication research project. It also emphasizes the importance of participatory communication for development research in general.

Key Factors in Participatory Communication

The first stage of the research process entailed gathering information about the physical and socio-economic aspects of the agricultural production system through a preliminary survey. The preliminary survey provided the research team with specific information about the methods used for livestock production in the target areas, namely the Niayes zone, the Groundnut Basin and the Senegalese River Valley. The researchers also studied the soil and vegetation types in each region as well as the rainfall patterns. In addition, they collected data about the number of sheep, cattle and goats per household as well as the demography of the local population involved in livestock and horticultural production. Appraisal methods and tools were also used to evaluate the potential agricultural methods specific to the region, the different types of weather patterns throughout the year as well as the general problems the local population faced. The researchers analyzed the constraints as well as the potential of existing production methods, and they made recommendations about how to improve livestock productivity by overcoming high mortality rates, increasing the animals’ weight and improving milk production.

The preliminary data collection confirmed that each of the regions where the experiments were carried out had a high population density. For example, there are approximately 140 inhabitants per square kilometre in Bambey and 1000 in Dakar (Fall and Faye, 1999, Fall and Fall, 2001). In addition, the information-gathering phase of the project confirmed that 80 percent of the livestock farmers operated small-scale farms and that most of them had less than one hectare of land. In light of these facts, there seems to be an urgent need to produce food for large urban populations. The researchers employed participatory methods in order to reach a consensus with the farmers about the constraints they faced in agricultural and livestock production. Farmers and researchers ranked each constraint and then prepared a list of potential technologies that could overcome the constraints.

Importance of Participatory Communication

Participatory communication has become a priority for most development projects as researchers have demonstrated the necessity of involving the local population in any research endeavour. Farmers must be involved from the beginning of the research process in order to foster participatory development and successfully transfer appropriate technology for improving agricultural and livestock productivity. In this particular project, the research team demonstrated how to involve the local populations from the beginning of the research process; local farmers and researchers collaborated to analyze the problems in the communities and design appropriate solutions. The research project also illustrated the importance of participatory communication strategies and appropriate forums, such as meetings and radio broadcasts, which provide an outlet for people’s participation.

Participatory communication allowed the farmers to learn about scientific methods to improve agricultural productivity, whereas the researchers learned to appreciate the value of indigenous knowledge about agricultural production. Participation in needs assessment as well as research planning fostered a greater commitment to the project and ultimately a greater acceptance of the technology selected. The project clearly demonstrated that participatory
communication is an essential component of any development research project.

**Conclusion**

The research team successfully provided a framework for participatory communication in order to improve agricultural productivity in Senegal and Gambia, although there is still room for improvement. Development research initiatives need political support if they are to be successful and it is particularly important to gain the support of the local authorities in the region where the projects are undertaken. Finally, researchers need to establish permanent networks, which allow the local population to identify the main problems related to crop and livestock productivity and implement the appropriate solutions even after the development project comes to an end.

**References**


Addressing Desertification in Chad and Burkina Faso through Participatory Communication

Yacouba Konate
The Permanent Interstate Committee for Drought Control in the Sahel (CILSS)
Ouagadougou, Burkina Faso

Abstract

The Permanent Interstate Committee for Drought Control in the Sahel (CILSS) is a regional intergovernmental organization composed of nine member countries, including Burkina Faso, Gambia, Cape Verde, Guinea Bissau, Mali, Mauritania, Niger, Senegal and Chad. The mandate of the CILSS consists of seeking food security, improving natural resource management and controlling the effects of drought and desertification in the Sahel. The CILSS and the International Development Research Centre (IDRC) initiated a participatory research project in Chad in February 2000 and Burkina Faso in January 2001 for a period of ten months.

The main objective was to design and implement participatory communication strategies that supported local efforts to combat desertification. Therefore, the research team determined the methods required in order to support local anti-desertification initiatives in Chad and Burkina Faso and then they implemented appropriate communication strategies to address problems of desertification. They also evaluated and monitored the strategies they selected and implemented in collaboration with the local population. Finally, they developed the participatory communication capabilities of other development groups working to combat desertification in each country and shared their research results with the agencies that implement the United Nations Convention to Combat Desertification in Sahelian countries.

The project was successful in the selected regions of Chad and Burkina Faso when the local population was able to participate in the design, selection, implementation and evaluation of the strategies to overcome their natural resource management problems.

1 Director, The Permanent Interstate Committee for Drought Control in the Sahel (CILSS), B.P. 7049, Ouagadougou, Burkina Faso. Email: cilss@fasonet.bf. Yacouba passed away during the preparation of this publication.
Introduction

The Permanent Interstate Committee for Drought Control in the Sahel (CILSS) is a regional intergovernmental organization composed of nine member countries, including Burkina Faso, Gambia, Cape Verde, Guinea Bissau, Mali, Mauritania, Niger, Senegal and Chad. The Sahel stretches in a band across Africa, north of the equator, from Senegal in the west to Somalia in the east. The CILSS countries cover an area of 5.5 million square kilometres in the western part of this band. During the past 20 years, these countries’ populations, approximately 40 million people, have suffered immensely from the effects of recurrent drought and progressive desertification. CILSS policy on drought and desertification has undergone significant changes since its formation in 1973. Initially, it organized and coordinated food aid, but then shifted its focus in 1976 in order to mobilize resources to implement programmes at the national or regional levels that promoted socio-economic development in the following sectors: farming, livestock production, village water supply and forestry. In the mid-1980s, CILSS recognized desertification as a significant problem influencing land degradation, food insecurity and human suffering in the Sahelian region and therefore organized action at the regional level to combat desertification.

The current mandate of CILSS consists of seeking food security, improving natural resource management and controlling the effects of drought and desertification in the Sahel. CILSS studies the climatic, environmental and demographic factors that influence sustainable development and economic growth in Sahelian countries. CILSS aims to develop and test participatory research approaches that help communities in the fight against desertification. In general their strategy includes: a global approach to the problems of desertification; voluntary support from local grassroots organizations; the integration of desertification control with land use planning; restructuring national institutions in order to support local initiatives to combat desertification; ecological rehabilitation of degraded land; improving land tenure and credit opportunities for the local population, ensuring women’s participation; and creating forums to facilitate the exchange of information between rural farmers.

The CILSS and the International Development Research Centre (IDRC) decided to test a communication strategy that permitted the local population’s participation in efforts to control desertification. The project was called Participatory Communication to Combat Desertification in the Sahel. The project team set out to address the failures of past development projects that merely emphasized the dissemination of research results to a local population rather than soliciting their participation in the design, implementation and evaluation of an anti-desertification initiative.

The researchers initiated the project in Chad in February 2000 and Burkina Faso in January 2001 and the duration of each project was ten months. The main objective was to design and implement participatory communication strategies that supported local efforts to combat desertification. The research team determined the methods required in order to support local anti-desertification initiatives in Chad and Burkina Faso and then they implemented appropriate communication strategies in order to address problems of desertification. They also evaluated and monitored the strategies they selected and implemented in collaboration with the local population. Finally, they developed the participatory communication capabilities of other development groups working to combat desertification in each country and shared their research results with the agencies that implement the United Nations Convention to Combat Desertification in Sahelian countries.

Research Methods

The research team initiated the project by selecting local organizations within certain regions of Chad and Burkina Faso to support their on-going anti-desertification efforts and then developing relationships with members of the groups. Then the research team facilitated training on participatory communication methods for the local groups they collaborated with. The research team and the local population organized meetings and planned effective communication strategies to combat desertification. Then the research team and members of the local population implemented the strategies and searched for other organizations to collaborate with, such as government departments or other grassroots organizations. The
final step consisted of monitoring and evaluating the success of the project. The following section details the implementation of the site selections, the training session, the participatory communication strategies used, the meetings with the local population, the efforts to collaborate with other groups working to resolve problems related to desertification, monitoring and evaluation of the project, and the roundtable meeting to discuss the project’s results.

**Site Selection**

The research team surveyed regions in Chad and Burkina Faso in order to determine which local organizations to support. The research team utilized the following criteria to evaluate the regions. They determined the accessibility of the site, if the region had development projects related to anti-desertification, the economic potential of the region, the system of agricultural and forestry production, the willingness of the local population and other organizations to contribute to the anti-desertification project and whether the natural resources in the region were degraded. Researchers collected this data by conducting a literature review and holding discussions with the local population as well as the technical staff of development organizations working in the regions. The research team wanted to understand the social, economic and cultural conditions that influenced natural resource management practices in the region, learn about the local methods of information exchange, identify local groups working on anti-desertification projects and the types of strategies they employed, and assess the level of land degradation in each region.

In Chad the research team selected the Doum-Doum region to address the problems associated with the degradation of their fertile valleys or streambeds that peasants used for small gardens; the Bol region to address women’s need for irrigation; and the Darna region to focus on controlling deforestation and providing training for rural women on credit opportunities. The project team selected four regions in Burkina Faso to initiate the anti-desertification project. Each region required strategies to establish participatory management of local natural resources: bushfire management in the Ouarkoye area; management of resources along the Mouhoun River in the Padema region; management of forest resources in the Toumousseni forest; and management of shared pasture resources in the Beli region.

The collection of preliminary data to select regions and local organizations to support their efforts to combat desertification prompted the research team to contemplate two questions: What strategies are the most effective to overcome problems related to desertification? Who should determine which strategies to implement, the grass-roots community, government officials or NGO workers? In addition, the importance of collaborating with local organizations that were attempting to overcome the problems associated with desertification was apparent to the research team. However, the question of how to foster collaboration between grassroot organizations and decision-makers, such as government officials or development researchers, remained a challenge.

**Training Sessions**

After selecting the sites to study, the research team organized training sessions, which brought together the project’s facilitators, representatives of the local population affected by desertification and local authorities, in order to develop a communication strategy to deal with the problems of desertification. The objective of the training session was to establish the role of the project’s facilitators, allow the participants to exchange information about the problems related to desertification as well as propose potential solutions, foster a dialogue about other groups to collaborate with and sensitize the project team to the traditional methods of communication that the local population utilized.

**Participatory Communication Strategies**

The communication strategy emerged during the training session after the participants assessed the problems related to desertification. The distinctiveness of this project lies in the fact that the research team defined and planned communication strategies according to the local population’s needs, perspectives and traditional methods of communication. The research project team decided not to use the mass media, such as radio and television, to communicate with the local population. Instead they used the tradi-
tional methods of communication that the local populations utilized in the various villages because they were simple and inexpensive, but most importantly they facilitated the local population's participation in the project. Moreover, it was a priority of the project team to ensure women's participation in the project. For example, in the Bol region, researchers attempted to convince the husbands that the women's work on their plot was beneficial to the households. During the ten months the project team worked in Chad and Burkina Faso, the project team focused on the local population's preferred methods of communication in order to develop an appropriate participatory communication strategy to combat desertification.

The communication strategy devised during the training session involved the participation of the rural population, government officials and other development partners. Initially the project team contacted the village chiefs, the religious and traditional leaders, as well as the village dignitaries in order to set out a detailed plan of action, seek input about the activities planned and determine when it would be convenient to meet with members of the local population. After these preliminary informal discussions, the research team organized meetings that included the village chief, religious and traditional leaders, village dignitaries, local administrative authorities, NGOs and local farmer's associations. The meetings established a forum to discuss the project's objectives, the problems for each specific region and appropriate communication strategies to combat desertification. The objective of the meetings was two-fold. First, the research team wanted to develop a clear statement of the project's objectives in collaboration with members of the local population. Second, the research team wanted to reach a consensus about an appropriate communication strategy that would foster the participation of various actors in the effort to combat desertification. Finally, the meetings also allowed for changes or modifications to the proposed communication strategy. Overall, the meetings fostered a commitment by all the participants to proceed with the implementation of the communication strategy.

Local Meetings

The research team discovered the range and complexity of the problems the local population faced in the various regions in Chad and Burkina Faso and they determined the need to partner with other development groups or government departments in order to address the problems. For example, in the Kouloudia village of the Doum-Doum region in Chad, three months after the project work began, researchers learned about the villagers' need for a well to supply drinking water as well as provide water for the seedlings the local farmers produced. Therefore, the project researchers contacted the water utility department to initiate action to drill a well in this village. In the Toumousseni region the

Collaboration with Development Organizations

Since the research team only had ten months to implement the project in Chad and in Burkina Faso, they contemplated whether the short time period would allow them to foster the collaboration with as many groups as possible in the anti-desertification effort. The research team did not resolve the following questions: Are the representatives of the local population that participate in the project able to represent the concerns of the entire population of the village or region? Does the research reflect the project researchers' views more than the local population since the peasants may either lack training in anti-desertification activities or they do not trust researchers enough to be completely honest during the meetings?
project team put representatives of lumbermen's groups in contact with provincial rural credit institutions to meet their need for financing to acquire materials for their work. Finally, in the Padema region the project team developed a partnership with the Houet, Kossi and Mouhoun Integrated Rural Development Project (PDRI/HKM) and in the process supplied 6000 seedlings to the Mouhoun Riverbank Management Committees.

**Participatory Monitoring and Evaluation**

The project team implemented three methods to monitor the project's results. First, researchers continuously monitored activities by comparing them to the original plan they developed at the training session and meetings with the community members to see if they were achieving their objectives. Second, the site coordinator monitored the project's progress monthly to determine if field workers required additional technical support and they wrote monthly reports about the project's progress. Finally, the research team conducted quarterly monitoring to check the progress of activities and provide any required technical support. The project team also established a steering committee, which consisted of representatives from the various organizations working to combat desertification in Chad and Burkina Faso.

Although continuous evaluation of the project's progress was a crucial element of the monitoring process, the research team also collaborated with the local population in a workshop at the mid-point and at the end of the project to evaluate its success. An outside consultant facilitated the workshop and also conducted research at the sites where the project occurred to determine the effectiveness of the strategies implemented.

**Roundtable Meetings**

The research team organized a roundtable conference to discuss the project's results. Representatives of CILSS member countries, the United Nations Convention to Combat Desertification coordination members, the project researchers, local NGOs and researchers from IDRC attended the roundtable meeting. After reviewing the project's results from regions in Burkina Faso and Chad, the roundtable participants noted that the project successfully increased awareness about desertification, allowed the research team to identify locally appropriate and inexpensive methods to communicate information about desertification, and overall contributed to local – and therefore national – economic and social development.

**Results**

The following paragraphs outline the results of the project's implementation in the Doum-Doum, Bol and Darna regions of Chad as well as the Ouarkoye, Padema, Toumousseni and Beli regions of Burkina Faso.

**Chad**

The participatory communication project to combat desertification successfully fostered the participation of the local population in the Doum-Doum, Bol and Darna regions of Chad by allowing them to define the problems related to natural resource management as well as identify and implement locally appropriate solutions. For example, the peasants in the Doum-Doum region increased their awareness about the degradation of the wadis, which are the fertile valleys or streambeds where farmers keep small gardens and the polders, which are wadis that have been artificially created by damming a small inlet of a lake. After discussing the problems related to the degradation of the wadis and polders in the Doum-Doum region, the peasants took action to rehabilitate and preserve the land in order to improve agricultural production. The peasants also designed and implemented rules in order to protect the wadis and polders. In addition, the project team also offered training to women in the management of rural credit in this region. Finally, the project enabled the women of Bol to organize themselves into groups and contribute to the harvesting of the plots prepared by a development corporation Société de développement du lac (SODELAC).

**Burkina Faso**

The project team successfully fostered the local population's participation in the Ouarkoye, Padema and Toumousseni regions, but the project team's efforts were less successful in the Beli region of Burkina Faso.
The land in eight villages of the Ouarkoye region was spared from brushfires, while the land of ten villages was less than 50 percent burned, and no village's land in the region was 100 percent burned. In addition, 53.5 hectares of land were cleared according to technical experts' recommended methods for clearing land. Finally, the project created one local group, called the *Troupe Sininyasigi de Ouarkoye*, and established four activity centres, which functioned to ensure that the local population could continue anti-desertification measures.

In the Padema region, the Village Riverbank Committee planted trees along the Mouhoun riverbanks and provided cattle access to the river. In addition, the village committee also formed a union, which functioned as a forum for villagers to discuss the management of river resources. In the Toumousseni region, the research team successfully rebuilt trust between the villagers and the technical staff of development organizations and organized local groups to sustain action related to anti-desertification measures after the project came to an end. In addition, they organized the wood merchants from the town of Banfora to remove the wood and reach a consensus about the price for wood. The research team created a forum for farmers and merchants to meet with each other and finally they organized women to engage in beekeeping and fruit harvesting from the forest in order to generate additional income. After six months the revenue generated from lumber operations was approximately one million francs for the villages along the river. The local population used the revenue they generated to purchase school supplies, mineral fertilizers for their soil, clothing and kitchen utensils.

The project's success in the Beli region was limited to the formation of local organizations, which would serve as a forum for the local population to discuss problems of land degradation or natural resource management as well as devise potential solutions. For example, researchers established a forum to facilitate communication between crop and livestock farmers, women's and young people's groups, and fishery and wildlife management groups in eight different villages.

The research team demonstrated that the project's success depended on the participation of the local population in the selection of appropriate communication strategies to address desertification. Since the local population participated in the decision-making and implementation of the anti-desertification activities in the Toumousseni and Ouarkoye regions of Burkina Faso, the results were successful. However, in the Beli region of Burkina Faso the project was less successful because the local authorities did not involve the local population in decision-making to address desertification.

**Conclusion**

Initially people were suspicious that participatory communication research was just like past development research approaches. The research team demonstrated within a few months that if people can participate in the research process and if they have the information and skills required, they can implement action to combat desertification. Despite the project's success, the research team noted one remaining challenge. Researchers need to devise a participatory approach that works more quickly and allows them to respond to people's urgent and immediate needs.
Resolving Water Conflicts in the
Nakanbe River Basin of Burkina Faso
Participatory Communication as a Viable Solution

Nlombi Kibi
Centre d'études, de documentation et de recherches économiques et sociales (CEDRES)
Université de Ouagadougou, Burkina Faso

Abstract

This chapter describes a study that used a participatory communication approach to resolve water conflicts in six villages of the Nakanbe River Basin, in Burkina Faso. The project involved all the community stakeholders: women, girls, young men, farmers, stockbreeders, and merchants. They cooperated in the identification and definition of the types of conflicts that existed around the water sources, mainly hand-pumps and modern wells. They also cooperated in the design and implementation of solutions to resolve the water conflicts.

The participatory communication method relied on communication activities, such as informal discussions, roundtable discussions, and meetings involving all the stakeholders. Communication strategies also included theatrical representations, video documentaries as well as meetings regarding the Village Council and Village General Assembly to elect the members of the water management committee (WMC). The WMC was the framework used to manage water use at hand-pumps in the villages.

The researchers identified a range of conflicts that related to technical problems, such as insufficient water sources and malfunctions of the hand-pumps; social problems, such as ethnic conflicts; or sanitation problems related to the presence of waterborne diseases or bad hygiene. The proposed solutions included technical solutions, such as fixing hand-pumps or building new ones; solutions aimed at changing mentalities, behaviours and taboos of the local population about water use and water conflicts; and solutions to make the village water management committee more participatory.

1 Nlombi Kibi, Project GUCRE, Centre d'études, de documentation et de recherches économiques et sociales (CEDRES), Université de Ouagadougou, Ouagadougou, Burkina Faso, from 1999 to 2003; currently associated with the Institute of the Environment, University of Ottawa, PO Box 450, Ottawa, Canada. Email: nlombi.kibi@bf.refer.org
Introduction

In Burkina Faso, water has a variety of uses; it supplies the population with a source of drinking water; it irrigates the farm lands, and it is indispensable for mining production, hydroelectric power, and small-scale production in villages, such as flour-milling, production of local drinks, and brick-making. Burkina Faso’s water supply comes from four large basins; the Niger River Basin, the Nakanbe River Basin, the Mouhoun River Basin, and the Comoe River Basin. A workshop about water conflicts, held in Ouagadougou between July 7 and 9, 1998, revealed that conflicts over water occur mostly in the Nakanbe River Basin (CEDRES and IE, 1998). The Nakanbe River Basin covers an area of approximately 33,000 square kilometres and provides water to approximately 22 of the 45 provinces in Burkina Faso, including the city of Ouagadougou. The areas surrounding the Nakanbe Basin have a population of about 3,723,627 people, or 33% of the entire population of Burkina Faso. Water conflicts exist in the villages surrounding the Nakanbe Basin because of the multiple competing water usages in the region and an absence of rules at the village level regarding the water resources management.

The Centre d'études, de documentation et de recherches économiques et sociales (CEDRES) at the University of Ouagadougou in Burkina Faso and L'Industrielle de l'environnement (IE), a branch of the Institut national de la recherche scientifique (INRS-ETE) of the University of Quebec, in Canada initiated the project entitled Resolving Water Conflicts through Participatory Communication in the Nakanbe River Basin of Burkina Faso. The project received funding from the International Development Research Centre (IDRC) between 1999 and 2003. The project’s objective was twofold. First, researchers wanted to involve all stakeholders in the identification of the types of water conflicts that existed at the village hand-pumps between women, girls, young men, farmers, stockbreeders, and merchant women. Second, they wanted to design and implement solutions to resolve water conflicts through a participatory communication approach as well as transfer successful methods of conflict resolution to villages throughout Burkina Faso. The remainder of this chapter outlines the participatory methods the researchers selected and implemented in order to resolve water conflicts in the six villages of the Nakanbe River Basin.

Research Methods

The research team designed a sampling plan in order to select the villages to study. The plan divided the Nakanbe River Basin into three zones around Bam Lake, Baré Dam and Loumbila Dam. The research team then selected six villages according to available water sources, the distance to the water sources, the types of socio-economic activities, such as farming or animal breeding as well as the existence of women’s associations since women collect drinking water in the rural villages. In addition, the researchers calculated the distance from a village to its water source because they wanted to evaluate if water-related conflicts correlated with the proximity of a village to its water source. Researchers selected villages according to three ranges of proximity to a water source: villages located within 5 kilometres of a water source; villages located within 10 to 15 kilometres of a source of water; and villages located within 25 kilometres of a water source.

The researchers then conducted informal discussions and meetings in the six villages of the Nakanbe River Basin and they organized a two-day roundtable discussion in Ouagadougou in September 2000. The roundtable discussions brought together, for the first time, community stakeholders as well as stakeholders from the government, private sector and academic circles. The discussions fostered a participatory process to explore the viewpoints, concerns and reasoning of the stakeholders in an effort to identify the main problems related to water conflicts and reach a consensus about how to solve the conflicts in the rural villages.

The researchers identified four general problems that were the source of water-related conflicts in Burkina Faso: a) there are insufficient supplies of water resources; b) the existing water resources are poorly managed; c) there is a lack of communication about water uses, management and conflicts; and d) the rural populations have not always adopted methods from past development projects to address the problems related to village water resources. The researchers also classified a range of conflicts related to technical problems, such as insufficient water
resources and malfunctioning of hand-pumps, social problems, such as ethnic conflicts, or sanitation problems related to the presence of water-borne diseases and bad hygiene.

The researchers then designed the participatory communication approach they would implement to resolve the water conflicts in the Nakanbe River Basin, especially the conflicts that occurred at the village hand-pumps (Kibi, 2004). The research process began by selecting a project facilitator who was the official decision-maker guiding the project and decided when to share his decision-making power with other participants (Bessette, 2001). The facilitator sometimes took a neutral role where he merely assisted with the coordination of meetings and ensured compliance with the rules, although the facilitator could also play a more active role by suggesting compromises or searching for a consensus in order to resolve water conflicts (Roy, 1985; Keeney, 1992). The role of the facilitator was to foster dialogue and information sharing among the various stakeholder groups; to stimulate discussions about local water management problems as well as possible solutions; and finally to support the preparation and implementation of concrete actions to overcome water conflicts (Bessette, 2001).

The next stage of the research process involved the identification of stakeholders who would participate in the research project. Researchers brainstormed about how to identify the different stakeholders in a village, how to ensure that each stakeholder could participate in the project, and how to initiate consultations with the various stakeholders (Banville et al., 1993). The researchers began this project on the premise that if all stakeholders had an input in defining the problems they faced, it would be easier to find solutions that were acceptable to everyone. Once the researchers identified the stakeholders who would participate in the project, they determined the decision-making methods as well as the level of consensus that was acceptable.

The researchers collaborated with the selected stakeholders to identify and define the types of water conflicts in the villages and to propose solutions. The project's participants then defined the types of water conflicts and the proposed solutions. Then, they evaluated the feasibility of proposed solutions in order to select and implement the appropriate ones to resolve water conflicts. Finally, the research team consistently monitored the research process and made adjustments when necessary.

**Project Implementation**

The research team relied on meetings with the Ministry of Water Resources held in December 1999, on preliminary fieldwork as well as discussions with the local populations in the villages in order to identify two categories of stakeholders: community stakeholders and decision-making stakeholders. The community stakeholders included farmers, stockbreeders, fishermen, women, girls, men, boys, merchants, village construction workers, administrative and local village authorities, such as the administrative delegate, the chief of the village, or the chief of a clan. The decision-making stakeholders included government managers who were in charge of hand-pump maintenance, local and regional public authorities and development partners such as organizations providing financial support as well as the technical experts and the researchers who work for development organizations.

**Identification of Water Conflicts**

The participatory communication strategy that the research team implemented was twofold: It consisted of matching the needs that the various stakeholders identified with the objectives of the project and then choosing appropriate communication activities to disseminate information for resolving water conflicts. The project team used two communication strategies, participatory investigations at the local level and meetings with all stakeholders, to identify current and potential water conflicts at village hand-pumps. The researchers sought the participation of various people within the villages by targeting stakeholders according to factors such as age, sex, socio-economic activities, occupational and social status, influence in the community, and commonalities or differences between stakeholders. For example, women and girls may have a common interest related to gathering water for household use, but may have divergent opinions about the favours, such as passing to the front of the line, granted to some people in the community at the hand-pump.
The communication strategies allowed the involvement of all community stakeholders in most circumstances and established a forum to assess and understand the dimensions of water conflict in each village. The communication strategies also ensured that the stakeholders had an opportunity to participate in the decision-making process about the solutions to resolve water conflicts at the hand-pumps.

The participatory communication strategies the researchers implemented also involved circulating information among the community stakeholders through communication strategies that were appropriate to the local context in each village. The communication strategies consisted of the research team facilitating informal discussions with small groups; formal roundtable discussions involving all the stakeholders; producing theatrical representations, radio broadcasts as well as video documentaries about resolving water conflicts; organizing meetings at the village and regional levels; and holding a Village General Assembly meeting to elect members of the water management committee. The research team pre-tested the communication strategies before their implementation since methods of communication differed between villages. In addition, sometimes the topics of discussion differed since the priorities related to water use in each village varied. Pre-testing allowed community stakeholders to inform researchers whether the communication strategies were appropriate.

**Participation of Community Stakeholders**

The research team grouped all stakeholders into small groups according to their diverse characteristics, such as age, sex, ethnic group or cultural traditions and beliefs, as well as their level of education to facilitate the participation of diverse groups within each village in the research process. The research team aimed to capture the heterogeneity of the stakeholder perspectives about problems related to water conflicts as well as any potential solutions. In addition to identifying problems related to water use and conflicts, stakeholders needed to justify why they identified certain problems and solutions. If the views of the stakeholders in each group were completely different, the research team divided the stakeholders group into two or three groups according to their common interests. For certain stages, it was necessary to set up a group of stakeholder representatives, which then formed a Village Assembly. Lastly, the researchers established a procedure for decision-making, which was flexible so that it could adapt to the needs of the stakeholders. This procedure aimed at improving the quality of the contribution of the stakeholders, the communications between the stakeholders as well as their confidence in the process.

**Types of Water Conflicts**

The researchers and the stakeholders identified three types of water conflicts related to social, technical or sanitary issues. The social conflicts erupted because cultural backgrounds or religious beliefs influenced divergent water uses between the various ethnic groups. At one village, near Lake Bam, for example, members of one ethnic group caused friction with two other ethnic groups in the village because they arrived at the hand-pump with their livestock. In addition, one ethnic group considered certain wells sacred and therefore restricted its use to the preparation of traditional medicines, while another ethnic group did not view the well as sacred and attempted to use it for other purposes, thereby causing conflict. In Gogninga, a village in the Bagre Dam region, a conflict occurred because the Mossi ethnic group used black pots for water collection, which is taboo for the Bissa ethnic group.

Conflicts also erupted because of technical issues: water availability and water quality; the infrastructures of the village hand-pumps, the number of functional hand-pumps or modern wells per inhabitant. Water scarcity was in fact one of the major causes of conflict at the hand-pumps. Sanitation was also a source of conflict because of poor hygiene practices; some villagers, for example, let their animals drink water directly from the village's water source thus causing some water-borne diseases to be transmitted to the villages.

Some other conflicts erupted among villagers because they disagreed about using massive amounts of water for irrigation, which strained the villages water source and decreased people's access to potable water. Water conflicts also occurred between users at the village hand-pumps because some people did not
respect the water collection schedule. For example, during the dry season in the Gogninga, Goué, and Silmiougou villages, some women did not respect the water collection schedule and therefore caused friction with the users who did respect the schedule.

Conflicts also occurred because some users refused to pay for the hand-pump’s maintenance. In the Goué village, for example, some people refused to pay for the maintenance of the hand-pump because the wife of the treasurer of the water management committee did not pay. In addition, in the same village some people refused to pay for the costs of hand-pump maintenance because they were not invited to provide any input into the selection of the site for the hand-pump.

Finally, many conflicts occurred when people jumped to the front of the line-up at the hand-pump. Sometimes people responded by smashing the clay jugs of those who jumped the line or shoving each other. Some villagers did not respond but they still felt resentful if the village chief’s wife jumped the line. The researchers learned, for example, that conflict erupted in Kora, a village in the Bam Lake region, because the wife of the village chief moved to the front of the line at the hand-pump.

An additional social problem, related to water scarcity and the inadequate infrastructure of existing hand-pumps, is starting to emerge in rural Burkina Faso. Young men living in villages that are plagued with water problems are viewed as unsuitable husbands. If a young man in Silmiougou, for example, wants to marry a young woman from another village, she is going to be reluctant to move to his village because it has only one hand-pump. Women know that their lives in a village that has only one hand-pump would be filled with the daily drudgery of spending hours fetching water. They dread the idea of marrying a man from such villages.

Solutions to Water Conflicts

The researchers and the community stakeholders organized meetings in the villages, a roundtable discussion in Ouagadougou in September 2000, followed by more meetings. A number of solutions emerged from those meetings. The researchers facilitated the input of the villagers by arbitrating divergent viewpoints and promoting consensus among the various stakeholders. The research team also ensured that the various stakeholders had an opportunity to express their opinions. For example, the researchers specifically asked the women how to overcome the problems related to water collection schedules at the village hand-pump. The women suggested building more hand-pumps and requested that the water management committee create a new schedule for water collection.

The research team and the community stakeholders devised three solutions to overcome the water conflicts. First, they suggested the need to change the mentalities, habits and behaviours of water users in the villages. Second, they suggested that the water management committee be reorganized and restructured in order to improve water management and prevent conflicts at the village hand-pumps. Finally, the researchers and the participating stakeholders suggested fixing the existing hand-pumps and constructing more hand-pumps in each village. As the research team and the various stakeholders discussed potential solutions, additional issues emerged that they needed to address. For example, if the stakeholders wanted to build more hand-pumps, they needed to determine how to cover the costs. In addition, the suggestion to establish a new water collection schedule raised the issue of how to ensure compliance among water users. After various solutions were proposed the researchers and the community stakeholders evaluated the feasibility of each solution.

Viable Solutions

As a first step to evaluate the feasibility of the solutions, the researchers and the stakeholders proposed to compile a list of all the solutions discussed at the village meetings and at the roundtable discussions. The second step involved calculating the number of conflicts each solution would resolve in each village. Finally, the researchers and the community stakeholders evaluated each proposed solution in terms of its implementation costs as well as its acceptability to the village population.
Implementation of Solutions

The researchers and the community stakeholders held a total of 103 meetings between December 2001 and June 2002 in the six selected villages of the Nakanbe River Basin. The objective was to implement the solutions aimed at changing the mentalities, behaviours and habits of the population as they related to water uses and water conflicts. They held 25 meetings in the Bagré Centre village, 22 in the Gogninga village, 20 in the Goué village, 18 in the Silmiougou village, 10 in the Kora village and 8 in the Loaga village. The purpose of the meetings was to exchange information about problems related to hand-pumps. The researchers began by holding meetings with the traditional village chiefs, the village administrative delegates, the village leaders as well as the members of the water management committees prior to meeting with other community stakeholders. The discussion included women’s role in decision-making about water resources in the village and the importance of maintaining the infrastructures of the village hand-pump.

In July 2002, after those meetings aimed at exchanging information about conflicts at the village hand-pumps, the researchers and the community stakeholders collaborated to implement the next phase. They designed communication strategies, such as theatrical performances in the six villages and videos in order to circulate information about participating in the resolution of water conflicts. The researchers also continued to disseminate appropriate information about water conflict resolution, through village meetings, videos, theatrical performances, to a number of villages throughout Burkina Faso.

The researchers and the representatives of the Ministry of Water Resources developed and implemented a new model for water management based on a participatory approach. In June 2002, the researchers demonstrated that improved water resource management in a rural setting occurred with better management of the water management committee. They argued that if the village water management committee functions well, there is better access to drinking water for everybody but especially for women and children; more equitable access for all members of the community; improved communication between water users and consequently fewer conflicts.

The implementation of a new water management committee consisted of three stages. The first stage consisted of establishing a water management committee for each water source in the village. Establishing a water management committee required the local population to determine the number of staff necessary for the committee, the village authorities to nominate and elect members of the committee and provide training for the staff of a water management committee.

The second stage involved establishing a Management Cell of Water Sources for the Village District (MCWSD), which was an ad-hoc committee consisting of contact persons from the villages, members of the water management committee, representatives of the local administrations as well as notables such as the village chief. The objective of the committee was twofold. First, to give a progress report about the operation of the new water management committee; and second, to allow the integration of each water management committee into the village general meetings where the entire village could participate in decision-making about water management.

The third stage consisted of installing a Permanent Village Framework of Dialogue (PVFD). A village meeting defined the framework to implement a Village Water Users Association (VWUA) intended to allow the entire village to participate in the management of water resources. The VWUA consisted of water management committee members from all of the village’s water sources. The VWUA constituted a permanent resource to monitor water management in the villages. It was recognized as a legal entity by the government.

The research team also produced a guide and a video documentary about how to establish a participatory water management committee. Both the guide and the video are intended for dissemination to NGOs and development organizations working on water resource management in the rural areas of Burkina Faso.

Project Results

After two years, the project team has resolved a number of disputes around village hand-pumps. Three years ago, there were more conflicts over water in the villages of Goué, Silmiougou, Kora, Loaga, Bagré and
Centre and Gogninga. Nowadays, the local populations are happy to participate in the process of conflict resolution. In the Slimiougou and Goué villages, the new water collection schedule devised by women and girls functions well. In the village of Kora, in the Bam Lake region, however, the implementation of a new water collection schedule has not been as successful. Overall, the project resulted in the restoration of two hand-pumps, the construction of five protection walls around existing hand-pumps or the construction of new hand-pumps in all six villages between July 2001 and March 2002.

The research team learned that the functioning of a water management committee is directly related to the water conflicts at the hand-pumps. The researchers also learned that water management committee members had difficulty managing the following issues: the population's participation in the decision-making process about water management; the nomination procedure to select committee members; the conflicting views between men and women, women and girls, girls and young boys. Therefore, the researchers recognized the need to reorganize and restructure the village water management committees. In December 1999, for example, conflicts erupted in the Goué village, as users refused to pay maintenance costs at the two village hand-pumps. The researchers organized a meeting to discuss the conflicts which resulted in the local population deciding to establish a new water management committee. Seventy percent of the members of the committee were women and many conflicts were resolved. The local population now ensures proper hygiene around the hand-pumps and the end-users, mainly women, meet once a month to discuss water management in Goué village.

The project team also demonstrated that theatrical presentations can be useful to resolve water conflicts. In the village of Goué, for example, the fishermen repaired a hand-pump, on their own initiative, after seeing a theatrical presentation about resolving water conflicts. In the village of Kora, a theatrical presentation also prompted the Peuhls, the Mossi and the Yarce people to exchange their respective points of view about the problems related to water management.

Moreover, the project team demonstrated that in order to successfully resolve water conflicts, the local population must play a significant role in the process. During meetings related to hand-pumps issues, in the village Loaga, in the Bam Lake Zone, for example, women and girls came to an agreement about water intake rules. The resolution of some specific conflicts, however, may require a long-term commitment on the part of all involved parties. Overall, the research team focused on strengthening the administrative and technical capacity of local organizations in order to ensure that management of water resources continued after the end of the project. Since the project is still ongoing, it remains to be seen whether that goal will be achieved.

**Conclusion**

Despite the successes of the project the following questions remain: How can researchers determine if communication strategies change certain behaviours, such as the acceptance of women as members of a village water management committee? How will the solutions implemented today affect future generations? The experience in the field proved that changing mentalities, habits and behaviours was not easy. A long-term commitment is required from all parties involved. The research team did not resolve the conflicts over the village chief's wife refusing to wait in line at a village hand-pump, nor did they resolve the conflict about women's participation in the water management decision-making process. Most men and village chiefs are still reluctant to allow women's participation in the water management committee and, at present, women still cannot become president of the committee.
In addition, the researchers learned that the village meetings and the theatrical presentations did not really resolve the conflicts related to ancestral beliefs or taboos about water collection, the required payment of hand-pump maintenance or the implementation of proper hygiene practices to avoid water-born diseases and ensure safe drinking water in every village.

In conclusion, although not all water conflicts were resolved successfully in the Nakanbe River Basin of Burkina Faso, the project team did solve a number of problems. The researchers collaborated with the local population in the six villages and together they identified three types of water conflicts related to social, technical or sanitary issues. Then, they proposed a number of solutions to resolve the water conflicts in the villages. They also demonstrated the importance of a water management committee that facilitated the participation of women and girls in the six villages. Finally, the research team demonstrated that successful methods of resolving water conflict can be transferred to other villages in the Nakanbe River Basin, other river basins in Burkina Faso, or even in other Saharan countries where the water conflicts exist.

References


Participatory Communication to Improve Natural Resource Management in Peri-Urban Kumasi, Ghana

Charles Quansah 1
Faculty of Agriculture
Kumasi Kwame Nkrumah University of Science and Technology (KNUST)

Pay Drechsel
International Water Management Institute (IWMI) Kumasi
Ghana

John A. Bakang
Faculty of Agriculture
Kumasi Kwame Nkrumah University of Science and Technology (KNUST)

Abstract

In the last decade, the concept of Participatory Technology Development (PTD) stressed the importance of appropriate communication strategies between researchers and farmers. For too long, researchers developed technologies without sufficient involvement of their target group resulting in low adoption rates. This chapter describes the required communication skills as well as communication strategies used in participatory technology development. The chapter also explains the monitoring and evaluation exercises related to agricultural innovations developed in peri-urban Kumasi, Ghana. Communication strategies used for further technology dissemination are also described. Strategies discussed comprise interviews, group meetings, field days to evaluate on-farm trials, local radio broadcasts, and indirect communication between researchers and farmers through training of agricultural extension staff.

1 Charles Quansah, Department of Crop Science, Faculty of Agriculture, Kumasi Kwame Nkrumah University of Science and Technology (KNUST), Ghana. Email: crop-ust@africainline.com.gh
Introduction

In the face of dwindling agricultural land and threats to livelihood security, sustainable food production on an intensive basis can only be achieved through the development and adoption of improved land management technologies (Quansah and Asante-Mensah, 2001). Participatory Technology Development (PTD) has been found to be of relevance both in the development and selection of appropriate technologies and the achievement of greater adoption (Gyiele and Drechsel, 1998; Bechstedt, 1996). The most crucial pillar for a successful PTD project is the use of appropriate communication strategies to enhance the active participation of the target beneficiaries in all its component activities. These essentially consist of building and maintaining relationships with the target beneficiaries; situation analysis to fully understand their bio-physical and socio-economic circumstances; needs assessment; identification and ranking of problems; research priority setting and planning; development of solutions; testing and implementing available promising technologies. Of particular importance is participatory monitoring and evaluation (PME), which provides the target beneficiaries’ feedback on the technologies under test for the analysis of shortcomings.

Within the framework of the agricultural research programmes, supported by the International Board for Soil Research and Management (IBSRAM), now part of the International Water Management Institute (IWMI), the national research partners at the Kwame Nkrumah University of Science and Technology (KNUST) were trained in appropriate communication skills and strategies for PTD and PME with farmers. Emphasis was given to bottom-up approaches aimed at shifting the attitudes and perception of scientists towards the advantages of a continuous interaction with end-users. In this chapter, the communication strategies and skills used in the PTD process and PME field studies are presented along with some of the results and conclusions of the case study.

Methodology

Context

Land availability is a major constraint to farmers’ production systems in peri-urban areas. This has led to the shortening of the traditional long fallow periods used for replenishing soil fertility with a consequent reduction in crop yields. To compensate for the shortened fallow periods and to ensure sustained high crop yields, there is the need for alternative means of soil fertility replenishment. The pathways for soil fertility replenishment include mineral fertilizer application, maintenance of organic soil matter (animal manure, plant residues, compost, etc.) and accompanying technologies (soil conservation and sound agronomic practices).

While mineral fertilizers are generally expensive, there is an abundance of poultry manure in peri-urban Kumasi, which is cheap but used only by vegetable farmers. It was envisaged that the usage of poultry manure could be extended to improve the yields of other crops for enhancing the livelihoods of farmers. It is in this context that this study promoted PTD in the use of poultry manure and plant residues in a maize-cassava intercrop in two peri-urban villages, Afari and Akrofuom. The treatments tested on-farm facilitated a comparison of poultry manure with integrated nutrient management and the practice of maintaining residues on the field. The agronomic results are presented in Quansah et al. (1998). This chapter focuses on the communication strategies used.

Process

The beneficiary target group comprised smallholder farm families within peri-urban Kumasi. The KNUST-IBSRAM team that conducted the research consisted of an agronomist, a soil scientist, two rural sociologists, an extensionist and an agro-economist reflecting the multidisciplinary team required for any serious participatory on-farm research.

Before project inception, the general situation and needs of the farmers in the target villages were assessed through socio-economic surveys and participatory rural appraisal (PRA) studies. This was to initiate the first stage of participatory planning of project activities.
Local protocol and procedures for community entry and communication channels were used in seeking permission from the chief and his elders to carry out the research in the target village and in reaching the target group for the PTD and PME exercises. These included paying a courtesy call on the chief and his elders, communication with the chief through his linguist, communicating respect through appropriate body language and posture (e.g. bowing, standing with hands at the back, etc.) and punctuating the address by the appropriate title of the chief (e.g. Nana), explicit expression of the purpose and scope of the project, the motives of the research team and the expected roles of and benefits for the community and the project. In general, the local language (Akan) was used to facilitate effective communication and free self-expression by the participants.

The following communication channels were used:
- Village meetings and group discussions
- Field days to evaluate field trials
- Unstructured interviews with the aid of an interview schedule
- Local radio broadcasts
- Indirect communication between researchers and farmers through training of Agricultural Extension Agents (AEAs).

The first three activities were recorded on videotape. This enhanced individual participation since most of the participants wanted to see themselves on television or on the play back.

The group meetings and field days were held on taboo/communal workdays after permission had been earlier sought from the local community leaders (either the chief or the assemblyman). The taboo/communal workdays were days on which most people were available and could therefore attend (respect for farmers' time). People were summoned by traditional beating of a gong. Whenever the duration of an event lasted more than two hours (e.g. group discussion meetings and field days), participants were provided with soft drinks and snacks.

Communication Strategies

The communication strategies used for the various stages of the PTD and PME are presented in this section.

Participatory Needs Assessment

SWAP (Successes, Weaknesses, Aims and Problems) analysis, which elsewhere is referred to as SWOT (Successes, Weaknesses, Opportunities and Threats), was the main tool applied in the participatory needs assessment and research priority setting. SWAP is a participatory rapid appraisal method suitable for assessment and self-evaluation. The steps involved are elaborated in Quansah and Asante-Mensah (2001). In the main, the SWAP exercise commenced with pairs of interviewers holding discussions with the villagers (individuals or groups) in their work places to get a first impression of the situation in the village. This was followed by a workshop with the target group (farmers) at which interviews and discussions were held to bring out information about the general situation in the village, farming activities, needs, common problems and possible solutions.

At the beginning of the workshop, the Project Coordinator, who acted as the moderator with the assistance of two other researchers (an extensionist and a rural sociologist), introduced the research team to the participants. He then presented an overview of the on-farm research project emphasizing the purpose and scope as that of mutual learning in search of appropriate solutions (with available resources) to problems identified. This was necessary to clarify the expectations of the beneficiaries which, in most cases, are directed towards credit or other input supplies. Semi-structured interviews with open-ended questions in contrast to formal questionnaires were used to elicit information from the participants. This provided an opportunity for the researchers to:
- Exchange ideas with the participants;
- Communicate respect for and lively interest in farmers' ideas;
- Create an opportunity for farmers to express honest opinions;
- Elicit and understand the reasoning behind these opinions through probing questions;
- Establish their neutrality with respect to positive or negative comments; and
- Avoid giving clues about their own opinions, which may bias farmers' responses.
A good command of the local language (Akan) and the use of appropriate local expressions for technical terms by the moderator made the issues discussed more comprehensible to the farmers. This facilitated active participation of the farmers in the workshop proceedings through the flow and free expression of their ideas. In order to communicate receptivity of and respect for farmers’ contributions during the discussions, the information provided by the participants regarding their successful farming activities, constraints and problems and needs were recorded on cards and read aloud to them for confirmation or alterations. The problems that were within the influence of the participants were ranked and prioritized to serve as a basis for research. This revealed soil fertility depletion as a major problem in the farming community.

**Participatory Technology Generation and Testing**

Following the recognition of soil fertility depletion as a major problem by the target group, field trials of mutual interest were discussed. Farmers reported their experiences with applying poultry manure on vegetables, the yield increasing effect, and the enhancement of crop performance in general when plant residues were left on the soil. Trials with poultry manure and (for comparison) mineral fertilizers were then recommended with plant residues as an initial input. Farmer collaborators were identified during the SWAP analysis and the field trials subsequently implemented.

The communication strategy adopted at this stage of the PTD process involved making use of:

- The interests of the target group in selecting the technology to be tested;
- Past experiences or prior knowledge of the use of poultry manure and plant residues on vegetables as the basis of the trials; and
- The traditional respect for knowledge and value of experience to challenge other farmers to try out poultry manure on crops other than vegetables (especially the prevailing maize-cassava intercrop). Indeed subsequent monitoring and evaluation as well as beneficiary assessment exercises revealed that many non-collaborating farmers had applied poultry manure on crops other than the maize-cassava intercrop that the project concentrated on.

To further increase awareness of the community of the project and also direct attention to the field trials, signboards were erected on the fields of farmer-collaborators.

**Participatory Monitoring and Evaluation of Technology**

The focus of the participatory monitoring and evaluation was on farmers’ feedback concerning the introduction of poultry manure, among other innovations, for a maize-cassava intercropping system with two different intensity levels of the innovations and farmers’ traditional practice as control. The following communication strategies were used to retrieve feedback information from collaborating and non-collaborating farmers, and to further disseminate the technology:

**Community Group Meetings**

Group meetings were organized as a prelude to the farm visit and the unstructured interviews. The Project Coordinator again presented an overview of the on-farm research project. The importance of farmers evaluating the effects of the different treatments was explained (in contrast to researchers’ evaluation). Participants were interested in visiting the experimental sites to see things for themselves. A bus was arranged for the farm visit.

Table 1 indicates that nearly equal numbers of participants attended the group meetings in all three communities. There were slightly more males (57.4%) attending than females (42.6%), which corresponds with the traditional work share for the cropping system under study.

84
Table 1

<table>
<thead>
<tr>
<th>Community</th>
<th>Farmers</th>
<th>Gender Distribution</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afari</td>
<td>N</td>
<td>N %</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>28</td>
<td>82.4</td>
</tr>
<tr>
<td>Saamanso</td>
<td>33</td>
<td>10 30.3</td>
<td>23</td>
<td>69.7</td>
</tr>
<tr>
<td>Akrofuom</td>
<td>34</td>
<td>20 58.8</td>
<td>14</td>
<td>41.2</td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
<td>58 57.4</td>
<td>43</td>
<td>42.6</td>
</tr>
</tbody>
</table>

Field Days to Evaluate Field Trials by Collaborating and Non-Collaborating Farmers

Evaluation by Non-Collaborating Farmers

To avoid influencing farmers' evaluation of the effects of the treatments under study, the plots were marked out and simply labelled as plots 1, 2 and 3. Farmers were not told what treatments had been applied to these plots. The participants were asked to use their experience and careful observations to pinpoint the treatments and their respective plots. Participants gave their comments on their observations on the different plots. All observations were recorded. Participants' explanations as to the reasons for the differences observed were also recorded. Each farm visit took about two hours and sufficient time was given for as many participants who were willing to make comments to do so.

Evaluation by Collaborating Farmers

After recording the observations of the non-collaborating farmers, the participating farmer in charge of the experiment was asked to present the treatment imposed on each plot, his or her observations of the effect of the treatment on the vegetative growth phase as well as the yield of the two crops – maize and cassava. Other observations on the soil, weed growth, etc. were also presented. Conclusions were jointly drawn with the non-collaborating farmers. The nondisclosure of the treatments imposed, and allowing participants to assess and comment on each plot stimulated participation in the discussions. It is probable that participation would not have been to the extent observed if participants had been immediately informed about the treatments applied.

Unstructured Interview

The unstructured interview was conducted after the visit to the experimental site. The purpose was to capture the impact the experiment had made on the participants and also other information with respect to the adoption of the tested innovation in the locality.

To ensure that the exercise was of a participatory nature, the study emphasized the use of open-ended questions during the farm visit, and the unstructured interviewing and discussions that followed. The interviews covered the following areas:

- Farmers' awareness of the existence of the trial;
- Sources of information on the trial (diffusion pathway of the technology);
- Attempts at diffusing information on the trial;
- Farmers' indigenous knowledge related to the innovation;
- Specific knowledge gained from the trial after the farm visits;
- Farmers' assessment of attributes of the innovation (relative advantage, compatibility, complexity, trialability, observability);
- Perceptions of difficulties/problems associated with adoption of the technology;
- Farmers' interest to adopt poultry manure in the coming planting season and changes in their knowledge, attitudes, skills, and aspirations (KASA) with respect to the use of poultry manure (Asante-Mensah et al., 1998).

Local Radio Broadcasts

Local radio broadcasts, made fortnightly for six months, were also used to disseminate improved land management technologies (poultry manure and compost management) in the Akan language to a wider audience of peri-urban farmers. The programme was sponsored by the Natural Resources Institute (NRI) of the United Kingdom through the
Ghana Organic Agriculture Network, with some members of the KNUST/IBSRAM team as resource persons. Before each broadcast, local radio announcements were made to indicate the schedule of broadcasts so that farmers could tune-in and also phone-in. The latter promoted dialogue and discussions between the presenter and the farmers.

Indirect Communication between Researchers and Farmers

Apart from using the above channels to communicate directly with farmers, agricultural extension staff were trained to reach more farmers than researchers could do. The dissemination of some of the results of the field trials, for example, on the use of poultry manure to farmers in peri-urban Kumasi was carried out through the Directorate of Extension Services, Ministry of Agriculture (MOFA). This was facilitated through the training of 49 technical extension staff of MOFA, the production and distribution of fact sheets on the use of poultry manure, training of farmers, field days and meetings at which farmers presented their own achievements with others. The fact sheets were targeted at the agricultural extension staff and literate farmers. A typical fact sheet on poultry manure covered the following areas: what it is, uses, (advantages and constraints), nutrient value, handling, storage, methods of application, when and where to apply, and rates of application (converted to a local measure). These activities were carried out within the context of the Kumasi Natural Resources Management Project (KNRMP – 1997-2000) sponsored by the Department of International Development (DFID) and active participation of some members of the KNUST/IBSRAM team of researchers.

Results

Information Gained from the Farmers

The following section summarizes some of the results of the communication strategies used highlighting also unexpected feedback from the farmers including those cases where researchers learned from them.

The SWAP Analysis and Participatory Communication

The SWAP analysis and its accompanying participatory communication strategy proved to be an effective tool for:

- Assessing the general situation of the locality and prioritizing farmer felt needs in the shortest possible time;
- Identifying the complex constraints to farming and other activities of the target group to serve as the basic input to problem-solving research;
- Using past mistakes or weaknesses constructively as learning processes;
- Promoting participation of the target group in the discussion of their common problems with the aim of finding solutions; and
- Promoting the self-help spirit and initiative of the target group and affording them the opportunity to participate in the planning, execution and monitoring of research activities.

Field Days

The field days proved to be an excellent communication facilitator. About 100 non-project participating farmers took part. The farmers easily and correctly identified plots with different treatment because of the bigger cassava stems, larger and greener leaves etc. Also the control plot was unanimously identified. Here, cassava plants had poorer vegetative growth with thinner stems, smaller leaf area, and lighter green leaves. Farmers assessed the growth of the maize by observing the stalks on the plots. The parameter used was the size of the maize stalks. Also here, farmers unanimously and correctly identified any visible difference. After identification of the actual treatments, farmers concluded that in light of the high cost of fertilizers and the extra cost of application, it would be more economical to apply only poultry manure.

Researchers Learn from Farmers

Researchers usually follow standardized parameters during their fieldwork. Records are taken on crop height and related agronomic parameters. Farmers, on the other hand, observed more than researchers basing their judgement also, for example, on the cracking and uplift of the soil over tubers. Farmers observed also that during growth of maize, poultry
manure helped to preserve soil moisture because the leaves of plants on the manured plots were turgid during the day while those on the control plot had flaccid leaves. Also soil structure was more friable under poultry manure treatment. Though researchers noticed that manured plots had heavier weed growth than the control, farmers observed that the weeds were herbaceous and softer and therefore easier to weed than the weeds on the control plot, which were shrubby and tougher.

**Unstructured Interviews**

Of the about 100 non-collaborating farmers who took part in the PME exercises, only half of them were aware of the trials in their community. The relatively low percentage of awareness is attributed to the failure of the project team to organize earlier field days for the farmers immediately after the introductory meetings and start of the on-farm work. Table 2 shows sources of information for the participants who were aware of the project trials.

<table>
<thead>
<tr>
<th>SOURCES OF INFORMATION</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBSRAM introductory group meeting</td>
<td>34</td>
<td>62</td>
</tr>
<tr>
<td>Agric. extension officers</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Friends and relatives</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>Visit to experimental sites/fields</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>100</td>
</tr>
</tbody>
</table>

The findings indicated that the project itself was the most important source of information. This was expected since the project was still at an early stage. However, extension officers and friends/relatives were the next important source of information. These two sources would be more important pathways for diffusion of information in subsequent trials, seasons and other communities.

**Diffusion of Innovation**

In addition to the collaborating farmers, a few non-collaborating farmers had engaged in spreading the innovation of poultry manure use to other farmers. A total of 215 farmers were estimated at the time of the PME to have been reached with the innovation. This indicates that poultry manure could have a high rate of diffusion based on farmers' interest and conviction of its beneficial attributes such as the high observability (see below) of its effects on crop growth and yield coupled with its current low cost of acquisition and application.

**Assessment of Attributes of the Innovation**

Most farmers agreed that the innovation showed the main characteristics of innovations (Adams, 1983; Blackburn, 1984):

- **Relative Advantage** – the increased crop growth is convincing;
- **Compatibility** – the innovation is compatible with current practice;
- **Complexity** – the innovation is very simple thus easy to apply;
- **Trialability** – the innovation is easy to try on small plots; and
- **Observability** – the effects of the innovation are clearly observable.

**Perceptions of Difficulties**

Participants, in group meetings as well as in individual interviews, expressed some concerns, for example:

The main difficulty related to the innovation was that of poultry manure transporting from the roadside to the farm. The trucks usually dump the manure at the roadside, and only by bush paths can most farms be reached. This necessitates carrying the manure to the farm by head loads (women's task).

The majority did not perceive any health hazard with handling the manure though a few people mentioned the likelihood of poultry manure being a possible source of worm-eggs and the general bad odour, especially when wet.

The PME study also tried to assess the sustainability of the use of poultry manure in the study area. Several sustainability indicators based on farmers' statements were identified. These included: availability, low cost, easy application and higher yields.
Support of Local Leaders

The support of local leaders is essential for adoption and sustained use of introduced innovations. Local leaders' support for the project was observed in the following ways:

- Chiefs/assemblymen gave the IBSRAM team permission to meet and talk with the people.
- Some assisted in the rallying of their people for the programme.
- Some, such as the Chief of Akrofuom, attended the group meeting, and unstructured interviews with elders.
- Some (e.g. Chief of Akrofuom) contributed to the discussions and encouraged their people to adopt.

Such open support by the community leaders enhances wider diffusion and adoption of the innovation. Such support is likely to enhance sustainability of the use of the poultry manure technology.

Conclusion

The use of local languages in farming communities enhances mutual understanding of issues discussed and facilitates communication towards free expression and explicit articulation of views:

- Unstructured interviews with an interview guide stimulate participation and discussions on a wide range of issues.
- The use of appropriate communication strategies, such as joint field work/visits, is very pertinent to getting the requisite feedback information on on-farm trials.
- Identifying farmer felt needs through the SWAP analysis may not be a problem in farming communities. However, their priority setting may be different from what the project seeks to promote. For example, credit provision, potable water, roads, etc. may be ranked higher than or at the same level as the project's soil fertility improvement objective. In such a situation, linking the community to the relevant agencies dealing with those areas other than that of the project is a prerequisite to the smooth implementation of the project's objective.
- Active participation of the community in the selection of collaborating farmers to pilot project activities enhances the dissemination and adoption of improved technologies.

References


This chapter describes an experiment in participatory communication in Burkina Faso and Mali. Forestry workers, agricultural technicians, media professionals and villagers in Nagréongo and Kriollo in Burkina Faso and Kafèla in Mali all collaborated in order to overcome environmental management problems related to water and wood shortages as well as soil degradation. The experiment was marked by both successes and failures, but most importantly by valuable lessons. The initiative originated with the network of African Journalists for Development (JADE) who was convinced that rural media were missing the opportunity to support development because they lacked the necessary resources and participatory tools.

1 Souleymane Ouatara, Réseau de journalistes en Afrique pour le développement (JADE), B.P. 6624, Ouagadougou, Burkina Faso. Email: jade.comdev@iptifor.bl
Introduction

Can you make water spring from the earth and turn dry, compacted soil green with your bare hands? It is, in fact, feasible. What is the secret? Bring people together through radio programmes and town hall meetings so that they can share their local knowledge and become self-sufficient.

This is the story of forestry workers, agricultural technicians, media professionals and villagers in Nagréongo and Kriollo in Burkina Faso as well as Kaféla in Mali. It relates an experiment that was marked by both successes and failures, but most importantly by valuable lessons. The initiative originated with the network of African Journalists for Development (Journalistes en Afrique pour le développement - JADE) who were convinced that rural media were missing the opportunity to support development because they lacked the necessary resources and participatory tools.

Socio-Economic Context of the Villages

Nagréongo

In Mooré, one of the 60 languages spoken in Burkina Faso, the clearings where nothing grows are known as zippéle. In those areas, the land is overexploited by humans, eroded by violent winds and rainstorms, compacted by animals. The earth is covered by a sterile crust. The inhabitants of Nagréongo, a village in central Burkina Faso, know the zippéle all too well. For them, it is synonymous with famine and thirst.

In March 2001, at the beginning of the research project in Nagréongo, the village had 18,946 inhabitants and four wells. The water supply of the wells was insufficient and two of them did not always work as there was no water management committee. A famous healer lived in the village, so that many people would come to the area for medical treatment, which required water and medicinal plants. It is important to note that the village was located within the area covered by Radio Venégré, a community radio that provided the villagers with programmes related to farming techniques as well as programmes based on the history of the villages as well as their stories and legends.

Kriollo

Kriollo, a village of 2000 people, lies further to the north of Burkina Faso. When asked to explain why the village did not have enough water for humans and animals, Dicko Issa Boureima, a woman in her sixties, remembered her youth: I remember, when I was a teenager, about 40 years ago, the water stretched from here to Taaka, a village about 5 kilometres away. It was like a lake. Yet, today there is a shortage of arable land, the soil deteriorates a little more each day and firewood is scarce. Additional problems include illiteracy and women's inability to speak in public.

Kaféla

Kaféla, a Senoufo village with 510 inhabitants, is located at the edge of the urban community of Sikasso, in Southern Mali. There, intensive logging has taken a heavy toll on forest resources. In order to meet the high demand for wood in Sikasso, people plunder the forest resources. The local population relies on the wood production as their primary source of income. The commercial cutting of firewood to supply the urban centres is an important factor in deforestation, which frequently leads to the creation of rings of desert around the towns. But the search for profit does not explain everything. N'GoIo Coulibaly, a sociologist and researcher with the Sikasso Production Systems and Natural Resource Management team, speaks of socio-cultural baggage. He explains that: in Senoufo country, a wife's femininity is measured by the quantity of wood she piles up. Therefore, women stack as much wood as they can in front of their houses, in order to enhance their social standing further depleting the forest resources.

Communication Context

Priority to the Elders and the Powerful

The three villages involved in the study use traditional means of communication either in religious settings (church, mosque), around the wells, in the market, at
the village square or in places where young people gather (kiosks, tea shops, public festivals). Radio is also becoming more and more important as a communication medium in the villages. As it is a relatively new medium, however, its effectiveness in supporting development is somewhat limited. In other words, an increase of technology does not guarantee universal involvement in the community decision-making process. Community debates remain heavily influenced by powerful people in the community: the traditional chief, the healer (Nagréongo), the Iman (Kriollo), and the Council of Elders (Kafêla). The women and the young people, in particular, are not given much space in public debates.

Impositions from Supporting Agencies

NGOs and government technical services are all concerned about issues related to soil infertility, scarce water resources, and deforestation. Development organizations, however, have a tendency to impose their own solutions which are often far from effective. All too often, they impose programmes, pre-packaged by their headquarters, that do not take into account the participation of the local population.

JADE’s Participatory Project

Difficult Beginnings

In June 2000, following a meeting with the various participants involved in the project, JADE organized a workshop in Nomgana, a village located about 20 kilometres from Ouagadougou. The participants discussed the implementation of the research project as well as the organizations interested in participating in the experiment. The participants came from Dori in the north, Ziniare in the centre, and Fada in the east. All three regions suffered from water shortages as well as severe depletion of their vegetation and wildlife. Yet, they all had several experienced farmers’ organizations as well as a number of supporting agencies that were quite receptive to innovative strategies.

The Nomgana meeting proved crucial to prevent any misunderstandings due to poor planning of the project’s implementation. The first meeting, however, did not produce any concrete results as a disagreement erupted over daily monetary compensation. JADE decided that the people of the eastern region, who made their participation conditional on an increase in the per diem rate, could no longer participate in the research project. On the other hand, the organizations of the Ziniaré region in the centre of the country and of the Dori region in the North agreed to continue the project.

In Mali, the potato producers, the processors of local products, as well as the livestock exporters also left the project, following the profile analysis of the region. Their objectives were no longer compatible with the research orientations of the project. The potato producers required information on potato seeds, while livestock exporters required information about the export price of cattle in the Ivory Coast market. Finally, new partners joined the project, such as the Nature Conservation Division.

From a Media to a Participatory Communication Approach

The JADE research team presented two communication approaches in order to resolve the problems related to natural resource management: a traditional media approach and a participatory communication approach.

Innovative Uses of Radio

The research team launched the project through radio, which is a powerful tool to disseminate information and educate people, especially in rural areas where oral communication traditions are prevalent. Three editorial committees, established in each of the three areas, namely Sikasso, Ziniare and Dori, were responsible for radio content and production. The editorial committees operated very much like typical editorial boards, but in addition to the radio producers, they also included representatives of the communities and the development agencies.
Radio for All

In September, the JADE researchers organized a workshop in Dori and in Sikasso, in order to show the local populations how to use radio for community development. The workshop discussed the following issues:

- Identify important topics to cover and broadcast;
- Determine the needs of the audience;
- Organize teams for the fieldwork to make contact with the communities;
- Organize training sessions in sound recording techniques;
- Organize training in interview techniques;
- Develop radio plays from issues the local population identify as important;
- Organize field trips to cover a variety of topics: livestock trails, anti-erosion sites and fallow land, mulching, organic manure, threatened medicinal plants;
- Analyze the field trips in plenary to discuss the lessons learned;
- Produce radio broadcasts.

The synergy between all the actors helped enrich the contents of the magazines (reporting, investigations, and technical information) and find a genuine partnership model. In Sikasso, for example, the people discussed whether they should ask the griots (village chroniclers and musicians) to broadcast the radio programmes since they already played an important role in social communication in the village. The people decided that using the griots as hosts would be appropriate for stories, but not for technical messages. They argued that the griots might distort the information in the technical messages. They further argued that some radio hosts were real stars in their respective communities, so that they would be credible sources of information. Their voice was, therefore, the best medium to get the technical messages across.

All parties were convinced that the local population had to be fully involved in all phases of the development project.

The Participatory Approach: The Community at the Centre of the Process

Understanding the Context

At a workshop in Ziniaré, the agriculture, livestock, and environment officers presented their teaching techniques. The members of the Village Communication Committee provided feedback on the teaching approaches and made some useful suggestions. For example, they stressed the importance of the introductory greeting, which was too often cut short. They also recommended more open discussions so that the local population would have more input into finding solutions to their own problems. The meeting illustrated the importance of understanding the local context by listening to the people in the community. This kind of knowledge is often referred to as diatigité or lodger in Jula, a West African vernacular language. The lodger is the one who opens your eyes, teaches you what has to be done and what has to be avoided in the village. For as the proverb goes, the stranger has big eyes but cannot see.

Misunderstanding the Context

In Ziniaré, the team of researchers that came to meet with the people in the village and establish the groundwork for cooperation was surprised to see that the entire population came to greet them. Yet, this was common practice in the village. The communities want to make a good impression on the development agencies. The lack of understanding of the local context, on the part of the researchers, could have created an embarrassing situation. Yet, during the initial encounter, the researchers set aside their initial plans and decided to broadcast a programme about the history of the village, which pleased everyone. Then, they interviewed the healer,
the master of ceremonies and another influential person in the village. The broadcasts were aired that same evening over Radio Vénégré. Moreover, the project coordinators, who were reluctant to accept any presents from the villagers, changed their minds on the advice of the field officers. You will make them angry if you refuse the sheep and the chicken they offer you as a welcome gesture one of the agriculture officers explained.

Prior knowledge of the local environment would have enabled the researchers to anticipate a mass greeting by the villagers and to organize the meeting accordingly. Since it is difficult to anticipate all situations, the researchers have to find ways to adapt to spontaneous events. In this case, the research team succeeded in turning a difficult situation to their advantage by producing a radio broadcast on the spot. In the end, the radio broadcast helped the researchers gain the trust of the local population and facilitated their access to the members of the community, especially the women, the young people, and the elderly.

**Identifying the Natural Resource Management Problems**

Which problem involving water, wood, and land keeps you awake at night and for which might you have a solution? This was the question debated at first by each of the four groups, namely the young people, the women, the adults, and the elderly, and then in a plenary session. The aim was to emphasize the community’s ability to identify the solutions to its own problems before turning to other resources for assistance.

**Water and Wood Shortage, Soil Degradation**

Three themes emerged from the discussion in Ngréongo: water shortage, soil degradation and shortage of wood. Water shortage received the most votes in an open ballot and ranked first among the problems requiring immediate attention. The research team further identified the problem of water pollution as well as the need for simple techniques to make it drinkable.

The villagers noted various reasons for water shortages: the insufficient number of wells, the reduced depth of the water table, the shortage of erosion-resistant sites and the lack of dams. They also noted that the shortage of drinking water created public health hazards, such as the prevalence of Guinea worm disease and diarrhea among children.

**Humour as a Medium of Communication**

During a session aimed at identifying the problems and analyzing their causes and consequences, the women noted that the village leaders had a negative influence on their participation in the discussions. In order to relieve the tensions arising from the conflicts between the women and the village leaders, the researchers resorted to the use of traditional jokes. It typically involved two ethnic groups who were able to make fun of each other without becoming hostile. The research team, for example, included one agricultural technician from the San tribe, and another one from the Mossi tribe. Both lived in Ngréongo. They used jokes to tell the Mossi tribe not to prevent the women from expressing their views. I am your chief. I alone can decide who can do this or that. So I’ve made my decision: the women will speak. This amused everyone at the meeting and one of the leaders just replied: This Samo’s crazy! The joking exchange helped the participants address the issue of the women’s inability to contribute to the research projects. Otherwise, the problem would have created tensions and conflicts that might have derailed the project’s objectives.

**Using Technical Services**

The research team conducted additional research in collaboration with the technical services in order to assess the water supplies, the condition of the infrastructures as well as the existing support programmes in each village. The aim was to accurately document the strategies to be implemented and to identify the people or institutions capable of providing technical or financial support to the communities. One case involved the health officer of the Ziniare health division on the topic of drinking water, whereas another case involved his counterpart in Kriollo about ways to raise funds for a cistern.
Conclusion

The participatory communication strategy consisted of several elements: forming groups of people with diverse expertise in order to solve natural resource management problems; producing radio broadcasts; organizing workshops and discussion groups; formulating voting procedures to help in the decision-making process; involving the local population and taking into account the collective local knowledge. Overall, the participatory approach proved conducive to dialogue, decision-making with a broad consensus, as well as community commitment. The climate of competition which prevailed prior to the initiation of the participatory communication project was now being replaced gradually by an ongoing consultation between the various stakeholders.