

Land Use, Disaster Risk and Rewards

A community leader's Guide



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FOREWORD

“We may perhaps *live* on Earth, but we surely *survive* on Land,” said an old farmer.

True, we are all aware of the value of land. But unprecedented population growth has led to some alarming facts. One: less and less land is available for farming. Two: more and more land - degraded - has become unfit for farming and can even cause disasters such as landslides.

The good news, however, is that proper use of land not only helps to prevent such risks, but also yields some rewards.

The present booklet, entitled *Land Use, Disaster Risks & Rewards – A Community Leader's Guide*, seeks to help community leaders understand how land becomes degraded, what to do about it, and how proper use of land, disaster risk reduction and sustainable development are linked.

Still better, this booklet helps community leaders to help others to opt for correct land use and disaster risk reduction - for better life and sustainable development.

A handwritten signature in black ink, appearing to read 'S. Briceño', is positioned to the left of a vertical black line.

Sálvano Briceño
Director
United Nations Inter-Agency Secretariat of
the International Strategy for Disaster Reduction
(UN/ISDR)

1. SETTING THE SCENE



Landscape - Ethiopia

The “landscape” consists of the land and its processes (soil, topography, vegetation, animal life, water resources, air and weather), as well as the people that live on the land - their social and cultural values, ambitions, indigenous knowledge and practices. The diverse activities or life a landscape can support (the carrying capacity), depend on its intrinsic characteristics as well as the demands made on it

We are all users of our own as well as a greater landscape and there is a delicate, complex and at times changing balance to be realised between competing demands on the landscape (competing land uses). This creates inevitable tensions, depending upon the different purposes and ambitions of the existing or potential users, the health of the environment and the quality as well as the sustainability of land and water resources.

Respect for the landscape as a valued resource, whether we use it directly or indirectly, is an important component of appropriate land use. The principle of respect operates at the small and seemingly insignificant individual scale (such as not littering) to as large and complex a task as preparing land use schemes at national, provincial, municipal and community levels. Land use planning, management and in some instances land conservation or rehabilitation reduce our vulnerability to natural hazards and disaster risks.

A hazard is a potentially damaging event, phenomenon or activity that may cause a disaster, leading to injury, loss of life, damage, social or economic disruption or environmental degradation. Hazards can be natural (e.g. earthquakes, storms and tropical cyclones, volcanic eruptions) or induced by human processes (e.g. land degradation, global warming).

The risk (probability) of a disaster occurring results from the interaction between the probability of a given hazard occurring and the degree of susceptibility of a landscape to the hazard. The susceptibility to disaster comprises the inherent vulnerability of our environment, our society and our economy, and is mitigated by the capacity to cope, withstand and recover from the impacts of a hazard.

The United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR) defines Risk (R) as a function of Hazard (H), Vulnerability (V) and Capacity (C), quantified as:

$$\text{Risk (R)} = \text{Hazard (H)} \times \text{Vulnerability (V)} / \text{Capacity (C)}$$

Land degradation, which is the reduction or loss of the biological or economic productivity of land, is a major hazard. Population pressures and a lack of knowledge or appreciation of the negative impact over time of certain land use practises contribute to land degradation. Man's impact on the landscape can be a hazard. It can also contribute to an increase in vulnerability to, and or the frequency and intensity of, natural hazards.

Land degradation is caused by a combination of processes and human activities. These include the pollution of land, air and water resources, poor farming practices and overgrazing, as well as soil erosion and the consequent long term loss of natural vegetation, biodiversity and soil fertility. The degradation of land negatively impacts its quality and usefulness, reducing the quality and quantity of goods and services that can be provided by the environment. Unless the land is rehabilitated and our land use practises change, this loss of goods and services is permanent.

Good land management and land care is important to ensure that we use land effectively and sustainably, with as little ecological damage as possible. The management of land starts at a national level and is detailed at a provincial, municipal or community level. Land use plans outline

Examples of goods and services provided by different environments

Natural Systems	Goods	Services
Wetlands e.g. Okavango Swamps	Water Food (e.g. fish)	Filter and purify water Act as a sponge to store water and reduce flooding
Coastal dunes and mangroves e.g. Nigerian coast	Wood	Protects the coast during storms Nursery for fish
Forests e.g. Ugandan forest	Food (plants and animals) Fuel wood Building materials Medicinal plants	Stabilize soil and prevent erosion Produce oxygen and absorb carbon dioxide for the continent and the planet
Mountains e.g. Lesotho Mountains	Water Useful plants Food (animals)	Act as catchments and storage areas for water

the way in which specific areas of the country may best be used. Legislation at the different levels of government supports the implementation of the plans. It is the responsibility of communities and individuals to ensure that they practice good land use and exercise good land care in compliance with these laws.

Sustainable development aims to meet the demands on the environment without compromising the ability of future generations to meet their own needs (Brundtland Commission, 1987). Sustainable development is based on socio-cultural well-being, good governance, economic growth

and environmental protection which all contribute positively to reducing the risk of a disaster.

Disaster risk reduction is a set of activities undertaken by a community to minimise the risk of a disaster. Disaster risk reduction is done within the broad context of sustainable development, through the development of individual, social and institutional capacities (ISDR, 2002).

The purpose of this booklet is to offer insight and practical applications of land use planning and management and to illustrate how these activities can positively contribute to disaster risk reduction.



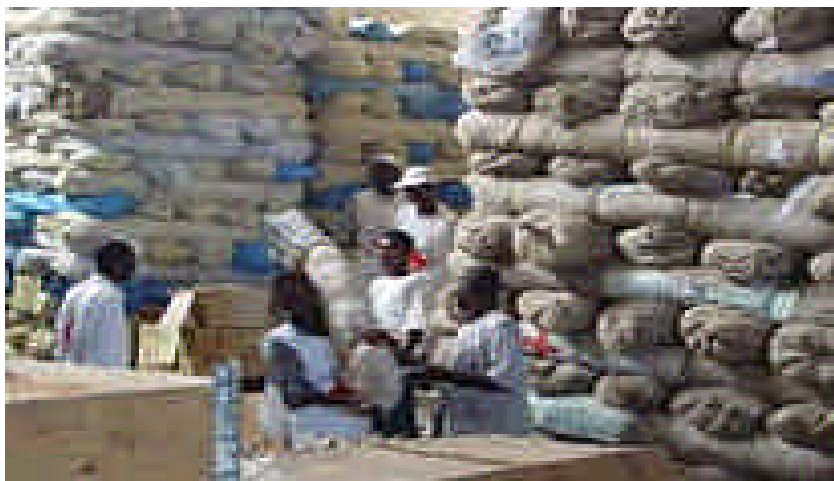
Fighting Desertification - Mauritania

2. DISASTER RISK REDUCTION

Until recently, disaster management has been reactive, focusing on crisis management and the emergency assistance (relief) needed only after a disastrous event has occurred. Disaster risk reduction takes a more proactive, longer-term view. Its purpose is to assist communities to prepare for and reduce the impacts of unavoidable disasters (e.g. earthquakes and volcanoes) and to reduce or prevent man-induced disasters.

Disaster risk reduction involves four phases of activity, these are:

1. Risk Assessment and Analysis
2. Developing an Awareness of Risk
3. Developing Early Warning Systems
4. Disaster Management



Floods preparedness in Mozambique

2.1 ASSESSMENT OF RISK

The assessment of risk generally begins with the identification of potential hazards, such as land degradation, water contamination, poor land use, over crowding etc. Assessing hazards involves well-established procedures that include the collection and analysis of data. In the context

of land degradation, land use data and land cover data are important. Land cover data refers to the present state of the land and carrying capacity in its pristine state (e.g. grassland, desert) and is directly related to the way in which the land can be used or is used (land use). Land use data shows us how the land is being used (e.g. residential, agricultural, mining) and what condition the land is in. Land use planning shows how the landscape could best be used by man.

The complementary evaluation of vulnerabilities and coping capacities poses many challenges and best involves the active participation of the communities at risk. The risk assessment process is an opportunity for a community leader to raise awareness of risks, develop ideas and confront preconceptions within his or her community

The risk-assessment process depends upon an evaluation of acceptable levels of risk. What is considered an acceptable risk may be different for different people and for different communities. This is "risk perception". In many cases of slow-onset land degradation, such as desertification and bush encroachment, the local communities may not be aware of the risk or may even deny its existence completely. Participatory Rural Appraisal is a useful method of disaster risk assessment as the community is actively engaged in debate about the final evaluation of risk.

Community Theatre

The stage is a platform from which to educate people of all backgrounds on the concepts of disaster risk, land use planning and sustainable development. **Theatre For Africa (TFA)** TFA uses theatre to create a two-way communication between policy makers and rural communities. Satellite theatre companies are set up in rural communities, facilitating skills development and job creation, while creating a viable platform for discussion. TFA aims to combine the vitality of the theatre with the issues of people and the environment. It strives to create a channel between rural peoples, those in governments and international decision makers.

Kat River Valley Project. The KAT project, runs through Rhodes University in South Africa, successfully communicates, through drama, the concept of sustainable water supply. The project is part of an integrated catchment management scheme and involves residents, national and local government in the management of the human impacts on land and water resources. The project focuses on empowering rural communities to develop the sustained provision of water as a community resource.

Participatory Rural Appraisal (PRA)

The method of PRA facilitates the documentation of local knowledge and interpretation of risk, synthesizing this understanding with 'outside' approaches and perceptions. Communities usually respond positively to the PRA techniques because the level of communication and interaction is done at the community level. Where possible, the PRA facilitators speak the local language and diagrams are initially done using readily available resources. Outsiders familiar with the PRA techniques become facilitators and then co-workers with the community as it becomes apparent that the community has significant knowledge and coping capacities. These are often simply expressed in a local idiom and may not initially be recognised as such.

There are five key principles that form the basis of any PRA activity:

Participation: Success of the PRA techniques depends on the participation of the local people in sharing information and responsibilities.

Flexibility: The current circumstances are always assessed and techniques are adapted to best suite a particular community.

Teamwork: It is best to have a mix of sector specialists and a large representation of women.

Optimal Ignorance: To be efficient, PRA work intends to collect just enough information to make the necessary recommendations and decisions.

Systematic: The data is accurate and carefully organised.

2.2 EDUCATION AND AWARENESS

If the local community is actively involved in the risk assessment process, it is an opportunity to raise their awareness about potential hazards. Some of these hazards may be familiar, others not. It can require a change in attitude within a community before a hazard is recognized or accepted. When this happens, it is possible to bring about a change in land use practice that contributes towards disaster risk reduction.

Awareness at community level is necessary to achieve consensus and to obtain commitment from local authorities to introduce disaster risk reduction policies. These could have controversial consequences, such as the re-allocation of funds from visible development projects to projects that will limit or eliminate the impact of medium- to longer-term threats.

It is a challenge to persuade people to invest time and money to prevent something happening that most do not believe will ever happen. The achievement of such objectives will require a public education process to increase awareness about the causes and consequences of hazards.

2.3 EARLY WARNING SYSTEMS

The purpose of obtaining early warnings of impending disasters is to enable the communities at risk to act timeously and appropriately to reduce the possibility of injury, loss of life, damage to property and environmental degradation. To do so, they need to be sufficiently impressed by the information they receive. Early warning is a critical component of disaster risk reduction. There are three key steps in developing an early warning system at community level, which depend upon the adequate monitoring of land use and on specific indicators of 'landscape health' being in place. People who are living in areas particularly prone to disaster (floods, drought, famine) need be especially alert to early warning signals. Land use planning would identify such communities.

The three key steps are:

Forecast and Prediction – Monitoring key indicators to determine whether the environment is warning us of an impending disaster.

Using and Announcing the Warning – Community leaders notify their people, their neighbouring communities and if necessary regional government of the possible consequences of the identified risk. In the case of a slow onset event, appropriate changes in community practices need to be considered and implemented (prevention opportunity).

Reaction - Community leaders and their people, having been forewarned and understanding the situation they face, can implement the necessary prevention or protective measures.

The 1998 Potsdam Early Warning Conference recognised that “early warning is effective only to the extent that policy makers at national levels of authority have the will and make a sustained commitment of resources that will establish protective measures”. The decision, both to issue an early warning or not, and to act upon it, is political in character and those with the necessary authority to make such decisions carry the political responsibility for the consequences of those decisions.

DISASTER: Kenya Budalangi Biannual Floods

The flash floods at Budalangi strike mostly at night or dawn in the time of the year when the men are away from home fishing the inland waters of Lake Victoria. Women and children are most affected and they have to take responsibility of the family possessions. Livestock, food supplies and personal belongings are lost in the floods while women have to make temporary shelters on high ground to protect their children. During the floods the people suffer diseases such as diarrhoea, malaria and pneumonia as well as STDs as people are forced to live in close confinement. The problems encountered during these floods show that it is extremely important that a community and especially the women be trained in early warning and disaster management at grassroots level, so that the community will have strength and skills to manage the floods.



Flooded plain in Budalangi, Western Province, Kenya

2.4 DISASTER MANAGEMENT - MITIGATION, PREPARATION, RESPONSE AND RECOVERY

There are four aspects of disaster management:

- Mitigation
- Preparedness

- Response
- Recovery

Disaster mitigation includes structure and non structure measures undertaken to limit the impact of potential disasters - for example, public awareness and flood forecasting are considered as non structural measures, while dikes and barrage construction is structural measure for mitigating flood impact.

Disaster preparedness helps communities reduce the likelihood or severity of impact of certain disasters, particularly slow onset disasters, many of which arise from land degradation (e.g. desertification, soil erosion, loss of soil fertility and soil salinisation (buildup of salt), as well as the consequent food scarcity and famine). Preparedness deals proactively with identified risks and results in increased community resilience and the capacity to overcome the impacts of a disaster.

In the grip of a disaster, many of the stricken community will be in a state of shock, too weak or too hungry to think beyond their immediate needs. A community that has discussed and thought through the problem in advance will know what it needs and how to respond. It will also know when it should call upon outside assistance and how to effectively manage this assistance. In slow onset disasters, like land degradation, the timing of assistance is often critical. Without this preparedness and the associated resilience, disaster relief can entrench dependence on international relief agencies.

With strong leadership, proactive and integrated land use plans and disaster risk reduction activities in place, communities can initiate important medium and long-term developments in their areas. They can also manage the aid that follows a disaster during the recovery phase.

Remember:

“In every crisis, there is an opportunity.”

3. LAND DEGRADATION

Many factors, biophysical (environmental), socio-economic and political in nature, contribute to land degradation. Climatic variability and change, inappropriate land use or land tenure policies magnify the impacts of land degradation. The current situation is that approximately 22% of Africa is classified as degraded. The effects of land degradation on food security make it a priority issue for African leaders. With improved farming practices, rates of land degradation can be reduced and soil fertility and land productivity restored.

Biophysical Processes – Climate (rainfall and temperature), vegetation cover, soil stability and land uses including deforestation and tillage methods.

Socio-Economic Causes – Economic structure (labor costs, market prices, institutional support and technology), overpopulation, poverty and human health.

Political Causes – Decision-making, land tenure, political stability and gender issues.

3.1 *EROSION*

Topsoil and its nutrients are a non-renewable resource that is fast disappearing due to water and wind erosion. Soil cannot be replaced at the same rate. It takes from 200 to 1000 years to form just 2.5cm of topsoil. The load of sediment carried by rivers is also silting up water storage areas and filling in estuaries and water channels.

Soil Loss on the East Coast of Africa

Under present environmental conditions, about one million cubic meters of topsoil reaches the shoreline of the African East coast each year. This irreplaceable topsoil is eroded into rivers and carried as sediment to the ocean, where it clogs water ways and is then lost to the ocean. Flemming and Hay (1983)

Land degradation leads to erosion, which further degrades the land. A number of factors increase the natural vulnerability of a landscape to erosion, namely climate (rainfall), slope, vegetation and soil type. The amount of rainfall and its intensity affect the vulnerability of an area to erosion. A low annual rainfall that occurs in torrential downpours may result in severe erosion, as recorded in many arid and semi-arid areas.

The steeper a slope the greater the erosion risk, as more water is likely to run off a steep slope and at greater speed, increasing the erosive power. Longer slopes are also more vulnerable as they gather more water runoff. Water runoff down slopes can be slowed by the creation of terraces or swales. Plant cover also slows water runoff and roots stabilize the soil, reducing erosion vulnerability.

Soil texture and constitution affects its stability and hence its erodibility. Soils with low organic matter and low infiltration capacities are most vulnerable to erosion.

The Consequences of Poor Soil Management Strategies

Soil, an invaluable resource to farmers, is fast disappearing and losing its yield potential due to poor farming methods. The following are some consequences of poor soil management strategies:

- *Mechanical tilling* – Erosion, physical degradation, soil compaction and crusting.
- *No fallows or biofertilizers (cover crops, compost, manure)* - Soil nutrients depleted leading to poor crop yield.
- *Overuse of chemical fertilizers* – Loss of soil quality and beneficial soil organisms.
- *Pesticides* – Kills useful soil organisms and other non-target animals in environment.
- *Irrigation in dry areas* - Evaporation and consequent salinisation of soil as the evaporated water leaves behind a crust of once-dissolved salts.

3.2 THE CAUSES OF LAND DEGRADATION

3.2.1 Poor Farming Practices

Agriculture provides the food we eat. In developing countries, small-scale cultivation is the major form of agriculture. A variety of crops are grown and the produce used for subsistence, with additional yield sold for cash income. This is in contrast to the large-scale agriculture practiced in many developed countries, such as North America, where expansive areas are under one type of crop (monoculture) for the large-scale production of cash crops. Significantly increasing the productivity of the land by using appropriate farming techniques (rainfall harvesting, timeous planting, crop diversification) can sustainably increase the carrying capacity of land and reduce the risk of degradation.



Farming irrigation

Crop production can be a major cause of land degradation if sound soil management strategies and farming practices are not in place. Poor farming practices include the excessive and irresponsible use of pesticides and chemical fertilizers, down slope ploughing, selection of inappropriate crops (e.g. those not adapted to local conditions), poor water management, irrigation and tillage techniques and lack of soil care.

Because of pressures to increase agricultural production, marginal land is being brought under cultivation or grazing, fertilizers and pesticides are being used and fallow periods are being reduced. These activities, though designed to increase productivity, result in the exhaustion of the production capacity of the land. This manifests in declining yields, devegetation, soil degradation and loss, and in extreme cases, desertification.

The use of marginal land for agriculture can lead to overstocking, low yields and soil erosion. In certain areas, farmers are forced to farm on steep slopes (> 5%). Ploughing slopes with a gradient of more than 5% causes erosion and increases the risk of floods and landslides. The excessive or inappropriate use of chemical fertilizers to artificially increase soil fertility reduces soil quality, pollutes water resources and releases greenhouse gases into the atmosphere, contributing to global warming. The shortening of fallow periods reduces soil fertility, as there is not enough time for nutrients to return to the soil.



Land preparation for agriculture

The Chagga Farmers in Tanzania

The Chagga people have lived as farmers on Mount Kilimanjaro for many years. During the colonial years, they were forced to live on small pieces of land, which limited their farming area and forced changes in their farming practices. In the early 1970's, the Chagga farmers suffered economic decline due to a disease that attacked their coffee trees. Pesticides proved to do more harm than good, causing a loss of biodiversity without effectively fighting the disease. Agricultural yield and economic capital declined and people resorted to felling trees, causing extensive deforestation and land degradation. An increasing population put pressures on the land and people began living on vulnerable land such as river banks, causing erosion. This negative spiral caused extensive land degradation and negatively affected the economy and the well-being of the Chagga people. Over the past ten years efforts have been made to try and break this negative spiral, with two main areas of focus: tree planting and environmental education for the youth. A club called the Malihai club was set up, which focuses on tree planting and on environmental education programmes.

Other initiatives include: encouraging local people to limit pesticide use, terracing crops on steep slopes to eliminate soil erosion, crop mulching and grass planting to preserve moisture, reducing water wastage by improved irrigation practices, introducing zero-grazing, reducing the wide use of fire in agriculture, and controlling wasteful use of fuel wood by using alternative sources of energy and modern cooking stoves.

SUCCESS: Better Banana Project

Bananas are grown in tropical areas of high biodiversity. In these areas, banana farming is the backbone of the economy, providing jobs for rural residents. In 1991, the Rainforest Alliance and its partner groups established the Better Banana Project (BBP) to reduce the negative environmental impacts of banana cultivation and improve working conditions on farms. They have helped change the way bananas are farmed – improving water and soil quality, reducing the use of agrochemicals, stopping rainforest destruction, promoting reforestation, reducing waste, and improving conditions for farm workers and their families. These changes have been achieved by the implementation of strict environmental and social standards on those farms wishing to be awarded BBP certification. Certified farms are awarded the “Better Bananas” seal of approval and are allowed to advertise their achievement, giving consumers an opportunity to help workers and wildlife. The project proves that a major agricultural industry can be directed toward sustainability and can realise the aims of good land use management.

3.2.2 Overgrazing and devegetation

Livestock farming is as important as crop production and even more so in dry regions where unpredictable rainfall and erodible soils make cultivation a precarious occupation (e.g. in Ethiopia, Sudan and Northern Kenya).

As more and more people compete for the same space, less area is available for grazing and pastoralists are unable to rest (fallow) pastures for long enough to revegetate the land. This leads to poor quality grazing and devegetation.

Vegetation cover plays an enormous role in protecting the underlying soils as plant roots keep the soil in place, reducing the risk of erosion. These plants also soften the impact of rain and because the soil crust does not become hard, water is able to sink into the soil. This prevents water run off and consequent erosion and flash floods.

Grazing by livestock can have a large impact on the land by removing or thinning vegetation cover. Overstocking and overgrazing leads to devegetation and erosion, particularly in dry areas. This is a major cause of desertification and eventually leads to food scarcity and famine.

Once the soil has been degraded through devegetation, it is no longer suitable for plant growth and it is difficult to reintroduce plants. Thus, it is best to prevent devegetation before the problem reaches levels where mass erosion gullies and flash floods can occur. The solution or risk reduction lies in decreasing the grazing pressure and increasing the ground cover.

International Tropical Timber Organization (ITTO)

"ITTO is an intergovernmental organization promoting the conservation and sustainable management, use and trade of tropical forest resources" It formulates and implements a wide variety of projects using mostly local expertise. ITTO also develops internationally agreed policy documents to promote sustainable forest management and forest conservation, and assists developing tropical countries to adapt such policies to local circumstances and to implement them in the field through projects. *ITTO in the Republic of Congo*In the Congo, the ITTO addressed the problem of poaching by establishing local 'eco-guards' and developing community-scale farming techniques for the production of alternative sources of protein.



A vegetable/fruit farmer in souther Lesotho stands next to a gully that has eaten away part of her property

SUCCESS: Sand Encroachment Control and Agropastoral Development in Mauritania

In Mauritania, intense wind erosion threatens productive land and infrastructure and causes severe levels of land degradation. Rural poverty encourages migration to urban centres. In an attempt to alleviate these problems, a project was established which focused on sand encroachment control and the empowerment of communities to initiate and manage land protection and economic activities. Moving sands were controlled by fixing existing sand dunes and establishing physical and biological barriers. This led to a regeneration of pasture and trees in protected areas. Dairy produce increased due to the improved pastures and people benefited from the increased nutrition. People returned to deserted villages and women gained an improved status through their involvement in project activities. Neighbouring communities are now implementing similar plans.

3.2.3 Deforestation

Deforestation is primary example of loss of habitat and biodiversity in Africa. Forests are highly productive ecosystems that support rich and diverse plant and animal communities. They provide vital resources such as wood, food, building materials, fuel and medicinal plants, and sustain many cultural, spiritual and religious values. They prevent soil erosion and floods by slowing and regulating water runoff and on a larger scale, regulate our climate.

Deforestation therefore means a loss of vital resources and a disruption of the socio-economic activities they support, leading to a negative feedback cycle of land degradation and poverty.

SUCCESS: The Rehabilitation of Mine Dumps Using Vetiver Grass

There is substantial evidence that Vetiver grass offers a simple, inexpensive solution to the stabilization of mine dumps and has a role to play in the reclamation of wastelands with extreme soil conditions.

The grass is tough and has a vast root system that reaches depths of 2-3m, making it both drought-tolerant and very difficult to dislodge. The grass tolerates a wide range of adverse soil conditions including :

1. a range of adverse soil pH (3,0-9,5)
2. high aluminium levels
3. high levels of manganese in a tropical soil and
4. high salinity.

Vetiver grass is planted into hedges that slow water runoff and reduce erosion. The grass creates an ideal micro-habitat for the establishment of indigenous plant species. It has been successfully established in gold mines in South Africa and a Vetiver network has been set up in Ghana by the World Bank, to send the grass all over Africa.



Deforestation in Madagascar

3.2.4 Pollution

Pollution is a major cause of land degradation in today's society, as we dump our ever-increasing volume of wastes into the environment. Wastes arise from a range of human activities: Mining, industrial and manufacturing activities, agriculture and domestic, animal and human life.

SUCCESS: Industrial Pollution: Towards an International Law Framework

During the World Summit on Sustainable Development in August 2002, twelve toxic chemical products called POP (Persistent Organic Pollutants) were listed as prohibited. At the same time, the European Commission launched the "White Book Project" in which, for the first time, the safety of industrial chemicals will have to be proved before they become marketable. This is a positive step towards enforcing the "polluter pays" principle, as governments will no longer bear the duty and cost to check whether substances are hazardous after they have been marketed.

Mining

Mining is a necessary economic activity and can have advantages for the local community. Poor planning and implementation can result in large-scale destruction to the landscape, removing topsoil and damaging the underlying structure of the land. Chemicals used in the mining process pollute watercourses and the soil. Drainage from mines, slime dams and slag (mine) dumps are generally acidic. This is known as acid mine drainage and is a significant threat to the environment. Mine dumps and associated waste sites are hazardous as they also contain toxic wastes and can be vulnerable to slides or collapse if improperly constructed. Mine dumps are difficult to revegetate, but there has been recent success using Vetiver grass.

Industry

The burning of fossil fuels, smelting and industrial processing techniques release toxins such as lead, nickel and boron. These toxins are often emptied directly into watercourses or are released into the atmosphere and eventually deposited back on to land. The toxins may change the environment sufficiently to reduce biodiversity.

Agriculture

Chemical fertilizer and pesticides run off into watercourses and leach through the soil into groundwater sources. The fertilizer causes eutrophication or increases in nutrient levels; plants grow prolifically clogging water systems, and bacteria, fungi or algae grow causing the deoxygenation of the water and killing fish, frogs and other aquatic animal life. The accumulation of nitrates (from nitrogen fertilizer) in water sources can reach toxic levels. Certain pesticides are not degradable and persist in the water or soil for many decades. They kill non-target organisms and build up in food chains. They can be difficult to remove from the environment and can be a major cause of environmental degradation, as well as impacting on human health.

Urban and domestic waste

Sewage is a source of nutrients, but when left unmanaged can cause algal blooms and massive plant growth (eutrophication) in watercourses, leading to a decline in animal life. Untreated sewage is also a major cause of disease (such as hepatitis B and cholera) and sewage waste therefore needs to be properly managed through adequate sanitation.

In many countries, particularly in Asia, the nutrients in sewage sludge are recycled by using treated sewage (night soil) to fertilize crops and fields. In other countries, sewage waste is mixed with heavy metal-containing industrial waste and cannot be used for agricultural purposes.

SUCCESS: Urban Upgrade in Senegal

In the small Senegalese town of Rusfique, a lack of sanitation posed a health risk. Much of the residential land was below sea level and the groundwater sources and drinking water were polluted by sewerage from pit latrines. Through community participation aided by international funding and the Rusifique Local Authority, nine communities are on the way to solving the problem, using horse-drawn carts to collect solid waste and low-cost pipes to dispose of waste water and sewerage. Sewerage, wastewater and solid waste end up in a purification and recycling centre where it is treated to form compost for use in local market gardens.

The local community actively participates in this scheme and women play a prominent role. The safe disposal of solids, the elimination of excrement as a source of disease and a reduction of flies and mosquitoes have improved the urban environment and reduced health risks to the community.

3.2.5 Alien Vegetation

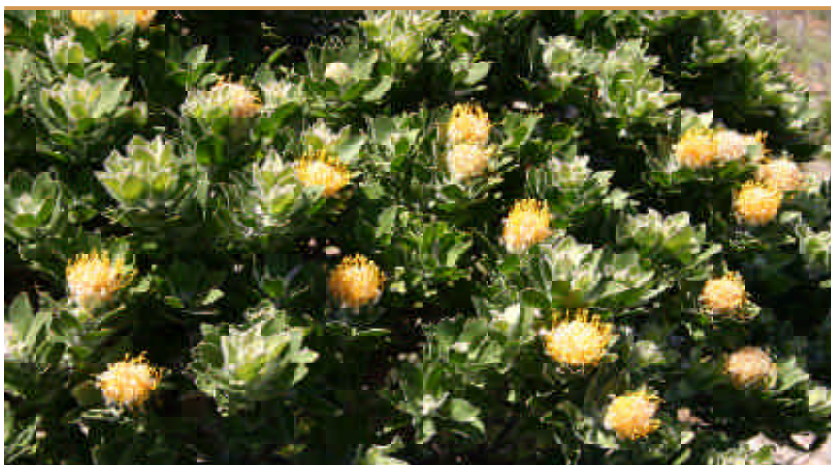
Alien vegetation constitutes plant species that are exotic to a particular location. The alien species have few or no natural predators in the environment to keep them in check and they spread rapidly through the environment. They crowd out the local, indigenous vegetation and eventually lead to a loss of biodiversity.

Alien trees can reduce the available ground water through excessive absorption of groundwater, which results in loss of productive land and livestock. Instead of building dams in new catchment areas, we should remove alien plants to increase water runoff to existing dams.

Thick stands of alien vegetation are a major fire hazard. In addition, following fires they leave large areas of land devegetated and prone to erosion and flooding. Some alien trees directly increase erosion by suppressing the growth of low-lying plants.

Dense mats of aquatic alien plants, such as water hyacinth (*Eichornia cassipes*), can also have serious impacts on the people living near infested water bodies, such as:

- reduced quality of drinking water;
- increased siltation and flood damage;
- promotion of waterborne, water-based and water-related diseases such as malaria, bilharzia and encephalitis;
- reduced areas for fishing and water transport; and
- clogging of irrigation channels and pumps.



SUCCESS: Working for Water (WfW)

In the national parks of South Africa, the single biggest threat to biodiversity comes from invading alien organisms. *Working for Water (WfW)* is a South African programme, which simultaneously tackles the problems of invading alien plants and unemployment. The WfW programme, together with South African National Parks, works to control invading alien plants, while at the same time stimulating a process of job creation and social transformation in the communities close to the parks. It is a national government programme to:

- enhance water security, improve ecological integrity, restore the agricultural potential of land and promote sustainable use of the natural resources and
- invest in the poor sectors of South African society.

3.2.6 Land Tenure

The issue of land tenure or land rights is a complex and sensitive social and political issue, closely linked with poverty and land degradation issues. Some newly independent governments perceived traditional land tenure and land access systems to be insecure and poorly suited to development. Thus, land became property of the state in some countries, and in others it was distributed according to wealth, gender and race, resulting in conflicts between traditional and contemporary tenure.

Land Tenure in South Africa

From 1913 to 1937, the apartheid government passed the Native Land Acts, forcing the removal of black people from their land to designated "homelands", which covered only 13% of the country.

Overcrowding in these homelands made even subsistence farming untenable and led to large-scale land degradation. After the first democratic elections, the ANC government took on the task of rebuilding a nation torn apart by decades of apartheid rule. The first priority was to focus on poverty alleviation within the country by aiding development in rural areas. This is being carried out through the Reconstruction and Development Programme (RDP).

A major priority of the RDP is land reform, which has three components: the restitution of land to individuals or groups who were historically dispossessed, increasing access to land and housing (redistribution) and ensuring tenure security (DLA 1997). Land reform in South Africa is currently being implemented on a significant scale and the authorities have recognized traditional community land claims, going as far back as 1913.

The security of land ownership (tenure) is necessary before land users will invest in resource conservation. This is because long-term investments are needed to combat land degradation. Interestingly, secure land tenure may not imply rigid land ownership. In many parts of Africa, communal areas with negotiated land access rights are the most suitable form of land tenure as they allow flexibility and mobility in response to unpredictable environmental conditions.

Women and Land Tenure

Both traditional and modern laws tend to favour patriarchal ownership of land in Africa and women are only granted access to land through fathers or husbands. If they become widowed, they may be forced to leave the land. Land reform in many African countries is helping to shift the balance of ownership and access towards equity in recognition and the rights of vulnerable groups, including women and minority, ethnic or nomadic groups.

Decisions around land tenure have far reaching consequences when they do not take appropriate land use into account, as poor land use planning leads to land degradation and poverty. The land tenure decisions of the apartheid government in South Africa, for example, led to overcrowded “homeland” areas with too little land for traditional land use practices. The homelands were consequently areas of major land degradation, particularly in the form of mass erosion. Long erosion gullies, some too deep to walk across, scar the old homelands.

SUCCESS: Avoiding Land-Use Conflict in South Africa

The post-apartheid government has had to negotiate with communities who were forcibly removed to make way for the establishment of protected areas.

The most celebrated case involves the Makuleke community's claim to the northern part of the Kruger National Park.

The national park authority has recognized the legitimacy of the claim and accepted a co-management arrangement by which benefits will flow to the community. In return, the community has accepted that the land remain within the overall area protected as wild land. The protected area status remains but the participation in management costs and benefits are both local and national. Communities do not just benefit from activities outside the park but from those inside as well.

3.2.7 Competing Needs for Land (overpopulation)

“High population density is not necessarily related to land degradation; it is what a population does to the land that determines the extent of degradation.”

(Eswaran et al. 2001)

Africa has the fastest growing population in the world because the fertility rate is high and improved health care has led to a decline in the death rate. According to UN estimates, at least 45% of the population in most African countries is under the age of 15, in contrast to 21% in the United States. Due to this youthful age structure, the rate of population growth will continue to increase for some decades to come, but skills and earning capacity are low. There is no doubt that if the population in Africa continues to increase at its present rate, Africans will be faced with falling living standards and an increasing scarcity of natural resources such as arable land, forests and water.

Food for All

All creatures must eat to live. Humans have developed unique and skilful methods of obtaining food through agriculture and domestication of animals. Today, however, many individuals and many human societies suffer from lack of food. On any given day perhaps 1000 million people eat less than they need. In any given year several million people die from hunger-related causes, and hundreds of millions experience retarded growth and reduction in their physical and mental abilities because of inadequate nutrition. The world's food production is sufficient to feed the world's population but unfortunately many of the poor are unable to obtain this food.

*(Agriculture, food and nutrition for Africa –
A resource book for teachers of agriculture)*

As the population continues to grow, more and more land resources are being utilized in order to feed and accommodate all the people. The vicious cycle produced by limited land, decreasing soil fertility and a rising population increases farming intensity and the utilization of marginal, unsuitable farmland. It also deems traditional, low land

productivity and farming techniques inappropriate. This ultimately leads to land degradation and poor crop quality and yield, increases food scarcity and escalates the downward spiral into poverty. Poor farming practice exacerbates this problem.

The challenge is to adapt and develop our farming and water husbandry practise to ensure that we increase the productivity of our land without escalating land degradation. It is only through appropriate land-use practice and land care initiatives that the land will provide the resources demanded by an ever-increasing population.

3.2.8 Urbanization

Urban environments are rapidly expanding as people migrate from rural areas to urban areas in search of employment, education and improved health care. Declining agricultural yields, environmental disasters and conflicts have also increased the influx of people to urban areas. In Mozambique, about 4.5 million people were displaced to urban areas because of civil war in the 1980s.

Inappropriate Land for Housing Development:

- Flood plains and below the one in fifty year flood line
- Seasonal wetlands (where the seasonal groundwater table is above ground level)
- Steep slopes that are vulnerable to land slides or mud flows (and become more so due to devegetation).

In many urban areas, the rate of economic growth and infrastructure lags behind urbanization rates, resulting in high levels of unemployment, inadequate standards of housing and services and impacts on human health and the environment. Increased settlement in urban areas has led to the formation of informal settlements on the outskirts of towns. The informal housing causes land degradation through destabilising land (devegetation and erosion) and increased waste load (sewage and solid wastes). The settlements also carry an increased risk of fire disasters.



Hangberg Informal Settlement in Cape Town, South Africa

The fires are often directly related to the use of open flames and paraffin and they spread rapidly because of the density of the houses and the materials that are used to build the informal homes.

In informal urban areas, the poor often make their homes on land that is unsuitable for this purpose. Such inappropriate land use arises from ignorance of the new landscape and a lack of resources, alternatives and hope, all of which feed the negative 'cause and effect' circle of poverty.

Urbanization in Africa

Africa is the most rapidly urbanising region of the world. By 2030 more than half of the sub-Saharan African population will be urban. This is exerting pressure on the infrastructure of towns and cities, leading to a rapid growth in informal settlements within urban areas. Lagos in Nigeria, with its population of 13.4 million is Africa's largest city and the 6th largest in the world. Cairo is Africa's second largest city with 10.6 million people.

3.2.9 Poverty

“When people’s survival is at stake, they are forced to farm marginal soils, to reduce fallow periods, to cut vital forests, to overstock fragile lands and to overfish rivers, lakes and coastal waters.”

Avoca, ‘Poverty and the Environment’ in Earth Summit 2002 – A New Deal

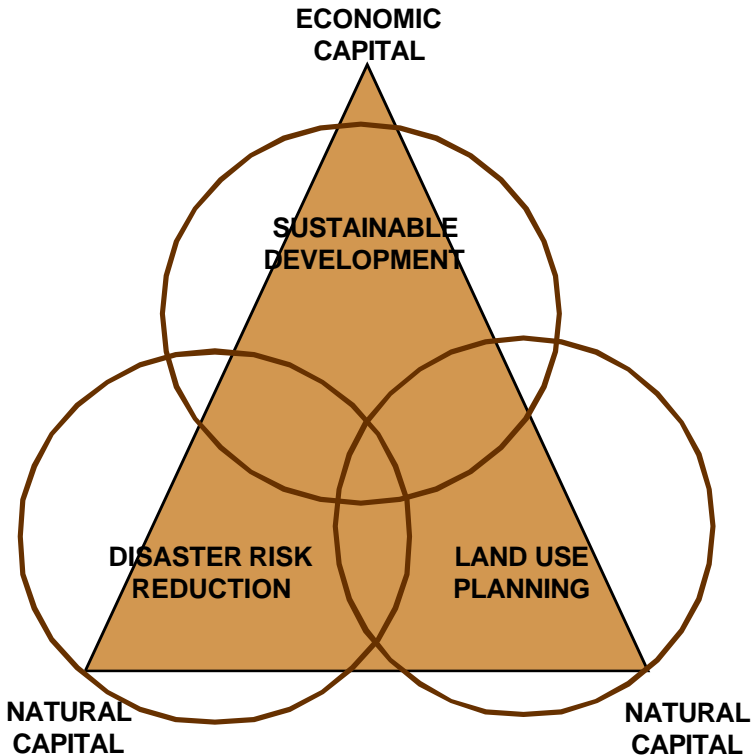
Resource conservation and poverty are often in conflict, as the poor cannot afford to initiate environmental protection measures or cannot afford education and training to change. However, the more the natural resources are stressed, the less the land can sustain our demands. Inappropriate land use is the first step in a negative feedback loop that increases poverty, food scarcity and pressure on rural land, which in turn escalates the rate at which the land degrades. This is known as the “cause and effect amplification”. People’s health suffers and they become increasingly demoralised and hopeless, posing yet another challenge to sustainable development and risk reduction.

It is clear that programmes to protect our environment need to coincide with poverty alleviation programmes if we are to succeed in promoting sustainable land use.



Poverty in urban area - South Africa

4. LAND USE PLANNING AND SUSTAINABLE DEVELOPMENT



Responsible land-use planning and implementation are key factors in mitigating the negative impacts of overpopulation, poor land use and consequent land degradation. Through land-use planning, sustainable development initiatives can be put into place and the risk of disaster significantly reduced. Conflict within a region can inhibit the implementation of land use planning and escalate land degradation.

Somalia

The fall of the Somali government in 1990 led to an increase in the crime rate and a general lack of respect for others and their property. Conflict arose between pastoralists and farmers, and was aggravated by the ready availability of weapons. Farmers were often the victims, as pastoralists raided their crops for fodder. The combined effects of drought and the breakdown of law and order manifested itself in the weakening of people's socio-economic well-being.

In the absence of a central regulating government to develop sound management and production policies, ways of addressing problems at the local level need to be established. Emphasis needs to be placed on community empowerment and education, which will help to institutionalise traditional government systems for conflict transformation.

4.1 LAND USE PLANNING AND MANAGEMENT

Africa has diverse climatic conditions, soils and vegetation from deserts to savannas, grasslands and tropical rain forests. Local climate, topography and soil fertility largely determine the overall potential of the land and the way in which land is used. The local skills and social and cultural values within the area also play a large role.

Planning for land use involves an investigation into geographic factors as well as socio-economic conditions, skills, traditional practice, knowledge, cultural values, role of women, current challenges faced within the community and pressures arising from outside of the community. Current land-use practices are analysed and indigenous skills adapted to avoid an increasing dependence on outside support. Members within the community who have implemented and benefited from an adapted land use method are leaders in this field and can actively support community leaders. The sharing of knowledge and ideas with neighbours will increase the pool of knowledge within a community and more people will enjoy the success of well-managed land.

The practice of land use management proceeds through three stages: strategic planning, administration and control, and follow-up and monitoring. Land use management will confront challenges, particularly

during the first two stages of development. Tensions and vested interests can occur between government and private interests, national and local interests. Dynamic factors, such as population growth, migration, conflicts over land use and the demand for services provide additional challenges to effective land use management.

Change management is very important – breaking belief systems, challenging leaderships and comfort zones.

Importantly, land use policies must be possible to implement within local economic constraints. If the community is given no guidelines, advice or support to reduce the pressures that are driving poor land use and care, they will lose interest in managing the land sustainably. This will escalate land degradation and increase the risk of a slow-onset disaster. Community leaders need to set land use guidelines to rehabilitate degraded land or conserve land that is not yet degraded. Rehabilitation, conservation and sustainable development are key to increasing the economic value of land and ensuring its usefulness in the future.

4.2 SUSTAINABLE DEVELOPMENT

The three pillars of sustainable development are:

1. Socio-cultural equity and quality (Social Capital)
2. Economic growth (Economic and Financial Capital)
3. Environmental protection (Natural Capital)

Sustainable development encourages communities to consider social, economic and environmental issues in planning and decision-making. A community's wealth is measured by its total capital - the sum of its social, economic and natural capitals. For development to be sustainable, the total capital must increase with time. Through training and education, economic capital can be used to increase social and natural capital, and vice versa. Successful land use planning and management therefore builds up and restores social, economic and natural capital. If new skills are acquired, every-day stresses in our lives are reduced and we have more resources, the social capital is further increased. We can afford to invest time in our community. The financial, physical and emotional willingness with which to initiate education, business and social upliftment projects, or simply to use the land more appropriately, increases.

**Examples
of natural capital provided by different land use options**

Natural System	Natural Capital: Services	Land use options	Natural Capital: Goods
Savanna e.g. Kenyan savanna and open woodlands	Stabilizes the soil and prevents soil erosion	Tourism	Biodiversity (plants and animals e.g. "the big five")
		Hunting	Animals
		Livestock farming	Grazing
		Agriculture	Fertile soil
		Harvesting	Wood, Useful plants
		Residential	Land, Shelter
Mountains e.g. Drakensberg Mountains in South Africa	Act as water catchments and water storage areas	Dams	Water
		Harvesting plants and animals	Useful plants (e.g. thatching) and animals
		Forestry	Wood
		Ecotourism opportunities	Beautiful views, Biodiversity.
Forests e.g. Forests of the Uganda	Stabilizes the soil and prevents soil erosion, Produce oxygen and absorb carbon dioxide	Wood harvesting	Wood for fuel, sculpture and building materials
		Hunting	Food
		Plant harvesting	Food and Medicinal plants
		Tourism	Biodiversity, Specialized animals e.g. gorillas
		Slash and burn agriculture	Infertile soil

4.3 APPROPRIATE LAND USE AND LAND CARE

Given the population pressure experienced throughout Africa, it is increasingly important that we increase the productivity of our land without decreasing its carrying capacity. This can be done by adopting appropriate land use and land care practices, initiating rehabilitation programmes and adapting our use in order to conserve land where required.

Land care can be implemented on many levels, from improved farming and pastoral practices, rehabilitation of polluted lands and land invaded by alien vegetation, appropriate use of forests and revegetation. These activities constitute land care and the result is that natural and economic capital increase. Alternative land use practices, such as conservation and tourism, can be considered to provide economic capital in conjunction with land care initiatives.

SUCCESS: Desertification Control Project in São João Baptista Valley, Cape Verde

This area is faced with various physical and socio-economic problems. Severe droughts are interspersed with torrential rains from occasional summer storms. The steep terrain and sparse vegetation cover causes rapid erosive run-off. There is not enough moisture for rain fed cultivation and insufficient flat land for year-round irrigation production. The rapidly growing population is exhausting natural resources such as wood and grazing. Many men are dependent on work outside of the valley, leaving women in charge of the households. Through this project, the valley landscape, which seemed to be at the base of many of these problems, was turned into an asset.

The key to the success of this project was the implementation of an integrated river basin management approach. There was a successful application of flood and erosion control measures from catchment head to valley bottom areas. This increased ground water recharge and improved soil moisture retention. Erosion control was integrated with water conservation measures by reforestation on plateau areas and slopes. A guardian system was created to protect these areas against overgrazing and indiscriminate tree felling. Local communities were encouraged to get involved in the project and goals for socio-economic development were implemented. Local organizations were then established to maintain the project work independently.

Appropriate land use and land care leads to an upward spiral of 'success breeding success' in all areas of our lives. This cycle of positive growth within the constraints of the natural environment is sustainable. If the actions we take result in an increase in the total capital without decreasing either the natural, social or economic capital of our communities we have contributed to sustainable development.



Tree Planting as a Land Care Practice

Communities and individuals in Africa benefit from implementing tree-planting plans as trees increase soil fertility, decrease erosion, increase the availability of fodder and fuel wood, and increase the habitat available for wildlife. Where the trees' roots stabilize the soil, decreasing erosion, there is a decreased risk of desertification as well as floods and landslides, which may be caused by excessive runoff.

Establishing nurseries to grow indigenous seedlings is important in rehabilitating degraded lands. Species can be chosen as to their quality as fodder, their growth rate and their resistance to poor soil conditions and drought. Nurseries also provide a means for empowering women, as they often run the nurseries and care for the seedlings.

4.3.1 Improved farming practices

Improved farming techniques maintain and increase land resources. They include improved tillage methods (e.g. zero tillage, ploughing along contour lines, terracing), rotating crops, inter-cropping, the use of legumes (which biologically fix nitrogen) as biofertilizers, mulching, composting and rainfall harvesting. These farming methods can improve crop production, use less water and reduce pressure to use more land or marginal land for food or cash crop production.



Intercropping maize and beans

Today, improved farming techniques are starting to be used in parts of sub-saharan Africa. Better water management practices that control salinisation and lower the amount of irrigation water needed are also becoming more widely used.

4.1.2 Improved urban settlement planning

Land use planning and the initiation of land care activities are essential to reducing land degradation and its associated hazards in dense urban settlements. Appropriate land use practices and land care initiatives increase social, economic and natural capital, leading to sustainable development and breaking the poverty cycle.

Soil Management Practices in semi-arid eastern Kenya

Strip cropping - Cultivation of crops in strips following the contours of the land to minimize erosion.

Intercropping - The cultivation of two or more different crops at the same time on the same piece of land.

Agroforestry - A land-use system in which trees are planted with agricultural crops or on animal pastures.

Crop rotation - A pattern of alternating the crops grown in a specific field from year to year in order to control pests and to maintain soil fertility.

Mulching - The spreading of organic materials such as hay, leaves, bark chips and compost on the soil surface to reduce evaporation, control weeds, enrich the soil and moderate soil temperatures.

Terracing - The shaping of sloping land to create a series of broad, nearly level 'steps' with short vertical drops from one to another. This technique helps to conserve water and reduce soil erosion.

Zero Tillage - Planting without ploughing to conserve moisture conservation and weed pressure.

SUCCESS: Mr. Serigne Samb's farm, Senegal

Mr. Samb's farm is located in Thiambène, an area in Senegal with low, irregular rainfall and sandy soils subject to wind erosion. His land also suffers from other problems such as:

- Insufficient tree cover due to increased tree felling and grazing pressure
- Soil degradation with a resulting decline in crops and fodder yields
- The gradual breakdown of traditional agricultural land-use patterns
- Monoculture resulting in reduced protection for the land and increased wind erosion.

Through Mr. Samb's hard work, many of these problems were reduced. He fenced a 10 hectare field specifically as a fodder reserve for the drought years and returned to traditional land management techniques, using Euphorbia live-fencing to protect the plots. This protection allowed the natural regeneration of trees. Returning to the traditional system of land management enabled the productivity of the plot to increase. Mr. Samb now helps other farmers in the region with advice on soil conservation and environmental protection. (He farmed livestock and the fodder he used was natural vegetation. His success came when he allowed fields to lie fallow for long periods in order for the vegetation to recover fully.)



Rural Women and Food Production

Women are the main producers of crops. They sow seed, weed, apply fertilizer and pesticides, harvest and thresh the crops. In the livestock sector, women feed and milk the larger animals, while raising poultry and small animals such as sheep, goats, rabbits and guinea pigs. Once the harvest is in, rural women provide most of the labour for post-harvest activities, taking responsibility for storage, handling, stocking, processing and marketing. Yet, despite their contribution to food security, women farmers are often underestimated and overlooked in development strategies and are not granted independent access to land.

[FAO. Gender and agriculture.]

4.3.3 Conservation and Tourism

Tourism makes use of and maintains the natural capital by conserving the land and maintaining the integrity of natural ecosystems. Conservation and tourism are usually only successful in areas where there is also political stability.

Tourism provides economic growth by directly increasing financial capital and improving economic capital (roads and infrastructure). It can also increase socio-cultural equity and quality (increase social capital) by providing work for both men and women and integrating or adapting cultural practices to the market.

SUCCESS: World Wildlife Fund in Namibia

The *Community Game Guards* project, initiated by WWF-South Africa, is an innovative approach to wildlife conservation based on the idea that indigenous people make the best conservationists in their area. This project and other community-based projects have been so successful that many species of wildlife have returned to areas of Namibia where they had disappeared due to hunting and illegal poaching. Due to the success of the *Community Game Guards* project, two other conservation projects have developed, namely, the NGO initiative *Integrated Rural Development and Nature Conservation (IRDNC)* and *Living in a Finite Environment*.

SUCCESS: Abalimi Bezekhaya: “Planters of the Home”

Abalimi Bezekhaya was founded in 1982 to promote and facilitate urban food gardens in the Cape Flats, a dense informal settlement in Cape Town, South Africa. They assist individuals, groups and community based organisations to initiate and maintain permanent organic growing and nature conservation projects as the basis for sustainable lifestyles, self-help job creation, poverty alleviation and environmental renewal.

They supply low-cost gardening resources and offer advice to local residents. In addition, Abalimi Bezekhaya-supported gardeners have organised regular market days to sell their organic produce. Recently, with support from WWF, they have established the Green Schools project and community managed parks. In each participating school, a major portion of the school grounds has been converted to a green area with vegetable gardens and indigenous, water-wise plants. The first community-managed park, Manyanani Peace Park in Khayelitsha, was established in 1994. This park remains the leading model for community-based park development.

Abalimi Bezekhaya has helped to improve informal settlements while boosting the economic incomes and morale of those who partake in their activities.

4.4 LAND USE PLANNING AS AN OPPORTUNITY FOR DISASTER RISK REDUCTION

Disasters result in a loss of social, economic and natural capital. It is not only the high impact disasters that reduce a communities resources and capacity to thrive. Repeated exposure to small to medium scale disasters that often do not attract attention will lead slowly and insidiously to the same downward spiral of material and emotional poverty.

Disaster risk reduction aims to break this cycle. Every step in the disaster risk reduction framework is also an opportunity for sustainable development. Risk management and land use planning, management and implementation initiatives do not compete with other developmental objectives. Rather, they are an integral part of sustainable development. While it is not possible to prevent natural hazards altogether, we can decrease the frequency and the scale of disasters by adopting environmentally sound and sustainable land use practices.

Landslides in Algeria

On 10th of November 2001, there was a devastating flood and a subsequent landslide in Algeria, causing 721 deaths and damage to almost two thousand houses, 56 schools and scores of bridges, roads and public works. The mudflows reached a thickness of up to 10m in the streets of Bab El Oued and more than 350 vehicles were buried under the mud. The estimated preliminary cost of this disaster was two hundred and fifty million dollars. The landslide resulted from poor land use practices, which caused rocks and soil to slide rapidly downhill following a flash flood. Deforestation and the construction of inappropriate housing led to soil instability in the area. Poor quality houses were built on and below steep slopes, on cliffs and at river mouths. The risk of flash flooding was increased by urbanization that increased water runoff due to a reduction in open spaces and an increase in the concrete surface area. Poor planning of engineering works that diverted river flow and weak city storm water drainage systems exacerbated the problem. This disaster could have been mitigated if proper land use practices and infrastructure standards were adopted.

To successfully implement disaster risk management, we need to take into consideration the relationships between population growth, the physical demands of human settlement, short and longer-term economic trade-offs and the most appropriate use of available land. With informed, well thought out planning, the potential risk of disasters can be significantly decreased. On the other hand, if a government and communities fail to implement effective land use and planning practices some sort of disaster is almost inevitable.

The post-disaster reconstruction period is an opportune time to introduce disaster reduction measures and to initiate change. This can be done by introducing environmental protection measures, improved land use planning and if needs be changing the land use. However, no opportunity should be lost to reduce or mitigate risks long before disaster strikes, even though it may be more challenging to persuade people of the need to do so.

A community that understands its symbiotic relationship with the environment understands how to transform the goods and services that it offers into sustainable economic activity. This makes it a resilient community that is alert to the early warning signs of the onset of disaster and is responsive to the need to change in order to avert an escalation of risk. Responding to early warning signs is critical to developing communal coping capacities that will reduce the threat of natural disasters.

Coping Capacity is:

1. the ability to cope with and recover from shocks and stresses
2. economic effectiveness or the use of minimal inputs to generate a given amount of outputs
3. ecological integrity, ensuring that livelihood activities do not irreversibly degrade natural resources within a given ecosystem
4. social equity, which suggests that promotion of livelihood opportunities for one group should not foreclose opportunities of other groups, either now or in the future

[UNEP, 2002]

5. SUMMARY AND RECOMMENDATIONS

Every human interacts with the environment and thus is a land user. It is imperative that we develop a culture of responsible land use.

There are challenges to ensuring that land use planning is successfully carried through to implementation and is fully integrated into other risk reduction activities. The most important element is that of reaching a common understanding within a community with regards the purpose of land planning and management, the usefulness of the proposed or recommended land use, land use practises and or the rehabilitation of land. Insight and appreciation into the risks of not doing so is necessary for reaching common understanding and purpose.

The purpose of this booklet is to support and encourage community leaders to initiate appropriate land use and integrate disaster risk reduction into land use activities. The results of good land use practice mean increased productivity and, in time, improved living conditions. Once begun, the process becomes self-supporting and will positively contribute to disaster risk reduction and sustainable development, with positive medium to long-term outcomes.

Success depends upon community leaders who are prepared to:

- adapt or change their current land management schemes as required;
- promote the necessary awareness raising and education;
- facilitate the best application and adaptation of local knowledge;
- utilise the available resources, technology and scientific knowledge available from support structures;
- support and encourage rehabilitation of land and diversification of income if it is needed;
- mainstream disaster risk reduction into land use planning and appropriate implementation and development activities at community and individual level.

It is important to have partnerships between government (at various levels), the private sector, the research community, non-governmental organisations, community organisations, development partners and various UN agencies to achieve disaster risk management and effective land use planning, regulation, management and rehabilitation. This is necessary for a number of reasons:

- It is a multi-disciplinary and sectoral challenge;
- It is necessary to focus on the links between poverty, climate change and weather disasters, political instability and conflict, vulnerability of the landscape and opportunities for sustainable development;
- Mapping of the risk of land degradation lends itself to the use of sophisticated technologies such as specialist remote sensing that may not be readily available at local community level and that facilitates the integration and coordination of local practise with neighbouring areas;
- Management of land use practises (e.g. use of weather forecasts), monitoring of the impact of such practises or the progress of rehabilitation programmes can successfully use space technology and recent advances in satellite communication to marry the best of traditional practise with the advantages of scientific measurement, prediction and process understanding;
- A two way approach that addresses both the short term impacts of a disaster as well as the root cause of a community's vulnerability requires medium to long term investment and regional, national or international support and participation (e.g. poverty relief programmes, national or international conflict resolution, the impact of HIV epidemic, particularly on women and children).

We have included in the Appendices of this booklet some information that we trust will assist you, the community leader, in releasing and renewing the knowledge and purpose within your community, as well as

in accessing the knowledge and support that is available from various regional, national and international organisations.

APPENDIX A: GLOSSARY

The following terms are taken from **Living with Risk**, A global review of disaster reduction initiatives. UN-ISDR 2002

Acceptable risk: The level of loss a society or community considers acceptable given existing social, economic, political, cultural and technical conditions.

Beneficiate: To process ores and other raw materials as by reduction

Capacity: A combination of all the strengths and resources available within a community or organisation that can reduce the level of risk, or the effects of a disaster.

Capacity building: Efforts aimed to develop human skills within a community, organisation or institution needed to reduce the level of risk.

Coping capabilities/Capacity: The manner in which people and organisations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster event or process.

Counter measures: All measures taken to counter and reduce disaster risk. They most commonly referred to engineering (structural) measures but can also include other non-structural measures and tools designed and employed to avoid or limit the adverse impact of natural hazards and related environmental and technological disasters.

Disaster: A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community/society to cope using its own resources.

Disaster risk reduction: (disaster reduction) The systematic development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development.

Early warning: The provision of timely and effective information, through identified institutions, that allow individuals at risk of a disaster, to take action to avoid or reduce their risk and prepare for effective response.

Ecosystem: A system of interacting living organisms together with their physical environment.

Environmental degradation: Processes induced by human behaviour and activities (sometimes combined with natural hazards), that damage the natural resource base or adversely alter natural processes or ecosystems. Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards.

Hazard: A potentially damaging physical event, phenomenon or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hazard analysis; Identification, studies and monitoring of any hazard to determine its potentiality, origin, characteristics and behaviour.

Land-use planning: Branch of physical planning that determines the most desirable way land should be used. Involves land-use studies and mapping, analysis of data acquired, formulation of alternative land-use decisions and design of a long-range land-use plan for different geographical and administrative scales.

Mitigation: Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Pastoral: Pasture land, land used for livestock grazing.

Preparedness: Activities and measures taken in advance to ensure effective response to the impact of disasters, including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location.

Prevention: Activities to provide outright avoidance of the adverse impact of hazards and related environmental, technological and biological disasters.

Public awareness: The processes of informing the general population, increasing their levels of consciousness about risks and how to take action to reduce their exposure to hazards. This is particularly important for public officials in fulfilling their responsibilities to save lives and property in the event of a disaster.

Recovery: Decisions and actions taken after a disaster with a view to restoring the living conditions of the stricken community, while

encouraging and facilitating necessary adjustments to reduce disaster risk.

Relief / response: The provision of assistance and/or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.

Resilience/resilient: The capacity of a system, community or society to resist or to change in order to obtain an acceptable level in functioning and structure. This is determined by the degree to which the social system is capable of organising itself, and the ability to increase its capacity for learning and adaptation, including the capacity to recover from a disaster.

Risk: The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable/capable conditions. Conventionally risk is expressed by the equation $\text{Risk} = \text{Hazards} \times \text{Vulnerability} / \text{Capacity}$

Risk assessment/analysis: A process to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability/capacity that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

Risk management: The systematic management of administrative decisions, organisation, operational skills and responsibilities to apply policies, strategies and practices for disaster risk reduction.

Risk reduction measures: The development and application of policies, procedures and capacities of the society and communities to lessen the negative impacts of a possible impact of natural hazards and related environmental and technological disasters. This includes structural and non structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, as well as the development of coping capabilities.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's

ability to meet present and the future needs. (Brundtland Commission, 1987).

Vulnerability: A set of conditions and processes resulting from physical, social, economical and environmental factors, which increase the susceptibility of a community to the impact of hazards.

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APPENDIX C: ADDITIONAL BACKGROUND INFORMATION

1 International Agreements and Initiatives

In the last thirty years, a series of summits, meetings and agreements have brought us to the wide-ranging interpretation of sustainable development we have today. At the UN Conference on Human Environment (Stockholm, 1972), the international community met for the first time to consider the global environment and highlight the need to support people in this process. Land use Planning and Disaster Risk Reduction were recognised as an essential part of development.

1.1 International Decade for Natural Disaster Reduction

The United Nations declared the 1990s, the International Decade for Natural Disaster Reduction, and during this period the connection between disaster reduction and sustainable development, was clarified to a greater extent.

1.2 Conference on Environment and Development (Earth Summit)

The UN Conference on Environment and Development, also known as the Earth Summit, took place in Rio de Janeiro in 1992. The main outputs of that Summit were the *Rio Declaration on Environment and Development* and *Agenda 21* (a programme of action).

Disaster Reduction was not specifically dealt with in this declaration, but was implicit in the conventions adopted at the Summit.

1.2.1 The Rio Conventions

- The Convention on Biological Diversity
- The Convention to Combat Desertification
- The Framework Convention on Climate Change

1.2.1 Agenda 21 (a programme of action)

The chapter “Combating Poverty” in Agenda 21 focuses on enabling the poor to achieve sustainable livelihoods. A specific anti-poverty strategy is one of the basic conditions for ensuring sustainable development.

One of the strategies proposed in this chapter of alleviating poverty is the empowerment of communities. Sustainable development must be achieved at every level of society. Governments should support a community-driven approach to sustainability, which would include:-

- a) Empowering women through full participation in decision-making
- b) Respecting the cultural integrity and the rights of indigenous people and their communities
- c) Giving communities a large measure of participation in the sustainable management and protection of the local natural resources in order to enhance their productive capacity.
- d) Establishing a network of community-based learning centres for capacity-building and sustainable development.

In Chapter 9 of Agenda 21 "Protection of the Atmosphere", plans for developing countries include a strive for sustained economic growth and to eradicate poverty. Particular attention is given to four programme areas, namely

1. improving the scientific basis for addressing uncertainties
2. preventing stratospheric ozone depletion
3. trans-boundary atmospheric pollution
4. promoting sustainable development with particular reference to:
 - a) energy development, efficiency and consumption
 - b) transportation
 - c) industrial development
 - d) terrestrial and marine resource development and land use.

"By examining all uses of land in an integrated manner, it makes it possible to minimize conflicts, to make the most efficient trade-offs and to link social and economic development with environmental protection and enhancement, thus helping to achieve the objectives of sustainable development." (Agenda 21, para.10.1)

1.3 World Conference on Natural Disaster Reduction

In support of the International Decade for Natural Disaster Reduction, the UN organised the World Conference on Natural Disaster Reduction, held in Yokohama, Japan, in May 1994. This conference adopted the “Yokohama Strategy and Plan of Action for a Safer World”, which was based on ten principles. These principles emphasised:

- Risk assessment
- Prevention and preparedness
- Capacity to prevent, reduce & mitigate
- Early warning

1.4 United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR)

At the end of the decade, in 1999, the United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR) was established to provide an international co-ordinating structure for Disaster Risk Reduction. Considerable additional information and resources may be accessed via the UN/ISDR internet website: <http://unisdr.org>

1.5 World Summit on Sustainable Development

In 2002 the World Summit on Sustainable Development held in Johannesburg resulted in:

- A political declaration on increased commitment for action
- A Plan of Implementation
- The formation of partnerships to implement the Plan of Implementation.

1.6 World Conference on Disaster Reduction

This conference, scheduled for January 2005 in Kobe, Japan, intends to:

- To conclude and report on the review of the Yokohama Strategy and its Plan of Action, with a view to updating the guiding framework on disaster reduction for the twenty-first century;
- To identify specific activities aimed at ensuring the implementation of relevant provisions of the Johannesburg Plan of Implementation of the World Summit on Sustainable Development¹ on vulnerability, risk assessment and disaster management;
- To share best practices and lessons learned to further disaster reduction within the context of attaining sustainable development, and to identify gaps and challenges;
- To increase awareness of the importance of disaster reduction policies, thereby facilitating and promoting the implementation of those policies;
- To increase the reliability and availability of appropriate disaster-related information to the public and disaster management agencies in all regions, as set out in relevant provisions of the Johannesburg Plan of Implementation.

This conference will review the progress made in the implementation of the Yokohama Strategy and Plan of Action and will result into documents: (1) Conference Statement, (2) Programme of Action 2005-2015.

2 Financial support for sustainable development

Many countries and international organisations provide funding for environmental protection, social upliftment and sustainable development programmes and projects. Some examples are:

2.1 GEF (Global Environment Fund)

The Global Environment Fund (GEF) was established in 1989 to invest in, and provide management support to, companies and projects that contribute positively to environmental quality, human health and the

sustainable management of natural resources. GEF supports energy sources and means of production that are cleaner, cheaper, more efficient and more sustainable.

The businesses in which GEF invests cover a wide range of economic sectors and they occur in all major geographical regions of the world. GEF targets companies for investment that have a strong local presence, significant opportunities for growth and those that create value. These companies must also have a capable and responsible management and a natural respect for the environment.

2.2 World Bank

The World Bank assists in poverty alleviation through various education programmes and partnership organisations. PovertyNet is a World Bank website developed to provide resources for people and organisations working to understand and alleviate poverty.

<http://www.worldbank.org/poverty>

3 Current initiatives in Africa

A number of initiatives, programs and partnerships have been and are currently being initiated that aim to promote and enhance opportunities and resources for poverty alleviation, environmental protection and sustainable development in Africa. Some of these are described below:

3.1 NEPAD (New Partnership for Africa's Development)

The formation of the African Union and NEPAD provides an opportunity to place Africa on a path of sustainable growth and development by reducing poverty, revitalising governance and developing mutually beneficial global partnerships.

NEPAD currently has two projects to improve agriculture in Africa. These are as follows:

1. Expand the ambit and operation of the integrated action plan for land and water management for Africa. The project addresses the maintenance and upgrading of Africa's fragile agricultural natural resources base. Many African governments are already implementing these initiatives as part of this

programme. Partners include the Global Environment Facility (GEF), the World Bank, the African Development Bank, the FAO and other bilateral donor agencies.

2. Strengthen and refocus the capacity of Africa's agricultural research and extension systems. The project addresses the issue of upgrading the physical and institutional infrastructure that supports Africa's agriculture. Technological innovation and technology diffusion hold enormous potential for accelerating agricultural output and productivity, but the continent lacks the research capacity necessary for major breakthroughs. Major players include the Forum for Agricultural Research in Africa (FARA), the World Bank, the FAO and the Consultative Group on International Agricultural Research (CGIAR).

3.1 African Desk

The African Desk was established by the Climate Prediction Center (CPC) of the USA in 1994 to focus on short term climate monitoring and weather predictions for Africa. This Desk aims to develop a partnership between NCEP (National Centers for Environmental Prediction) and the African Meteorological Services through data and product exchange. The three main programmes which are conducted by the African Desk are training, operations and research. It produces precipitation maps; issues seasonal rainfall outlooks and assessments, and 10-day weather summaries that are used in the Famine Early Warning System (FEWS). The African Desk works closely with the CPC component of the USAID/ Famine Early Warning System Project to put together products to assess vulnerability in Africa related to food security and water supplies.
http://www.cpc.ncep.noaa.gov/products/african_desk

3.2 UN Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR)

A number of disaster risk reduction initiatives between African institutions and the UN ISDR Africa are in progress. These include:

- Sub-regional reviews.
- Development of guidelines to mainstream Disaster Risk Reduction into development projects.

- Promotion of women's active participation in disaster reduction.
- Development of educational materials for children and community leaders.
- The development of an African Regional Strategy on Disaster Risk Reduction together with the African Union and NEPAD.

3.3 The Working Group

A new forum known as "Working Group on Disaster Risk Reduction in Africa" is to be established in Africa in 2004. The Working Group to be chaired by the AU will get support from the UN/ISDR Africa. Membership will comprise the AU, the NEPAD Secretariat and all Regional Economic Communities (RECs). The UNDP will represent UN agencies working on disaster risk reduction issues in Africa. The overall goal of the Working Group is to support the efforts of AU/NEPAD and national governments to advance disaster risk reduction and to facilitate the integration of disaster risk reduction into all phases of development in Africa, in order to achieve the objectives of NEPAD. The Working Group will aim to address a wide range of problems including: drought, dissemination of information, women participation in disaster reduction and the integration of disaster risk reduction into poverty alleviation strategies and sustainable development.

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International Strategy
ISDR
for Disaster Reduction

The United Nations Secretariat for the International Strategy for Disaster Reduction

Within the United Nations system, the Secretariat for the International Strategy for Disaster Reduction is responsible for co-ordinating disaster reduction strategies and programmes.

Its mission is to help people withstand disasters by making them aware of the importance of disaster reduction measures and providing support to help reduce human, economic and social losses.

The Secretariat also provides backing for an Inter-Agency Task Force on Disaster Reduction headed by the Under-Secretary-General for Humanitarian Affairs and comprising representatives of several United Nations agencies, regional institutions and non-governmental organisations.

Within the United Nations system, the Task Force is the chief body responsible for the design of disaster reduction policy.

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