

## How can we manage our land to achieve food security?

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### Introduction

Improved food security around the world is one of the main issues articulated nationally and internationally as a top priority for sustainable development. The World Food Summit of 1996 defined food security as existing “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”.

Food security is built on three pillars: food availability (sufficient quantities of food available on a consistent basis), food access (having sufficient resources to obtain appropriate foods for a nutritious diet, and food use (appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation).

There is a growing international consensus that access to food should be a universal human right. Olivier de Schutter, special UN rapporteur, defines the right to food as:

“The right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear.”

Although most people can agree on the importance of food security, there are many, often widely divergent, ideas on the kind of political and technological interventions that are needed to achieve global food security. Research findings from different agroecological zones warn us about the danger of making generalisations about the sorts of challenges (or “scenarios”) we are likely to face in future; rather, the latest research emphasises the need to adapt interventions to local ecological, social and political circumstances.

The DESIRE project (2007-2011) is funded by the European Commission, VI Framework Program, ‘Global Change and Ecosystems’ and brings together the expertise of 26 international research institutes and non-governmental organisations (NGOs). This project is implemented by ALTEIRA - research institute for the green living environment in the Netherlands.

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## **The DESIRE Project**

Desertification – a reduction in the ability of land in some of the driest (and often the poorest) parts of the world to provide food and other resources for the people who live there – is an important and growing threat to food security. Drylands include cultivated lands, scrublands, shrublands, grasslands, semideserts, and true deserts (IAASTD Global Report p. 37). In order to contribute to scientific knowledge on how to combat desertification, the EU financed the project DESIRE combined local knowledge with the latest scientific advances in 17 study sites around the world to find solutions to some of the environmental causes of food insecurity in drylands.

These arid and semi-arid ecosystems are in urgent need of integrated conservation approaches that can prevent and reduce widespread degradation such as erosion, flooding, overgrazing, drought, and salinisation. To this end, the EU financed DESIRE project established promising alternative land use management conservation strategies based on a close participation of scientists with stakeholder groups in a wide range of degraded drylands around the world (<http://www.desire-project.eu/>).

At the same time, this project provides us with new answers to questions about whether combating desertification in drylands can help in the global effort to reduce food insecurity. The subject of this project is therefore highly relevant, since it relates to agricultural production, the demand of which will increase with the world population soon reaching more than 7 billion inhabitants. More than 50% of the world land mass is covered by drylands, and this being the habitat of nearly 40% of the global population underscores the relevance of this endeavour.

The increasing need for food, fodder and fuel will eventually lead to higher demands on land, a more intensive use of existing farmland, as well as the need to rehabilitate degraded land. In view of the global challenges in feeding the world the costs of losing farmland due to degradation are too high to bear.

Desertification is defined as both a climatic as well as a human induced process of dryland degradation. In the DESIRE study sites the focus was on the human-induced processes leading to desertification (report 72b).

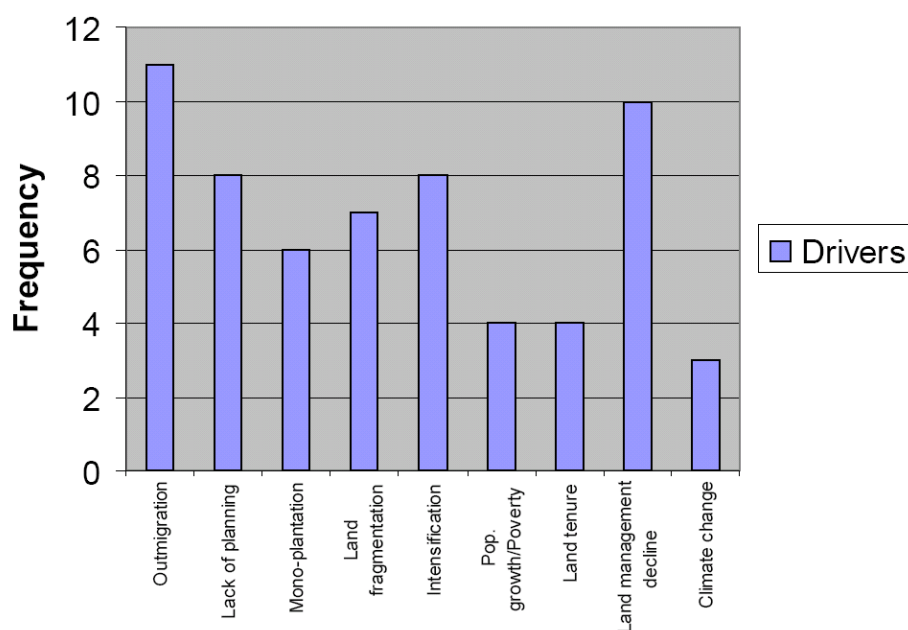
Erosion by wind and rain is the most common cause leading to land degradation, not only on slopes, but also on plains, due to a lack of sustainable management practices. If climate change is going to be a major driver of environmental change, as is now widely believed to be the case, our focus should be on sound management practices that build resilient agroecological production systems, enhancing productivity while reducing vulnerability to climate variability. Future scenarios will however only be realistic if they properly account for the human induced processes behind desertification. This means also that proper land conservation and rehabilitation practices may have direct positive results, and will help to build resilience against the possible negative effects of climate change, on combatting desertification processes and secure food production.

The adoption of integrated soil fertility management strategies at the farm and landscape scale requires consensus building activities. However, promoting and supporting participatory technologies have limited impact when they are not grounded in participatory policy development and implementation. Labour-intensive eco-agriculture will not succeed unless farmers and the agricultural sector have higher total factor productivity including total labor productivity (IAASTD Global Report p. 402). In the DESIRE project, participation of land users and other stakeholders in the design of techniques, the experiments and the valuation of techniques was a central project aim. Therefore, participation in policy and decision making should be the next step enhancing rural livelihoods that are food secure and ecologically sustainable. In this paper we try to bring these

concepts together, and propose a new way of looking at how dryland agriculture can help reducing food insecurity.

### The major drivers behind desertification in the DESIRE study sites

The following graph gives an overview of the most important drivers behind desertification, as identified for the 17 dryland areas in the DESIRE project by the research teams and stakeholders:



**Figure 4: Frequency diagram for major drivers of desertification in the DESIRE study sites.**

The major drivers identified by the study site teams<sup>1</sup> are all related to socio-economic processes that transcend the region. Policy interventions addressing the causes would therefore necessarily, besides the technical solutions, also address the processes that put livelihoods in the drylands at peril. This paper will take up the lessons learned from the study sites, to contribute to the question how to improve food security in the drylands at a global level through Sustainable Land Management.

### Political, economic, institutional, social and cultural drivers

Let us focus more intensively on the mentioned drivers behind desertification. One of the most mentioned causes seems to be outmigration. This is indicative of a global trend of rural depopulation, due to several socio-economic and political processes.

*Migration* is a livelihood strategy pursued by millions of people all over the world, for reasons ranging from labour seeking, economic interest and family reunification to displacement due to natural or political disasters. Temporary migration and commuting to national and international, rural and urban destinations are now a routine part of the livelihood strategies of many households,

<sup>1</sup> For further explanation, see DESIRE Report 72b: Drivers, policies and laws in DESIRE study sites. Deliverable 1.3.1 and 2.1.2, written by Mantel, S. Van Lynden G. and van der Werff ten Bosch, Mj., Karavitis, Ch and Kosmas, C..March 17. 2011,(online at: [www.desire-his.eu/](http://www.desire-his.eu/)).

including farm households, both in industrialized and developing countries. The effects of migration on agriculture are highly diverse—migration can be a negative phenomenon that creates labor shortage in rural areas, leaving the land abandoned; or it can mitigate population pressure and resource use, and the remittances from family members can boost agricultural development (IAASTD Global Report p.27).

Global trends in trade and market liberalisation influence food production and consumption patterns. The focus on raising production for exports only can lead to desertification (DESIRE report 72b, p. 15). However, trade could also help to prevent desertification. Trade relationships create for instant stronger links between local, national, or global factors related to desertification. Several of the major drivers in the study sites, such as outmigration and land use change, can be highly influenced by global trends in trade and policy.

The DESIRE project did not do a study on the causes of ‘outmigration’, but during the workshops a number of problems in the rural areas were mentioned. The exodus of rural people to the towns is a global trend and is partly also caused by land use changes where agriculture has intensified and where there is lower labour demand. Worldwide, young people are attracted to the city because of employment, modern lifestyles and educational services. Worldwide, farmers are worried about who will inherit, buy or occupy their land, which demotivates them to invest in sustainable management practices. World wide, outmigration causes neglect of existing soil and water conservation structures that collapse as a consequence and with accelerated erosion as a result. Outmigration also causes a collapse in the social set-up of village life, necessary for social capital and indigenous knowledge transfer to the next generation, and probably only an innovative impulse with new chances for development can bring back life in the rural areas.

A study of desertification in the DESIRE study sites found for instance that grazing intensity increased in recently abandoned areas further deteriorating already degraded lands. Traditional dry land farming is disappearing because of low income for the producers. Other countries, outside Europe suffer from the falling incomes too and from the resulting decreased profitability of (smallholder) farming. The low income of producers has a negative impact on the motivation of farmers to invest in soil and water management techniques. However, a price incentive alone will not be enough. Even though in the case where mechanic soil and water conservation measures such as the construction of *boquera* in Spain resulted in a doubling of income, farmers indicated they will use the existing ones, but they had no incentive to build new ones (<http://www.desire-his.eu/fr/guadalentin-spain/354-water-harvesting-experimental-results-and-conclusions>). Stronger incentives are necessary.

In the developing countries, just like in the European countries, the claim on high quality agricultural lands and labour for urban development is a threat to the rural livelihoods. Also there, the loss of rural population leads to skewed age distribution of the remaining population and depopulation of rural villages. Service provision and labour requirements, and therewith opportunity for work in the rural areas decline. The land use change and decline of traditional dry land farming causes a loss of knowledge of sustainable practices in these fragile environments.

Lack of coherent land use planning in which the various sectors are represented is mentioned in several study sites, as well as the agricultural transformation away from diversity. For instance, the introduction of monoculture tree plantations was mentioned in six countries. Especially plantations of Eucalyptus and Pinus species cause a decline in biodiversity, increased water use and decreased soil protection. In some Mediterranean areas (Crete for instance) olive plantations replaced natural vegetation in sloping areas. Ploughing plantations and lack of undergrowth on slopes often leads to soil erosion. Also in Tunisia the traditional land use practices were replaced by monocultures, which has led to erosion. The intensive nature of large scale farms has created a high water demand in dry areas, causing a lowering water table in drylands and lower water recharge (e.g. Greece-Crete, Tunisia, Spain, Turkey-Karapinar)

In Mexico mechanisation and plantation farming contributed to soil erosion. Here SLM has shown its potential, through the improvement of soil ecosystem services by Intercropping and crop diversification has led to a great improvement of soils (blx.7, del. 5). In general, it can be said that the shift of traditional agricultural practices to capital intensive, large scale managed monocultural agricultural systems has led to land degradation, and depopulation of the area. This, with the concomitant high prices of agricultural commodities, but low rural incomes, lack of service provision in the rural areas has led to the marginalisation of dry lands and its inhabitants all over the world, in rich as well as in poor countries. This marginalisation is a global trend. Also in the global policy arena drylands get surprisingly little attention. This is remarkable, given the focus on food security in policy circles, and the important role of small-scale farmers in agricultural food production in these regions. Food security is high on the 'development' agenda, but the focus is on the more humid areas instead of on dry lands.

The absence of attention for drylands is indicative for the current misconception of food security. As Amartya Sen taught the world already 20 years ago, food security is not a matter of producing enough food or not. Food security is about accessibility of food for everyone, also in marginal areas where people are poor. Food security policy is about families in marginal areas being able to grow sufficient food for themselves, also under adverse weather conditions. DESIRE focused mainly on degraded areas in the higher and middle income countries. Only few poor countries participated in this project. We therefore need to interpret the findings such that it becomes relevant for developing countries.

### **What do DESIRE results teach us, and what relevance is there for food security?**

DESIRE results show that with extra investments in Sustainable Land Management often a doubling of production of biomass is possible. (see DESIRE report on experiments WB4, deliverable. 4.3.1). Other research shows that eco-farming can double food production in 10 years, in farmer/scientist partnerships, but it requires public policies supporting agricultural research and participative extension services (de Schutter, in UN report, March 2011<sup>2</sup>). Without farmers willingness to invest time, effort en financial resources in SLM, nothing however can be achieved. It is therefore important to investigate the factors that determine farmers motivation for investments.

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<sup>2</sup> <http://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=10819&LangID=E>



It has been suggested that insecure ownership regimes could explain the lack of incentives to invest in proper land management techniques. In general, secure land tenure in developing countries has been shown to improve the conditions for Sustainable Land Management, and hence for improving food production, as well as livelihoods and ecosystems (e.g. Liniger et al., 2011). However, in the industrialised countries where land is severely degraded, and where land tenure is characterised by individual ownership, this does not necessarily translate into feelings of responsibility towards sustainable stewardship of soil quality. Privatisation of land therefore does not necessarily lead to better land management. Farmers' investment in combating desertification depends on many other factors.

What came out from the multi-stakeholder meetings, most land users seem not to be really motivated to carry the initial investment costs, unless returns are immediate (i.e. in the first year (see DESIRE Project deliverable 4.3.1). Would that imply that maintaining soil quality, even if the land is in private ownership, is a responsibility outside their single action radius? Or could it also mean that they are unable to take measures alone because of lack of funds, lack of labour, or they feel that many measures cannot be taken at individual level and should rather be organised? If fertile land has common good qualities, it makes sense to also design public policy that incorporates fertile land as objective. As it turned out, most study site teams in DESIRE indeed mention some sort of subsidy schemes to pay for land conservation and protection measures.

This poses some pertinent policy questions that concern the relevance of DESIRE results for poor countries in especially Sub-Saharan Africa, where public funding is a problem.

The question is not only whether such subsidy schemes are sustainable and feasible from a financial point of view, but also whether it has come to a point that soil quality should only be perceived as a common good for which governments should be held responsible? Is the agrarian economy so alienated from the producers that all the extra returns on SLM investments do not improve their livelihoods? Many farmers have indicated that they are not so sure about the future of their land; urbanisation is a real threat: either the urban areas absorb the farmland, or it absorbs the labour force that should have kept the rural areas alive. The vitality and liveability of the rural areas in general, but of drylands in particular, could very well be crucial in addressing the food security problem worldwide. Europe is facing a shrinking population, not only in the rural areas, but also in small cities. This will lead to an ever decreasing rural population, exacerbated by mechanised large scale agriculture and lower labour demands.

It seems therefore reasonable to underscore the common good qualities of fertile land and vital rural livelihoods. Not only has degradation and desertification of farm land negative spill-over effects on a wider area, in turn, on site investment to combat desertification can be expected to have positive externalities, like increased biodiversity, improved soil humidity, a stabile ground water table, less runoff and sedimentation down-slope, decreased wind erosion, etc. This does not mean that subsidy schemes are the only possible way to support farmers in their effort to improve fertility and liveability of the rural areas.

Market incentives, cooperate initiatives, responsible trade products and new trends in product demands from consumers can have positive returns, and have impacts on the value of agricultural land in Europe. Of instance, the recent interest in Western countries for biofuels and locally

produced food (and/or organic, fair trade) may improve life in the rural areas and increase the value of Europe's agricultural land. The increasing interest for locally produced food (the market percentage of 'slow food' is still small, but could become considerable) can give a positive impulse for the value of land, the value of agricultural products, and motivate European farmers to invest in SLM practices. This is in line with the idea of the multi-functionality approach to farming as articulated in the IAASTD report:

*Multi-functionality is used solely to express the inescapable interconnectedness of agriculture's different roles and functions. The concept of multi-functionality recognizes agriculture as a multi-output activity producing not only commodities (food, feed, fibres, agrofuels, medicinal products and ornamentals), but also non-commodity outputs such as environmental services, landscape amenities and cultural heritages ... The working definition proposed by OECD, which is used by the IAASTD, associates multi-functionality with the particular characteristics of the agricultural production process and its outputs; (1) multiple commodity and non-commodity outputs are jointly produced by agriculture; and (2) some of the non-commodity outputs may exhibit the characteristics of externalities or public goods, such that markets for these goods function poorly or are non-existent. The use of the term has been controversial and contested in global trade negotiations, and it has centred on whether "trade-distorting" agricultural subsidies are needed for agriculture to perform its many functions. Proponents argue that current patterns of agricultural subsidies, international trade and related policy frameworks do not stimulate transitions toward equitable agricultural and food trade relation or sustainable food and farming systems and have given rise to perverse impacts on natural resources and agroecologies as well as on human health and nutrition. Opponents argue that attempts to remedy these outcomes by means of trade-related instruments will weaken the efficiency of agricultural trade and lead to further undesirable market distortion; their preferred approach is to address the externalized costs and negative impacts on poverty, the environment, human health and nutrition by other means. (IAASTD Global report for Decision makers, p. 5).*

However, how can, keeping the European situation in mind, food security in developing countries be improved? As was said before, food security is a function of continued accessibility of food. If locally ecologically produced and processed food in rich countries can lead to improved and more secure livelihoods, so should this mechanism apply in the poor countries as well. In fact, a number of reports show that shortening of food chains, improving access to local markets, agro-ecology, and less dependency on external farm inputs are also beneficial for ecological conditions. (IAASTD). In addition, food security is improved if strategies exist that deal with the variability of factors beyond the farmers' control, be it climatic variability (which can be dealt with by storing water for dry periods), or by becoming less dependent on (inter)national market insecurities.

Food security is not likely to be improved if only technical measures against degradation will be applied (since accessibility and availability of food depends on political and economic factors); neither will food security policy have impact if the environment degrades further. Well informed policy that combines both environmental and socio-economic concerns would need however a multi-disciplinary study on land degradation, SLM and socio-economic processes.

### **Policy addressing Europe's degraded land and drylands in developing countries**

For both the developing world and the industrialised world we need a 'land use policy' that enhances food security in poor countries, and which improves vitality of local economies in Europe's rural areas as well as in countries with dry lands world wide. Policies must address the root causes of livelihood deterioration in rural areas and land degradation, low productivity and food insecurity and simultaneously establish socially acceptable mechanisms for encouragement or enforcement of Sustainable Land Management.

SLM practices will not be adopted in Europe if it is not coherent with the policy to improve 'liveability' in the rural areas. Liveability will be improved if local producers receive better returns of their labour, with better educational services and infrastructure to market locally produced crops. Therefore, improving food security in the drylands, in fact needs the same kind of policy; valuing labour, improving market access, rehabilitation of degraded land, investment in education and infrastructure, and diversifying agricultural products and restoring biodiversity in surrounding green belts. In both rich and poor countries large scale monocultures do more harm to the environment, to labour conditions, and leads to rural-urban migration. Some elements relevant to policy addressing land degradation will be discussed below.

### **Small-scale resilient agriculture and agroecological farming**

This calls for a redesign towards an agroecological type of small-scale, resilient, bio-diverse agriculture, while recognising the limits of natural resources, where farmer's livelihood choices and opportunities are centre stage. Small scale family farming still dominates agricultural production in developing regions. Even though productivity is low, with little extra input productivity increases tremendously (HIVOS, 2011, p.8). A serious reorientation towards small-scale producers and greener agriculture should be part of any solution addressing global food insecurity and poverty. However, not all small-scale producers own land. Food security will only improve if it does not target land owners alone: also food accessibility *for all inhabitants of dry lands* should be enhanced, by sound purchasing power policy and market accessibility.

### **Increasing diversity**

Increasing diversity in crops, in plant varieties, in economic activities, in job opportunities, in landscape patterns at various levels of scale can greatly enhance the resilience of ecosystems and of people living in dry lands. A diverse palette of income generating activities decreases external market dependence, and in turn may improve the supply of products at local level (see also Rabbinge, 2011<sup>3</sup>). Certification schemes for products exported outside the regions can enhance the adoption of sustainability criteria, and helps paying for ecological restoration. (TerrAfrica p.44, 45)<sup>4</sup>

### **Cooperation between local land users, civil society, local government and knowledge institutions**

The experiences in DESIRE tell us that only those SLM techniques are adopted that are easy to adopt, that show direct increases in revenues, that are not too costly and which have been demonstrated

<sup>3</sup> Rabbinge, R.; Bindraban, P.S. (2012)

Making More Food Available: Promoting Sustainable Agricultural Production  
Agricultural Sciences in China 11 (1). - p. 1 - 8.

<sup>4</sup> Sustainable Land Management In Practice. Guidelines and Best Practices for Sub-Saharan Africa 2011



results (See for instance results in Chile, Turkey, Mexico, Portugal, del. 4.3.1). Results in terms of improved ecological services are not a motivation to land users, (WB4, del. 4.3.1). To establish the process of involvement of various parties, test, monitor and apply results, increase awareness and inform on best practices and recent developments, a multi-stakeholder process should be facilitated. This can only work in an enabling environment where land users, communities, NGOs, policy makers and scientists have open dialogues, and where farmer's needs remain centre stage.

An example of a multi-stakeholder process can be on spatial land use planning, whereby all users of the land are involved in decision making. In many cultures where land tenure systems are diverse and user rights complex, a form of participatory land use planning could prevent agricultural developments that destroy nature, local livelihoods, food production systems and local markets.

*Public policy, regulatory frameworks and international agreements are critical to implementing more sustainable agricultural practices. Urgent challenges remain that call for additional effective agreements and biosecurity measures involving transboundary water, emerging human and animal diseases, agricultural pests, climate change, environmental pollution and the growing concerns about food safety and occupational health. Achieving development and sustainability goals calls for national and international regulations to address the multiple economic, environmental and social dimensions of these transboundary issues. These policies need to be informed by broad-based evidence from natural and social sciences with multistakeholder participation. Improved governance and strengthening engagement of stakeholders can redress some of the inadequacies where identified in AKST arrangements that often privilege short-term over long-term considerations and productivity over environmental and social sustainability and the multiple needs of the small-scale farm sector. (IAASTD global report for decision makers, p. 7)*

## Conclusion

Current socio-economic trends are changing the perception of who is responsible for maintaining the quality of the land. If sustainable land management is only seen as a private concern, it will remain a marginal phenomenon. However, it is shown that sustainability is an investment too costly in terms of money and/or labour for individual farmers to bear on their own. Sustainable Land Management is a responsibility of the well known construct of land users and civil society, government, the private sector and the knowledge sector.

Since the future of the traditional family farm in the current trends is uncertain, farmers have no strong incentive to carry all costs of long term land improvement measures, even if the crop returns in the short terms are higher. Agricultural lands in dry lands have common good qualities, and are therefore eligible for a regional, or better, national plan of action with various integrated technologies and approaches (see WOCAT<sup>5</sup> for an overview) that should be applied. For this plan, the government takes responsibility, while communities should have the freedom to choose those technologies they deem fit. Such a regional plan should not be perceived as a top-down design of imposed technologies attached to social policy to rescue poor farmers; it should be a regional plan in which farmers initiatives, cooperatives, partnerships and innovations are facilitated in order to achieve a greater common goal; improved livelihoods, restored ecosystems, and more participation in local markets and decision-making fora.

Adoption rates of techniques by farmers will be greatly improved if the techniques fit in a regional plan. This plan should also create the boundary conditions that farmers need to implement measures. Therefore, integrate remediation strategies into the regional and national action plans for combating desertification. Soil improvement and action plans for combating desertification have always been on the development aid agenda's of European countries. There are many good reasons to keep these themes on these agenda's. Europe is committed to contribute to greater food security in Africa, and the current interest in promoting agriculture is promising. However, food security policy in the drylands is not yet developed well, since agronomists are focused more on the humid areas than on the drylands.

Since food security policy is strongly felt to be an African responsibility as well, given the Maputo Declaration on Agriculture and Food Security from 2003, when African countries promised to gear 10% of their total budget towards food production, combating desertification while improving food security are two sides of the same coin. Not combining food security policy with dry land rehabilitation is a missed chance; if drylands are better protected against desertification, and livelihoods in the drylands will improve, this will have positive effects on the environment, on local economies, on livelihood and wellbeing of people living in drylands.

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<sup>5</sup> Liniger, Hanspeter and Will Chritchly, 'Where the Land is Greener', case studies and analysis of soil and water conservation initiatives worldwide, WOCAT 2007.

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