



# Green Sahel

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Sustainable Management of Resources in Agriculture

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## Acronyms:

ALCD	Association de Lutte contre la Désertification
ARI	African Re-greening Initiative
BF	Burkina Faso
CDM	Clean Development Mechanism
NDVI	Normalized Difference Vegetation Index
PATECORE	Projet d'Aménagement des Terroirs et de Conservation des Ressources (BF)
SWC	Soil and Water Conservation

## **1. Introduction**

When we think of the Sahel zone, we generally think of drylands, drought and hunger. But there are positive developments taking place in the Sahel, too. According to some experts, a process of re-greening is taking place. The reasons for this have been the subject of controversial debate. Some experts link this phenomenon to an increase in rainfall. Others argue that it is due to changes in land and tree-use legislation, which have given farmers the incentive to plant and maintain tree stocks. But just how far-reaching an impact do grassroots initiatives like this actually have – and will they really make the Sahel green again?

### **1.1. Introduction by Maren Kneller (BMZ)**

Maren Kneller introduced key points of the new German Federal Ministry for Economic Cooperation and Development (Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung - BMZ) cross-sectoral concept on rural development.

In order to cope with challenges such as the extension of the Sahara, and to support developments such as the greening of the Sahel, BMZ is convinced that rural areas need to be reinvented as a category for development. For this, the new BMZ concept on rural development reiterates the need for a comprehensive approach which bridges political sectors and levels. An integrated approach is needed that takes into account economic, social, political, legal and ecological aspects. Therefore, in the view of BMZ, the following reform processes are needed in many of Germany's partner countries: First, the rural economy needs to be strengthened to provide people with jobs and incomes and subsequently with the means for escaping poverty. Second, the sustainable management of natural resources must be supported as these resources form the basis of rural livelihoods and production. Third, rural development needs a supporting political and legal framework: The key to sustainable production systems is the secured and equitable access to land. And last but not least, social services and technical infrastructure must be provided in rural areas in order to reduce inhabitants' vulnerability and to make remaining in rural areas more attractive.

In the first place, it is the responsibility of the partner countries to develop rural areas; development cooperation can only play a supporting role. However, BMZ is aware that the reform processes outlined above demand a lot of institutional, financial, technical and human capacity and, upon the request of partner countries, the German government can provide assistance.

Still, in order for development cooperation to be successful, visions need the strong backing of society and activities need to be supported by a wide range of actors. Partnerships are needed between the political, the economic, the non-profit and, last but not least, the academic sectors to make the development of the rural areas a priority again.

### **1.2. Introduction by Dr Stephan Krall (Programme Leader NAREN<sup>1</sup>, GIZ)**

The Sector Programme Sustainable Management of Resources in Agriculture, which the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Division Agriculture, Fisheries and Food, carries out on behalf of BMZ, organised this symposium.

In early 2010 Hannelore Kußerow from the FU University Berlin, suggested a debate between Chris Reij from the VU University Amsterdam and herself on the 'yes or no' question of whether greening

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<sup>1</sup> Sector Programme Sustainable Management of Resources in Agriculture

was taking place in the Sahel. GTZ (now GIZ) took up this proposal and organised this symposium with the support of the Convention Project to Combat Desertification (CCD Project).

We would like to thank everybody involved for their interest and special thanks to Dr Dennis Garrity, the Director General of ICRAF, the World Agroforestry Centre, based in Nairobi, for his surprise participation.

One of the topics of our division is how to produce more in times of poverty and population growth. And how to grow more in the Sahel is a very difficult question. Since the early 1980s the population in the Sahel has doubled and even then it was very difficult to produce enough sorghum and pearl millet. Yields are often lower than 300 kg per ha.

How can people survive in this region? What causes conflicts between pastoralists, nomads and farmers? What about precipitation in times of climate change?

Are there promising stories of re-greening in the Sahel, as Chris Reij will tell us? Or is it the case, as Hannelore Kußerow argues, that this is not representative of most parts of the Sahel? We will discuss this and other issues today.

## **2. Re-greening Africa's drylands: experience, impacts and tools for scaling-up**

**Dr Chris Reij**, Center for International Cooperation, VU University Amsterdam

In 1955 population density was low compared to now and precipitation was above average. However, tree density was low, because monocultures without trees were common on agricultural land during the French colonial time. Population pressure is the main driver for intensifying agricultural systems. Agroforestry is the lowest-cost method for intensification and numerous farmers construct agroforestry systems, either initiated by a project or spontaneously. 300-400 mm rainfall is the minimum for agroforestry systems. There are differences between valleys and plateaus, because plateaus generate runoff, which is beneficial for vegetation in the valleys. Examples show that re-greening since 1985 has mainly taken place in areas with high population densities and sandy soils and is undertaken by farmers.

Rainfall is an important factor for re-greening, but observations of tree densities along the Niger-Nigeria border show that it is not the determining factor. Human management is the key factor, influenced by cultural issues, differences in ownership of trees, forestry laws and economic opportunities. Migration is not a major factor. A Great Green Wall is proposed by African governments to stop desertification, but this is not based on substance: The farmer version of a Green Wall in Southern Niger does not stop land degradation in northern Nigeria. Whether degradation takes place or not depends on land use.

Multiple benefits result when farmers manage natural regeneration themselves. These include additional value of trees due to pruning, adaptation to climate change, improved food security, poverty reduction, increases in biodiversity and increases in drought resilience. The protection of natural regeneration is usually only sustainable when local people are responsible for its management.

The soil surface temperature is reduced through vegetation cover. Farmers' first seeding is thus more likely to be successful, which results in higher yields. Farmers need to be able to cut their trees in times of drought, as this helps them survive drought periods when the crops fail. After such periods farmers continue to protect and manage natural regeneration. Therefore, the Clean Development

Mechanism (CDM) is inappropriate for African farmers, as it obliges them not to cut their trees. The conditions attached to the CDM need to be made more flexible as the rural poor literally survive thanks to their trees during drought years.

As the Niger experience shows, soil fertility and crop yields improve when manure is restituted to the field as opposed to being burnt in kitchens, as it was 20 years ago due to a lack of firewood. For six months of every year livestock depends on tree fodder and today biodiversity has increased by up to 35 different species; women benefit as the time needed to collect fuel wood is significantly reduced; conflicts between farmers and herders have decreased (-80%) as the land now offers enough for all, etc.

Farmers invest in on-farm trees when they have exclusive rights to their trees. Governments have a vital role to play: adaptation of forestry legislation and designing policies that induce farmers to invest in trees. The protection and management of natural regeneration often produces more and faster benefits than planting trees (e. g. farmers in Niger have protected and managed 200 million on-farm trees during the last 20 years, while all projects combined have planted 60 million trees during the same period, of which only an estimated 20% survived).

#### **Tools for scaling-up:**

- Identify existing successes
- Farmer-to-farmer visits
- Adaptation of national policies
- Build movement or organisations
- Competitions at different levels
- Build (inter-)village institutions
- Radio programmes
- Use of Internet and mobile phones
- Mobilisation of international media
- Advocacy

This ARI (African Re-greening Initiative) needs to scale-up existing successes in re-greening to produce multiple impacts at minimum costs. It is possible to improve the livelihoods of millions of farmers in Africa and support their adaptation to climate change through agroforestry, therefore many have to join the movement!

### **3. The myth of the encroaching desert**

**Dr Hannelore Kußerow**, Institute of Geographical Sciences, FU University Berlin

The Sahel is defined as a zone with a mean annual rainfall of 100-600 mm. The zone belongs to one of the oldest cultural regions of the world. 'Hydraulic societies' are people who had to move to more humid areas (in the vicinity of the Nile and Niger rivers) due to increasing droughts. Historically, large empires have existed there until the 19<sup>th</sup> century. For over 2,000 years there have been intensive society-environment interferences.

Desertification is mostly understood as an encroachment of the Sahara to the south. This conception originated from European researchers' observations of decreasing vegetation as a result of a severe drought period from approximately 1907/08 to 1914/1915. This conception makes us think of sand dunes moving southward towards the Sahelian savannah. However, satellite images show that there is no such southward movement. Instead, since 1981 the Sahara-Sahel border has fluctuated according to yearly rainfall as indicated by NOAA satellite data (satellite based vegetation indices allow the discrimination between vegetated and non-vegetated areas). There were years of drought, as in the period between 1982 and 1984, resulting in a shift of the Sahara-Sahel border to the south, followed by a retreat to the north.

Desertification could rather be described as an increase in crusted soils as a result of the destruction of trees and shrubs (deforestation). Analysis of Landsat images since 1984 (example of the Canal du Sahel region in Mali) also shows that the observed re-greening in the 1990s is a natural recovery

after a drought. But the comparison with older images since 1972 shows a decrease in vegetation cover and a higher fragmentation of the remaining savannah complex.

Chris Reij refers to the agroforestry region in the vicinity of Maradi. This region belongs to the southern Sahel–northern Sudan transition zone which is different from the system described above. Thus, his findings cannot be applied to the Sahel region as a whole.

In the Sahel, the capability of vegetation growth is far greater on sandy soils than on crusted soils, where nearly no re-growth is possible without anti-erosion measures. Sandy soils, or even thin sand layers, offer many possibilities for plant growth. The capability of plant growths depends on the amount of rainfall and the use/overuse/management of natural resources by people.

There are huge areas of crusted soils in the plateau regions of south-west Niger, with relics of formerly closed savannahs and/or 'tiger bush' mosaics. Satellite-based observations show an absence of vegetation cover in 2009, although this region has been treated with anti-erosion measures since the mid-1990s. The comparison with historical data shows much more vegetation in 1989, although the 1980s belong to the driest decades in the last century. The effectiveness of anti-erosion measures, still verifiable in the 1999 ground truth mission, did not last until 2009. Excessive population growth (demand for firewood) and management failures destroyed the initial success.

The same problematic situation can be found in the whole Sahel: a decrease of woody vegetation combined with an increase in crusted soils. The exact dimension of these soils is not yet known.

Desertification is mainly triggered by human activity and drought. Governmental measures to combat desertification differ from country to country. The same applies to the effectiveness of resource protection measures. Positive results have been achieved through the use of (for example): small dams, lines of stones, tassa cultures, demi-lunes and new Nardi trenches - however, there have been questions concerning the sustainability of Nardi trenches on the plateau regions in south-west Niger.

Analysing rainfall data shows that droughts were followed by an increase in rainfall. In recent years rainfall levels have fluctuated highly, with general trend pointing to a decrease.

Population data from Niger show an increase from 2.4 million in the mid-twentieth century to 16 million today and a projected population of 27 million by 2050. Further pressure is put on the ecosystems by climate change.

Research results suggest that new strategies addressing topics like population growth and firewood consumption are needed. With a 'business as usual' mentality, land conservation methods will not be sustainable.

#### 4. Green Central Plateau, Burkina Faso

Melchior Landolt, Director of Terra-Verde e.V. ([www.terra-verde.de](http://www.terra-verde.de))

Greening can be defined by ecological productivity or by increasing levels of soil productivity, plant growth and carbon sequestration during a time period of at least 25 years on a savannah, forest or farmer's field. Both re-greening and land degradation processes can exist at the same time and may appear on a farmer's land or in an entire region. The question is: Which process dominates?

Re-greening in Burkina Faso (BF) is found on improved agricultural land and appears in areas with soil and water conservation (SWC) projects, where degraded and completely barren land has been re-cultivated. You are more likely to find degradation on land with natural vegetation cover, like

##### Burkina Faso - Info

- 275,000 km<sup>2</sup>; 15 million inhabitants; 55 inhabitants per km<sup>2</sup>
- Over 50% of the soil is degrading; 9 million people live in areas with severe and very severe human-induced soil degradation
- The northern part of the central plateau covers 25% of the national area, but accommodates 50% of the national rural population
- Rainfall: 500-700mm

forest and woodland savannahs, in cotton growing areas and on agricultural land in the north. Overall, more land on the Central Plateau in BF is degrading than re-greening.

Due to an increasing population (from 4.7 million in 1965 to 30 million projected for 2030), intensification in BF is necessary. Although the agricultural area will have increased from 7% of the entire area of BF in 1965 to 33% in 2030, the agricultural area per inhabitant is decreasing. Water and wind erosion have a tremendous impact when the protective cover of the soil is removed on new agricultural land. Higher yields can be produced on degrading soils only with 'high tech agriculture', which is not a sustainable solution for Sahelian farmers, who work with low input production systems.

For farmers, 'sustainable greening' means increased soil productivity and it has to be initiated by protecting soils against erosion and increasing soil fertility. Man-made degradation has to be replaced by man-made greening. SWC infrastructure (hardware) is needed more than training and extension (software) – farmers know what to do, but don't have sufficient money to invest in infrastructure. For farmers, a changing environment means more people to feed, degrading resources and less and more irregular rainfall. The options for farmers are to either expand their cultivated area, which is mostly limited, or to out-migrate, which is followed by unemployment, social conflict, limited resources and degrading resources.

On the central plateau, SWC measures are needed for better water infiltration and to stop soil erosion, followed by organic fertiliser, integrated animal husbandry, improved seeds and plant protection. The land tenure system, whether a traditional or individual system, does not influence the process or the farmers' motivation to improve land.

SWC methods and organic fertiliser lead to an increase in land productivity (50-100%) due to better infiltration of rainwater (100-200 mm), reduced soil erosion and sedimentation (up to 200 kg/m<sup>2</sup>) at the same time. Additional impacts are an increased number of trees, higher level of groundwater and increased carbon sequestration.

### A success story on the central plateau

Barren and degraded land has now been turned into arable land. 40,000 km of stone lines have been built, rehabilitating 125,000 ha of farmland, with a financial contribution covering the transport of stones. The Government and donors do not support farmers adequately, even though soil and water conservation is a very good investment and pays off after 5 years. Due to land pressure, many farmers are convinced of the need to work on an additional 500,000 ha of degraded land. This means that with an investment of €100 million they could generate food security for 4 million people.

Additional important impacts are: human well-being (poverty reduction and eradication of hunger), less out-migration, less social conflict in urban areas, political and social stability, ecosystem-services (like carbon sequestration and climate regulation), improved water availability (groundwater) and higher biodiversity. Decision-makers are recommended to increase national budget allocations for soil and water conservation and environment protection.

Terra Verde and the *Association de Lutte contre la Désertification* (ALCD) were founded in 2006 by ex-employees of the German-Burkina project PATECORE and farmer representatives. If sufficient funds were available they would have a maximum work capacity of 4,000 ha SWC / year (€1 million). On the northern part of the Central Plateau, where the two organisations work, farmers are highly motivated to improve soil productivity on an additional 500,000 ha.

## **5. Disentangling the effects of climate and people on Sahel vegetation dynamics**

**Dr Thomas Hickler**, Biodiversity and Climate Research Centre, University of Frankfurt

Working with NDVI (Normalized Difference Vegetation Index<sup>2</sup>) images, a greening of the Sahel is not observable in all areas. This might explain different experiences of people working in the Sahel. NDVI shows simply how green the vegetation is, but not what kind of vegetation exists, e.g. a forest harbouring high biodiversity or an irrigated field. Overall, NDVI images show that large areas of the Sahel have become greener.

A vegetation model, which is driven by data on climate and soil texture and ignores human activity, can reproduce the average historical greening trend in the Sahel surprisingly well. In the model, the greening and its interannual variability are mainly driven by changes in rainfall, suggesting that these are the main drivers of greenness (Hickler et al. 2005<sup>3</sup>). Other additional potential drivers were analysed by Seaquist et al. (2009<sup>4</sup>). The initial hypothesis was that the correlation between the modelled changes in greenness and satellite-derived trends would be weaker in areas with high grazing pressure or high population density, but the land use data could not generally explain mismatches between the model and satellite data. In contrast to this expectation, the fit between modelled and observed greenness changes was best in areas with the highest grazing pressure, suggesting that, at the scale of the analysed data, land degradation as a result of grazing is not widespread. However, the study was based on relatively large spatial units (0.5 degrees, i.e. approx. 50 km). Smaller scale variations could therefore not be considered.

In summary, greenness and productivity seem to have increased in many but not all areas in the Sahel, but a fertilised field with low biodiversity can appear as 're-greening' on satellite data, even if some ecosystem services are degraded. Shrub encroachment can also have negative effects without

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<sup>2</sup> Vegetation index, based on satellite images

<sup>3</sup> Hickler, T., L. Eklundh, J. W. Seaquist, B. Smith, J. Ardö, L. Olsson, M. T. Sykes, and M. Sjöström (2005): Precipitation controls Sahel greening trend, *Geophysical Research Letter*, 32, Washington, USA

<sup>4</sup> Seaquist, J. W., T. Hickler, L. Eklundh, J. Ardö, and B. W. Heumann (2009): Disentangling the effects of climate and people on Sahel vegetation dynamics, *Biogeosciences*, 6, 469-477, Göttingen, Germany

leaving an NDVI imprint. An increasing population requires intensified agriculture, but if this is based on fertilisers only, possible degradation and negative effects need to be considered.

A general greening trend also occurs in many other global dryland areas. A mystery surrounds the pasture areas of Mongolia and Western USA, which are extensively used areas where precipitation is expected to be the main driver for re-greening. But while precipitation is decreasing, satellite images show that greening is taking place. This might be expected on intensively-used areas, but human activity does not play a major role in the examined areas and it is obvious that rainfall is not the main driver. One potential explanation could lie in poorly understood changes in species composition, such as shrub encroachment.

In the future, higher levels of atmospheric CO<sub>2</sub> could become an important driver. Modelling and a few experimental studies indicate that higher CO<sub>2</sub> levels will favour shrubs over grasses, but the associated processes are still poorly understood.

Any adaptation strategy has to be flexible because projections of changes in rainfall for a particular region are uncertain and vegetation dynamics in drylands are not fully understood.

## 6. Panel discussion<sup>5</sup> with Dr Thomas Hickler (TH), Dr Hannelore Kußerow (HK), Melchior Landolt (ML), Dr Chris Reij (CR), Dr Anneke Trux (AT)

*Question (AT): We all agree that greening and degradation happen at the same time on different occasions. The discussion is not so much on “how much” and “where” we can find greening, but on “why”. What are the **driving forces for greening** and what are the driving factors for land **degradation**?*

*Answer (CR):* There are many drivers. One is **crisis** - farmers have to do something to intensify their production systems. Developing agroforestry systems is the lowest-cost way to intensify the system in multifunctional ways. Second, farmers quickly see **benefits**. They are motivated, quick and keen to spontaneously adopt what they see. The third driver is **governance**, which needs to make strong policies and legislation that will induce millions of farmers to invest in natural resources. Giving farmers the exclusive rights over trees on their land is a very important driver for re-greening. Drivers for degradation are the opposite. There is a lot of degradation outside of agricultural fields because



**Figure 1: Panel discussion** with Dr Thomas Hickler (left), Dr Hannelore Kußerow, Dr Anneke Trux, Melchior Landolt, Dr Chris Reij

<sup>5</sup> This report is a summary of the discussion and not a literal reproduction.

there are no clear user rights established. Large scale and collectively rehabilitated areas are likely to be subject to degradation, while individually rehabilitated land is more successful because farmers continue to maintain and extend it.

Answer (HK): **Rainfall** is one driver; a second is **soil condition**. If there is semi soil cover you have many possibilities, but once you have a sealed surface there is no chance for re-greening. **Protection** is another driver of greening. For degradation I would say woodcutting, **deforestation** and firewood consumption are very important drivers. This means that there is not enough protection against woodcutting in place. Another important factor is the increase in **population density**, an explosive demographic development.

Answer (ML): More **rainfall** is not a must, but supports the process of re-greening. **Soil health** is important. **Land pressure** is the main driver for greening, so long as farmers get sufficient financial support. **Population density** can lead to greening and degradation: as long as land is available there is a degradation process, but people are finally forced to increase land productivity and invest more work in their land. They shift from labour productivity to land productivity – more hands mean better soils – but they need support to invest in SWC. Increased population density can be a chance for re-greening, because there is no other way of intensifying the production.

Answer (TH): There can be degradation at the same time as greening.

Answer (ML): An increase of **precipitation has caused erosion** and flooding in recent years. The driving factors for declining vegetation, from the farmers' point of view, are bush fires/drought and human use, but it's also a matter of culture. We found a confusing pattern according to the ethnic groups, making it dangerous to generalise on local patterns.

*Question (AT): CR mentioned government policies and how they influence greening and degradation. But social and economic issues also need to be involved. In addition to population issues, what about **cultural issues, social conflict, trade, food production, poverty reduction and individual countries' priorities**? These are issues that go to the heart of the areas' national contract. What happened to these policies?*

Answer (HK): In Niger, for example, the President introduced land conservation techniques around Niamey, which have resulted in lots of millet fields. But in the fields further from the capital I couldn't see an impact. Some resource protection measures have been introduced from the presidential side, but nobody knows if they are sustainable or not.

Comment from audience: This is a technically focused discussion, which is good, but the non-technical things need to be kept in mind, like socio-cultural or ecological issues, governance, multi-sectoral approaches, education, and so on!

*Question (AT): That people **see a value** in the resource is a positive driving force. However, using forests for fuel wood and charcoal is one of the driving forces behind degradation. A lot of fuel wood harvesting and marketing systems are currently not sustainable, yet we can change these systems. Fuel wood is one of the most important products that savannah vegetation provides and we should not exclude this kind of utilisation of the natural vegetation, but rather transform it into a sustainable system. In wildlife conservation we have this "use it or lose it" approach. Could this be a comparative approach for fuel wood too?*

Answer (CR): No – you see a decline of natural forests all over the world. You don't find any statistics on agroforests. Trees on farms don't count as forests in statistics, but that's not the current situation.

Everywhere you see the shift from declining natural forestry to a strong development of agroforestry, which has the potential to take the pressure off the natural vegetation.

Comment from audience: In Senegal there are good examples of areas between several villages, called **community forests**, which have been given to communities who organise, create management plans and burn charcoal, and it's a very sustainable system. They can earn more money than by planting crops.

*Question (AT): Both speakers talked about soil conservation, about policies, increase of climatic changes, but nobody talked about the **relationship of pastoralists vs. nomads/semi-nomads**. The Sahel is not just agricultural. It is also a land of nomads and semi-nomads. Are nomads and semi-nomads contributing to less or more greening?*

Answer (HK): When we talk about the Sahel we are speaking about many different things. We work in the agricultural area of the Sahel, in the southern part. There are many agricultural areas, many farmers, while nomads live more in the north. If you use satellite data you see that there is just a very tight space left for people to migrate with their animals.

*Question (AT): There are pastoralists with large amounts of cattle next to the Niger delta. They may not be the owners, but they are there. These animals come with settlements, because everybody has a few animals, and this contributes to soil conservation. We mustn't forget that here.*

Answer (HK): Sealed surfaces are related to woodcutting, which is mainly done by farmers. Nomads cut fewer trees and are not that relevant

*Question (AT): What is the relationship between pastoralists and farmers? How do they factor in greening or degradation? Does land tenure make a difference? If farmers are re-greening and pastoralists come along, does this become an area of local conflict? Do local arrangements exist between farmers and herders for the use of new resources? How are pastoralists included in the re-greening process?*

Answer (CR): In areas of re-greening, the **conflicts** between farmers and herders have not disappeared, but they have **decreased**. It turns out that farmers give access to the herders if they want fodder from the trees. You even see herders who have settled in recent decades. Those groups have the highest farm tree densities. It was surprising, because I expected the opposite. In discussions with them it turned out that it was because they have a lot of livestock, which means a lot of manure and therefore **good soil fertility** management. They have a fairly high food production and do not need the manure for the kitchen, and they don't need to cut the trees to sell them, so their tree densities were higher than for the surrounding agricultural communities.



Figure 2: Audience

Comment from audience: The Sahelian agricultural system depends on both farmers and herders and this has to be integrated – we need to look at both. We know from the past that re-greening can have negative effects of green belts and in some areas precipitation immediately attracts pests like grasshoppers. Another aspect which needs to be considered is **introduced species**. Neem trees have been introduced. In populated areas, this tree has been adapted by the local population as a source of firewood, but it also contributes to a greener Sahel. Introduced species are also an important contribution to the Sahelian ecosystem, as some specific species have multiplied themselves.

*Question (AT): Is **tenure** a key driver in whether land gets greener or is degraded? Is it related to the land grabbing discussion in the Sahel?*

Answer (HK): It is not the key, but it is part of a complex of different factors. I work in the environment of the capital. There may be different systems of land tenure in the surroundings of Niamey or north of Mali where the impact of the government is not as strong. There we have other influences, other impacts. We have to look very closely at different regions. We don't have one tool we can use for all of the Sahel. We have to differentiate.

Answer (ML): Many people ask if land use rights are important drivers for greening or not. It is **not an important issue**. I have never seen any land use conflicts. If the demand of farmers is very high they will they continue investing their labour. Although we need property rights, there is still a lot of activity. A driver for greening is **good leadership**. Like in BF, where the former President was able to mobilise farmers and people to invest more in soil and in nature. So I believe if you have good leadership, if you have people with charisma, this can become a very important driver. Socioeconomic issues are also important. You have different living systems in countries, but ultimately farmers are very pragmatic. They are not very romantic because they have to survive.

Comment from audience: **Land tenure**. Small-scale farmers are often kept out of fertile areas and have to work with less productive soils, because soil is managed by private investment firms and by governments. As soon as an investor comes along, small-scale farmers are kept out and they receive very few resources, because everything (water, soil...) is gone. The question of good governance and land tenure and land rights is very important. Farmers see development going on around them, but won't invest if they can't keep their land.

*Question (AT): Can you say something about the magnitude of the examples you're presenting? What role do they play to the entire Sahel region? Do you have an **estimate of scale**?*

Answer (CR): Public consensus is that the Sahel is a region which is degrading and which is in permanent crisis. The number that I mentioned for Niger (5 million ha) is the largest positive environmental transformation in the Sahel, if not in Africa. It is a large-scale transformation. In BF we know that land rehabilitation using water harvesting techniques is happening in 300,000 ha. We see that the number of trees on land that used to be barren and degraded has significantly increased over the years and is higher than on the land which has always been cultivated. In some areas in Mali we see thousands of trees; we don't know the exact numbers, but we will get remote sensing specialists who will explore the scale of the re-greening of the Sahel. But we will find areas where significant re-greening takes place and where new agroforestry systems have been built. In other areas in Mali, we find old agroforestry systems on 6 million ha on ancient parkland where farmers are rejuvenating old stands - **something big is happening!**

*Question (AT): CR and HK are not far away from each other, but they work in different fields. Could you say a little about this?*

Answer (CR): HK works in uncultivated, open-access areas on degraded plateaus and states that you can do a lot with sandy soils. I work in areas with high population densities and sandy soils, where you have a better success than on the sealed soils where ML is working. I don't see sealed soils (it's a matter of perspective): I see a potential resource to be developed. In areas where you have runoff you can do miracles with simple water harvesting techniques. There are areas where nothing is growing, but maybe there will be in the future if you have runoff.

Comment from audience: There is a discussion about commons and the **importance of commons**. What happens when people have joint access to land? Are commons – the joint management of a certain area – a good idea in the Sahel?

Answer (CR): Outside of agricultural land there are forms of joint management of natural resources which are functional, but not everywhere. Therefore people need their own institutions and the governance of the commons will be an issue.

Comment from audience: We've talked about commons and public goods, which have had a big impact, and then we came up with microcredit and privatised activities on farm land. I would like us to be careful here, because the types of microcredit that worked came from **urban and peri-urban areas** where you can do business quickly and pay back the loans sooner. We all know that agriculture is pretty different in terms of risks. Microcredit works when a lack of capital is the real issue. That's not what we are lacking for land degradation and re-greening. I wonder if capitalism here constrains. Re-greening shouldn't be done on a credit basis! Finance it in a way so as to make it sustainable, compose these best practices and build on them, but don't make people indebted through environmental ecosystem services.

*Question (AT): Do all four panellists agree that **precipitation** makes the biggest difference in terms of further re-greening? If yes, would water harvesting and irrigation, small-scale rainwater harvesting and damming be useful?*

Answer (ML): I agree 100%. We won't find enough money with microcredit. People have other priorities with these credits. It's a good investment for us and for farmers, because you ensure food security, peace-keeping and a contribution to the climate. It would cost much more if you have to solve conflicts and civil war situations. Burkina Faso is one of the poorest countries and does not have the money to support itself.

*Question (AT): So far we have seen success stories and also failed investments as part of the attempt to re-green the Sahel. We identified a couple of driving factors for both greening and degrading tendencies. By now most governments and donors have shifted from investments in natural resources management to fuel wood production agricultural investments or to climate change and adaptation investments. Meanwhile, we have an agreement between EU and AU on investments in adaptation to climate change. There are discussions about the Great Green Wall, which is not meant to be a green wall in the sense of a green belt, but which is meant to be a major re-greening initiative. Do you have any advice for these initiatives? Can we **transfer these technical experiences and success stories** to governments? Can we provide for more investment at the local level? What is the role of local institutions? How can we transfer these experiences in such climate funds?*

Comment from audience: Funds are really important for implementation. We should not rely on the CDM – they will not invest in agriculture in the near future. What we should support is investment in microcredit systems in Africa. It's common in other parts of the world, like in Asia, so why don't we have such mechanisms in Africa and in the Sahel? It's difficult but possible, and farmers would have the chance to escape poverty. For a subsistence farmer it's nearly impossible if he can't build these small structures and buy fertilisers, pesticides, seeds, etc.

Answer (CR): There is an important initiative, initiated by Kofi Annan, which emphasises improved seeds, more fertilisers, mechanisation, irrigation and all these aspects. This is a conventional package of the green revolution, which didn't have much impact in the past and so there is no reason to think it will have much impact in the future, but it is heavily supported by the Bill and Melinda Gates Foundation and many other institutions. Dennis Garrity and others argue that it is necessary to put agroforestry higher in their priority list. **Agroforestry is important** because it links adaptation to climate change, mitigation of climate change, poverty reduction, biodiversity and food security and is a simple method which allows you to deal with more problems at the same time. It's not the only solution, but we are looking for such cases that have an impact. It works with low costs and you put the responsibility where it should be: in the hands of the resource user! This lowers the risk of re-greening initiatives failing completely. We simply need something bigger and more ambitious than the Great Green Wall, because the Great Green Wall, as we know it now, cannot stop desertification or the advancing Sahara. What we need is a massive effort from the southern and northern savannahs, protecting and **managing regeneration**, combining it in certain areas with tree planting and rain management and other activities. We need a corridor, which is four times bigger than the Great Green Wall and something very different, at low cost. The interesting aspect of investing in agroforestry and protecting on-farm regeneration, is that there are no further costs involved for governments and donors after the project has ended, because it's all in the hands of farmers.

Comment from audience: I question the concept of foreign investment. It's possible to consider the model of '**outer organisational changes**'. In the first half of the 1990s, the civil war in Niger was followed by a complete retreat of the Government for some time and a total retreat of projects. People were thrown out onto the street. But they managed, for a greater part, to reorganise themselves and gained the experience that it was possible to do so. It would not be bad to come back to those experiences. For three to four years they had a lot of ideas, based on local knowledge and different local scales, but on a regional scale. There was another model for a while, but afterwards foreign investments returned.

**Final remarks from the Panel:**

*Question (AT): We've heard a number of success factors for greening the Sahel, a number of recommendations for opportunities for better environmental management. There is a need to build on those successful greening and re-greening examples – we do not even know what their proportion to degradation is. I would like to invite the members of the panel to share their final comments:*

TH: We have seen many good examples that land can be improved and we should lobby for getting it done!

HK: Without new strategies in population development and the use of firewood, conservation techniques will not be sustainable.

ML: Scale-up success stories! Advise political decision-makers about how they can mobilise official funds; this does not mean creating new models, but rather scaling-up success stories.

CR: I want to quote a Sahel farmer who said: "If rain falls on a bald head, the drops will flow off very quickly. If rain falls on a head with a lot of hair, it will infiltrate." Research is important, we do not need to stop it, but we do know enough at this moment to take substantive action quickly.

## 7. Conclusion

The four speakers presented their take on the situation in the Sahel. Dr Chris Reij would like to see more commitment from donors and governments to hand over the responsibility for natural resources management to farmers. With low-cost initiatives like agroforestry farmers can fulfil sustainable miracles on their farmland. Dr Hannelore Kußerow, who works on the central plateaus around Niamey, which are not privately owned, does not see SWC methods as sufficient for re-greening because the population pressure is too high. She underlined the problems of sealed surfaces, which hinder an ecosystem from naturally recovering after a drought. Melchior Landolt's presentation gave a very practical view on the situation in BF. He described how farmers contribute to, and benefit from, stone lines. Dr Thomas Hickler's presentation gave an insight in model-based predictions and the importance of integrating ground truth data into vegetation models.

During the panel discussion the driving forces for re-greening and degradation were discussed. Direct benefits, good governance and leadership and giving farmers exclusive rights to their trees are positive drivers, while land pressure due to high population density can be a factor for both re-greening and degradation. Bad soil conditions, sealed surfaces and deforestation lead to further degradation. Rainfall is identified as beneficial for re-greening, but it can also cause further destruction and erosion.

Agroforestry is a viable tool for improved soil fertility, which is necessary for food security and decreasing social conflict and smallholders' vulnerability. As climate changes are not predictable with 100% certainty, it is important to implement very flexible measures.

## 8. Annex

### 8.1. Comment from Dr Issa Ousseini<sup>6</sup>

#### **A green Sahel: perceptions, facts and perspectives (Dr Issa Ousseini, University of Niamey, Republic of Niger)**

##### **1- Perceptions: potentialities and constraints in fluctuations, but hope and life exist**

All the traditional and modern literature of Sahelian societies (stories, legends, etc.), the chronicles of their history and the scientific data on the environmental evolution are unanimous about the dynamics of Sahel. The Sahel is an environment that fluctuates between the permanent Saharan aridity and the temporary wetness of Sudanese savannahs. So, the greenery, understood both like vegetation and like hope and socioeconomic development, draws on different scales of time: from the dry season to the rainy season, from years of abundance to years of penury. But this is not a fatality.

Since the late Quaternary, palaeoecological compilations and meteorological data show a double climatic evolution characterised by fluctuations and decreasing rainfall. But that does not confirm the pessimistic projections of Sahel mutations in the Sahara. For example, concerning vegetation, despite these trends the changes in boundary between Saharan and Sahelian zones becomes stable again during the period 1984 to 1994 (NASA, 2007, Schulz, E. et Al. 2009). Several cases of spontaneous regeneration are recorded (Sudan, Niger, Chad, Mali) when people have been forced to leave areas during periods of insecurity. Other examples relate regeneration trends to the improvement of rainfall in the 1990s (Herrmann S. M. et al., 2005). These evolutions are possible, despite their constraints, because Sahelian ecosystems have the potential of generation which give them some resilience. For Schulz: “the question of stability – lability and vulnerability – resilience cannot only de-evaluated from the physical conditions of these regions.”

Indeed, what about pressure from human activities? Several scientific perceptions present the savannahs in Sahel and Sudan zones as anthropogenic vegetation. Are not savannahs the original domain of the *Hominidae*?

To consider all these views, the right questions seem finally more concise than the duality ‘climate – human pressure’. If there is re-greening (and it certainly is somewhere), how it can be explained? Can an observed ‘model’ of re-greening be transferred elsewhere in the Sahel? What limits should be reserved? What conditions and modalities must be considered?

##### **2- Facts**

###### A diversity that reduces the pertinence of local experiences to explain the Sahel

To take this climatic definition, the Sahel (from isohyets 500 to 200 towards Nord) is a band of area 200-400 km wide and more than 5,000 km from Cape Verde to Djibouti (equivalent to the eastern coast of Russia to the western coast of Portugal), across the countries shown in table 1.

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<sup>6</sup> Dr Issa Ousseini was invited as one of the speakers for the symposium, but was unable to attend. His paper for the occasion is being reproduced here as a contribution to the debate on re-greening in the Sahel.

**Table 1:** Sahel countries and their total area.

<b>Countries</b>	<b>Area (km<sup>2</sup>)</b>
Djibouti	23,000
Ethiopia/Eritrea	122,100
Cape Verde*	4,033
Burkina Faso*	274,200
Mali*	1,239,710
Mauritania*	1,030,700
Niger*	1,267,000
Senegal*	196,192
Sudan	2,505,813
Chad*	1,284,000
Guinea Bissau*	36,125
Gambia*	11,295
<b>Total</b>	<b>79,94,168</b>
(Europe)	(10,522,100)

\* Politic Sahel (CILSS) or common Sahel for Medias

In spite of the climatic homogeneity linked to the situation on the Sahara border, such an extended area presents a great diversity when interest is focused on complex topics such as renewable resources (water, soils and biomass), their associated systems of production and dynamics of rural development. In this way two nearby countries like Niger and Burkina Faso have different ecological situations. The ecological potential in Niger is more fragile and degraded because the soils are sandy and thus more erodible, the flux of full-nomadism more intense and rural land use more open (Azawagh = open land, free use land). The rainfall is more abundant in Burkina Faso, but the underground water stocks are lower because the geology is dominated by magmatic and metamorphic stones. This analysis is focused on the thin farming zone in middle and western Niger.

#### Drought: extent and effects

The tables 2 and 3 summarise the spatio-temporal variations of annual rainfall during the last half-century (1955-2005). The 16 stations cover the official farming zone (annual rainfall higher than 300 mm).

For each station the statistic median value of the period (1955 to 2005) is the reference. Years are classified according to excess or deficit in percentage of this median value.

The period from 1955 to 1967 was normally humid (100 to 124% of the median value) or exceptionally humid (more than 150%), particularly for the Sahelian stations which register less than 600 mm. The first drought period from 1968 to 1973 was normally dry (50 to 74%). During the second drought from 1981 to 1987 the drought was accentuated by some exceptionally dry years (less than 50%). The phenomenon was also more extended throughout the entire region. The years from 1984 to 1987 recorded the highest deficits. Since 1991, rainfall has improved, particularly in areas which received less than 500 mm; nevertheless, it hasn't reached the levels prior to 1967. 1993, 1997 and 1994 were in deficit. Farming and breeding are based on natural resources without great technical management.

So periods of drought also become periods of drastic downtrend in production, with dramatic impacts. In summary, these impacts:

- concerned the 'forest' potential: 70,000 to 80,000 ha disappear per year against less than 20,000 ha reforested. Now, 98% of the energy consumption in rural areas and 85% in urban areas is provided by firewood,
- concerned the small farming economy: recurrent food and nutritional deficits (1973-1974, 1984-1985, 2004-2005, 2010); reinforcement of poverty (66% of the population

are considered poor according to the World Bank standard in 2001); people and cattle are more exposed to diseases,

- concerned the social security: frequent conflicts for access to natural resources, strong economic dependence towards external resources (towards opportunities offered in local towns or on coffee and cocoa plantations in the south States, towards aid from industrial States in the North); political instability (rebellions, military putsches, crime, Islamism, etc.).

**Table 2:** The median (“médian”) spatio-temporal variations of annual rainfall from 1955 to 1979, classified from less than 50% of the median (“moins de 50% de la médiane”) to more than 150% of the median (“plus de 150% de la médiane”).

		Se	moins de 50% de la médiane																								
		S-	50% à 74% de la médiane																								
		Ns	75% à 99% de la médiane																								
		Nh	100% à 124% de la médiane																								
		H+	125% à 149% de la médiane																								
		He	plus de 150% de la médiane																								
N°	Stations	Médian	1955	6	7	8	9	0	1960	2	3	4	5	6	7	8	9	1970	1	2	3	4	5	6	7	8	9
16	Dolbel	319	*	*	*	*	Nh	H+	H+	Ns	H+	H+	Nh	Nh	Nh	Ns	Nh	Nh	Ns	S-	Ns	Nh	S-	Ns	Ns	Ns	Nh
15	Ayerou	318	Nh	H+	Nh	Nh	He	Nh	Nh	H+	Nh	He	Nh	Nh	Ns	Nh	Ns	S-	Ns	S-	S-	Ns	Ns	Ns	Ns	Ns	Ns
14	Tahoua	367	H+	Nh	Nh	H+	H+	Ns	He	He	Ns	Nh	H+	H+	H+	Nh	Ns	Nh	S-	S-	S-	Nh	Nh	Nh	Ns	He	Ns
13	Filingue	338	He	H+	He	He	He	Nh	H+	H+	H+	H+	He	Ns	He		Nh	Ns	Nh	Ns	S-	Nh	Ns	Ns	Nh	He	Ns
12	Ouallam	394	Nh	H+	H+	Nh	He	Nh	Nh	H+	H+	H+	He	He	H+	Ns	Ns	Ns	Nh	Ns	S-	Nh	Ns	Ns	Nh	H+	Nh
11	Tillabery	403	H+	H+	He	H+	He	Nh	He	Nh	Nh	He	H+	H+	Ns	Ns	S-	S-	Ns	Ns	Nh	S-	H+	Nh	H+	Nh	Nh
10	Tera	426	Nh	Ns	H+	Nh	H+	Nh	He	Nh	Nh	*	*	Ns	H+	Ns	Ns	Ns	S-	Ns	Nh	Ns	Ns	Ns	Nh	*	H+
9	Keita	429	Nh	Nh	H+	He	H+	Nh	Nh	*	*	*	*	Nh	Nh	S-	Ns	Nh	Ns	S-	*	Nh	Ns	*	Ns	He	*
8	Gothey	450	H+	Ns	H+	H+	Nh	Ns	Nh	Ns	Ns	He	He	Nh	He	Nh	Ns	Nh	Ns	Ns	Ns	Ns	Ns	Nh	Nh	Nh	Nh
7	Madaoua	447	Nh	Nh	Ns	Nh	Nh	Ns	H+	Nh	Nh	He	H+	Nh	*	*	Ns	Ns	Nh	S-	S-	H+	H+	Ns	*	*	Ns
6	Doutchi	454	Nh	Nh	Nh	He	He	Ns	H+	Ns	Nh	He	H+	Ns	*	*	Ns	Ns	Ns	S-	S-	Nh	H+	Ns	*	*	Ns
5	B Konni	495	Nh	Nh	H+	H+	H+	Ns	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Nh	S-	Ns	Ns	Nh	H+	H+	Nh
4	Niamey Aéro	543	Nh	Nh	H+	Ns	Nh	Nh	Nh	H+	Ns	H+	H+	Ns	H+	Nh	Nh	Ns	Ns	S-	S-	Ns	H+	Nh	Nh	Nh	Nh
3	Dosso	569	Nh	Nh	H+	Nh	Ns	Nh	Nh	Nh	Nh	H+	Nh	Nh	Ns	Ns	*	Nh	S-	Ns	Ns	Nh	Ns	Nh	*	*	Nh
2	Say	591	Ns	Ns	H+	Nh	Ns	H+	*	H+	Nh	Nh	H+	Nh	Nh	Nh	Nh	S-	S-	S-	S-	Nh	Nh	Nh	Nh	Nh	Nh
1	Gaya	801	H+	Nh	Nh	S-	Nh	Ns	Nh	Ns	Ns	H+	Ns	Ns	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Ns	S-	Nh	Nh	Ns	Nh

**Table 3 :** The median (“médian”) spatio-temporal variations of annual rainfall from 1980 to 2005, classified from less than 50% of the median (“moins de 50% de la médiane”) to more than 150% of the median (“plus de 150% de la médiane”).

		Se	moins de 50% de la médiane																									
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N°	Stations	Médian	1980	1	2	3	4	5	6	7	8	9	1990	1	2	3	4	5	6	7	8	9	2000	1	2	3	4	5
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15	Ayerou	318	Ns	Ns	Nh	He	S-	S-	Ns	S-	Nh	Nh	S-	Nh	Nh	Ns	H+	Ns	Ns	S-	He	H+	H+	He	Nh	Nh	S-	Nh
14	Tahoua	367	Ns	Ns	S-	S-	Ns	S-	Ns	S-	Nh	Ns	H+	Ns	S-	He	Ns	Ns	Ns	H+	H+	Ns	Nh	Nh	Nh	S-	Nh	Nh
13	Filingue	338	Ns	Ns	Ns	Ns	Ns	Nh	Ns	He	Ns	Ns	Ns	H+	Nh	S-	He	Ns	Ns	Ns	Ns	He	Ns	He	H+	H+	Ns	Nh
12	Ouallam	394	Nh	S-	S-	Ns	He	S-	Ns	S-	Nh	Ns	Nh	H+	H+	Ns	Nh	Nh	Ns	Ns	Nh	Nh	Ns	Nh	Nh	H+	Nh	Nh
11	Tillabery	403	Nh	S-	S-	Ns	Ns	S-	Ns	S-	Nh	Nh	Ns	Nh	Ns	Nh	Nh	Nh	Nh	Nh	H+	Ns	Ns	Ns	Ns	H+	Nh	He
10	Tera	426	*	Ns	S-	S-	S-	Ns	S-	Nh	Nh	Ns	Nh	Nh	S-	H+	Nh	Ns	S-	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Nh	Nh
9	Keita	429	S-	Ns	Ns	Ns	He	Ns	Ns	Ns	H+	Nh	Ns	H+	Nh	S-	He	Ns	Ns	Ns	H+	Nh	Nh	*	*	*	*	*
8	Gothey	450	Ns	Ns	Ns	S-	Ns	Ns	S-	S-	Nh	S-	Nh	Nh	Ns	H+	Ns	Nh	Ns	H+	Nh	Ns	Nh	Ns	Nh	He	Ns	H+
7	Madaoua	447	*	S-	Ns	Nh	S-	Ns	Nh	S-	Ns	Ns	Ns	He	Nh	Ns	H+	Ns	Nh	Nh	Nh	H+	Nh	Ns	*	*	*	*
6	Doutchi	454	*	S-	Ns	Nh	S-	Ns	Nh	S-	Ns	Ns	Ns	He	Nh	Ns	Nh	Nh	Nh	Nh	H+	Nh	Ns	*	*	*	*	*
5	B Konni	495	Nh	S-	S-	Ns	S-	Ns	S-	Nh	Nh	Ns	Nh	Ns	Nh	Ns	H+	Ns	Nh	Ns	Nh	Nh	H+	Ns	S-	*	*	*
4	Niamey Aéro	543	Ns	Ns	S-	Nh	Ns	S-	Ns	S-	Nh	Ns	Ns	Nh	Nh	H+	Nh	Nh	S-	He	Nh	Ns	Nh	Ns	Nh	Ns	Nh	Nh
3	Dosso	569	*	Ns	Ns	Ns	*	Nh	Nh	S-	Nh	Nh	Ns	Nh	Nh	H+	Ns	Ns	S-	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Nh	Nh
2	Say	591	Ns	S-	S-	Ns	S-	Nh	Ns	H+	Ns	Ns	Nh	Nh	Ns	He	S-	Ns	S-	Nh	Nh	S-	Ns	Nh	S-	Ns	Nh	Nh
1	Gaya	801	Nh	Nh	S-	Ns	S-	Nh	Nh	S-	Nh	Ns	Ns	Nh	Ns	Ns	Nh	Ns	Nh	Nh	Nh	Nh	Ns	Ns	Nh	H+	Ns	Ns

### Mutations of natural resources statutes and their consequences

Since 1960 the development in public health has shown some impacts. The most visible result is the accelerated demographic growth (more than 3% per year). The population of Niger has quadrupled from 1960 to 2001.

Figure 3: Development of the population of Niger.

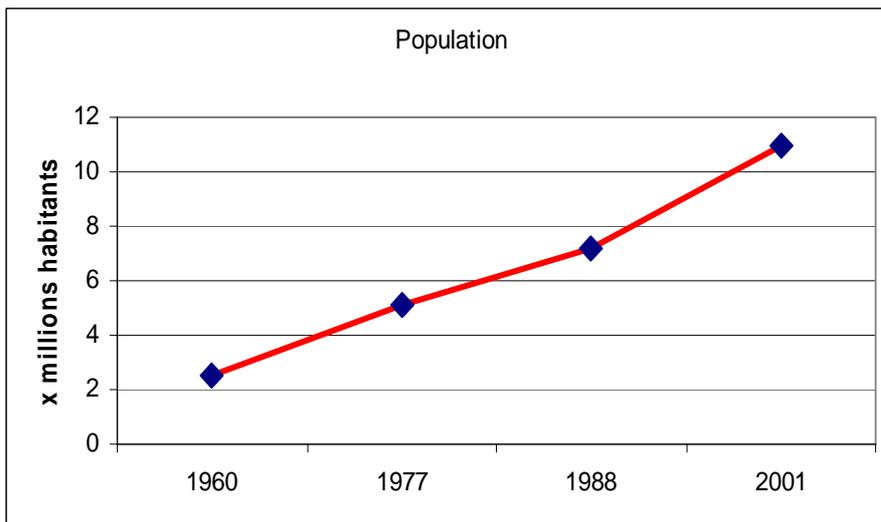
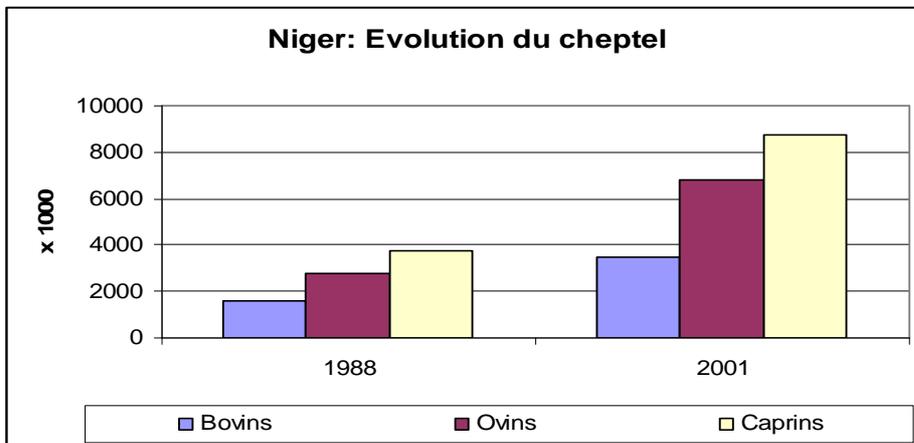


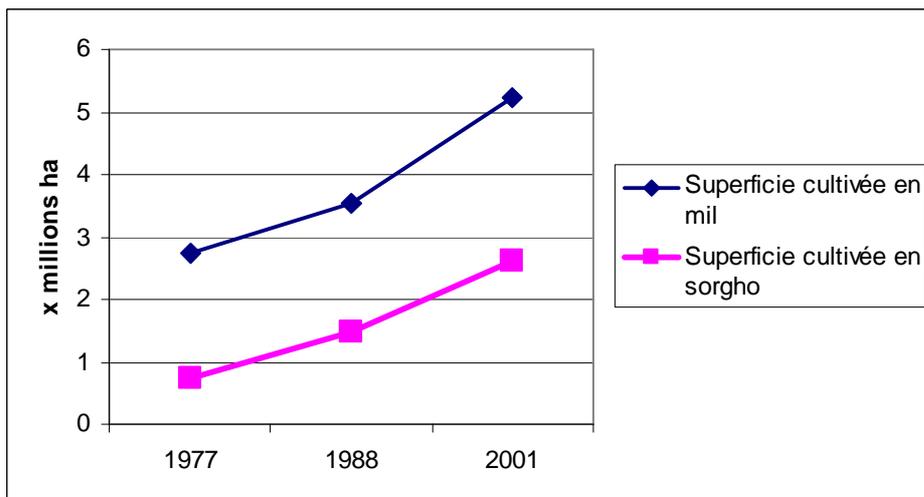
Figure 4: Livestock numbers in 1988 and 2001 of beef ("bovin"), sheep ("ovins") and goats ("caprins").



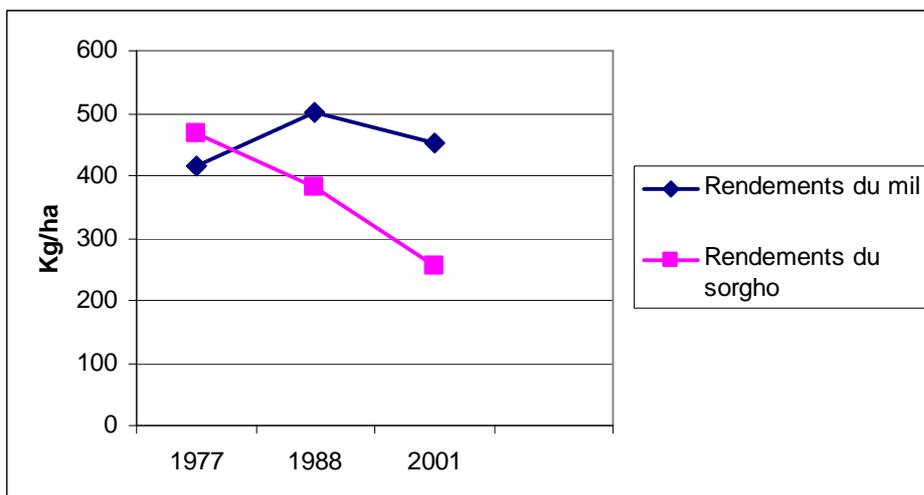
In reply to increasing food demand, there has been an extension of agricultural and breeding areas rather than the implementation of technical management. Since the 1970s, yields of the main crops (millet and sorghum) per ha have fallen, which is linked to degraded soil fertility (figure 6).

The correlation between the numeric growth of the population and episodes of drought and the degradation of natural resources is not systematic or linear.

**Figure 5:** Area cultivated with millet (“mil”) and sorghum (“sorgho”) in 1977, 1988 and 2001 respectively.



**Figure 6:** Yields of millet (“mil”) and sorghum (“sorgho”) in 1977, 1988 and 2001 respectively.



One must remember that the statute and functions of land (consequently of land use) were based on communitarian ownership. In the majority of cases, land is inalienable because it has more than a market value. Property is handed down in communities, but there are many mechanisms to access loans, donations, rent, pledges and others contracts. Throughout many centuries these mechanisms have allowed the regulation of social inequalities. At the individual level they operate as an insurance contract to live and to keep a minimal social existence in spite of poverty. Countries’ religious beliefs (animism) also controlled the usage of natural resources in the face of people’s easy access them.

With the rapid demographic growth in areas of high population density (i.e. South Maradi, South Tahoua, Dosso and the Niger River), land has become parcelled out into such small pieces that it can no longer offer a family subsistence. The traditional rules of communitarian solidarity cannot function. The demographic drain through migration is higher.

Often, a country’s religious beliefs have been insidiously dismantled by miscellaneous pressures (European schools and education, extension of Islam, income from migration, etc.), and have been not replaced by new land laws from the centralised modern State.

### Rural development programmes: impacts in re-re-greening

Several development programmes now see the effects of drought as problematic for development. The major ones are the Rural Development Project of Maradi (in the 1970s), the Rural Development Project of Badaguichiri (south Tahoua, in the 1970s), the Integrated Development Project of Keïta (PIK-FAO, south-eastern Tahoua, from the 1980s to 1990s), the Rural Development Project of Tahoua (PDRT-GTZ, central Tahoua, from the 1980s to early 2000s) and the Agro-pastoral Project of Tillabéry (PASP-GTZ, north Tillabéry, from the 1980s to early 2000s).

In spite of these programmes everybody knows that these regions have also been seriously affected by hunger and malnutrition in 1985, 2005 and now in 2010. The phenomenon has been intense, particularly in the regions of Maradi and Tahoua.

What does this mean? Don't these programmes have any impacts? It is not possible here to develop a detailed evaluation. In summary, the following results can be underlined:

- Improved management has (relatively) secured the pluvial crop productions in many places (Tahoua, Maradi). The yield output per ha has risen, particularly in the valleys managed with micro-dams. In these valleys it is now possible to have two harvests per year, one at the end of rainy season and another by irrigation when the underground water is accessible.
- Some equipment has been improved (plough, donkey or cow drawn cart, water harvesting techniques, etc.). The technical itinerary of production has been relatively, but simply, improved. The result is a general improvement in the auto subsistence of families (i.e. from average of 3-5 months in a good year before PIK and PDRT intervention at Tahoua, to 6-8 months now). It still misses the 4-6 months to be covered, but the diversification of activities is essential to building a durable farming system.
- The vegetation cover is reconstituted in some areas by reforestation and more efficaciously by the protection of natural regeneration. The firewood crisis has been reduced, but this dynamic hides many other challenges. The quality of pasture trends downwards in spite of improvements of techniques and rainfall, because overgrazing carries the proliferation of bad herbs (i.e. *Sida cordifolia* and *Cassia mimosoides*). In general the loss of biodiversity is a challenge, even in the re-greened areas. It reinforces food insecurity and malnutrition because picking or hunting in the forest was traditionally a non-negligible contribution to a balanced diet and medicine.
- In some areas, the improvements to families' economies permit some surplus and a sparing of cattle. Is this a reduction of risks?
- But probably the most promising impact against Sahelian adversity is a result of the innovations of these projects in organising the producers and to build their capacity to share their experiences and their power to improve. The results have often been limited both by the approaches of projects (to short-term interventions, World Bank oriented choices towards 'less State', etc.) and the political context without democratic choice. The potential of organisation exists, but in many cases without power to legitimate the territorial innovations.

### **3- Perspectives towards a greener Sahel**

A main output from these experiences is that processes will be considered whose impacts are lower than those hoped for. The 're-greening' appears in little isles that don't inverse the structural dynamics of the Sahel. But within these isles of success lie great challenges for the future:

- The mutation of land statute, which becomes alienable by money, runs the risks that many small farmers may become marginalised as well as reinforcing poverty and malnutrition for a fraction of the population. The primary structure of the economy still doesn't offer the opportunities to provide people with decent conditions, as was the

case, for example, in Europe during the last centuries. This seems to be the case in the Maradi region.

- The losses of biodiversity become very important for breeding, traditional medicine and a good, balanced diet. In this way the fundamental question is not only if the 'green' is or isn't, but what 'green' is.

Another lesson we can draw from these experiences is that climatic constraints are not a fatality. It is also often said about these experiences that the most difficult problems aren't solved by technical approaches, but by social organisation. The decentralisation and democratic movement today provides a different context to that prior to 2000. Interventions will be implemented close to producers' organisations.

But producers' capacities will be built on answers to practical questions about the mobilisation of financial investments for diversifying rural activities, for equipment to manage soil fertility, to control water resources and crop diseases, to develop procedures of transformation and networks connected to markets.

## 8.2. List of participants

<b>Nr.</b>	<b>Given name</b>	<b>Family name</b>	<b>Organisation</b>
1	Khalid	Almodimeagh	Riyadh Dev. Arch.
2	Martin	Baumgart	agknowledge-consulting
3	Alexandra von	Bieler	Bödeker Partner LA
4	Seboka	Bizunest Bojate	Universität Bonn
5	Richard	Bödeker	Bödeker Partner LA
6	Isabel	Bodemeyer	KfW
7	Richard	Escadafal	CESBIO Toulouse
8	Christoph	Fischer	Universität Göttingen
9	Dennis	Garrity	ICRAF
10	Laurens	Geffert	Universität Bonn
11	Lea	Herberg	GIZ
12	Thomas	Hickler	Universität Frankfurt
13	Uwe	Hoering	Policy Research Bonn
14	Heike	Höffler	Ag Economist & PhD cand
15	Hans-Josef	Honsel	GIZ
16	Heidi	Humer-Gruber	GIZ
17	Mandy	Hupfer	BMZ
18	Timothy	Johnston	GIZ
19	Marcus	Kaplan	DIE
20	Maren	Kneller	BMZ
21	Wilhelm	Kohlmus	Welthungerhilfe
22	Stephan	Krall	GIZ
23	Marius	Kraus	GIZ
24	Thomas	Krings	Universität Freiburg
25	Diana	Kurzweg	GIZ
26	Hannelore	Kußerow	Freie Universität Berlin
27	Tene	Kwetche Sop	Universität Hamburg
28	Daniel	Kyalo	Universität Bonn
29	Melchior	Landolt	Terra-Verde Förderverein
30	Heike	Ostermann	GIZ

31	Kordula	Pfeiffer	GIZ
32	Chris	Reij	VU Amsterdam
33	Armin	Rieser	Universität Bonn
34	Annette	Roth	DED
35	Carolin	Schaefer	GIZ
36	Jutta	Schmitz	GIZ
37	Diethelm	Schneider	
38	Alexander	Schöning	GIZ
39	Erhard	Schulz	Universität Würzburg
40	Steve	Sepp	Eco-Consult
41	Cornelia	Sepp	Eco-Consult
42	Levke	Soerensen	GIZ, Bonn
43	Chinwe Ifejika	Speranza	DIE
44	Kurt	Steiner	Landconsult
45	Katharina	Stier	GIZ
46	Severin	Sturm	GIZ
47	Anneke	Trux	GIZ CCD
48	Bertrand	Vincent	UNCCD
49	Michael	Wahl	GIZ
50	Luis	Waldmüller	GIZ
51	Martina	Wegner	GIZ
52	Juliane	Wiesenhütter	GIZ
53	Angelika	Wilcke	Rural 21
54	Günther	Winckler	Consultant
55	Maximilian	Witting	Germanwatch
56	Martin	Wolff	Deutsche Welthungerhilfe
57	Miriam	Zeh	EADI
58	Sergio A.	Zelaya	UNCCD

### 8.3. Programme

Symposium  
Program



## Green Sahel

28 October 2010

10.30 am - 4.00 pm

Gustav-Stresemann-Institut, Bonn (Langer Grabenweg 68)

*Moderation: Dr Stephan Krall und Dr Heike Ostermann*

**10:30**

**Welcome and introduction to the topic**

Maren Kneller, BMZ  
Dr Stephan Krall, GIZ

**11:00**

**Re-greening Africa's drylands: experience, impacts and tools for scaling-up**

Dr Chris Reij, Center for International Cooperation, VU  
University Amsterdam

**11:40**

**The myth of the encroaching desert**

Dr Hannelore Kußerow, Institute of Geographical Sciences, FU  
University Berlin

**12:20**

*Lunch Break*

**13:15**

**Green Central Plateau Burkina Faso**

Melchior Landolt, Director of Terra-Verde e.V.

**13:50**

**Disentangling the effects of climate and people on Sahel vegetation dynamics**

Dr Thomas Hickler, Biodiversity and Climate Research Centre,  
University Frankfurt

**14:25**

**Panel discussion with the referees**

Dr Anneke Trux, GIZ (Moderation)  
Afterwards: Conclusion and final remarks

**End of symposium: 4.00 pm**