

SCENARIOS FOR PARKLANDS IN BURKINA FASO

- a report from a workshop for identifying research needs

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Focali Report

2012:01



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ISBN: 978-91-86402-19-8



The **Forest Initiative** is a strategic partnership between **Sida, the Swedish Forest Agency and the Swedish Forestry Association**. The overall objective of the Initiative is poverty reduction through promotion of sustainable management and administration of forest resources within Swedish development cooperation. Sida is the main donor of the Forest Initiative, which is based on the belief that forests play an important role for poor people and can contribute to economic and social development as well as a better environment.

This document has been financed through the Forest Initiative and does not necessarily reflect the view of the three main partners of the Initiative. Responsibility for its contents rests entirely with the author(s).

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1 INTRODUCTON

This report presents the process and the results from a workshop titled “The future of parklands” held in Ouagadougou, Burkina Faso on 17-20 October in 2011. The workshop brought together researchers from Burkina Faso and Sweden. The local participants were academic experts and practitioners working with agriculture and parklands. Their areas of expertise range from *Vittelaria* (shea/karité) ecology, parkland ecology, agroforestry, forestry and livestock, to shea butter and value chain and agricultural economics. The aim was to discuss possible scenarios for agricultural parklands and based on these scenarios identify research needs. The scenarios presented can be seen as qualified guesses for future development, and are foremost tools for analyzing possible future agricultural research needs.

Workshop participants

Workshop leader: Gert Nyberg, SLU (Swedish University of Agricultural Sciences)

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Picture from group discussion during scenario workshop in Ouagadougou (Foto: Lisa Westholm).

Burkina Faso

Burkina Faso is a landlocked country in West Africa. The population was almost 16 million in 2010 and the population growth rate is over 3.4%. In the last census, in 2006, over 46% was below 15 years of age (INSD, 2011). Burkina Faso is one of the poorest countries in the world, ranked 181 out of 187 countries according to the Human Development Index (UNDP, 2011). According to the UNDP (2011) almost 66% of the population is in severe multidimensional poverty; a definition that includes indicators of education, health and living conditions. The rural population comprised 77% of the population in 2006 (INSD, 2011).

The country's agricultural sector is one of the least productive on the African continent, due to among other things financial and technological constraints (Burkina Faso, 2007). Nonetheless, the primary sector, including agriculture, livestock breeding and forestry comprises about 35% of the Gross National Product (GDP) (INSD, 2011). A survey from 2005 estimated that 85% of the active population is occupied in "agriculture, hunting and forestry" (INSD, 2011). The same survey conducted in the dry season in 2007 estimated that 67% of the population was occupied by the same activities. However, many people leave agriculture during this season to search for alternative incomes from seasonal jobs, and return to agriculture in time for the rainy season to begin.

1.1 Parklands in Burkina Faso

Parklands are the dominating agricultural system in Burkina Faso and in other semi-arid areas in West Africa. It is an agricultural system with trees interspersed in cereal fields (sorghum, maize, millet). The cereal production in the parklands is low; about 1-1.5 ton/ha or below. Trees are actively kept in the system for the value of their products. The most common tree species are *Vittelaria paradoxa*, Karité that supplies nuts which are used to produce cooking oil and Shea butter, *Parkia biglobosa*, Neré, used to make the widely used spice soumbala, and *Fadherbia albida*, providing fuel wood, fodder and improved soil fertility. Common densities of Karité is 10-20 trees per hectare, 1-2 trees/ha for Neré and 20-30 trees/ha for *F. albida*. Under Karité and Neré trees crop yields are normally lower because of the reduction of sunlight. This yield loss is compensated by the value of the tree product. Under the trees in parklands the levels of soil carbon and nutrients are usually higher than in the surrounding fields and water infiltration is higher. Fallow periods are included in the system. These periods are important for the regeneration of trees. However, due to increased population pressure fallow periods are nowadays often shortened or completely abandoned.



The parkland system in the village Bonogo, Burkina Faso (Foto: Maria Ölund).

2 CONSTRUCTING SCENARIOS

2.1 Scenarios as a tool

The discussions at the workshop developed four different schematic scenarios. The aim of the four scenarios was to present a range of possible and different scenarios to freely stimulate new thoughts and ideas about future challenges, gaps in knowledge and research issues. The details of the scenarios were then developed in the workshop discussions between researchers from different disciplines. Whilst some changes in agriculture may be relatively rapid most changes and adaptations within crop, tree and livestock production, and changes in land use are gradual and extended over time. Thus, research on food production has to take a long-term perspective. Consequently a time horizon of 40 years (2050) was chosen for the scenarios.

The four constructed scenarios were:

1. Business as usual
2. Foreign/corporate agriculture and land grab
3. Mixed systems
4. Parklands prevail

The scenarios are examples of possible future developments. They were neither target scenarios nor were they chosen as desirable visions for the future. The scenarios were used as tools to analyze what research issues and questions will be pertinent in the future. Typical questions in this analysis were:

- *“What research is needed to develop means and knowledge, e.g. systems, methods, technologies, policies, regulatory frameworks to avoid ending up in the problems of scenario X?”*,
- *“How can research enhance the possibilities of reaching the situation in scenario Y?”*,
- *“How can research improve some specific components in scenario Z?”*

This was done with a food production and food security focus for Burkina Faso and with special emphasis on the persistence of the parkland systems.

2.2 Background data

In the construction of the scenarios, background data from a number of sources was used as a means to contextualize the scenarios. The background data included projections on climate change, water availability and population growth.

Water availability per capita is expected to half between 1990 and 2025. Burkina Faso will then be under water stress, with only around 1 500 m³ per person and year available in 2025 (UNDP, 1999).

Together with rapid population increase, projected to rise from today’s 16 million to 47 million in 2050 (U.S. Census Bureau, 2012), this paints a bleak picture for agricultural possibilities, poverty eradication and food security in the future.

2.3 Assumptions and delimitations

Although global drivers and actors play a significant role in several of the scenarios posed for Burkina Faso, they were not analyzed as such on a global scale. The four scenarios were constructed with Burkina Faso, and especially the parklands systems, as the focus. External (global) and internal (national, local, cultural/traditional) drivers derived from global forecasts (predictions for climate change and population growth), pertinent international developments (e.g. land grab) and

discussions were seen rather as independent variables. In the construction of the parkland scenarios these forecasts were combined with workshop participants' own expertise and experiences.

The term land grab is used for when international corporations or foreign countries buy or lease large areas of land for intensive agricultural production (including forest plantations and feedstock productions for biofuel). This production may be intended for a local and/or international market, and in some cases exclusively for export production, e.g. to the investing country. Such large scale international land acquisitions can be seen as land grab if they only favor the investing country or company but they may be seen as a development opportunity if they benefit local development, markets and populations (Cotula et al., 2009; Anseeuw et al., 2011).

In the development discourse it is often said that development is middle class driven (e.g. Juma, 2011). However, in many African countries this middle class is mainly urban and most economic development takes place in cities. In some of the scenarios presented below, we use the term rural middle class referring to a middle class that stays and invests in rural areas. This could e.g. be successful and entrepreneurial farmers buying or leasing land from less productive neighbors, hence enabling them to become even more efficient and productive. This class would also include people investing in small scale rural agro-industries and agribusiness.



Shea nuts (Foto: Maria Ölund)

It was concluded that fluctuations and increases in cereal crop prices are not likely to threaten the parklands as such. The tree products are too valuable for this to happen. Based on workshop participants' local knowledge and expertise and on present local prices of crops and Shea nuts, a rough estimation showed that even a five-fold increase of the crop value would not economically motivate the removal of Karité trees. Hence, price fluctuations are drivers of agricultural development, but do not threaten the persistence of parklands *per se*. However, parklands may be threatened by large scale mechanization or other scale-invoked changes, or by the change of crops or cropping system.

3 PARKLAND SCENARIOS

3.1 Business as usual scenario

In this scenario agricultural development is slow and little progress is achieved in agricultural research. There is only moderate intensification which is not enough for food production to keep up with population increase. Efficiency, specialization and diversification in agriculture are low and farmers are dependent on few crops or products which make them vulnerable both to market fluctuations and to the effects of climate change, i.e. they have a low adaptive capacity. Rapid population increase and augmented pressure on land worsen the problem and hence the farmers vulnerability.

There is low availability of agricultural inputs, little subsidies and low access to credit. Market access is low both for crops and for tree products (e.g. Shea butter). Agriculture remains largely on subsistence level and agricultural productivity continues to be very low, or might even decrease.

Policies related to land-use and agriculture are weak, as is implementation of them. Decentralization policies are only implemented at a limited scale. There are no fundamental tenure reforms and land laws are not sufficiently enforced. Although there is little likelihood of large international



Harvest time in Bonogo village (Foto: Maria Ölund)

investments in the agricultural sector (land grab), national elite may appropriate the best lands for agribusiness.

The threat to the parkland system is low although regeneration of Karité and other trees becomes increasingly problematic due to shortened fallow periods. Food production remains very low with poverty and increased prevalence of hunger or even starvation as consequences. Due to high population pressure and low agricultural productivity environmental degradation is severe. The difficulties with sustaining rural livelihoods will lead to increased migration, both internal and international, and result in urbanization in despair, i.e. people migrating to cities from rural areas where they cannot make a living. The risk for social unrest and conflicts is high in the business as usual scenario.

3.2 Foreign/corporate agriculture and land grab scenario

In this scenario international companies or foreign countries own, or lease on long-term basis, large parts of the agricultural land in Burkina Faso. The international actors invest heavily in agricultural production (including forest plantations and feedstock production for biofuels). In these areas the production is specialized, efficient, highly mechanized and the use of inputs is high. Monocultures are the dominant mode of production and operations are large-scale. However, the produce is exclusively intended for an international market or to feed the people of the investing country. This form of exploitive international agricultural investments is often termed land grab.

There may be some agro-processing and other value addition in Burkina Faso making use of cheap labor. The majority of agro-processing will be in the hands of international investors and most of the value will be exported. Since mechanization is high, both in agricultural production and in the industrialized process, rural employment opportunities will be limited. In this scenario there are few incentives for a rural middle class to develop since they compete with more powerful actors. The local middle class will largely remain urban.

The large-scale international agricultural investments, or land grab, will target the best and most productive land. Small-scale subsistence farmers will be pushed to marginal areas with lower productivity and more constraints. There will be little policy support or subsidies for small-scale agriculture and market access will be limited. Land productivity will remain low or even decrease. Furthermore, the population increase will intensify pressure on land and resulting degradation. Small-scale farmers will be vulnerable to fluctuations in global prices on agricultural products and to the effects of climate change. The large-scale agriculture will likely be better able to adapt to market fluctuations and to adapt to the effects of climate change due to higher efficiency and through technical solutions.

The government is weak, not able to regulate the land grab. It is also unable to substantially improve the situation for small-scale subsistence farmers. Resources for national development will most likely be limited although some individuals in the political system may draw benefits from land grabbing.

Although food production may be high in the land-grab agriculture this does not positively affect food security in the country. The low productivity of subsistence agriculture, population increase, land degradation and climate change will decrease local availability of food. Poverty will increase.

Migration, including urbanization in despair, will be common. The threat to the existence of parklands is severe. As in the business as usual scenario the risk for social unrest and conflicts is high in the foreign/corporate agriculture and land grab scenario.



Granaries, women and children (Foto: Gert Nyberg)

3.3 Mixed systems scenario

In this scenario land grabbing is to some extent regulated by international policies or the national government. There may also be a market-driven control, through ethical or environmental signaling systems to consumers, e.g. certification schemes. There are substantial foreign investments in the agricultural sector, mostly in highly specialized large-scale production. The produce is for both international and local markets.

Agro-processing and value addition exists on different scales and is in the hands of both international corporations and local entrepreneurs. This leads to the development of a rural labor force, employed by local and international companies for farming and agro-processing.

There are spillover effects of technologies from the large-scale agriculture to a medium-sized, intensive and fairly specialized local agriculture. In addition the market for agricultural inputs and products works well, partly due to spillover effects from the economies of scale of large-scale agriculture.

There is a relatively well-functioning institutional environment. The process of decentralization has advanced. Tenure reforms have enabled a rural middle class to acquire more land. Initially, agricultural subsidies to local farmers are most likely part of this development. Credit systems are available to well-performing farmers and rural entrepreneurs.

International investors and companies will make high profits and export large values. The development of a rural middle class will drive much of the local production and consumption. However, a vast majority of the rural population will remain in subsistence agriculture or rural labor.

Productivity is moderate and intensification limited for subsistence agriculture. The overall increase in food production will better match population growth leading to increased food security in Burkina Faso. However, wealth distribution will be uneven and poverty remains widespread. Social tension is plausible. There are especially risks for conflicts concerning land tenure. Migration will be a viable livelihood strategy and there will be urbanization in despair to some extent.

Small-scale farmers will continue to be vulnerable to global price fluctuations and the effects of climate change and their adaptive capacity will remain low. On the other hand medium-sized farmers and the rural middle class will be less vulnerable and have better adaptive capacity.

The threat to parklands is moderate in the mixed system scenario. It will be high in areas of specialized large-scale agriculture, moderate in medium-sized farms (some may even specialize in Karité production) and low in the subsistence agriculture.

3.4 Parklands prevail scenario

In this scenario institutions and policies are enabling, strong and decentralized. The development in Burkina Faso depends largely on internal drivers. Foreign investments are limited in scale. Agricultural productivity is high and there is a largely domestic and rural processing industry creating added value. Export revenue mainly stays in the country.

Agriculture is sustainable, intensive and efficient. The use of inputs is high. However, environmental concerns are also taken into account and inorganic as well as organic fertilizers (e.g. manure) and pest control are used. Agriculture is specialized and efficient but production is also diversified in order to spread risks and opportunities. To reach these scenario policies to support agricultural intensification such as subsidies and credit systems are needed, at least initially.

Tenure reforms and incentives enable the development of a rural middle class, sometimes with larger sized farms. However the scale is still moderate compared to the land grab in previous scenarios. The most successful farmers will acquire more land from less productive farmers. Entrepreneurs in the rural middle class will also be drivers in value addition in processing and small-scale industrialization of rural centers creating new employment opportunities.

Market access is good both to markets for agricultural inputs and products. This development is knowledge intensive, and there needs to be good and efficient means for generation and spread of knowledge. This includes research and an efficient extension system for agricultural knowledge to both small- and medium-scale farmers. Although the medium-scale agriculture and the rural middle class drive this development there will still be less specialized and less productive subsistence agriculture. However, even subsistence farmers will have access to inputs, markets and new knowledge and hence be more productive than today.

In the parkland prevails scenario the vulnerability to external factors, such as global price fluctuations and the effects of climate change, is moderate to high for subsistence farmers and lower for the rural middle class. Adaptation capacity is good, food production sufficient and food availability fair. Due to these reasons the threat to parklands is only moderate to low.



Looking into a bright future? (Foto: Gert Nyberg)

4 WORKSHOP CONCLUSIONS

Most agriculture today is small-scale, on subsistence level and with low productivity (< 1 ton/ha of grain yield). Increasing productivity is of utmost importance for small- and medium-scale agriculture to be able to feed the country's rapidly growing population. Several of the scenarios envision a shift from small- to larger-scale agricultural production. This may have environmental as well as socio-economic effects. On a national level, the extent and magnitude of this shift will depend largely on how related policies and regulations are framed and implemented.

The aim of the workshop was to identify critical research issues. In the discussions questions were therefore asked about how research can enable the achievement of the positive developments envisioned or help to avoid negative developments.

4.1 Critical research areas

Based on the above described scenarios for parklands and agriculture in Burkina Faso four research areas were identified as critical for future food security and poverty reduction in the country:

Identified research areas based on the scenarios:

- ✓ Policies and institutions for agriculture;
- ✓ Productive and sustainable farming systems;
- ✓ Scales and markets in agriculture;
- ✓ Innovation, adoption and dissemination of knowledge and technology in agriculture.

The overarching goal of these research areas is to produce food for the growing population.

4.2 Policies and institutions for agriculture

In Burkina Faso there are quite ambitious and deliberate agricultural policies. How effective they are will depend on the political weight and the financial resources put behind them and the trust farmers, consumers and other market actors put in them.

Important research issues are:

- Tenure - farmers need to have secure land use rights to be able to use land as collateral and to have secure rights to their products. The possibility for richer farmers to access more land or for foreign corporations to buy or lease land will be decisive for agricultural development.
- Access to markets and credits - research on how to increase market access is needed.
- Incentives - research on effective incentive structures to promote the use of productivity increasing inputs and technologies is also needed. Examples of factors to study are subsidies on agricultural inputs, micro-finance schemes, price guarantees and tax structures.
- Socio-ecologic research on the parklands - focusing on the role of tree resources in the household economy and other values of trees such as cultural or ecosystem-services. Local perceptions and usage of tree resources influence the future of the parklands.
- Dissemination of knowledge - a crucial component for agricultural development. Strategies, methods and organization of dissemination need to be well anchored in research and efficient.
- Social security systems - in all scenarios population increases rapidly and there are social changes, such as migration, urbanization and structural changes in the labor market. Existing traditional social security systems might not be designed to cope with such changes or that magnitude of change. A pertinent research area is how to reduce the risk of social unrest, e.g. through creation of social security

- Gender issues - structural changes in society as well as policy changes are likely to affect gender relations. The effects of these changes and how to handle them are important research areas that can provide valuable insights in appropriate policy formulation.

4.3 Productive and sustainable farming systems

Important research issues are:

- Intensification, increased productivity - soil fertility research, water harvesting and deficit irrigation research, plant breeding for drought resistance and shorter growing seasons.
- Trees research - regeneration of trees in parklands, management and productivity of trees, multi-disciplinary research on integrated systems of trees-crop-livestock.
- Integrated methodologies for combining e.g. organic and inorganic fertilizers or biological and chemical pest management such as Integrated Soil Fertility Management (ISFM) and Integrated Pest Management (IPM) where e.g. organic and inorganic fertilizers are combined, or biological and chemical pest management are combined are needed.
- Diversification - crop diversification, alternative crops and agricultural products, interaction between different crops, crop rotation and soil health.
- New production forms - e.g. zero-grazing, intensive poultry rearing, urban agriculture, intensive home garden irrigation, large-scale crop, and forest or biofuel production. Analyses of productivity, hazards, social and ecological consequences.
- System research - Parkland research needs to consider all system; tree-crop-livestock and human. It is a system managed by humans for human use. This research is by definition multidisciplinary and has to be carried out by multidisciplinary teams.



Irrigated and non-irrigated farmland in Ouahigouya (Foto: Lisa Westholm)

4.4 Scales and markets in agriculture

In the scenarios there are variation of scales of the agricultural production units that also invokes the scale of markets and social effects. Agribusiness, processing and the development of a rural middle class, a class of local productive and successful farmers and entrepreneurs that capitalize on their own competence and an enabling environment to develop business and medium scaled efficient agriculture, are to varying degrees important actors in these scenarios.

Important research issues are:

- Scale dependent ecosystem research - e.g. what are the consequences of different scales on water runoff and erosion, chemical pollution, biodiversity. Sustainability research.
- Scale dependent social system research - socio-economic consequences of different scales.
- Scale dependency of productivity - economies of scales, synergies etc. Socio-cultural possibilities for intensive (new) production (e.g. tenure issues, incentives, social acceptance)
- Incentives and possibilities - for the development of a local rural middle class.
- Market access - availability of input and product markets
- Conditions and regulations - for agribusiness and processing, tenure
- Value chain research
- Knowledge flow - will the development of a large and medium sized productive agricultural sector result in a transfer of knowledge also to small scale agriculture? Will market advances also be available for small scale farmers?

4.5 Innovation, adoption and dissemination of knowledge and technology in agriculture

The spread of new knowledge, be it technological innovations and technologies, or social security systems to tackle new situations or new economical or financial conditions, needs to be fast, thorough, equal and efficient for agricultural development to reach its full potential. How this should be organized is a pertinent research area. There is also a need for knowledge to go the other way; for researchers to learn from farmers and consumers. To reach relevance and facilitate knowledge dissemination research should be conducted in on farm experiences as much as possible.

Important research issues are:

- Scaling up and out of research results.
- Dissemination - research on how to efficiently spread information and knowledge, e.g. how should extension systems be organized?
- Incentive structure - Whom and what should incentives target? How should it be organized? How should it be financed?
- Organizations to be involved in the innovation, adoption and dissemination - Governmental? Private? NGOs? National? International?
- Organizational and institutional set up for agricultural development.
- Transparency - how to build transparent, reliable and credible organizations for agricultural development?

5 Recommendations for policies and institutional reform

In addition to the research issues identified, a number of policy recommendations were also identified during the workshop. The workshop participants saw a need to increase market access for small-scale farmers and their products. Improving access to credit as well as the availability of agricultural inputs was seen as important measures to promote increased productivity.

Burkina Faso has quite ambitious and deliberate agricultural policies. However their impact will dependent on how efficiently they are implemented. Although policies to support rural development, agricultural production and tenure reform exist, a need to strengthen implementation and related institutions was identified. In order to support long-term development there is a great need for transparency and predictability in policy development and implementation.

An important factor is also the spread of technology, dissemination of knowledge and sharing of lessons learned, between regions and between different types of actors. This flow of information can be facilitated by government policies and programs involving various stakeholders.

Finally, several of the scenarios envision various degrees of shift from small-scale subsistence agriculture to large-scale agricultural production. Such shifts will need to be accompanied by appropriate tenure and policy reforms in order to regulate developments and avoid adverse effects.



Woman in Bonogo village returning home from the market (Foto: Maria Ölund)

6 References

- Anseeuw, W., L. Alden Wily, L. Cotula, and M. Taylor. (2012). *Land Rights and the Rush for Land: Findings of the Global Commercial Pressures on Land Research Project*. Rome: ILC.
- Arnell, N. W. Cannell, M. G. R. Hulme, M. Kovats, R. S. Mitchell, J. F. B. Nicholls, R. J. Parry, M. L. Livermore M. T. J. and A. White. (2002). The Consequences of CO₂ Stabilisation for the Impacts of Climate Change. *Climatic Change* Vol. 53, No. 4, p. 413-446.
- Burkina Faso (2007). *Programme d'action national d'adaptation a la variabilité et aux changements climatiques (PANA du Burkina Faso)*. Burkina Faso : Ministère de l'Environnement et du Cadre de Vie. Secretariat Permanent du Conseil National pour l'Environnement et le Développement Durable.
- Cotula, L. Vermeulen, S. Leonard, R. and J. Keeley. (2009). *Land Grab or Development Opportunity? Agricultural Investment and International Land Deals in Africa*. London and Rome: IIED/FAO/IFAD.
- INSD (2011) *Institut national de la statistique et de la démographie*. Available at: www.insd.bf (Accessed 2011-12-09)
- Juma C. Africa's New Engine. (2011). *Finance & Development*, December 2011: p.6-11.
- UNDP (1999) *Global Environmental Outlook 2000 (GEO 2000)*. Nairobi, Kenya: United Nations Development Programme.
- UNDP (2011) *Human Development Report 2011. Sustainability and Equity: A better future for all*. United Nations Development Programme, New York : Palgrave Macmillian.
- U.S. Census Bureau (2012) *U.S. Census Bureau International Programs*. Available at: <http://www.census.gov/population/international/data/idb/informationGateway.php> (Accessed 2012-02-03)

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