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This case has been translated from French.



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Republic of Doumbelane: a fictitious case study

Mobilization of water and land resources for food security

Resource persons: Dr. Madiodio Niassé and Dr. Moctar Toure, President of the Agricultural Science section of ANSTS

BRIEF STATE OF KNOWLEDGE

The emergence of the Water-Land-Energy Nexus paradigm for food security

Since 2007-2008, in the wake of soaring food and oil prices and the financial crisis, food security is at the forefront of the international development agenda. To feed the world's population, which is expected to reach 9 billion people by 2050, the FAO estimates that food production will need to be increased by 70% globally and doubled in developing countries. Achieving this objective would require a significant increase in the productivity of current arable land and a substantial increase in the amount of land used for agriculture.

However, the margin available for increasing agricultural production in the world's traditional breadbaskets—the Asian countries in particular—is disappearing: yields are already approaching their limit, while water and arable land resources are on the decline.

With climate variability and climate change, energy acts as an aggravating factor for the risk of food insecurity. The volatility of oil prices was a major factor in the record food price increase observed ten years ago: higher production costs in the agricultural sector, higher costs for the processing and transportation of food, etc. Added to this is the fact that, during the 1990s and 2000s, agricultural land dedicated to biofuels increased sharply to the detriment of that allocated to food crops. While only around 2% of global arable land is currently allocated to biofuels, land used for biofuel production (especially second-generation biofuels such as biodiesel) is projected to increase fourfold by 2030, according to the World Bank's World Development Report 2010. Energy is therefore at the heart of food security issues.

Thus we find ourselves in a situation of conflict between three of the key resources for agricultural production: water (with freshwater resources becoming increasingly scarce); land (with agricultural land that is not only shrinking, but declining in fertility); and energy (contributing to higher agricultural production costs and decreasing areas for food production). The need to recognize the multiple interactions between these resources led to the emergence of the "Nexus" paradigm, referring to a Water, Energy and Food Security Nexus (WEF) or a Water, Energy and Land Nexus (WEL). The Nexus paradigm aims to transform the vicious circle of negative interactions between water, land and energy into a virtuous circle in which the three resources are managed in an integrated and equitable manner so as to achieve sustainable food and nutrition security.

Africa, the Water-Land-Energy Nexus and food security issues

In practice, the conditions under which Nexus is applied vary greatly depending on context, the availability of water and arable land, and development levels and objectives. As this approach is relatively new, a number of definitions coexist and different analysis and evaluation models are being developed at both local and global levels. The model is already attracting interest from decision-makers seeking to establish integrated policies and insurers and investors who practice risk management.

In the search for solutions to current food issues, Africa is seen as the world region with the most assets, given the abundance of its natural resources. In particular, Africa has the world's largest land reserves, that is to say virgin, abandoned or underutilized land suitable for agricultural production. However, this apparent abundance hides enormous regional disparities on either side of the equator, the most significant discriminating factor being the availability and management of water resources. Many believe—sometimes rightly so, but often mistakenly due to oversimplification of an extremely complex reality—that there is a significant gap in agricultural productivity in Africa, and thus a significant margin for increasing agricultural production using currently cultivated land. In addition, Africa possesses an abundance of unused or underused land suitable for agriculture. According to the World Bank, of the 445 million hectares of virgin or underused arable land available around the world, almost 45% is found in Africa. For example, another World Bank study compares the African savannah to a “sleeping giant” who, once awakened—by the development of large-scale commercial agriculture—could become a gigantic agricultural production zone comparable to the Cerrado region of Brazil (Morris et al. 2009).

It is therefore not surprising to note that Africa is the main target of current large-scale land acquisitions: The World Bank (Deininger & Byerlee. 2011, op.cit.); the Land Matrix (Anseeuw et al. 2012) and the authors of various studies agree that the majority (60% to 80%) of current international land transactions (in number and in cumulative area) target acquisitions in Africa, and Sub-Saharan Africa in particular.

While Africa appears to hold one of the keys to global food security for the coming decades, it is also currently the continent that is the most vulnerable to volatile food prices and the most at risk for food insecurity.

The challenge for Africa, in a global context in which natural resources are scarce, is to mobilize and make the best use of its significant water, arable land and energy potential, in particular to ensure its food security. This will be a question of implementing policies at the State level to avoid or minimize negative interactions and optimize positive interactions within the Water-Energy-Land-Food security Nexus.

REPUBLIC OF DOUMBELANE: A FICTITIOUS CASE STUDY

Seizing investment opportunities and activating positive Nexus interactions in the Republic of Doumbelane¹

The Republic of Doumbelane is located in the mid-latitudes of Sub-Saharan Africa. In general, it is well endowed with water resources, but there are strong spatial disparities. Rainfall is abundant in the south and moderate in the centre, while the north is dry. The country is drained by a number of significant watercourses, including some of the continent's major transboundary rivers. It also has several aquifers, most of them transboundary, which are often poorly studied and underutilized. Shared governance mechanisms for these transboundary resources (especially those on the surface) have been in place for several decades, and function with some success (co-ownership of water infrastructures, integration of national regulatory frameworks, etc.). Their effectiveness, however, continues to be plagued by political, financial and technical problems. Half of the national territory of Doumbelane is in the under-exploited savannah that the World Bank compared to the Brazilian Cerrado. Nearly 60% of the population earn their living through farming, which is essentially rain-fed and thus vulnerable to the vagaries of climate. Doumbelane is heavily dependent on agricultural imports. Consumption of traditional food crops (millet, cassava, yam) is declining, while that of rice, corn and wheat is rising sharply from year to year. In 2007-2008, during the surge in imported grain prices, the populations of Doumbelane's large cities took to the streets to express their discontent, threatening the country's stability. Doumbelane is not an oil producer and is highly energy insecure.

The peasant organizations that came together at the national level condemn the passivity of the Doumbelane government in the face of the current food crisis and explain the decline in local agricultural production by the economic liberalism adopted by the Doumbelane government in the early 1980s which led to the withdrawal of the State from the productive sectors (including agriculture). With the support of national and international NGOs, Doumbelane's peasant organizations are denouncing the appropriation of their land, pointing the finger at the proliferation of land concessions granted by the State to foreign private investors.

Doumbelane has a very long tradition of agricultural and agribusiness research. Unfortunately, its institutional capacity has eroded over time, resulting in a marked decline in scientific productivity. It is still struggling to generate, appropriate and apply, in an integrated manner, the knowledge and know-how essential for understanding and addressing the issues and challenges associated with the profitable and sustainable management of natural resources. While the management of water resources (irrigation) and land resources (fertility and agronomy) is relatively well developed at the micro level, higher-level knowledge and techniques are scarce, incomplete or uncertain (long-term water resource planning, watershed management, environmental impact, etc.)

Doumbelane is an open democracy with many platforms for dialogue and exchange between government, producers, civil society, academics and researchers, but the current food crisis is creating tensions between stakeholders. It is commonly accepted that the solutions adopted to date have not been effective and that new answers, or even a new paradigm, must be considered. However, little attention has been paid to the interactions between water, arable land, energy and food security. Very few national actors have been involved in the international discussion and debate on Nexus.

¹ Doumbelane is the name of a mythical country founded by animals, the setting for most of L.S. Senghor and A. Sadjji's "Leuk-le-lièvre" stories. In the Republic of Doumbelane, "the animals lived in peace" and "loved one another". "The strong protected the weak. Everybody's needs were met through the collective efforts of all". (Senghor & Sadjji, *La Belle Histoire de Leuk-le-Lièvre*. EDICEF-NEA, 2001 (Reprint).

It is in this context that three large foreign investors, aware of Doumbelane's great water and arable land potential, have come to the country's capital with proposals for major agricultural investment projects.

- **Investor A** is asking for 100,000 hectares of land for biofuel production (sunflower, jatropha, oil palm) destined primarily for the European market, but some of which could be sold locally.
- **Investor B** would like to obtain 20,000 hectares of irrigable land along the country's largest river – a river that Doumbelane shares with 5 other countries. He wishes to expand his grain production area, which already extends into three of the five countries along the river.
- **Investor C**, whose financial resources exceed those of investors A and B combined, is exploring the market and is open to any agricultural investment opportunities. However, Investor C has clearly indicated to the Doumbelane authorities that he is not interested in philanthropy and is seeking to maximize return on investment.

The peasant organizations have been mobilizing for several months to denounce these investment projects, which they consider to be an aggressive large-scale appropriation of their land. They advocate support for family farming. The movement's most radical fringe is calling on the State to stop promoting conventional "star" crops—grains such as rice, corn and wheat—in favour of supporting a revival and revitalization of "orphan crops" (millet, sorghum, cowpeas, fonio, plantain, yam, cassava, etc.) to reduce the impacts of international market fluctuations on the food security of Doumbelane.

The government is working on several fronts to develop an ambitious food security strategy. It plans to team up with partners who can provide access to financial resources and expertise. It also wishes to revise its rural area management practices: land laws, appropriate land and water resource allocation mechanisms, environmental protection, decentralization, etc.

The Prime Minister of Doumbelane instructs the Minister of Agriculture to convene and chair a meeting of the High Advisory Authority on Agricultural Investment (HAAAI) of the Republic of Doumbelane. The purpose of the meeting is to examine the investment proposals and make recommendations to the government. HAAAI is a structure made up of representatives of the State, civil society, peasant organizations and the private sector. Investors A, B and C are invited, on an exceptional basis, to attend the HAAAI meeting in order to defend their projects and receive suggestions.

You are the scientific advisor to the Minister of Agriculture. You suggest to her that she should use the Nexus approach to prepare the HAAAI meeting. She receives this idea with enthusiasm, as she thinks that Nexus will change the perspectives of those present. However, she feels that there are still few examples of the application of Nexus models in other African countries.

In preparation for the HAAAI meeting, you must prepare a presentation of Nexus in order to facilitate consensus building among the participants, and advise the Minister of Agriculture on the proposals of the three investors in the context of the establishment of the food security strategy.

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Group exercises

PART 1: DISCUSSION

Communicating a new theoretical framework

What resources will you use to prepare your presentation? What information can you provide to convince stakeholders to adopt the theoretical framework of Nexus? What are the limitations of available knowledge and how can you communicate them in such a way as to keep your scientific credibility?

Evaluate the economic and financial options

On what criteria will you base your evaluation of the proposals? To what extent will you take into consideration the social and political environment in which the Minister of Agriculture and the Prime Minister operate? What points for negotiation will you bring to the attention of the Minister of Agriculture regarding Investors A and B? What investment opportunities will you propose for Investor C?

Co-constructing solutions

What position should you adopt during the HAAAI meeting? To what extent can you get involved? How can you encourage consensus among participants? What suggestions could you make in that regard?

PART 2: ROLE-PLAYING

You are taking part in the HAAAI meeting, and must work with the parties present to build a solution to ensure the country's food security. You hold one of the following positions:

- Advisor to Investor A or Investor B
- Scientific advisor to the Minister of Agriculture of Doumbelane
- Activist, advisor to the National Federation of Peasant Organizations and Small Family Farmers of Doumbelane
- Representative of a neighbouring country that shares a river basin with Doumbelane

You are advisor to Investor A or B: You have the floor to defend your investment project by explaining how it contributes to the food or energy security of Doumbelane while minimizing negative Nexus interactions (especially those affecting water resources) and optimizing their positive counterparts.

You are advisor to the Federation of Peasant Organizations: share your perspective on the projects, based on Nexus interactions. What investment opportunities do you see for Investor C?

You represent a neighbouring country that shares a river basin with Doumbelane: your country is concerned that the land concessions granted to private investors by Doumbelane may result in excessive water withdrawal from the river you share. You question the potential investors and the Doumbelane government on this issue. You call on all participants to consider the ways and means of avoiding the “tragedy of the commons” syndrome between countries along the river, as each country will be tempted to withdraw as much water as possible, assuming that the others are doing the same.

You are the scientific advisor to the Minister of Agriculture of Doumbelane: what merit do you see in the participants’ proposals, with regard to the government’s project to establish a food security strategy? What types of consensus do you encourage participants to explore?

You are the Minister of Agriculture of Doumbelane: you are chairing the meeting and, once it is over, you must prepare a proposal for the Prime Minister. What are your constraints and room for manoeuvre? How do you address project partners? How do you collaborate with your scientific advisor?

REFERENCES

- Anseeuw, W.; M. Boche; T. Breu; M. Giger; T. Lay; P. Messerli; K. Nolte. 2012. Transnational Land Deals for Agriculture. Analytical Report Based on the Land Matrix database. International Land Coalition. Rome. April. Available at: https://www.oxfam.de/system/files/20120427_report_land_matrix.pdf
- Deninger, K; D. Byerlee. 2011. Rising Global Interest in Farmland. Can It Yield Sustainable and Equitable Benefits? World Bank. Washington D.C. http://siteresources.worldbank.org/INTARD/Resources/ESW_Sept7_final_final.pdf
- FAO. 2009. Global Agriculture Toward 2050. High-Level Expert Forum on How to Feed the World? FAO. 12-13 October. Rome. Italie. Available at: http://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Global_Agriculture.pdf
- Hoff, H. 2011. Understanding the Nexus. Background Paper for the Bonn Conference on The Water, Energy and Food Security Nexus. Bonn (Germany), 16-18 Nov. Available at: http://wef-conference.gwsp.org/fileadmin/documents_news/understanding_the_Nexus.pdf
- Morris, M.; H. Biswanger-Mkhize; D. Byerlee. 2009. *Awakening Africa’s Sleeping Giant. Prospects for Commercial Agriculture in the Guinea Savannah Zone and Beyond*. World Bank. Washington D.C.
- Niasse, M. 2014. La ruée vers les terres agricoles du Sud: quels enjeux pour la sécurité alimentaire en Afrique? *Passerelles – Analyses et Informations sur le Commerce et le Développement Durable en Afrique*. International Centre for Trade and Sustainable Development – ICTSD and ENDA-TM. July Vol. 15. No. 3. Pp. 18-20
- Niasse, M. & Cherlet, J. 2014. Coordinating land and water governance. An essential part of achieving food security. *GWP/TEC Perspective Papers*. GWP Stockholm. December. Available at: http://www.gwp.org/Global/ToolBox/Publications/Perspective%20Papers/07_perspectives_paper_land_water_governance.pdf;
- European Union. 2012. Confronting scarcity: Managing water, energy and land for inclusive and sustainable growth. 2011/2012 European Report on Development. Executive summary available at: https://ec.europa.eu/europeaid/sites/devco/files/erd-consca-report-summary-20110101_en.pdf
- World Bank. 2010. World Development Report 2010: Development and Climate Change. World Bank, Washington D.C.
- The Parliamentary Office of Science and Technology. 2016. The Water-Energy-Food Nexus. Postnote Number 543. Accessible Available at: <http://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0543>
- Network of African Science Academies. 2014. The Grand Challenge of Water Security in Africa. Recommendations to Policymakers. Available at: <http://www.interacademies.net/Publications/25140.aspx>



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