Senegal

In the Senegalese Sahel, researchers are monitoring a reforestation project whose environmental and human impact is potentially high, with a view to analyzing and understanding the changes occurring in this semiarid ecosystem.

The great (green) wall

Working on the Wall
A microbiologist and his team take soil samples from a parcel of land to be planted as part of the Great Green Wall, a green belt intended to fight desertification. Fifteen kilometers wide and 7,600 kilometers long, it runs from Dakar to Djibouti.

Growth in progress
In the tree nurseries of the Widou Thiengoli village (Ferlo region, Senegal), the production of acacia seedlings starts in May. When the first rains come, they are ready for transplanting to land allocated to the Great Green Wall. The plants here are 3 months old.

Back to the village
A family of Peuls, a people known to be excellent livestock herders, only returns to Widou Thiengoli after several months of following the herd. This is one of the first villages selected to take part in the Great Green Wall project.

Hope springs eternal
The well in Widou Thiengoli supplies water for all the people and animals within a radius of 20 kilometers. In Widou, the first collective gardens watered from this source have caused a minor revolution on the economic, cultural and dietary fronts: groups of women are producing vegetables and investing their earnings.

The Ferlo Valley in northern Senegal, a landscape of parched earth and sparse forest that stretches as far as the eye can see, is home to the Peul herders and their livestock. In this silvopastoral reserve, a few wells supply the bare minimum in terms of water resources. All around, the desert is gaining ground; yet, here and there, the vegetation is becoming denser. Rows of young trees bear witness to the effort launched against desertification. Here, an eco-restoration project referred to as the Great Green Wall does more than raise hopes. This state-financed tree-planting program is being carried out on the ground by the Directorate for Water Resources and Forestry (DEFC) in cooperation with the local population. Every summer, it mobilizes volunteers from all over the country who, since 2008, have helped plant 5,000 hectares of seedlings. Once mature, the ziziphus, balanite and Acacia senegal trees will help regenerate an ecosystem damaged by overgrazing, brush fires and regular water shortages. They will also help build the local economy, especially through the harvest of gum arabic. Already, multi-purpose gardens on the outskirts of villages are starting to produce fruits and vegetables. For the nomadic portion of the rural population, this is the first step towards a more sedentary life and access to basic services. The rural population stands to benefit from this large-scale program whose environmental, socio-economic and health impacts are under close scrutiny by researchers working at the Tessekere International Men and Environment Observatory (OHM).

Promoting dialogue between the sciences

An interdisciplinary observatory set up by the Institute of Ecology and Environment of the French National Center for Scientific Research (CNRS), the OHM observatory is staffed by botanists, plant ecologists, physicians and pathologists as well as anthropologists, political scientists and geographers. They are all studying the same environment, now under reconstruction, with four main areas of concentration: water and soil resources, biodiversity, social systems and health. "Our job is to observe the effects of strong anthropogenic action on the environment," says physical anthropologist Gilles Boëtsch, director of the observatory. "To do it, we've created a dialogue between social, environmental and medical sciences." For the last eighteen months, the effects of reforestation have been measured at various levels (e.g. microbiological, ecosystemic and sociological). The Senegalese and French research teams take turns working on location in the village of Widou-Thiengoli. Each team completes a ten-day mission, then returns to Dakar to analyze the data collected. In 2010 and 2011, the CNRS financed twenty-three projects on a broad range of subjects, e.g. the adaptation of plant species, microbial ecology, the dynamics of social systems and avian diversity. These projects reflect the complexity of this broad area of study as well as new concerns: "We want to know how reforestation will affect the standard of living, diet and pathologies of the local population. It's also our responsibility to anticipate unplanned effects," notes Gilles Boëtsch.

A community in the making

A network of scientists has gradually formed around the OHM observatory. Meaningful exchanges take place despite limited means and rudimentary working conditions. Another of the observatory's goals is to see that the scientific community and appropriate authorities realize how broad the scope of this research is. "Coordinating an interdisciplinary project like this is a big challenge," observes

What's "The Great Green Wall"?

It's a green belt **7,600 kilometers long and 15 kilometers wide that runs through 11 countries of sub-Saharan Africa.** These numbers say a lot about the ambition driving what President Wade of Senegal has called "a mad project" to create a wooded zone that is ecologically and economically viable for the local population. Senegal, the lead country in the program, has undertaken the reforestation of 80,000 hectares of national territory.

Young trees
A student working on a PhD in plant ecology from the University of Dakar is monitoring the species *Balanite aegyptiaca*, a desert date tree that grows along the path of the Great Green Wall.

THIERRY VANDEVELDE
Executive Officer, Veolia Environnement Foundation

"Putting human beings at the center of the project"

Why does the Foundation support the OHM observatory of the Tessekere region?
Thierry Vandevelde: We want to get involved in eco-restoration initiatives both in the field and in the lab. The research project presented by the French National Center for Scientific Research was a good candidate for support. Undertaken by anthropologists, it aims to put human beings at the center of the project. The observatory is working to determine how best to get the local population involved in protecting their own natural environment, hence their own interests. This approach converges with the aims of the Foundation.

What can be learned from the reforestation project?
Th. V.: For good reason, we are very interested in the subject of offsetting carbon emissions. The idea is to plant trees, not only to atone for one's carbon emission sins but also to encourage local human development. We expect to learn a great deal from the project in Senegal.

How does the Foundation make itself useful, generally speaking?
Th. V.: Our presence in Senegal dates to about ten years ago. We seek to provide institutional support by getting our local partners interested in an eco-restoration project and facilitating their involvement. Once the project gets off the ground, we can think about solutions to improve local access to drinking water. Our commitment is to supply the relevant expertise.

Water source
During the dry season, the well in Widou Thiengoli is the only source of drinking water: a "drop in the bucket" in this semi-arid region where it rains only three months of the year.

anthropologist Axel Ducourneau, project manager. "It means correlating different categories of data collected in the same environment. We're exploring the idea of a geographic information system." Building a laboratory on location would facilitate research and help the scientists integrate into rural society. In the meantime, one mission follows another, staffed by new experts. It's still too early to draw conclusions about the positive or negative effects of the Great Green Wall. Ultimately, the results obtained can be used to adjust how reforestation is handled. For now, the survival rate of young trees indicates that the program is taking root: after one year, it is around 75%. Even more important, the initiative has gained local acceptance. "That's crucial," stresses Gilles Boëtsch. "Our chances of success improve substantially as soon as people realize that the project represents benefits to their environment and living conditions." ■

Of seedlings and men

"The support of the local community is vital to the long-term viability of the reforestation program," points out Colonel Pape Sarr, Coordinator of Technical Operations at the National Great Green Wall Agency (ANGMV). "Neighboring villages are invited to take part in most initiatives. We confer with them to decide which parcels of land to plant, then recruit teams to do the planting. The local residents are also asked to keep an eye on fenced-in planted areas to prevent overgrazing. In the villages, women produce fruit and vegetables to diversify the family diet and earn money. At this rate, the reserve will be really transformed in five years."

Acacia seedlings
Most of the seedlings planted for the Great Green Wall project are various types of acacia, including *Acacia senegalensis* (white gum tree), which produces gum arabic.

Health care, research and prevention

"On the health front, the mission of the OHM observatory has two objectives. The first is to provide health care and prevent disease," says Professor Lamine Gueye, director for Senegal of an organization set up jointly by the French National Center for Scientific Research and the University of Dakar. "The area under study has little or no access to health services. There are a few infirmaries, but the nearest physician is a two-hour drive from Widou. That's why we carry out health care campaigns with the help of volunteers, medical and pharmacy students. The second objective is research. We're studying the epidemiology of a region for which we have absolutely no data on the prevalence of diseases. It's true that the transformation of the environment is likely to modify the epidemiological profiles. Among its effects, the Great Green Wall is likely to introduce a more sedentary way of life and different dietary habits, in which case one should expect hypertension and diabetes to appear. Reforestation may also be conducive to the appearance of malaria or lymphatic filariasis. It will be very important to track all of these developments and focus heavily on prevention."

A movement of solidarity
A student plants an acacia tree. Like him, hundreds of Senegalese and international students flock to Tessekere every year to plant trees, hoping that their gesture will contribute to the development of this poor, isolated region.