

case 06

Farmer-managed natural regeneration and other agroecological practices to restore soil fertility and improve agricultural production in Senegal

**EL HADJI FAYE,
ENDA PRONAT - SENEGAL**

www.endapronat.org

Sustainable Development Goals:



ZERO HUNGER



CLIMATE ACTION



LIFE ON LAND

FOR MORE THAN FORTY YEARS, ENDA PRONAT HAS WORKED WITH FARMERS' ORGANISATIONS TO PROMOTE AGROECOLOGICAL ALTERNATIVES IN SENEGAL. SINCE 2008, THE ORGANISATION HAS BEEN ACTIVE IN THE COMMUNE OF DIOUROUP (FATICK REGION), WHERE AGROECOLOGICAL PRACTICES HAVE SIGNIFICANTLY CONTRIBUTED TO LOCAL FOOD SECURITY, IMPROVED INCOMES AND REGENERATION OF DEGRADED ECOSYSTEMS. ENDA PRONAT IS ALSO INVOLVED IN NATIONAL AND PAN-AFRICAN NETWORKS TO EXCHANGE KNOWLEDGE AND RESULTS, AND TO SCALE UP AGROECOLOGICAL PRACTICES.



FMNR is based on the pruning of shrubs present in farmer's fields to enable the growth of healthy trees.

(Photo credit Enda Pronat)

SOIL DEGRADATION AND FOOD INSECURITY

Two-thirds of the arable land in Senegal is considered considerably degraded.¹ This is mainly due to the combined effects of conventional farming practices (e.g. stumping, monoculture, low organic amendments, and slash-and-burn), disturbances in rainfall, and the erosion of soils through wind and water. Salinisation also plays an important role, with more than 1.2 million hectares (around a third of all cultivable land) being affected in the country.²

This soil degradation significantly affects the productivity of family farms and, consequently, their food security. The prevalence of food insecurity in the Fatick region, part of the so-called 'groundnut basin', is currently around 30 per cent.³ This situation has inspired agricultural producers, researchers, state and non-state actors, including Enda Pronat, to support alternative soil fertility practices, based on locally available resources, to increase agricultural production.

AGROECOLOGICAL INTERVENTIONS BASED ON PARTICIPATORY DIAGNOSES

Enda Pronat's activities in Diouroup began with a participatory diagnosis of the ecological state of the environment. Responding to the previously mentioned constraints, farmer field schools were set up to promote local and scientific knowledge. The schools served as a framework for experimentation and sharing of knowledge between farmers and technicians to test the application of different types of organic matter, farmer-managed natural regeneration (FMNR) and the cultivation of fertilizing plants and different varieties of short cycle certified seeds (e.g. groundnuts, millet and cowpea, etc.). Market gardeners also benefited from advisory support and training for the production of organic vegetables (i.e. nursery preparation, solid and liquid compost production, crop combinations, rotations, biological pest treatments, etc.). Technical capacity building and experimentation were complemented by the strengthening of local governance systems, which was accomplished through the implementation of a local convention on the sustainable management of natural resources.

Based on action research, Enda Pronat focused its efforts on three main practices: millet-cow pea intercropping, intensified use of organic amendments, and FMNR. While the mixing of millet and cow-pea was already practiced by a few producers, Enda Pronat improved the technique by suggesting to farmers to intercrop in lines rather than mixing the crops randomly throughout the field. Enda Pronat also

facilitated intensification of soil organic amendments, which consisted of increasing the quantities of organic matter applied; diversifying the sources of supply by adding domestic waste, slaughterhouse waste and peanut shells; and improving the quality of organic amendments by training farmers on the composting of organic residuals of both agricultural as well as household origin. Finally, while FMNR and reforestation were already introduced in the area, Enda Pronat helped to intensify these practices not only within farms, but also in community spaces throughout the area to contribute to the restoration of fertilizing trees.

RESULTS IN DIOUROUP CONFIRM THE PROMISE OF AGROECOLOGICAL PRACTICES

In 2017, two studies evaluating the effects of agroecological practices were conducted in Diouroup in collaboration with students and professors of AgroParisTech and the universities of Dakar and St. Louis. One study involved around 400 farms (200 beneficiaries and 200 referents)⁴ and the other 66 farming plots.⁵ The studies showed that 58 per cent of the 200 beneficiaries adopted agroecological practices recommended by Enda Pronat. The evidence showed that application of agroecological practices can be considered a main pathway towards achieving several Sustainable Development Goals (SDGs), particularly SDG two of eradicating hunger. (SDG 2). They had a major impact on millet yields (+17 per cent among beneficiaries), cowpea (+19 per cent) and to a lesser extent peanut (+4 per cent).⁶ It was also observed that the higher the level of integration of agroecological practices, the higher the yield of millet (+5 per cent between parcels that had a low level of integration of agroecological practices and those with a high level of integration). The combined effect of repeated use of agroecological practices for several years in a row was even more significant. The parcel with the highest level of integration of agroecological practices over three years recorded a yield of 2,890 kg/ha of millet in 2016, nearly four times the average yield of the 66 parcels surveyed.⁷

The increase in yields of food products resulting from agroecological practices contributes not only to Target 2.3 of the SDGs, which aims to improve agricultural productivity, but also to the access of poor households to healthy food (SDG Target 2.1). Indeed, studies have shown that the average amount of food (millet, groundnuts, cowpeas, etc.) produced by the 200 farmers who practice agroecology in Diouroup is 14 per cent higher than that of the reference group. In low-income groups, the advantage is close to 60 per

cent. The adoption of agroecological practices has also contributed to the increase in farmers' incomes (Indicator 2.3.2). In systems with a high degree of integration of agroecological practices, the income of receptive families is two to four times higher than that of other families for the equivalent size of an area.⁸

The comparison and modelling of different production systems made it possible to highlight the positive effect on agricultural income of those who have integrated the principles of agroecology. The families concerned can more easily escape situations of economic, social and ecological crisis, which affect a large part of West African family farming. These positive effects reinforce the climate resilience of farming communities through increased land fertility and yields, contributing significantly to SDG Target 13.1 (Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries).

Moreover, the improvement of soil fertility was confirmed by soil tests carried out with ten producers who regularly incorporated different types of organic matter at doses equivalent to 10 t/ha. The results of the analyses were positive. They showed significant increases in pH, and more than a doubling of both percentage of carbon (0.22 per cent to 0.47 per cent) as well as the amount of organic matter (from 0.38 per cent to 0.8 per cent) between 2015 and 2017, although soils still remain relatively poor in both. They also showed good mineralisation, noticeable through a stable C/N ratio.

In addition to building farmers' climate resilience, Enda Pronat's considerable efforts to promote FMNR – about 20 local species with 205 producers on 142 hectares – has contributed to SDG Targets 15.3 and 15.5, which aim for restoration of degraded lands and to stop the loss of biodiversity. The 2017 University of Dakar and AgroParisTech-supported study⁹ showed that in just two years:

- the floristic richness has increased in the FMNR bands, with 49 species recorded, compared to 42 in

the fields without FMNR (*Faidherbia albida* being the most frequent species with 67 per cent)

- the tree density (young and adults) has been recorded to be twice as high in the FMNR bands as in the other types of land use
- the rate of regeneration, given by the percentage ratio between the total number of young plants (diameter of less than 3.5 cm and less than 1.3 m in height) and the total population, has been reported higher in the bands of FMNR (59 per cent) than the average of the soil (48 per cent).

“In systems with a high degree of integration of agroecological practices, the income of receptive families is two to four times higher than that of other families for the equivalent size of an area.”

Evaluating the study

revealed that a period of

two years was too short to comprehensively measure all the eventual effects. Nonetheless, it also showed that after the continuous application of practices over a longer period of time, and especially when trees have improved soil fertility, the real benefits of agroecology should become more visible.

Women harvesting beans in a field where FMNR has been applied. (Photo credit Enda Pronat)



ADEQUATE RESOURCES AND A CLEAR POLICY OF SUPPORT FOR FAMILY FARMING AND AGROECOLOGY

Enda Pronat is now spreading agroecological practices in two other communes neighbouring Diouroup – Tattaguine and Diarrère – and in six communes in the regions of Tambacounda, Thiès and Saint-Louis. The group participates in several key networks, including the National Federation of Organic Farming, which brings together 22,000 farmers in the 14 regions of Senegal; the Alliance for Agroecology in West Africa which is composed of about fifty farmers' organisations, research institutes/universities, international NGOs and social movements; and the Alliance for Food Sovereignty in Africa (AFSA), a broad alliance of different civil society actors who are part of the fight for food sovereignty and agroecology in Africa. The results in Diouroup highlight the considerable potential that agroecology represents for agricultural production, economic and social development, food and nutritional security and the regeneration of degraded ecosystems. Yet Enda Pronat believes that large-scale efforts cannot be achieved without a coherent set of interventions, including public policies.

Enda Pronat calls on the national government to provide adequate resources and operationalise the country's National Strategic Investment Framework for Sustainable Land Management (adopted in 2014), and support to producers through, for example, subsidies for organic inputs. The group advocates for a clear government policy in favour of family farming and agroecology.



NOTES

1 Doukkali, M.R., Guèdègbé, T. & Sinsin, T. (2018). *La neutralité en termes de dégradation des terres en Afrique est-elle envisageable?* Retrieved from: <http://www.ocppc.ma/publications/la-neutralité-en-termes-de-dégradation-des-terres-en-afrique-est-elle-envisageable>

2 Sidy, A. (2011). *Salinisation des sols au Sénégal : sur les 3 800 000 ha cultivables, plus de 1 230 000 ha sont affectés.* Retrieved from: <http://xalimasn.com/salinisation-des-sols-au-senegal-sur-les-3-800-000-ha-cultivables-plus-de-1-230-000-ha-sont-affectes/>

3 World Food Programme. (2017). *ICA Senegal, 2017 - Recurrence of Food Insecurity, 2010-2017.* Retrieved from: https://geonode.wfp.org/layers/geonode%3Aasen_ica_firecurrence_geonode_20170508

4 Bachmann, L. & Seck, S.M. (2018). *Promouvoir l'agriculture saine et durable auprès des exploitations familiales - Voies durables pour un meilleur système alimentaire au Sénégal.* Retrieved from: http://www.endapronat.org/wp-content/uploads/2018/10/Etude_agroécologie.pdf

5 Assemat, A. (2017). *Analyse-diagnostic d'une petite région agricole en pays Sérère au Sénégal. Projet CALAO, pour l'étude des impacts et conditions de développement de l'agroécologie en Afrique de l'Ouest.* Mémoire de Master Agroparistech. 47p. For more information on the CALAO Project, check: https://www.avsf.org/public/posts/2211/rapport_etude_calao_2018-web_avsf_gret_cedeao.pdf

6 See 4

7 See 5

8 See 5

9 See 5