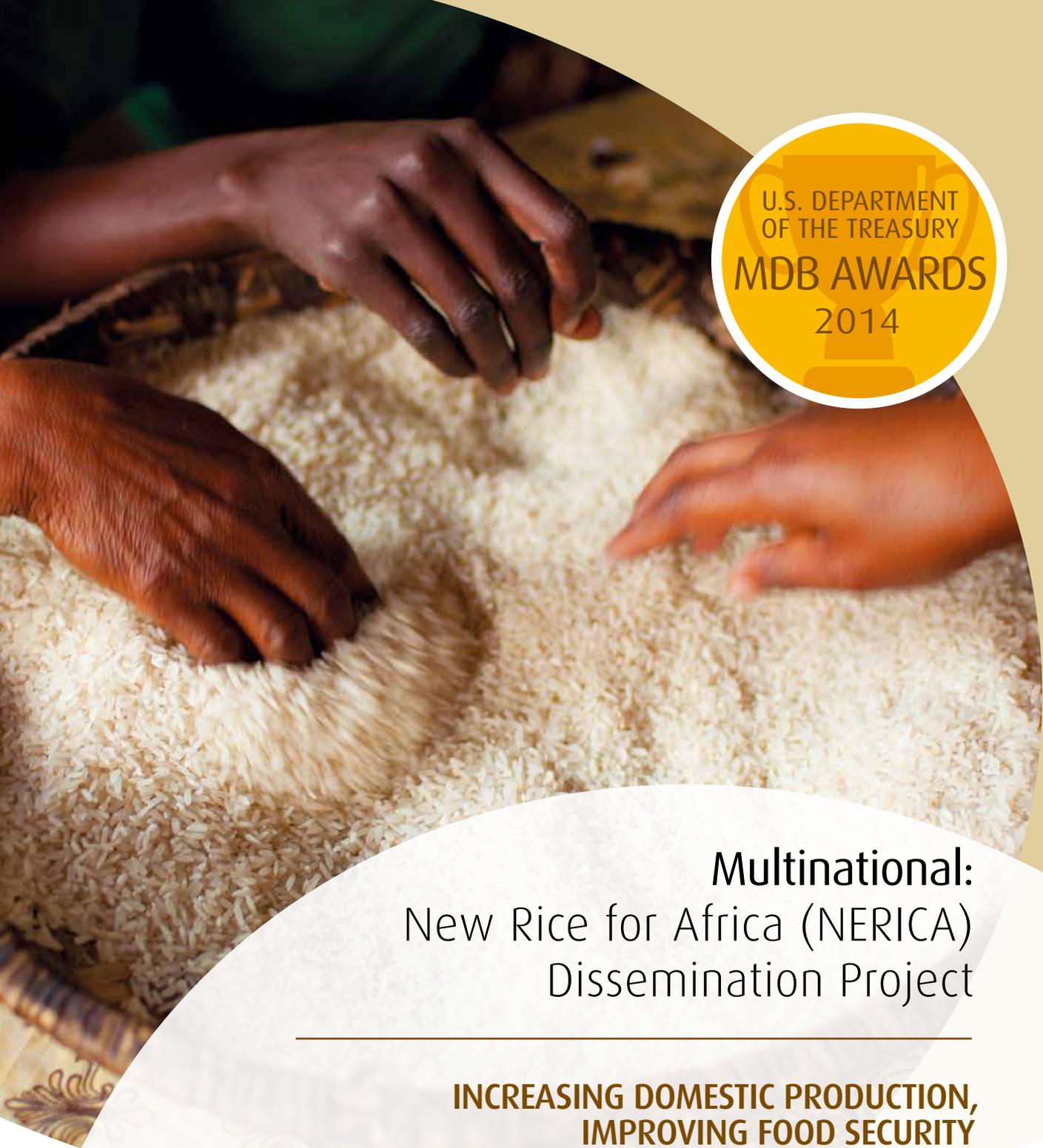




U.S. DEPARTMENT
OF THE TREASURY
MDB AWARDS
2014



Multinational:
New Rice for Africa (NERICA)
Dissemination Project

**INCREASING DOMESTIC PRODUCTION,
IMPROVING FOOD SECURITY**



AFRICAN DEVELOPMENT BANK GROUP

Multinational:
New Rice
for Africa (NERICA)
Dissemination Project



U.S. DEPARTMENT
OF THE TREASURY
MDB AWARDS
2014

PROJECT DESCRIPTION

1 Development problem

Each year Africa imports one-third of the world's rice, about 20% (5.2 million tons) for West Africa alone. By 2020 an extra 17 million tons of milled rice, costing billions in scarce foreign currency, will be required if domestic production continues to lag behind the growing demand. Any price increases in the international rice markets would adversely affect food security, especially in poor households, which spend a sizable portion (20-25%) of their revenue on food. Most governments in West Africa are aware of the facts and have put in place policies to mitigate the impact of increased world rice prices in their countries.

particularly in West Africa, where rice is the fastest-growing food staple crop. Encouraging rice farmers to adopt innovative technologies, such as the use of high-yielding rice varieties, is one way to increase domestic production.

In the 1990s AfricaRice developed NERICA (New Rice for Africa) rice varieties, work that has been widely hailed as one of the most significant advances in crop improvement. In 2005, seven West African countries—Benin, Gambia, Ghana, Guinea, Nigeria, Mali and Sierra Leone—jointly sought the assistance of the African Development Bank in enhancing food security in the region by funding the dissemination of new technology and sharing of knowledge on the NERICA rice varieties.

Enhancing domestic productivity in rice is another approach to reducing poverty and food insecurity—

2

PROJECT INFORMATION

Project name:	Multinational New Rice for Africa (NERICA) Dissemination Project
Location:	West Africa (Benin, Gambia, Ghana, Guinea, Nigeria, Mali and Sierra Leone)
Amount:	Bank financed: \$34 million Co-financed: • Participating countries: \$6.0 million • Beneficiaries: \$1.2 million
Duration and dates:	6 years (February 2005 to December 2011)

2 Project description

Under the regional coordination of AfricaRice, the project organized farmers into NERICA rice farmers' groups and associations to help them produce quality seeds and competitive commercial rice. They were instructed in optimal rice production technologies and were given the necessary basic seeds ("foundation seeds"), supervision,

production and processing equipment, storage and product marketing infrastructure, and post-harvest equipment for demonstration purposes.

Because improved varieties may be developed and tested on research stations but may perform

poorly under farmers' actual field conditions, the project introduced the participatory varietal selection (PVS) program—a client-oriented approach that offers farmers a choice of improved crop varieties that match their needs and field realities. The goal of PVS is to transfer the NERICA rice varieties to farmers efficiently to (i) reduce the time required to move varieties tested on research stations into farmers' fields, (ii) determine the types of varieties that farmers want to grow, (iii) learn the traits that farmers value in varieties to assist in breeding research and selection for further refinement of the

technology, and (iv) determine whether there are gender differences in varietal selection criteria.

Given the difficulty of establishing seed certification schemes in large countries, especially in rural areas, in the late 1990s AfricaRice developed community-based seed systems (CBSS), through which farmers were trained in best practices for producing “seed of acceptable quality” for themselves and their neighbors. The project adopted CBSS alongside formal seed delivery services, especially in areas where modern varieties had been adopted through PVS in the years preceding the NERICA dissemination project.

3 Analysis and appraisal

Several adoption and impact studies conducted in West Africa by AfricaRice¹ showed that the introduction of the NERICA rice varieties had a significant impact on rice productivity in West Africa, but that a more significant uptake of the technology would have been achieved at the regional level if larger farmers' groups had been exposed to the new rice technology. Therefore, the project adopted the PVS methodology to enhance the regional uptake of the proven rice technology. The seven countries participating in the project were at varying phases of developing their rice research capacities and extension services. To provide opportunities to build and share knowledge on food security issues, the project built a regional research system through the partnership programs and networks between AfricaRice and the National Agricultural Research and Extension Services—the technical and scientific arms of the Ministries of Agriculture in the participating countries, which are responsible for the



execution of the NERICA project. AfricaRice's technical and scientific expertise helped upgrade the technical, scientific, and managerial capacities of the National Agricultural Research and Extension Services.

4 Rate of return

The internal economic rate of return was estimated for two scenarios—one using fertiliser and one not using it. The assumptions were as follows:

- ▶ A 20-year rotation period to allow the full recovery of the investment costs, especially on the research and capacity-building activities under the project.

1 See, for example, Diagne 2006a, Diagne et al. 2006b, Adegbola et al. 2006, Spencer 2006, Dontsop Nguezet 2011.

- ▶ Economic prices for seed and rice based on the projected domestic and regional market prices. Although import substitution would result in a loss of revenues from taxes and duties, no adjustment was made on this account because of the advantages to be realized by saving foreign exchange and even gaining export earnings from trade in rice and rice seed between the regional member countries and beyond.
- ▶ NERICA yields of 1,500 kg/hectare without fertilisers and 2,500 kg/hectare using fertilisers, and traditional rice yields of 800 kg/hectare.
- ▶ On average NERICA is harvested 1.25 times a year.
- ▶ Most of the agricultural products produced under the assumed inter-cropping model are for subsistence consumption, largely within the production area. Consequently, market prices were used for the economic analysis.

On the basis of these assumptions, estimates from the economic and financial analysis of the project showed an average economic internal rate of return (EIRR) of about 26%, with values ranging from 25% to 39% across project countries. The project provided seed money to help farmers buy fertilisers for their rice fields, but fertilisers were often not available at the appropriate time in the participating countries.

5 Beneficiaries

The primary beneficiaries of the multinational NERICA dissemination project were upland rice producers in rural communities, who have limited education and training. They are mostly subsistence farmers who sell marginal surpluses to meet cash expenses, such as for education, health care, and other basic household needs. The yield levels for their traditional upland rice varieties are generally low. Because these subsistence rice farmers lack collateral, they are generally unable to access credit resources to engage in significant economic activities. About 80% of the targeted project beneficiaries were women and poor people.

The project benefited an estimated 241,000 farm families in the project area, 33,000 of whom were involved in NERICA PVS. The beneficiaries were

organized into 1,320 rice farmer groups, of which 1,056 were women's groups. Other beneficiaries of the project included rice scientists, extension agents (in terms of training), community seed producers, credit and microfinance institutions, input distributors, rice processors and traders.

A review of findings from NERICA adoption and impact studies in the target countries showed that NERICA had a positive impact on women². In addition to higher yields and higher protein content (25% higher than the average in the world market), the NERICA varieties mature quickly—a useful trait to cope with drought and compete with weeds, serious constraints in upland rice farming in West Africa. This feature is a major attraction for women rice farmers, who do most of the weeding in rice fields.

6 Monitoring and evaluation

The project was monitored through baseline surveys at the onset of the project (2006) and ex-post impact assessment surveys (2010) carried out by the National

Agricultural Research and Extension Services. For both sets of surveys, a common methodology was used in all countries to facilitate comparability and aggregation of

adoption and impact estimates across the countries. At the household level, data were collected on household socio-demographics, knowledge and cultivation of rice varieties, access to rice seed, production data for rice and other crops (input use and costs), agricultural and nonagricultural income, household expenditures, and household food consumption. In each country, data were collected at both village and producer levels through structured questionnaires.

Overall, the findings confirm the project design assumption that productivity-enhancing agricultural innovations can help raise the incomes of farm households, reduce poverty, and mitigate food insecurity in West Africa. The proportion of rice farmers growing NERICA varieties, mostly women, has increased consistently since the launch of the project in 2005. At project completion in 2011, the actual adoption rate across the seven countries was estimated to be about 43%, while the potential adoption rate was estimated at about 63%. This 20% gap seems to be due to a lack of both awareness and access to NERICA seed, showing there is still a need to increase investment in NERICA dissemination.

The NERICA varieties, which covered 200,000 hectares in all of sub-Saharan Africa when the project began, now cover—at a conservative estimate—800,000 hectares of farmland in the seven West African countries alone. Before the project began, farmers' average rice grain yield was about 1.0 ton/hectare in the upland ecology,

the largest rice production environment in West Africa; today, an average of 2.5-3.0 tons per hectare is not uncommon, and in Mali some farmers have attained 4.7 tons/hectare. Project countries such as Benin, Ghana, Mali, Guinea and Nigeria have recorded double-digit increases in domestic rice production, crediting NERICA rice for the remarkable jump. In 2011, farmers who had participated in the project activities benefited from additional income of US\$14.4 million.

By the end of the project, it was estimated that more than 35,000 people living in participating rice-farming households had been lifted above the poverty line of \$1.25 per day. Projecting this figure into the future, taking into consideration current awareness, seed availability, and adoption levels, gives a conservative estimate of half a million people who will be lifted out of poverty by 2035 because of the project.



7 Environmental and social risk mitigation

The introduction of the high-yielding NERICA rice varieties under monoculture growing conditions could have led to a loss of rice biodiversity, reducing rice farmers' varietal portfolio. The project addressed this risk of genetic erosion by introducing the proven PVS program as a means to involve rice farmers in varietal development and large-scale dissemination. In the first year, a "rice garden" was established in a target village, often in the field of a leading or innovative farmer. The garden, which cultivates rice seeds, was composed of NERICA, local and regional varieties of rice. In addition, the project funded and encouraged the collection of traditional and

indigenous rice varieties for conservation in national or regional seed banks; about 20 land races of rice were collected and preserved.

The project also introduced proven environment-friendly farming practices such as the proper application of fertilisers, manure, and agro-chemicals. The higher productivity of the NERICA rice varieties meant less marginal land encroachment, less deforestation, less destruction of fragile ecosystems and more sustainable farming systems. Funds were allocated to cover the cost of services provided by the national environmental

agencies to support the design and implementation of mitigation strategies.

The project gave special attention to women's challenges by ensuring that women were represented and organized

into rice farmer and seed producer groups. The project helped link project beneficiaries with microfinance institutions to ensure they had access to both short- and medium-term credit to enable them to carry out additional income-generating activities.

8 Lessons learned and applied

The NERICA project yielded two important lessons for the Bank's work in other projects. First, building a strong regional research system through appropriate partnership programs and networks between international or regional research centres of excellence (such as AfricaRice) provides unique opportunities for building and sharing knowledge on food security issues in the Bank's regional member countries (RMCs), which often have weak human and institutional capacities. And second, involving the end-user farmers at the onset of the development of any technology—no matter how innovative—is key to the subsequent uptake and adoption of the technology for enhanced agricultural productivity.

These lessons have informed the design of another multinational project, the Multinational Consultative

Group on International Agricultural Research (CGIAR) – Support to Agricultural Research for Development on Strategic Commodities in Africa, which was approved in 2012. Under this project, the Bank will partner with international and regional research centres of excellence, farmers' associations, and civil society to address the broad range of development needs in the agriculture sector, especially the areas of science, technology, and policy. The project's regional approach aims to draw on the international experience and modern research facilities of the CGIAR-supported centres to strengthen the capacity of the National Research and Extension Services to deliver innovative technologies adapted to the pressing needs of agricultural development for sustained food security in the Bank's RMCs

9 Sustainability

The sustainability of the NERICA project was built into its design. The capacity of the beneficiaries was enhanced using the well-tested Participatory Learning and Action Research for Integrated Rice Management. The project facilitated the organization of rice farmers into producer cooperatives. Learning materials such as videos (www.africarice/warda/guide-video.asp) were produced in close collaboration with researchers, field workers, rice farmers, and rice processors, using

simple language and clear visuals, and incorporating lessons from Participatory Learning and Action Research. The videos are available in English, French, and the most widely spoken languages in the target countries. Furthermore, the project enhanced the National Agricultural Research and Extension Services' capacities; reliance on these services was deemed critical to ensure the consolidation of the project's achievement when the project closed.

10 Partnerships

The project partnered with the leading pan-African rice research centre, AfricaRice. The National

Research and Extension Service, farmers' associations, and civil society in the participating countries worked

together on the project. The project's regional approach helped leverage the experience and the modern research facilities of the CGIAR-supported AfricaRice to strengthen the capacity of the National

Agricultural Research and Extension Services to deliver innovative technologies (e.g., NERICA rice varieties) to help address food security in the Bank's RMCs.

11 Dissemination of project

The Bank jointly funded and published with FAO and the Japan-based SASAKAWA Africa Association a compendium (www.africarice.org/publications/nerica-comp/Nerica%20Compendium.pdf) that assembles the results of scientific research on the NERICA varieties and their impact of their adoption on rice farmers' livelihoods. In addition, the Bank funded the production of short documentary films of various lengths (5, 8 and 20 minutes long) in both French and English to outline the field work of the project in participating countries and highlight its interaction with local populations.

The documentary (DVD/CD Flash Disk compatible), called "NERICA, the New Rice for Africa, the seed of hope – The contribution of the African Development Bank," released in 2012, served as a tool for learning, disseminating information, and increasing the Bank's visibility. The film was intended for dissemination to the Bank's member countries and for presentation to government representatives and potential donors from both the public and private sectors. The high-quality film meets the standards for distribution to international and regional broadcasters.

12 Dissemination in academic journals and conferences

Agboh-Noameshie, A., F.M.M. Kinkingninhoun, and A. Diagne. 2007. "Gender impact of NERICA adoption on farmers' production and income in Central Benin." Paper presented at the 2nd African Association of Agricultural Economists Conference, Accra, Ghana. August 20-22, 2007.

Diagne, A. 2006a. Diffusion and Adoption of NERICA Rice Varieties in Côte d'Ivoire. *The Developing Economies*, XLIV-2: 208-31.

Diagne, A. 2006b. "Bred for woman rice farmers? Impact of NERICA Adoption on Rice Yield in Cote d'Ivoire." Mimeo. Africa Rice Center (WARDA), Cotonou, Benin.

Diagne, A. 2010. Technological Change in Smallholder Agriculture: Bridging the Adoption Gap by Understanding its Source. *African Journal of Agriculture and Resource Economics* 5(1).

Diagne, A. et al. 2012. "The impact of adoption of NERICA rice varieties in West Africa." Paper presented

at SPIA Pre-conference workshop; 28th IAAE conference, Foz do Iguaçu, Brazil, August 18, 2012.

Diagne A., S.G. Midingoyi, and F.M. Kinkingninhoun-Medagbe. 2009. "Impact of NERICA Adoption on Rice Yield in West Africa." Paper presented at the symposium Promoting a green revolution in Africa, at the XXVII International Conference of Agricultural Economists, Beijing, August 17- 22, 2009.

Diagne, Aliou, Soul-Kifouly Gnonna Midingoyi, and Florent M. Kinkingninhoun-Medagbe. 2013. "Impact of NERICA Adoption on Rice Yield: Evidence from West Africa." In *An African Green Revolution: Finding Ways to Boost Productivity on Small Farms*, edited by __K. Otsuka and D. Larson. Dordrecht: Springer Science+Business Media.

Diagne, A., S.-K.G. Midingoyi, M. Wopereis, and I Akintayo. 2011. Increasing Rice Productivity and Strengthening Food Security through New Rice for Africa (NERICA). In *Yes Africa Can: Success Stories from a Dynamic Continent*, by C.P. Punam and A. Manka. Washington, DC: International Bank for Reconstruction and Development.

Dontsop Nguetzet, P.M., 2011. Impact of Adoption of NERICA Rice Varieties on Rice-Farming Households' Welfare in Nigeria. Published Ph.D. dissertation, Lambert Academic Publishing (LAB) GmbH & Co. KG.

Dontsop Nguetzet, P.M., A. Diagne, V.O. Okoruwa, and V.T. Ojehomon. 2011. Impact of Improved Rice Technology (NERICA varieties) on Income and Poverty among Rice Farming Households in Nigeria: A Local Average Treatment Effect (LATE) Approach. *Quarterly Journal of International Agriculture* 50 (3): 267-92.

Somado, E.A., R.G. Guei, and S.O. Keya. S.O. 2008. NERICA: The New Rice for Africa – A Compendium. Cotonou, Benin: AfricaRice; Rome: FAO; Tokyo: Sasakawa

Africa Association (www.africarice.org/publications/nerica-comp/Nerica%20Compendium.pdf).

Spencer, D., A. Dorward, G. Abalu, P. Dayo, and Ogungbile D.. 2006. "Evaluation of Adoption of NERICA and Other Improved Upland Rice Varieties Following Varietal Promotion Activities in Nigeria." A Study for the Gatsby and Rockefeller Foundations, Final Report.

Wopereis, M.C.S., A. Diagne, J. Rodenburg, M. Sié, and E.A. Somado. (2008). Why NERICA is a successful innovation for African farmers: A response to Orr et al. from the Africa Rice Center. *Outlook on Agriculture* 37 (3): 169-76.

African Development Bank

Statutory Headquarters:

Rue Joseph Anoma de Coubertin
01 BP 1387 - Abidjan 01

Côte d'Ivoire

www.afdb.org

Design: Créon - www.creondesign.net



AFRICAN DEVELOPMENT BANK GROUP



GROUPE DE LA BANQUE AFRICAINE
DE DEVELOPPEMENT
AFRICAN DEVELOPMENT BANK GROUP