Rio Rural is a watershed management project that fosters changes in rural production processes within a framework of market-driven agricultural development. It focuses on sustainable intensification of smallholder farms, adding value and improving market linkages.

Innovative mechanisms include co-funding from various government programme and private sector, including water users but also EIA and CSR investments.

Implementation: 2006 to 2018
Total budget: US$ 233 million

Financial sustainability for environmental services: rural development in microwatersheds Rio Rural, Brazil

Overview

The Rio Rural Programme promotes sustainable development in rural areas of the State of Rio de Janeiro, Brazil, with the objective of empowering family farmers, raising awareness about environmental issues and promoting their social and productive inclusion, so they can act as main partners in the sustainable management of natural resources and eco-friendly agriculture.

Implemented by the State Secretariat of Agriculture and Livestock of Rio de Janeiro, with funding from GEF (2006-2011), the World Bank (2010-2018), federal and state programmers and private sector. The project will benefit 78,000 farmers, 47,000 with direct financial incentives and technical assistance to improve productivity. In return farmers agree to implement conservation and restoration practices in their lands, contributing to sustainability of the Atlantic Forest biome.

The farmers are increasingly adopting practices such as reforestation, spring protection, recovery of riparian vegetation and protection of water recharge areas, sanitation, road rehabilitation, green and organic manure, among other actions with direct impact on natural resources. All activities and projects are discussed within the community active participation and set out in the local watershed plan. The families find out their priorities and establish how to take action. Rio Rural provide technical framework and encourage local actors to raise funds directly.

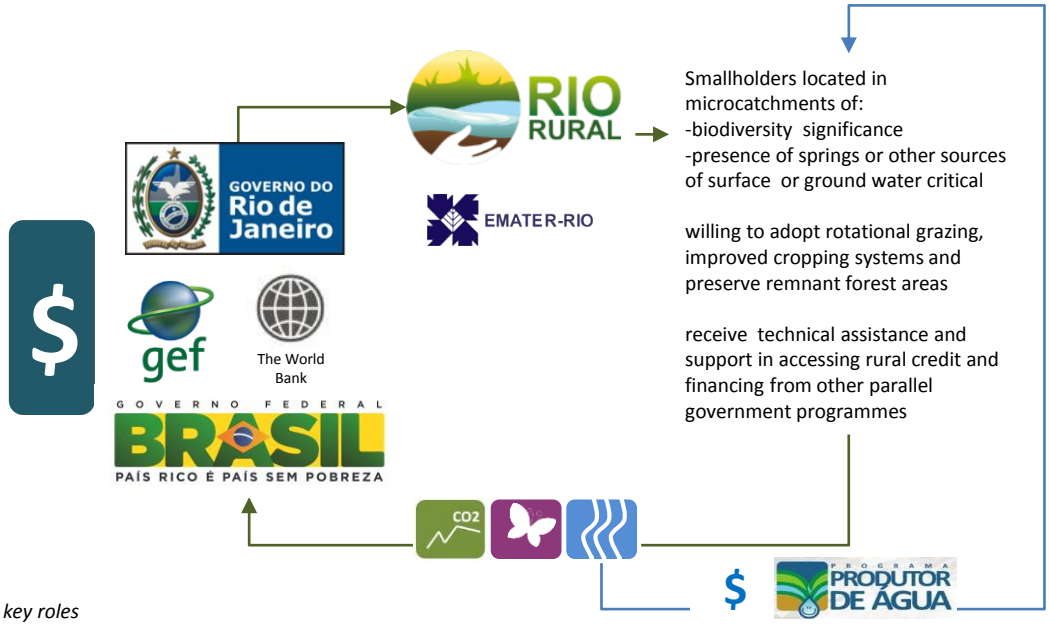

Figure 1: Schematic diagram of the key roles

Background

Rio Rural joins efforts to enhance financial sustainability of ES, supporting farmers with technical assistance, capacity building and adaptation of adequate technological solutions to local conditions.

It involves direct incentives on farming sustainability and ES provision, identification of new opportunities arising from private investments, and integration with multisectoral public policies.

In partnership with the Global Environment Facility (GEF), between 2006-2011 the RJ Gov approved a US$14 million grant to implement the RJ Integrated Agroecosystem Management project in productive landscapes of North Northwestern Region of RJ State Project - Rio Rural Project implemented in a pilot and demonstrative basis 48 microwatersheds supporting 4,000 small householders to adopt a sustainable and integrated management of ecosystems and landscapes into their productive systems. The main challenge was to improve rural livelihoods and income through adoption of sustainable natural resources management and conservation practices integrated to agricultural and non agriculture systems thus raising productivity while promoting biodiversity conservation, climate change mitigation and reversing land degradation in the most critically degraded and endangered remaining areas of the Atlantic Forest biome in the state of Rio de Janeiro.

The goal was to engage small farmers in in the North and Northwestern regions of the state, where rates of rural poverty, land degradation and deforestation are higher due to land use cycles of unsustainable and low productivity agriculture systems – coffee, sugar cane, pasture. One major factor which has contributed to the present situation are past rural policies, which were historically aimed at assigning priority to mono cropping of coffee and sugar cane and extensive cattle-raising, using deforestation and unsustainable production systems that caused soil depletion and degradation of water resources. Smallholder agriculture in the NNWF is suffering the effects of these policies that have significantly increased rural poverty in the region.

To reverse this pattern it was critical to (i) raise awareness among small farmers, local managers, technicians and stakeholders about global environment issues and their role on biodiversity conservation, water protection and climate change mitigation and (ii) long term support to small farmers to transition to eco-friendly productive systems. Since most of the sustainable and conservation technologies have higher costs of implementation and low impacts on rural income it is thus crucial to establish a financial incentive system to support adoption of integrated natural resources conservation and sustainable agriculture practices by small farmers. On the other hand, as farmers provide environmental services to whole society, they should be compensated or supported with public and private funds to ensure long-term provision of these services.

The Programme participated in discussions on the Law Project that culminated with creation of the State Policy of Environmental Services and the State Program of Payment for Environmental Services, which established forms of control and funding of ES activities, as well as the Green Economy Plan of the State of Rio de Janeiro and the Pact of the Atlantic Forest Restoration. Carbon Balance estimations of land use changes improvements [1] by Rio Rural is now part of RJ state climate change policy. This will enable farmers in the future to access environmental initiatives to long term support of green house gases mitigation and adaptation.

In 2006, with US$14 million funding from GEF and RJ GOv, project kick off actions in 48 microcatchments in 24 municipalities within the North and Northwest regions of the State. Based on good results of the GEF phase, in 2010 a loan of US$79 million was approved to upscale Rio Rural actions to 59 municipalities and 200 microwatersheds, benefiting 30,000 families (about 30% of rural population of Rio de Janeiro).

[1] In partnership with FAO, Rio Rural used the Ex-Act carbon balance tool to demonstrate that adoption of good practices by smallholders enable mitigation of global warming effects and neutralization of carbon emissions of the agricultural sector.

The tool allowed to measure project's carbon step and find more appropriate management practices, in order to guide technical support services to farmers interested in accessing carbon markets.

Ex-Act http://www.fao.org/tc/exact/en/) allows ex ante estimation of carbon balance of SDR projects, what can help these projects to get closer to the carbon markets.

Financing watershed management

PP$

Public-Private

Investment by water users

In Brazil, it was established by law in 1999 that water resources should be protected under sustainable and participatory management by the Watershed Committees, collegiate bodies with representatives of the public and private sectors and civil society within each federal or state watershed. The Watershed Committee is the coordinating body to ensure and implement sustainable watershed management with the Environmental State Agency financial, legal and technical support.

In Lagos São João Watershed Committee (Coastal Region of the state), Rio Rural brings its micro-watershed participatory diagnosis and planning methodology, which the committee has now adopted, and its farm technical assistance integrated with reforestation and sanitation projects. The committee created a specific fund which invests money collected from water taxes and other financial sources in the maintenance of the watershed. Four micro-watersheds have benefited with US$ 174,500 invested in sustainable land and water management, rural sanitation, improvement of local roads, agroforestry, reforestation, sustainable agriculture and building of a seedling nursery. Similarly, Guandu Watershed Committee - which supplies the city of Rio de Janeiro - and the Macaé River Watershed have leveraged almost US$ 200,000 in co-investments towards improvement of water quality and quantity within a perspective of maintenance of watershed services. Located on the Serrana Region,the Macaé Committee is now investing US$90,000 on an environmental education program and US$ 50,000 on agroecological transition of 10 farms in Nova Friburgo. All demands were identified by local actors and consolidated on the micro-watersheds' participatory diagnosis.

Private investors (EIA and CSR)

Investments are also made by private companies that must mitigate impact of their entrepreneurships. Partnerships were held in the North and the Northwest of the state, such as the logistics company LLX, which operates the Acu Port Complex and started to invest on agroecological production, through the construction of 5 greenhouses and 4 integrated production systems called "mandalas", with a total investment of US$ 300,000 in São João da Barra, in the North of the State, until 2015. The market of these sustainable products will be consumed by the own company, as part of their commitment in the EIA, that stipulates that 70% of food supply must be produced by local farmers. Another experience with the national oil and gas company - Petrobras funded a US$ 532,000 regional project for strengthening crafts productive chain, adding value to small farming production and strengthening local culture. Table 1 below shows the total amount of co-investments integrated to farmers by Rio Rural.

While Rio Rural gives technical support and financial incentives to income generation activities, the Watershed Committee invest directly on conservation practices.

PES from water users is a part of the basket funding used and of investment in water quality protection, trough soil, water and forest conservation is done as a condition to receiving technical assistance to improve farm productivity, mainly in coffee and dairy systems.

Co-investments in the micro-watersheds totalize US$ 10.133.158 (2009-2013), allowing long term sustainability to rural development activities

Table 1. Rio Rural funding 2009-2013 per funding source and type of initiative, in USD

Co-Investment source/objective	Rio de Janeiro Government	Federal Gov	NGOs, private sector	Municipal Gov	Beneficiaries	TOTAL
Cultural Initiatives		630.000				630.000
Environmental initiatives *	4.900.000		542.795		4.400	5.447.195
Food security		173.459				173.459
Research / Technological Innovation	634.000	151.964	2.225		40.380	828.569
Income generation	103.447	1.332.000	162.800	374.463		1. 972.710
Municipal initiatives				96.225		96.225
Technical assistance		975.000				975.000
TOTAL US$						10.133.158

* RJ Gov (State Fund for Environmental Conservation – FECAM); NGO/private sector: SOS Mata Atlântica Foundation + Watershed Committees

The providers of environmental services

Figures 2 and 3 (above) Protection of springs and riparian forests are environmental services already in small farms of RJ.

Figures 4 and 5 (below) Farmers have access to technologies and support to increase productivity and preserve the environment

All the farmers involved with the project (approximately 95% of whom are small householders), from all regions of the state, are encouraged to act as ES providers. Selection criteria were: significance of the microcatchment's biodiversity, presence of springs or other sources of surface or ground water critical to the protection of the microcatchment, concentration of small farmers and existing level of community organization.Rio Rural supports a **combination of practices** to raise productivity and natural resources sustainable management:

Rotational grazing system

Popular among Rio Rural´s farmers, it consists on keeping a confined livestock area with intensive food and water supply, so the cows can produce more milk in smaller pasture areas. The rotational grazing respects the growth time of grass, ensuring greater uniformity, recovery of soil fertility and productive efficiency. At the same time, it helps to preserve the environment while it keeps cattle away from areas of cultivation and preservation (rivers, springs and forests). A sustainable alternative to traditional extensive grazing, rotational grazing prevents soil compaction and degradation as well as reduction of vegetation cover. The "mandala" agroecological system consists of an integrated sustainable planting which allows producing quality food in small spaces without using pesticides or chemical fertilizers. The environmentally balanced system includes several varieties of vegetables and ensures increased household income, thanks to the variety and high value of foods naturally produced, as well as the high demand on the local and regional markets.

Improved cropping systems

Soil fertility and carbon accumulation are also stimulated with improved cropping systems through introducing soil conservation practices, green manure, organic manure and improved irrigation, integrated to the implementation of small poultry farming units. Each unit produces annually 2,475 tons of organic fertilizer, reducing the need for purchasing synthetic fertilizers and lowering pollution potential.

Agroforestry System

Combining the cultivation of diverse crops and forest trees, with or without the existence of animals in the same area. This system increases farm income and carbon storage, reduces pests and diseases and reduces pressure on natural forest.

As discussed above, conservation of forest and water courses is a requirement in each farm. Each farmer commits to do so in her own farm plan. The table below relates some practices promoted with Rio Rural and partner' incentives with related environment and social impacts.

Technical assistance is provided by Emater-Rio, the State extension public company, is Rio Rural´s executor and most strategic partner. The company is responsible for providing technical assistence to the small farmers and for implementing field activities, capacity building workshops, training and implementation of sustainable techniques. Rio Rural finances infrastructure for extension work and provide methodological and planning tools for technicians. **Pesagro-Rio**, the State agricultural research organization, is in charge of the programme´s researches, using Rio Rural´s participatory approach in order to support adaptation and adoption of sustainable practices and management of natural resources among farming families living in micro-watersheds. The institution also coordinates a rural research network, with the participation of the most relevant universities and research organizations.

Research is carried out by Embrapa, an internationally renowned reference on agricultural research. For Rio Rural, it aggregates knowledge and supports improvement of production processes, contributing to development strategies to access carbon markets. Embrapa is a key partner on monitoring micro-watersheds, collecting and analysing soil quality indicators, and making studies about carbon stocks in pastures.The Fluminense Federal University (**UFF**) supports Rio Rural with the elaboration of studies on forestry and other environmental studies, such as the selection of sanitation models adequate to rural communities and its best implementation. The field activities are funded by Rio Rural. The University of the North of the State of Rio de Janeiro (**UENF**) supports monitoring and studies on biodiversity in the micro-watersheds. The studies carried out with data collected in the micro-watersheds **[2]** allowed to identify native animals and plants and generated a list of species for reforestation.

[2] available at http://www.microbacias.rj.gov.br/biblioteca_virtual.jsp

Incentives

Farmers who adopt rotational grazing systems with Rio Rural support also agree to release part of their lands to forest restoration, to protect springs and riparian strips. On average, for each hectare of rotational grazing established, 1.5 ha are released for biodiversity conservation allowing the reappearance of birds and other native animals in the area and representing about 0,3 ha for every thousand dollars invested in sustainable grazing) **[3]** .

At the same time, this also results in an estimated increase in soil organic matter (67% more) with consequent improvements in soil fertility and biomass production (increase in biomass carbon storage 5t/ha/year? and in soil carbon storage (80t/ha/over 20 years), representing 19 carbon tons per thousand dollars invested.

The protection and restoration of forest areas and rehabilitation of vegetation cover around springs and recharge areas, improves on-farm water availability by increasing rainwater infiltration (also though roadside water diversion ponds- *barraginhas*), which is of great value in periods of drought. Some farmers reported an increase of approximately 12% in pineapple production after implementation of springs' protection, due to the increase in water availability for irrigation. In addition, spring protection also prevents contamination and cattle trample, improving the water quality, and the project has linked with water users to co-invest in these measures.

In Brazil, the National Policy for Biodiversity Conservation established that private conservation areas named Private Reserves of Natural Heritage (RPPNs), created voluntarily by the owner of rural properties, when legally established, becomes part of the National System of Conservation of Nature – SNUC, thus eligible to public and private support. In Varre-Sai municipality, in the northwest of the state, there was an outstanding implementation of private reserves by members of Rio Rural´s Micro-watershed Committee. Annually each farmer is granted up to four hundred dollars per hectare of forest protected. In 2012, the amount of US$ 15,600 was shared among six farmers in Varre-Sai, as a payment for environmental services. Moreover these farmers are engaged in other fiscal incentives programs such as exemption of territorial annual taxes and facilitated access to rural credit programs. This engagement led to conservation of natural heritage and encouraged discussions that resulted in a municipal law that ensures payment of environmental services directly to farmers who protect nature.

In Brazil every year several federal multisectoral programs releases millions of dollars of funding to support environmental, economic, cultural and digital inclusion initiatives in rural areas. The Rio Rural Programme support local actors to access these investments and also others opportunities opened up by other non-governmental institutions.

Rio Rural support farmer´s participation on calls for projects, such as the National School Feeding Programme and the National Food Purchase Programme, through designing individual and group proposals and giving technical support to adequate production systems and planning, totalizing US$ 828.569 of coinvestments. Grants from the international "Critical Ecosystem Partnership Fund (CEPF)" provided US$ 17,700 to the creation of natural reserves inside rural properties. With financing from private companies, the process involved the environmental NGOs SOS Mata Atlântica and Conservation International in implementation and monitoring. The farmers that implemented the reserves had their proposals designed with the support of Rio Rural and approved in a call for projects of the NGOs.

Rio Rural encourages good farming practices through a broad communication strategy, including direct interaction with farmers and other stakeholders. The successful experiences in the rural households are disseminated through campaigns, field days and tours, educational activities in schools and other events, as well as publications, creating thus a network of ecological farmers.

Incentives

"I have learned to diversify my production and to work in an ecoloLogical way, and i can guaranty it was worth it. My life has changed. Now that we also have a dedicated space to sell our produce, we are already getting better prices"
Luciana Andrade, using the Mandala agro-ecological cropping system, in São José de Ubá

To read more voices from the field visit:
http://www.microbacias.rj.gov.br/noticia_visualiza.jsp?p_idNoticia=274&p_retorno=busca.jsp&p_filtro=luciana;@!@;;@!@;&p_tabelas=ws_noticia&p_pagina=1

http://www.microbacias.rj.gov.br/noticia_visualiza.jsp?p_idNoticia=460&p_pagina=6&p_retorno=noticia.jsp&p_filtro=

http://www.microbacias.rj.gov.br/noticia_visualiza.jsp?p_idNoticia=273&p_retorno=busca.jsp&p_filtro=luciana;@!@;;@!@;&p_tabelas=ws_noticia&p_pagina=1

[3] Since agriculture carbon prices are currently about 6USD this may not look competitive, however, if we consider the biodiversity and livelihood benefits associated, this type of carbon credits could eventually be sold at a premium, and raise long-term funding to continue supporting these activities.
http://carbontradexchange.com/products/verified-emission-reduction-vers

MRV

Tracking impact

Participatory Monitoring is more cost efficient under social, environment and economic dimensions and helps to raise community awareness and empowerment. All the monitored activities and results showed that an approach focused on the raising farmers´ income through enhanced productivity implies a long-term perspective for the ES provision, as farmers take ownership of conservation and sustainable production practices as part of their business.

The programme built a **participatory method to monitor** its activities and results. Topics such as sustainable production, productivity of major agricultural chains, water and soil quality and biodiversity are introduced in the community agenda, through meetings of the micro-watersheds management committees, and take part of families´ daily activities. The own farmers collect water for analysis, with technical support of the rural extension professionals, also monitoring soil conditions and the increase of production, stimulating other farmers to adopt good practices. Beyond the educational role of the participatory monitoring, one of its advantages is the low cost of implementation, based on easy and cheap methods. One tool especially created to the monitoring is a wall panel posted in the rural residences, in which the family tracks economic, environmental, social welfare and life quality indicators. At the end of the year, data collected from the farms is processed and analyzed by local actors, allowing update of micro-watersheds' plans, strengthening participation and the local power to claim for services like public transportation, health care, education etc. The results are reported to the programme's team to be used as a basis to improve services and projects, according to community interests and level of satisfaction. Some panels are put under women responsibility, in order to identify gender issues and demands.

Rio Rural has been already experiencing the use of information technologies and communications, such as monitoring cameras inside the farms where sustainable projects are being held, as a solution for investors who are interested in **monitoring results in real time**, as well as tracking landscape changes. Good agricultural practices are also encouraged through direct communication with farmers and other stakeholders. The successful experiences in the rural households are disseminated through campaigns, field days and tours, educational activities in schools and other events, as well as publications, creating thus a network of ecological farmers.

The Office of Strategic Issues of the Federal Government (**SAE**) supports programme impact assessment. Rio Rural adopted a scientific methodology that allows comparing the results of farms that received incentives and technical assistance for the adoption of sustainable production systems and similar properties that did not, in the same community.

Figure 6. The monitoring panel is posted in each farm to register issues related to production, life quality and environmental issues.

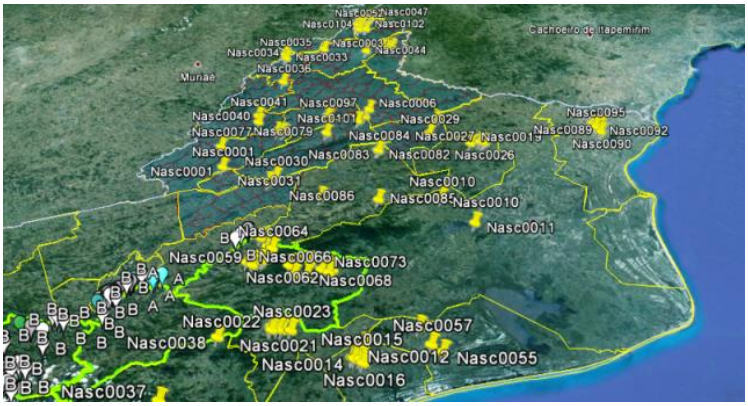

Figure 7. Georeferenced springs are accessible at the website where anyone can locate protected springs using Google Earth, and access basic information like the name of the farmer benefited, the name of the micro-watershed. http://www.microbacias.rj.gov.br/campanha_rio_olimpico.jsp

Lessons Learned

Negotiation

Water is the essential factor for the maintenance of production systems that ensure the families' livelihood. The microwatershed approach facilitates raising farmers´ awareness of the importance of preserving natural resources since water is the key entry point to start a negotiation process.

Incentives

Scaling up adoption of practices that enhance ES is facilitated when these practices are integrated to productive ones that raise productivity and farm income. The combination of practices to increase productivity and enhance natural resources conservation seem to be the best combination of incentives. The importance of farmers´ commitment in the farm plan and matching their own grants in counterpart, integration of multiple resources and funding (private, public), support of a "broker" facilitated farmers´ access to co-investments. The financial sustainability of ES provision seems to be more linked to farmers´ awareness and commitment to long term maintenance of natural resources conservation than unsustainable or short term payment schemes. Key criteria to select farmers integrating environment and social aspects seemed to facilitate raising awareness and farmers engagement.

Public-Private

Huge entrepreneurships that emerge in the state and the increased food demand also challenge agricultural sector to seize the opportunities that come with environmental, economic and social changes. Besides contributing to food security and mitigation of negative effects of climate change, the adoption of integrated good environmental and agriculture practices also increases production efficiency and competitiveness, raising farmers´ income while benefiting the whole society.

The campaign "Clean Water for the Olympic Rio" is one of the Rio Rural´s hotspots of communication strategy for mobilization of farmers, local managers, private sector and the whole society about the conservation and sustainable use of water resources. With a symbolic target of 2016 springs protected on farms until the Olympic Games in Rio, it promotes an integrated action to raise awareness of the farmers' role as water producer/protector and the importance of this resource to agriculture and human supplying. A virtual accountant on the website www.microbacias.rj.gov.br tracks the number of protected springs. Rio Rural has already protected 635 springs in partnership with family farmers and local governments. About 30% of the springs were protected without programme's financial incentives, with farmer's own resources, showing that awareness raising activities such as field days and communication strategies take effect on upscaling results.

Ownership

As Rio Rural Programme works within an environmental referenced unit, it is possible to more easily monitor the socioeconomic and environmental impacts. The micro-watershed is a hydrological unit that has a clear correlation with communities' perception of their immediate problems every day issues, being the water a central element livelihood. This approach have been facilitating participation of the several stakeholders in the local level. Governance necessarily involves empowering communities, improving coordination of public and private investments at the local level, decision-making and participation in the implementation of public policies and social responsibility projects. This interface allows greater efficiency in implementation of these policies, subsidized with demands raised from the organized communities.

Innovation

• Strategic Approach – Focus on long term actions and interventions meeting the main territorial challenges
• Sustainability – Assurance of long term impact. Capacity of raising funds and keep going after the project
• Alignment between funders / investors' objectives and communities needs – Interventions must be integrated to investments and entrepreneurships
• Participation of relevant actors (multi-stakeholder) – Direct involvement of territorial actors
• Measurability – Establishment of impact monitoring systems to assure result assessment. Checking mechanisms to allow redrawing activities of lower aggregate impact

Future outlook

Rio Rural seeks to promote in a near future ES provision by groups of farmers or rural communities. **The strategy is to leverage the successful groups established for economic purposes as environmental services providers**. If the microwatershed approach allows simultaneously community empowerment and ES improvement, it is expected that the provision by a group or community within a microwatershed will provide ES more efficiently and with additional social benefits.

The maintenance of partnerships already established with businesses and civil society organizations, the integration of agriculture with major events and economic opportunities makes the state of Rio de Janeiro an area with great potential for the consolidation of a green economy in Brazil, based on high productivity, low emission of C, rich biodiversity and water resources, with food security for families and strengthened social organizations.

It is also important to build awareness among consumers and market players in order to add value to sustainable agriculture products linked to ES provision thus raising farmers´ income. A system of conformity for these products is being designed by PESAGRO and partners based on a set of social, economic and environment indicators to be incorporated in the future in the farm plans. It is also being designed with Rio Rural support in partnership with the RJ State environment agency (INEA) a new GEF/IBD project coordinated by Federal Ministry of Science, Technology and Innovation involving 3 Brazilian states around Paraiba do Sul River Watershed. Project grants will be channeled to test the **technological leap** approach proposed by Rio Rural to contrast conventional PES schemes.

Scaling up is now ongoing to 366 micro-watersheds in 72 municipalities with an additional financing of US$140 million to extending its benefits to almost 80% of the state and introducing an approach focused on sustainable management of landscapes and acceleration of competitiveness to facilitate access of small farmers to markets.

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