Chapter 3
Catalyzing an Inclusive Green Economy through South-South and Triangular Cooperation: Lessons Learned from Three Relevant Cases

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1. Introduction

In this paper, I contend that triangular cooperation (TrC) has considerable potential as a vehicle we can utilize in efforts toward realizing an "inclusive green economy." This argument is supported by three sub-contentions. The first has to do with the understanding or definition of a green economy. Below, I contend that a green economy must be fundamentally defined as a pro-poor concept, and that it must inherently be an "'*inclusive*' green economy." Second, I argue that the realization of an inclusive green economy requires innovative solutions, based on the wisdom and knowledge of local people, and yet supported by solid scientific knowledge and technological foundations. And third, I argue that for the creation of such innovative solutions leading to an inclusive green economy, TrC can provide the ideal opportunity for tapping our hidden potential for dealing with the challenges. I will demonstrate these claims by referring to three TrC projects: two in Latin America and one in Africa.

1.1 Inclusive green economy

A 'green economy' is defined by the United Nations Environment Programme (UNEP) as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (UNEP, 2010). Therefore, a 'green economy' is a pathway to sustainable development and poverty reduction as highlighted by UNEP's report on the green economy prepared for the Rio+20 Conference in Rio de Janeiro in 2011 (UNEP, 2011).

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There is a close relation between the transition to a green economy and the eradication of poverty, as well as inclusive development. Productive sectors like agriculture, forestry, fishery and water management are sectors with high potential for poverty reduction as well as possible areas for a green economy. Nevertheless, the transition to a green economy will not automatically address all poverty issues. Or, in other words, the transition to a green economy will not be realized without people's support and cooperation, and hence it needs to contain a poverty-reduction orientation if it is to succeed. Thus, as UNEP correctly points out, "a pro-poor orientation must be superimposed on any green economy initiative" and, furthermore, "a green economy must not only be consistent with [the] objective [of MDGs], but must also ensure that policies and investments geared towards reducing environmental risks and scarcities are compatible and ameliorating global poverty and social inequality" (UNEP 2011, 20). Therefore this paper uses the term "inclusive green economy" to make explicit the inherent needs for a green economy to have a pro-poor orientation.[1]

1.2 The cases

This paper considers three projects broadly categorized as "sustainable and inclusive development" and related to the areas of agriculture, forestry and water management, to obtain insights into how to achieve the dual objective of reducing environmental risks and poverty and inequality or to realize, according to the definition given above, an inclusive green economy. This paper aims to analyze how a pro-poor orientation was superimposed on green economy initiatives in these projects. In particular, we will discuss how innovative solutions were created during the process toward the attainment of both these goals. We will also pay attention to the advantages of South–South/triangular cooperation in creating and sharing such solutions with other countries facing similar challenges.

All selected cases are related to forests in tropical regions, while they have different climatic and topographic conditions. Two cases, the Panama Canal watershed and the Amazon rainforest, are in the humid

1. "Green economy" or "green growth" does not always include an inclusiveness and poverty reduction perspective. A study by the Asian Development Bank (ADB) and ADB Institute refers to "low-carbon green growth" as follows: "An avenue toward development that decouples economic growth from carbon emissions, pollution, and resource use, and promotes growth through the creation of new environment-friendly products, industries, and business models that also improve quality of life" (ADB and ADBI 2013, ix).

tropical zone, while the third case, in Kenya, is mainly located in an arid or semi-arid zone. Topographically, the Panama Canal watershed is in mountainous areas while the Amazon rainforest is located in low, flat land. In contrast to the other two cases Kenya contains both low and high lands. Hence, all these regions face different risks of environment deterioration. However, they face common challenges to achieve simultaneously the conservation of the environment and improvement of livelihoods of those who live in these regions.

1.3 Innovative solutions

In this paper, "innovative solutions" are defined as ways and means to cope with the obstacles, constraints and other difficulties related to challenges to an "inclusive green economy," including technological and institutional innovations, and good practices in the field to implement and disseminate such innovations. "Innovative solutions" could include a wide range of ideas, but this paper sees those as of particular importance that have been developed in the context of the South to address the challenges it faces and had not been available elsewhere.

In the Panama Canal watershed, innovative solutions were identified to promote the transition from slash-and-burn farming to sustainable farming to produce staple foods and to improve soil fertility. The solutions adopted included the use of paddy rice production (wet rice culture), organic agriculture, contour line cultivation, and alley cropping. Although most of these individual technologies and practices are not in themselves innovative, they are carefully structured combinations of them, coupled with institutional innovations, which resulted in innovative solutions. These ecologically friendly solutions enabled, through the increased production of staple foods and other crops, improvement of the livelihood of farmers and the alleviation of poverty. In the case of the Tomé-Açu agroforestry model in the Amazon rainforest, the key elements have included an innovative combination of crops and trees and the sequence in which they have been planted. The author regards this model as innovative, because it came up with a way to assure the coordinated succession of productive plants and trees, or healthy reforestation (by promoting the reproduction of plants) in such a way that water and nutrient absorption by different kinds of plants and trees is self-adjusted to be optimal, that shading of higher plants protects smaller plants, and that crops provide farmers steady annual income.

Throughout social forestry projects in Kenya, with the Kenya Forestry Research Institute (KEFRI) as an implementing agency, basic tree nursery and tree planting technologies in arid and semi-arid regions were developed and core farmers were fostered as the base for the extension of the model developed under the Kenya–Japan technical cooperation projects. For the extension of this model, the Farmers Field School (FFS) approach, an existing proven extension approach in the agricultural sector, was applied across the forestry sector through innovative adjustments to the methodology used. Through the FFS, techniques such as seedling production, fruit tree planting (mango, grevillea, and others), poultry raising, vegetable cultivation, utilization of compost, and creation of woodlots were disseminated.

1.4 Inclusiveness through empowerment and social capital

While, as discussed above, innovative solutions in terms of technology and institutions are important factors in achieving an inclusive green economy, they are not a sufficient condition for the achievement of our goal. To create a truly meaningful impact, they should be effectively practiced by farmers, foresters and community members with their capacity, ownership and social capital, if the goal is a transformational impact at the country level or a full-fledged scale-up.[2]

The corollary of this recognition is that the innovative solutions should be assured and enhanced through the empowerment of farmers and through their community and its organizations with enhanced social capital. This is related to both the capacity and ownership of farmers as the main actors in the green economy on the one hand and dissemination of innovative solutions on the other. Innovative solutions alone, if not practiced and disseminated, cannot address the challenges facing a green economy.

Such developments are apparent in each of the three case studies discussed in this paper. In the case of Panama, the spontaneous creation by farmers of the Farmers' Association of the Upper Panama Canal Watershed symbolizes the farmers' empowerment and their enhanced social capital. In the case of the Amazon rainforest, the social capital generated and maintained by an agricultural cooperative has been a critical component in the success of farmers. It has supported the process of development of the Tomé-Açu agroforestry model, especially

2. Regarding this view on scaling-up, see Chandy et al. (2013), 7.

by serving as a forum for sharing knowledge and by marketing agroforestry products. In the case of Kenyan social forestry projects, the Farmer Field Schools (FFS) have developed ownership, strengthened communities, and increased farmers' capacity through knowledge about forestry.

1.5 The advantages of South–South and triangular cooperation

Each of the three cases discussed below tackles areas which are affected by particularly severe development challenges and constraints. In these areas, the simple transfer of knowledge or technology developed in the North does not work. In these cases, in place of knowledge transfer from outside, an endogenous capacity development (CD) process must take place, based on the efforts of the local people to find solutions through mutual learning and knowledge co-creation. This process must be led by the initiatives of farmers and their communities, but can also include government organizations and research institutions as well as external actors, which can act as supporters to the local residents' initiatives.[3] In the three cases, innovative solutions have been achieved through this type of process, which depended on both knowledge co-creation in the field and academic research by supporting actors with a long-term commitment. Through such processes, the institutions that played a major supporting role gradually developed their own capacity, eventually growing into what can now be called Centers of Excellence (CoE) in their respective areas.

South–South cooperation and triangular cooperation (SSC/TrC) could provide an effective approach to promote the abovementioned innovative solution.[4] In this approach, CoEs, which have contributed much to the achievement of innovative solutions over a period of many years, played an important role. For example, pivotal countries' CoEs were quick to become acquainted with the conditions, environment, and challenges of partner countries, and establish stronger networks of professionals, researchers, and practitioners from countries participating in SSC/TrC. In this respect, CoEs in the South have great advantages over similar institutions in the North, which tend to lack such knowledge and relevant resources. Thus, the SSC/TrC modality assures mutual learning and trust among participants and the organizations to which they belong.

3. As for capacity development, see Hosono et al. (2011)

4. As for South–South and triangular cooperation, see Hosono (2013).

1.6 Structure of the paper

The subsequent sections 2, 3 and 4 will look, respectively, at the cases of the Panama Canal watershed, the Amazon rainforest and Kenya's social forestry from the perspectives as outlined above. The sections will detail, in the case of each project, the challenges faced, innovative solutions developed, and factors observed related to inclusiveness, social capital and empowerment of poor communities in the process of efforts toward an inclusive green economy. Each section will then look at the features of South–South/triangular cooperation to see the contribution it made to sharing innovative solutions with other countries. Concluding remarks, based on the findings of these case studies, will be presented in section 5.

2. From Slash-and-burn Farming to Sustainable Agriculture: Panama Canal Watershed Conservation

The case of Panama Canal watershed conservation is important from the abovementioned challenges to attain both conservation of the environment and inclusive development. In Panama, there had been concerns about water, a key natural capital, for the Panama Canal, and the problem of how to conserve the watershed in the area while reducing poverty at the same time became a critical issue for the country.

2.1 Challenges

Land reclamation in the Panama Canal watershed is progressing because of recent increases in population in the area. Consequently, there are fears that forest degradation and a decline in the replenishment of water-source functions in the watershed will have an impact on the operation of the Panama Canal.

Since the 1950s, the Panama Canal watershed has been experiencing deforestation resulting from a number of factors, including expanding farmland and pasture, burning and subsequent extensive pasturage, clearing associated with slash-and-burn farming, and overexploitation. Forest degradation, as exemplified by deforestation, soil degradation, soil erosion, and the loss of biodiversity, is a major environmental concern on the development agenda for Panama. There are concerns that a fall in the capacity for water-source conservation/recharging as a result of forest degradation is affecting navigation along the Panama Canal.

El Niño in 1997 strongly raised concerns about environmental conservation and the Panama Canal navigation during the dry season. These circumstances prompted the Panamanian government in 1997 to establish a law concerning land use planning in the Panama Canal watershed. Among other targets, this law called for reducing the proportion of pasture from 39 percent in 1995 to 2 percent and increasing that of afforested land from 0.5 percent in 1995 to 23 percent for the purpose of forest conservation and appropriate land use.

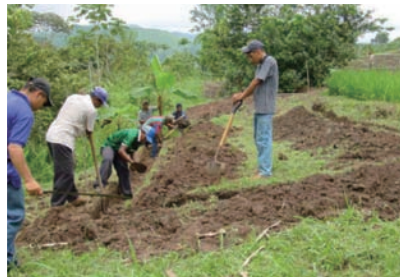
2.2 Innovative solutions

Attempts to achieve these targets led the National Environment Authority (ANAM), which was reorganized from the National Natural Resources Institute (INRENARE) in 1998, to formulate administrative guidelines on the relevant policy issues. The guidelines included a plan to promote participatory forest management whereby farmers in the watershed would understand the importance of forest conservation and practice appropriate land use. In this context, Panama–Japan technical cooperation on the Panama Canal Watershed Conservation Project (PROCCAPA) began in 2000.

According to a report on this project, the conversion from slash-and-burn farming to sustainable farming could be facilitated through the following three approaches (JICA 2004, 33): (1) converting to a more effective alternative farming method to produce staple foods; (2) increasing cash earnings to a level sufficient to purchase staple foods; and (3) abandoning agriculture completely. Of these alternatives, the project considered the first one to be the most realistic one. In this regard, paddy rice production (wet rice culture) was one of the most effective alternatives for farmers to turn from their slash-and-burn farming to more sustainable agriculture to produce their staple crops. At the same time it is crucial to improve and maintain soil fertility in order to produce considerable increases in the productivity of the land through the introduction of compost and a number of other improvement methods.

Forestation and reforestation were also promoted. This involved the planting of three types of trees: trees for timber, fruit trees and trees for medicinal use. The planting of trees for timber had a number of environmental benefits: the improvement of soil, the conservation of the watershed for small dams constructed by farmers, for the production of charcoal and the avoidance of landslides (JICA 2005, 26). Organic agriculture was also encouraged, including the experimental introduction of several different materials: *bokashi* fertilizer, *mimizu* compost, natural insecticides and so forth. Environmentally friendly cultivation methods were also introduced, including contour line cultivation, alley cropping (different crops planted in parallel alleys), the combination of coffee with laurel trees and so on. Charcoal kilns and ponds for tilapia culture were also introduced.

Seed beds in a farmer's community
(El cacao district, municipality of Capilla)



Preparation of contour line cultivation on farms
(El cacao district, municipality of Capilla)

Training for rice planting
(El cacao district, municipality of Capilla)

Training in burning wood to produce charcoal
(El cacao district, municipality of Capilla)

2.3 Inclusiveness through social capital and empowerment

The adaptation of these technologies was carried out jointly by farmers and other stakeholders in the Panama–Japan project. However, the leading role was played by farmers. In this process, the empowerment and enhancement of consciousness of individual farmers and their organizations were remarkable, a point highlighted in the project's evaluation report (JICA 2005, 60): "the most significant impact is that the Farmers' Association of the Upper Panama Canal Watershed (APRODECA, in Spanish, Asociacion de Productores y Productoras de la Cuenca Alta del Canal de Panama) was created spontaneously by farmers." In the words of the report: "Group organization strategy works as the mechanism for expansion of the techniques that is a part of farmers' empowerment. For example, the magnitude of training was multiplied considerably by the group activities." The report emphasized that group organization strategy contributed to the "creation of social capital."

There was an increase in farmers' consciousness of their situation. The report notes that: "they became aware of the importance of reforestation and are implementing small-scale tree planting in water source areas and for the production of firewood, charcoal and wood vinegar to improve the quality of their life. In addition, farmers become aware that practicing the new techniques instead of slash and burn contributes to the protection of their environment and watershed conservation" (ibid. 63). An empirical study highlighted: "Female group members developed more social capability than technical capability and male group members developed more technical capability than social capability. This may be caused by traditional responsibility sharing in farming and natural resources conservation activities" (Fujishiro and Amano 2008 55). The major activities to develop social capabilities were gender, self-esteem and mutual help, whereas the major activities to develop technical capabilities included agroforestry, organic agriculture and silviculture.

There were indeed increases in the level of women's participation and their empowerment was attained throughout this project. The report drew attention to the active participation of women as equal partners in the groups (JICA 2004, 30). Also noteworthy was men's help with household chores – something that was not common previously. This process is explained eloquently in an interview given in 2003 by a woman who participated in the project. "When slash and burn was practiced, farms were so far and steep that it was difficult for us, women, to participate in farming. Therefore, we depended on men for food production. In contrast, in paddy rice and other crop farming, which are promoted by the project, farms are located near our houses and the work is not so hard, so we women can participate. We would like to engage more in production work and improve our livelihood. Therefore, we want to introduce every possible improvement to our farms" (ibid., 30). The ANAM has properly evaluated the project outputs, studied an appropriate post-project framework, and formulated a plan to build on these outputs. Mass media such as TV programs, newspapers and radio introduced the PROCCAPA project on a nationwide basis. On a broader scale, *National Geographic*, which has a global reputation, has written about the project (JICA 2005. 60).

In the bulletin of the Panama Canal Authority (ACP), the administrator of ACP and other government officials all agreed that experience gained from the project could be put to good use in other parts of the Canal watershed. The ACP administrator was quoted as saying that was considering applying this model to other regions. The Panamanian government is considering granting land certificates to small farmers involved in the project through the Inter-institutional Commission of the Canal Watershed (CICH).

As one of the post-PROCCAPA projects, the Project for the Participatory Community Development and Integrated Management of the Alhajuela Lake Subwatershed (Alhajuela Project) was implemented by ANAM and JICA between 2006 and 2011.

2.4 South–South/triangular cooperation

Through SSC/TrC, Panama's experience and knowledge are shared with other countries that face similar challenges. For example, in Honduras, the watershed area of the El Cajon Dam was seriously affected by environment deterioration. The importance of this dam for this country is equal to that of the Panama Canal watershed for Panama, because the hydroelectric power generated by the El Cajon Dam covers 25 percent of electricity demand in Honduras. Therefore, the sustainability of the dam's watershed and the inclusive development of poor farmers remain urgent concerns.

In the El Cajon Dam watershed area, economic activities, especially agriculture and livestock production, have expanded, due to population increases. This has caused a reduction in forest coverage, a deterioration in water quality, soil deterioration and sediment accumulation. The challenge here is similar to that found in the Panama Canal watershed: to achieve an equilibrium between the environment and the improvement of the livelihood of communities and to avoid environmental deterioration.

Given the similarities between the El Cajon Dam watershed area and the Panama Canal, Panama's experience could prove very useful for Honduras. Experts from Panama who worked on PROCCAPA have participated in assessments of the Honduras case and in the formulation of a new project to address the challenges facing the El Cajon watershed area. In this process, the experience and technologies of Panama have been taken into account.

In Paraguay, virtually all power supply comes from the generation of hydroelectric power. The oldest power plant in the country is the Acaray Power Plant, built in 1968, and which remains an important plant for Paraguay. In order to adjust the summer water levels for the Acaray Power Plant, the Yguazu Dam was built in 1976, leading to the formation of Lake Yguazu. The government of Paraguay plans to construct a hydroelectric power plant at this lake. However, "the destruction of ecosystem caused by deforestation in the Yguazu watershed attracted immigrants who began large-scale farming in the 1970s, making matters worse to the present day" (JICA 2012, 1). "There is an urgent need to address the problems of soil erosion due to deforestation, the environmental effects of sediment deposition into Lake Yguazu, and the negative impacts on the livelihoods of indigenous and small-scale farmers in its watershed" (ibid., 1). Efforts to address this challenge have included the formulation of the Project for Strengthening Integrated Management of Lake Yguazu Watershed.

As the challenges faced by the Lake Yguazu Watershed face are similar to those facing the Panama Canal Watershed, experience and innovative solutions were taken into account in the process of formulation of this project in Paraguay, especially as regards visions and directions of watershed management (JICA 2012, 2). Expert from Panama who worked on PROCCAPA has participated in assessing the Paraguay case and in the formulation of the project to address the challenges to the Lake Yguazu watershed area. Throughout this process, the experience and innovative solutions including technologies and good practice established in Panama have been taken into account.

In this way, two unique triangular cooperative activities, Panama/Honduras/Japan and Panama/Paraguay/Japan, took place, both of which took advantage of Panama's expertise in this area, with the effective engagement of experts from Panama as "third country experts."

3. Agriculture that Cultivates Trees and Forest: Innovative Agroforestry in the Amazon Rainforest

3.1 Challenges

Tropical rainforests, a 'natural capital', are extremely important for a green economy. They are very rich in biodiversity and function as huge reservoirs of carbon dioxide, but are now increasingly becoming endangered. Indeed, significant losses have already occurred worldwide. Challenges are at least threefold: (1) illegal logging be stopped to avoid further destruction of the rainforests; (2) sustainable and inclusive agroforestry be introduced and established; and (3) the lost forest be regenerated.

Brazil's forest area is 520 million hectares, where the primary forested area is estimated to be approximately 490 million hectares, with 360 million hectares in the Amazon region, making Brazil the country with the largest rainforests in the world. At the same time, Brazil is also the country suffering from the severest depletion of forests in the world.

One of the major turning points in Brazilian environmental policy was the incorporation of environmental issues into the new federal constitution formulated in 1988. In 2003, the "Action Plan for Protection and Control of Deforestation in the Amazon (PPCDAM)" was announced as a major policy and action plan. This aimed to reduce the deforestation ratio in the Amazon through initiating a partnership between federal organizations, state governments, and citizens' groups. Thanks to this policy and related efforts, there has been a decrease in the level of illegal deforestation in the Amazonian rainforest, which reached its lowest-ever point in the period between 2009 and 2011.[5]

On the other hand, regarding the other two challenges mentioned

5. One major reason that illegal logging is difficult to stop is because rainforests are both vast and hard to access and patrol. However, Brazil's National Institute for Spatial Research, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), the Japan Aerospace Exploration Agency (JAXA), and JICA have together achieved a great breakthrough in patrolling using satellite monitoring. Although the Brazilian satellite monitoring system was very advanced, since Brazil used optical sensors, observation was hindered by the heavy clouds often present during the rainy season, when most illegal logging took place. Since then, the observation system has improved dramatically with the use of Pulsar radar mounted on an advanced land-observing satellite (ALOS) of JAXA, a system that is unaffected by clouds and that operates 24 hours a day regardless of the weather. JAXA began providing satellite images to the Brazilian institute in 2007. The institute relays this information to the federal police and to the Chico Mendes Institute for Biodiversity Conservation, both of which are involved in monitoring and managing the Amazon. Thanks to improved real-time data, Amazon deforestation has been decreasing, reaching its lowest ever point from 2009 to 2011. See Hosono (2013). As for sharing Brazil's experiences and innovative solutions, based on Pulsar radar on the ALOS, with other countries that face similar challenges through SSC/TrC, see Aida and Kobayashi (2012).

above, important progress has also been achieved. Agroforestry has been a key to this progress, as is explained later. In the mid-1990s, when forest clearing sharply increased in the Amazon, agroforestry was often perceived as a way to slow deforestation by breaking the predominant slash-and-burn cycle practiced by most farmers in the region (Smith et al. 1998, 1). Shifting agriculture was thought to account for about one-third of the deforestation in Amazonia, while cattle ranching was responsible for at least half of the forest retreat in those years. (Serrao et al. 1996, cited by Smith et al. 1998) It was common practice for illegally deforested land to be used for a number of years as pasture for cattle ranching and for other purposes, and for the land then to be abandoned when its fertility is almost lost. Therefore, the establishment of sustainable and inclusive agroforestry for small farmers, on the one hand, and the regeneration of abandoned land, also by agroforestry, which can be defined as 'an agriculture that cultivates trees and forest', on the other, are major challenges in the Amazon rainforest.

3.2 Innovative solutions

In Tomé-Açu, in the state of Para in the Amazon region, crop diversification and critical production experience have led to the development of important local ecological knowledge and an agroforestry model (hereinafter referred to in this article as the Tomé-Açu model) that is well suited to the Amazonian environment, according to, among others, a study by Jessica Piekielek (2010, 20). This study highlights the model's main characteristics: "The basis of this model is that production is most successful when it mimics some of the important natural processes of the tropical forest. Crops are inter-planted, grown with associated crops that complement each other by providing shade and that allow farmers to focus intensively on smaller plots of land. Crops are planted to establish a series of successive harvests. For example, a succession might begin with pepper and then be coupled with shade-giving crops like cacao and cupuacu. Among these crops, farmers plant slower-growing trees for high-quality timber. Combinations include native tropical fruits like açai, cacao and passion fruit, and cupuacu and imported crops like black pepper and African oil palm. Crops are intensely fertilized with a variety of organic compounds, including organic wastes, natural fertilizer compounds, charcoal, and *bokashi*, a type of fermented compost developed in Japan, to ensure that associated crops do not compete for nutrients" (ibid. 20).

"Agroforest" in an advanced phase

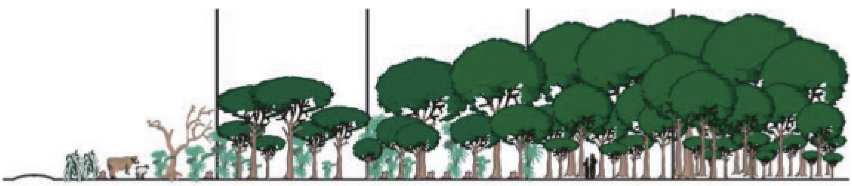
In the Tomé-Açu model, key factors include a combination of crops and trees and the sequence for planting them. For example, cacao needs 40 percent shade, so banana is the ideal neighbor, because it grows faster than cacao and provides protection from direct sun, heavy rain and strong winds. Between the rows of banana and cacao, at 24-meter intervals, tabereba (*Spondias mombin*) fruit trees, açai palm trees, and/or mahogany can be planted. Among these tree species, corn and rice can also be planted. When planting diversified species, it is necessary to take particular care that the spacing between the different species should be appropriate. Perennial and arboreal species tend to compete against each other for space in which to grow. Some consume a lot of water while others need more fertilizer. Mr Michinori Konagano, one of the leaders of Tomé-Açu Multipurpose Agricultural Cooperative (CAMTA), who made a substantial contribution to the development of the Tomé-Açu model, has devised a long-term cultivation plan, featuring crop species that are all economically reliable.[6]

Here is a model case for the overall development process of an "agroforest". The tropical climate encourages the rapid growth of plants. Rice is harvested in the first year, so farmers are sure of some income. In the second year, the banana and black pepper produce their fruits. From the third year, as the plants continue to grow, the farmland turns increasingly bushy. Banana plants bear fruit for several years. Cacao grows in the shade of the banana leaves. Black pepper increases production each year throughout their life span of about eight years. Tabereba, açai palm and mahogany grow quickly in their early years. Cacao starts to bear fruit from the third year. By the sixth year, cacao will have grown to a height of three meters, açai palms to five meters and tabereba and mahogany to more than eight meters. The farm becomes dense like a forest. Açai palm and tabereba are now ready for harvest. Cacao production begins to overtake that of pepper, giving farmers another source of revenue. Banana and black pepper plants die off after seven years. Cacao carries on producing in the shade of tall

6. This and the following paragraphs are based on information provided by JICA-Net (http://jica-net.jica.go.jp/lib2/07PRDM008, 2008).

tabereba and mahogany trees. At this point, the farm turns into a forest garden. In this way the agroforestry in Tomé-Açu allows a succession of productive plants, providing farmers with steady annual income. Which species are planted and when depends on the discretion of the farm and the farmer. Factors affecting the decision include location, soil condition, water availability, management efficiency and the optimum harvesting period.

Figure 1. A model case of overall development process of an "agroforest" in Tomé-Açu



Source: Yutaka Hongo

In their study Smith et al. (1998, 5) emphasize the commercial feasibility of the Tomé-Açu model: "Agroforestry is an ancient practice in Amazonia. Many indigenous peoples plant a mixture of tree and annual crops in their fields, and traditional, small-scale farmers usually maintain a rich assortment of tree, bush, and herbaceous plants in their home gardens." However, the authors emphasize that commercial agroforestry in plots away from homegardens is the main focus of their study because it can play an especially important role in slowing deforestation and improving rural livelihoods (ibid., 7). The study puts it: "Tomé-Açu in Para, settled by Japanese immigrants in the late 1920s and early 1930s, became an innovative pole for agroforestry systems geared to markets starting in the 1970s" (ibid. 8).

The high feasibility of the Tomé-Açu model was confirmed by a study as follows: Income from 25 ha of agroforestry of this model is the same as cattle ranching of 1,000 ha. Therefore, the former's income from 25 ha is 40 times that of the latter from the same extension of land. Moreover, the former creates jobs for 10–20 workers with 25 ha while the latter needs 50 to 75 ha to create a job for one worker (Yamada 2003, 105).

The origin of the Tomé-Açu model could be traced back to the traditional practice of the indigenous people of the Amazon region and the "Satoyama model," a traditional practice in Japan.[7] However, the process of finding innovative solutions has been incremental. Yamada and Osaqui (2006, 314) present the following interpretation: "Although the Tomé-Açu Multipurpose Agricultural Cooperatives (CAMTA) had experimental nurseries and the Japanese public agencies established local agricultural research stations to support emigrant farmers in the Amazon, the homegardens functioned as individual validation fields, where the farmers experimented with new crops. Homegardens were also used for improvement and propagation for nursery stock making them on-farm laboratories for adaptive research and extension. The immigrants with the traditional *tokuno* (master farmer) education of East Asia analyzed the local environment and 'experimented' with various plant associations and management techniques, which led to the evolution of the exceptionally successful and popular multistrate agroforestry systems in the Eastern Amazon region."

In the Brazilian Agricultural Research Corporation (Embrapa) Eastern Amazon, there has been a considerable amount of research on the topic of agroforestry.[8] Economically viable species adapted to the local environment have been developed and distributed to farmers. In one of its recent research projects, Embrapa Eastern Amazon found striking similarities between the characteristics of local "agroforest" soils and those of the natural forest soil of the Amazon rainforest. This may imply resilience of the "agroforest" ecosystem in terms of not only flora but also fauna. In fact, as "agroforests" have grown over the years the number of observed bird species has increased, showing how agroforestry supports both ecosystem recovery in the Amazon and also farmers' livelihood.

3.3 Inclusiveness through social capital and empowerment

The Tomé-Açu model is intimately linked with the agricultural cooperative CAMTA. Piekielek mentions that the social capital generated and maintained by the cooperative has been a critical component in the success of Tomé-Açu farmers. It has supported the

7. According to a lecture given by Mr Michinori Konagano, a member of the board of Tome Acu Multipurpose Agricultural Cooperative (CAMTA), at a seminar organized by Tokyo Noko University on January 30, 2012. On the other hand, Mr. Noboru Sakaguchi explained that he was inspired by indigenous people's traditional practice (JICA-NET 2008).

8. Embrapa Eastern Amazon and JICA have implemented research cooperation projects on agroforestry.

process of development of an agroforestry model, especially by serving as a forum for sharing knowledge and by marketing agroforestry products (Piekielek 2010, 27). Since the mid-1990s, CAMTA board members have become active in transferring agroforestry techniques to non-Nikkei (Japanese Brazilian) family farms in the neighborhood.

In 2004, a local municipal office, CAMTA, Embrapa Eastern Amazon, Poverty and Environment in the Amazon Program (POEMA, carried out by a local non-governmental organization (NGO), POEMAR) and JICA launched a project in Tomé-Açu to establish an agroforestry training center for young owners of small family farms. In 2005, SAMBAZON, a US-based customer of CAMTA, facilitated the organic certification of açai products, which led in turn to a doubling of the capacity of the cooperative's fruit juice factory, and it encouraged CAMTA to disseminate agroforestry techniques among small family farmers of the region, teach them how to organize marketing cooperatives, and buy products from these cooperatives for processing at the CAMTA juice factory (Yamada and Osaqui, 2006, 315).

In acknowledgment of these efforts, on December 1, 2010, CAMTA was awarded the first "Brazil Regional Development Contribution" Prize by the Federal Government of Brazil; the prize was presented by President Luiz Inacio "Lula" da Silva to Mr Konagai, who was in charge of technology at CAMTA.

3.4 South–South/triangular cooperation


Lectures in the field during a third country training course: Agroforestry with black pepper, banana, and cupuacu (left) and with black pepper and other crops (right).

In 2006, JICA, along with Embrapa Eastern Amazon, launched the five-year Third Country Training Program (TCTP) to host seminars with the intention of disseminating agroforestry skills to neighboring countries such as Venezuela, Colombia, Ecuador, Peru, and Bolivia. These seminars highlighted the Tomé-Açu model and included a visit to agroforestry fields in Tomé-Açuthat region. Based on the experience of this TCTP, in 2011 Brazil and Japan launched a new TCTP program entitled the "International Training Course on Agroforestry Systems Technology" as part of the five-year Japan–Brazil Partnership Program (JBPP). This course constitutes a part of the Okada Green Initiative, announced by then Minster of Foreign Affairs Okada in 2010.

The overall goal of this new program is "to contribute, through the transfer of agroforestry systems technology, to the incorporation of systems of use of the earth that minimize the biophysical changes resulting from conventional farming in the beneficiary countries" (JICA 2011b). In this program, the basic characteristics of the previous program are maintained. Embrapa Eastern Amazon is becoming a CoE in the area of agroforestry in the Amazon region and Tomé-Açu is becoming one of the most important focal points for the program.

This South–South/triangular cooperation (SSC/TrC), which has been implemented for agroforestry in a humid tropical area with experience in the Amazon region, shares several basic features with many of the other SSC/TrC programs in which JICA has been participating: (1) knowledge sharing, especially innovative solutions developed through years of effort, among countries that face similar challenges; (2) the participation of a CoE such as Embrapa Eastern Amazon, which, through this SSC/TrC program, has strengthened its network of researchers, professionals, and practitioners in agroforestry, achieving its capacity development and institution building as a provider of SSC/TrC cooperation; (3) the coordination of the program is undertaken through JBPP, thereby avoiding higher transaction costs and improving the efficiency of SSC/TrC.

However, the program also has some unique features. One is the continued and strong engagement of leaders of Tomé-Açu, the pioneering focal point of agroforestry in the Amazon. Second is the synergy with parallel projects related to the program that are being carried out in the beneficiary countries. For example, in the northern regions of Bolivia, where there is a high rate of poverty, a project to increase the added value of the farmers' products is carried out by

Bolivia, Brazil and Japan. In this project, Brazilian experts with experience in agroforestry are sent to Bolivia in order to share agroforestry technologies and practices, including those gained through the Tomé-Açu model.[9]

4. Fight against Desertification: Social Forestry in Semi-arid Kenya

4.1 Challenges

While about 83 percent of the total land surface of Kenya is covered by arid and semi-arid land (ASALs) that is vulnerable to global warming and climate change, this area is also characterized by a very high incidence of poverty. Therefore, one of the most serious challenges faced by the country is to cope with desertification of ASALs, preserving their ecology and environment, while at the same time reducing poverty in these regions. This means the introduction and consolidation of an "inclusive green economy" in this vast area.

Kenya relies on firewood and charcoal for more than 70 percent of its total energy consumption and around 90 percent of the energy consumption in homes. The increasing demand for firewood and charcoal, caused by a combination of a growing population that has doubled in the last 20 years, overgrazing, and disordered cultivation has devastated forest areas. This has caused not only great difficulty in supplying firewood and charcoal, but has also resulted in a decline in the productive capacity of the land, and the destruction of the natural environment (JICA 2003).

Moreover, the effects of climate change could aggravate ASALs' environment. It is estimated that between 1960 and 2006 the highest temperature in Kenya increased by 0.2–1.3 centigrade and the lowest temperature by 0.7–2.0 centigrade. The amount of rainfall has also been becoming more irregular in recent years. The drought of 2009 affected around 10 million people, one-fourth of the country's population, due to the decrease in the production of crops such as corn and sugar cane (Fujisawa 2013, 2). In 2011, another severe drought hit Kenya and neighboring countries.

In order to address these issues, in 1982, the Government of Kenya set

9. Web Page, JICA Brazil office 20120207.

targets for the production of 200 million seedlings per year in a "Strategy and Focus on Rural Tree Development" established by a presidential order. In June 1986, the Kenya Forestry Research Institute (KEFRI) was established as a parastatal institution.[10] In 1994, the Ministry of Environment and Natural Resources of Kenya announced the Kenya Forestry Master Plan 1995–2000 (KEMP). This plan, along with the revised Kenya Forestry Development Policy, identifies farm forestry, one of the social forestry practices, as an important model for forestry development in the country. In addition, the Economic Recovery Strategy for Wealth and Employment Creation (2003–07) identified the development of ASALs as a key area for accelerated development.

4.2 Innovative solutions

Several innovative solutions to address the issues discussed above have been developed and brought into the mainstream. One of the most important of these is "Social Forestry," which is defined as a "form of forestry which aims at both the improvement of the economy and the preservation of forest resources, by entrusting local people with the management and ownership of the forest resources" (JICA, 2003). It is a very similar concept to the inclusive green economy as a pathway to sustainable development and poverty reduction that was discussed in section 1. An effective instrument developed and disseminated to promote social forestry has been the "farm forest" as is explained below.

A period of more than twenty years has seen the introduction of three consecutive projects to strengthen social forestry in semi-arid areas of Kenya with remarkable results. The first of them, the Social Forestry Training Project (SFTP), was carried out from 1987 to 1997, and aimed to develop practical techniques for planting and tending trees for the establishment of a farm forest. In particular, the project focused on developing tree nursery and tree planting technologies in semi-arid areas as well as to provide social forestry training for farmers and government staff. The second project, the Social Forestry Extension Model Development Project (SOFEM, 1997–2002), saw the introduction of forestation nurturing technologies applicable to farmers and suitable for the local environment. "The Project developed systems such as a cost

10. Through grant aid, the Government of Japan supported the construction of facilities at the KEFRI headquarters at Muguga and the KEFRI Kitui Centre from 1986 to 1988 (JICA 2009).

sharing system, seed/seedling plan information system, farmer to farmer extension method, and core farmer selecting method. Their effectiveness was proved through actual farm forestry preparation practice" (JICA 2003, 3). Therefore, the project effectively developed a social forestry extension model, which is based on the establishment of farm forests by local residents (JICA 2009, 9).

The third project, the Intensified Social Forestry Project (ISFP, 2004–9), consolidated the main lessons learned and key technologies acquired in the previous two projects. Although the previous two projects achieved their goals, neither of them was able to reach a substantial number of farmers (FAO, JICA and KFS 2011, 12). Therefore, ISFP applied, among others, a "Farmer Field School" (FFS) as a means to extend the social forestry. A total of 94 FFSs conducted by the Kenyan Forest Service (KFS) cultivated the abilities of a considerable number of farmer facilitators. Farmer-run FFSs utilizing farmer facilitators had the same effect as a FFS by KFS. The Evaluation Study Team on ISFP confirmed "high evaluation and acknowledgements of FFSs by those who not only introduced FFSs in the initial time of the Project but also by those who implemented, managed and operated FFSs including target groups" (JICA 2009, 14–15).

As such, building on the country's past experiences, ISFP brought a new dimension to forestry extension, creating a systematic extension management system. The FFS methodology mentioned above was introduced with assistance from the United Nations's Food and Agriculture Organization (FAO). Previously, the FFS methodology had been principally applied to agricultural extension service delivery in the country. The ISFP customized the FFSs to farm forestry, leading to the implementation of the Farm Forestry Field School (FFFS) approach. Currently, this approach has become the standard method for farm forestry extension in KFS and is widely used in other districts and projects in Kenya. With help from the FAO, KFS has further developed the Livelihood Farmer Field School, which was based on the FFFS (FAO, JICA and KFS 2011, 13).

In short, throughout social forestry projects in Kenya, with the Kenya Forestry Research Institute (KEFRI) as an implementing agency, basic tree nursery and tree planting technology in arid and semi-arid regions was developed and core farmers were developed as the base for the extension of the model developed under the Kenya–Japan technical cooperation projects. For the extension of this model, the FFS approach, an existing proven extension approach in the agricultural sector was applied to the forestry sector through innovative adjustments to the methodology. Through the FFS, techniques such as seedling production, fruit tree planting (mango, grevillea, and others), poultry raising, vegetable cultivation, utilization of compost, and creation of woodlots were disseminated (JICA 2013).

As a result of all these measures, KFS, Kenya Forestry Research Institute, farmer facilitators and farmers, as well as JICA, have developed incrementally appropriate solutions to address the challenges mentioned above. They are based on a series of technological and institutional innovations and they have produced synergies to take full advantage of social forestry.

Learning Participatory Forest Management in Arabuko Sokoke forest in Mombasa

Learning seed germination test at KEFRI seed center

At a farmers plot in Kibwezi

Learning briquette making at KEFRI Karura center

Source: Kenya Forestry Research Institute, KEFRI

4.3 Inclusiveness through social capital and empowerment

From their inception the three projects entrusted local people with the management and ownership of forest resources. This approach is the essence of social forestry. The FFS has developed ownership, strengthened communities, and farmers' capacity with knowledge about forestry (JICA 2009, 15). Through FFS individual farmers, farmers' groups, and the surrounding farmers are continuing to raise and produce seedlings and plant trees. They have started to sell social forestry products such as mangoes, seedlings, lumber, and firewood. Through these activities, farmers are increasing their awareness of methods to improve their livelihood. Wider extension activities related to social forestry are expected, as graduate farmers from FFS give advice about agriculture and social forestry to neighboring and surrounding area farmers, which indicates the creation of a network (ibid. 15–16). The most important achievement is that the growth of trees contributes to the improvement of the livelihood of farmers, attaining the overall goal of social forestry projects toward a green economy. It appears that social capital is strengthened and empowerment of the people achieved. As the final evaluation on IFSP emphasized dynamic group activities, including songs and dance celebrating FFS, the group plays a core role in assuming the continuation of activities, as it expresses a joy of solidified farmer groups working and studying together, and keeps farmers interested in FFS.

The Green Zone project of the African Development Bank adopted the FFS approach in its forestry preservation activities in areas of high potential.

4.4 South–South/triangular cooperation

Efforts to share Kenya's innovative technological and institutional innovations with other African countries that face similar challenges were made as early as 1995, when the Regional Course of the Promotion of Social Forestry in Africa was launched. The second phase of this program was started in 2000. In its two phases this regional course aimed to promote social forestry in order to improve the livelihood of farmers and improve the environment, sharing technology and knowledge of social forestry. Kenya Forestry Research Institute (KEFRI) was in charge of implementing the program. The countries that benefited from this course were Angola, Burundi, Djibouti, Mozambique, Rwanda, Botswana, Ethiopia, Eritrea, Lesotho, Malawi, Namibia, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

In 2005, the five-year "Enhancing Adaptation of Social Forestry" training project was launched. This training course placed increased focus on facilitation skills to disseminate agroforestry to farmers and other stakeholders, enhancing the knowledge related to development and the adaptation of technologies for social forestry. In 2010, a new program, the "Third Country Training on Mitigating Climate Change in Africa through Social Forestry," was launched. In this program, issues related to climate change, including the recent progress of Reduced Emissions from Deforestation and forest Degradation (REDD) and other initiatives, are more focused. In other words, the program aims to mitigate climate change through social forestry in Africa.

The South–South/triangular cooperation implemented for social forestry in ASALs with experience in Kenya has several basic features that are common to many of the SSC/TrC programs in which JICA has been a participatant: (1) knowledge sharing, especially innovative solutions developed through years of effort, among countries that face similar challenges; and (2) participation of a CoE such as the Kenya Forestry Research Institute, which, through these SSC/TrC programs mentioned above, has strengthened its network of researchers, professionals, and practitioners in social forestry, achieving its capacity development and institution building as a provider of SSC/TrC cooperation.

The United Nations Office for South–South Cooperation (UNOSSC) highlighted the achievement of social forestry projects as follows: "Environment resilience and improved quality of life are development issues that require regional cooperation. The entry point is social forestry or forestry for the people, as a participatory concept and tool which not only integrates biological and socio-economic diversity prevailing in the area, but is also responsive to the subsistence and development needs of rural and non-rural communities. It recognizes capacity building as key for growth among African countries to enhance awareness, understanding and actions."[11]

11. "Note on Kenya Japan Social forestry in Africa" posted on the UNOSSC home page.

5. Concluding Remarks

Upon a comparative analysis of the three cases of SSC/TrC for an inclusive green economy, we find several common advantages of SSC/TrC compared with conventional North–South cooperation. First, SSC/TrC is a very effective instrument when it addresses such issues as are faced by developing countries. Some countries in the South are forerunners for developing solutions to these issues after years of effort. Innovative solutions, including knowledge, technologies, and good practice, cannot be achieved overnight. Moreover, such knowledge is not available in traditional donor countries. On the other hand, many of the innovative solutions are based on academic research and the experience of practical application for dissemination. For example, agroforestry in the Amazon rainforest is supported by a large number of specialized research papers.[12] In the three case studies, all these features are predominant.

Second, one of the advantages of SSC/TrC is that through these modalities, the experience of countries with a strong motivation to address challenges, and therefore with valuable innovative solutions, can be shared with other countries facing similar challenges. These solutions could be highly effective, because they were achieved by projects supported by people and government organizations strongly committed to the idea. The urgent need to protect the Panama Canal watershed and reduce the levels of poverty in the area forced the government to address the issue seriously. The conservation of the Amazon rainforest has been always a major concern for the Brazilian government. The fight against deforestation and desertification initiated by Wangari Maathai strengthened the consciousness of the people and government of Kenya regarding the importance of the environment and poverty reduction (see Box). The experience of pioneer countries strongly committed to finding solutions is the most valuable base for SSC/TrC.

Third, another advantage of SSC/TrC is the possibility of taking full advantage of Centers of Excellence (CoE) as well as pioneering local organizations in specialized areas such as agroforestry in the South. They are developed in forerunner countries and could be key for successful SSC/TrC. On the other hand, CoE are able to develop their capacity and enhance their institution building through SSC/TrC as a

12. They are available on JICA's Website.

cooperation provider, through accumulating practical capabilities to be in charge of such cooperation and to be networking hubs among researchers, professionals, and practitioners. This process has taken place in the Amazon agroforestry and Kenya Social Forestry cases.

As a result of our discussion above, after making an assessment of the impact of ongoing SSC/TrC programs on benefiting countries, we are able to confirm that SSC/TrC is one of the most effective approaches to catalyze an inclusive green economy.

Box. Green Belt Movement initiated by Wangari Maathai

From the "inclusive green economy" standpoint, the Green Belt Movement (GBM) in Kenya, the initiative of Wangari Maathai, a Nobel Peace Prize winner, calls for special attention, because it had both environmental and inclusiveness perspectives from the beginning. GBM planted 30 million trees in 30 years. But the achievement of the GBM was not just rural forestation and reforestation, but also creation of employment, awareness of the importance of the environment, and the empowerment of individuals and communities (Maathai 2003, 61).

Maathai recalls how the Green Belt Movement began in 1977:
"...I have always been interested in finding solutions. ... it just came to me: 'Why not plant trees?' The trees would provide a supply of wood that would enable women to cook nutritious foods. The trees would offer shade for humans and animals, protect watersheds and bind soil, and, if they were fruit trees, provide food. They would also heal the land by bringing back birds and small animals and regenerate the vitality of the earth" (Maathai 2006, 125).

The spirit of the Green Belt Movement (GBM) is summarized in the following committal recited at every tree-planting ceremony of GBM:
"Being aware that Kenya is being threatened by the expansion of desert-like conditions; that desertification comes as a result of misuse of the land and by consequent soil erosion by the elements; and these actions result in drought, malnutrition, famine and death; we resolve to save our land by averting this same desertification through the planting of trees wherever possible. In pronouncing these words, we each make a personal commitment to save our country from actions and elements which would deprive present and future generations from reaping the bounty of resources which is the birthright and property of all." (Maathai 2003. 20)

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