Food Policy Coherence for Sustainable Development: The case of the Rice Sector in Costa Rica

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Abstract

The term 'Food Sovereignty' has often been invoked in developing countries to justify protectionist trade policies aimed at promoting sustainable development, improve the livelihood of farmers, protect natural resources and enhance local food supply for local consumers. Costa Rica did so too when designing its rice support program to promote sustainable agriculture. Our Sustainability Impact Assessment illustrates how this rice policy largely failed to achieve its objectives due to the incoherence of the underlying policy principles that very much reflect the philosophy of the Food Sovereignty movement. The paper concludes by suggesting that Costa Rica may have to open its rice market to create the desired welfare gains for its most vulnerable citizens and contribute to sustainable agriculture.

1. Introduction

Policy coherence is defined as "the systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the agreed objectives". [1] From a sustainable development perspective, policy coherence implies that a country's public policy, should avoid negative consequences and spillovers which adversely affect the environment and the development prospects of its poorer citizens. More positively, policy coherence for sustainable development implies that a country, in designing its policies, should actively look for ways to exploit the potential for positive spillovers and consequences for the environment, social cohesion and economic growth.

Policy coherence research in the trade area has focused on the impact of developed country polices on developing countries. Empirical studies on policy coherence and the link between trade policy and sustainable development in developing countries themselves are rare. [2]

After the 1980s debt crisis, Costa Rica has followed a two-pronged liberalization strategy leading to both multilateral and regional commitments to open its domestic market. It was based on an export-led growth strategy that included tariff reductions (at the multilateral and regional level), market reform in protected sectors and some fiscal concessions. This led to a shift towards manufacturing and sharp export expansion, which in turn has contributed to rapid economic growth. The country finally joined GATT in 1990s. Even though agriculture remains an important economic sector for its contribution to employment and export earnings, some sub sectors in agriculture have been excluded from the reform process, and remain shielded from foreign competition.

The rice sector stands out as a clear example. A combination of tariff barriers, including the Special Agricultural Safeguard of Article 5 of the Agricultural Agreement, tariff rate quotas, price controls and phytosanitary measures are used to protect it from competition. Calculations of producer support estimates (PSE) for rice, suggest that rice farmers in Costa Rica receive more support than their peers in the United States and the European Union. [3]

Although there is some research done on the environmental impacts of rice production in Costa Rica, an integral assessment of economic, social and environmental impacts at the policy level has not been done for the rice policy in this country. [4,5]

The objective of this paper is to systematically explore the effects of rice policy in Costa Rica on sustainable development. Elements of the sustainability impact assessment methodology developed by the University of Manchester for the Doha Development Round will be borrowed to perform this analysis [6,7,8]

Issues addressed include: (i) the economic and social effects of rice market price support policies in Costa Rica; (ii) the environmental implications of productive development policies for the rice sector; and (iii) alternatives for improving policy coherence in Costa Rica. The paper argues that trade liberalization and deregulation of the rice sector in Costa Rica will contribute to sustainable development. Apart from the typical gains of trade, trade liberalization should increase the income of the poorest households and contribute to the effective protection of wetlands of international importance in the country.

The paper is organized as follows. Section 2 details the relationship between policy coherence, trade and sustainable development and describes the sustainability impact assessment methodology. Sections 3 and 4 explain the characteristics of both global and domestic rice markets, in which market price support and concentration are common characteristics. Section 5 analyzes the market price support system for rice in Costa Rica. In section 6, the economic, social and environmental impacts of Costa Rica's rice policy are analyzed from a sustainable development perspective.

2. Policy coherence, trade and sustainable development

Policy coherence has been defined as "the systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the agreed objectives". [9] From a sustainable development perspective, policy coherence implies that a country, in pursuing policy objectives in specific areas (e.g. trade or agriculture) should, at a minimum, avoid negative consequences and spillovers, which would adversely affect the environment and the development prospects of its most vulnerable citizens. More positively, policy coherence for sustainable development implies that a country, in designing its policies, should actively look for ways to exploit the potential for positive externalities for the environment, social cohesion and economic growth.

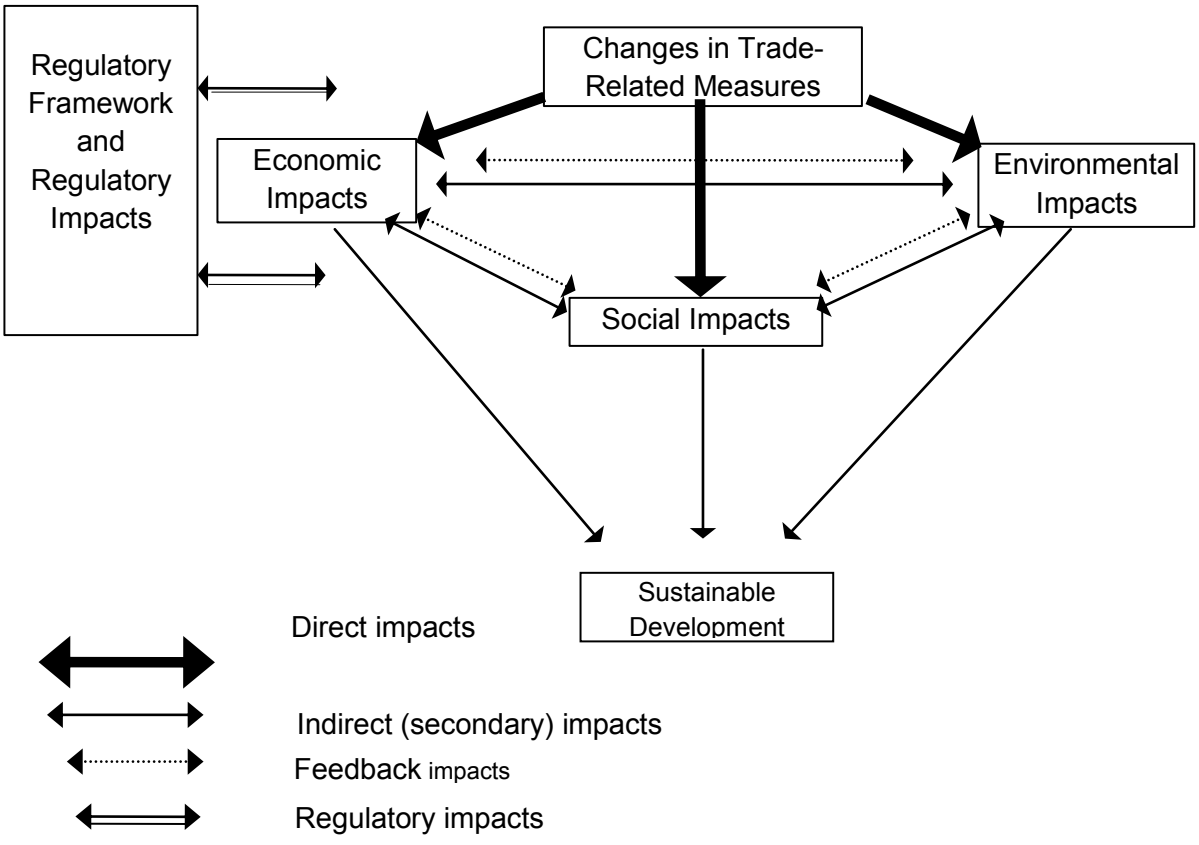
The OECD has been promoting policy coherence in developed countries in order to avoid negative consequences for developing countries. One of the best examples of incoherence with a profound effect in developing countries, stem from trade and agricultural policies in some OECD members. Three quarters of the World's poor depend, directly or indirectly, on agriculture for their livelihoods. In the OECD, less than 10% of the population is dependent on agriculture as a source of income, but received financial support equivalent of USD 268 billion. These protectionist policies result in a loss of market access for developing countries' and depress global food prices, often leading to export subsidies that are akin to food dumping. [10] Official development assistance, which amounts less than half of total amount of agricultural subsidies cannot outweigh this loss, apart from creating problems of its own kind.

Agricultural policies to promote for sustainable development in developed countries may result in lots of undesirable side effects when applied in developing countries. For developing countries achieving sustainable development is one of many competing objectives. Certainly, for a vast array of nations, objectives such as improving national security, pursuing faster economic growth or conserving biodiversity-may take priority. The challenge for policy makers is to strike a balance between the interests and objectives of diverse interest groups. Yet, incoherent policies are inefficient and ineffective no matter which objective takes priority. [11]

The OECD argues for a monitoring, impact assessment and reporting systems which involve collecting and analyzing evidence about the impacts of different polices. [12] The findings are then fed back into policy process to ensure that results that are not in line with the sustainability objectives are addressed properly. These instruments are rarely employed in developing countries because they are very costly to create, operate and maintain.

A sustainability impact assessment is a tool that can be used for determining coherence of trade and agricultural policies. It is a relatively new concept that

Figure 1. Sustainability Impact Assessment Framework



Source: Kirkpatrick, Lee and Morrisey, 1999

does not require prior established monitoring mechanisms. They are based on concrete practical impacts of certain policy decisions, particularly relating to trade policy. The measurement improved in impact assessment when the European Commission asked for the development of a tool to determine the impact of the multilateral trade negotiations on sustainable development. [13]

Figure 1 shows the simplified form of a Sustainability Impact Assessment Framework developed by the Institute for Development Policy and Management of the University of Manchester as part of the European Commission's preparation for what it would be the Millennium Round of multilateral trade negotiations. [14]

A trade measure may have direct (positive or negative) economic, social and environmental impacts, as well as indirect economic, social and environmental consequences. Measures such as changes in tariff levels, subsidies or quotas impact trade flows, which then have a number of direct economic consequences (e.g. on production, consumption and income). In turn, these may have further social and environmental repercussions. Other measures such as competition policy may have an impact on the regulatory provisions for environmental protection, which then, have environmental, social and economic consequences. All these impacts have cumulative impacts, which also need to be considered. The process can be very complex, as other reforms take place alongside trade reform measures. [15]

Most of the social and environmental effects occur as a result of the economic ones. Also, these impacts vary between countries and between short term and long term effects, with some of the impacts positive and some negative. The overall effect on sustainable development depends on how these impacts are weighed against each other, summing up the different values of the different groups of people that are affected in different way and the consequences for future generations. [16]

Apart from the economic gains from trade, e.g. specialization, economies of scale, product variety, increased competition and productivity; trade can improve social conditions via the link between trade and economic growth, consumer gains, the increase in real wages, the adoption of higher standards and the elimination of rents from protectionism, among others. Despite the much-publicized negative effects of trade on the environment, trade allows for powerful alternatives to protect it. The fact is that trade, following the logic of comparative advantage, may promote the transfer of activities to where the resource is less scarce and fragile, avoiding exacerbating patterns of exploitation.

3. The Global Rice Market

Rice is one of the most important commodities in the world. It is the main source of energy in the diet of the world population. According to FAOSTAT, on average it accounts for 13% of the total dietary energy consumption. In some countries this share rises to levels above 50%, Bangladesh (71%), Cambodia (66%), Lao People's Democratic Republic (64%), Vietnam (62%), Myanmar (57%), Indonesia (51%). Rice is therefore viewed as a strategic commodity for food security in many countries.

Concentration, thinness, high market segmentation, governmental intervention and price variability are the most important characteristics of the international rice market. Rice is mostly consumed in the country where it is produced, so trade in rice is small, both in absolute terms and as a proportion of global production. Rice is the second largest produced cereal in the world. Production is geographically concentrated in Asia with more than 90 percent of world output. China and India, which account for more than one-third of global population, supply over half of the world's rice. Brazil is the most important non-Asian producer, followed by the United States. Italy ranks first in Europe. World production has shown a significant and very steady growth, almost exclusively due to increasing production in Western and Eastern Asia.

International rice trade is estimated between 25 and 27 million tons per year, which corresponds to only 5-6 percent of world production. It makes the international rice market one of the thinnest in the world compared to other grain markets such as wheat and corn. Thailand, Vietnam and the United States are the leading rice exporters in the world.

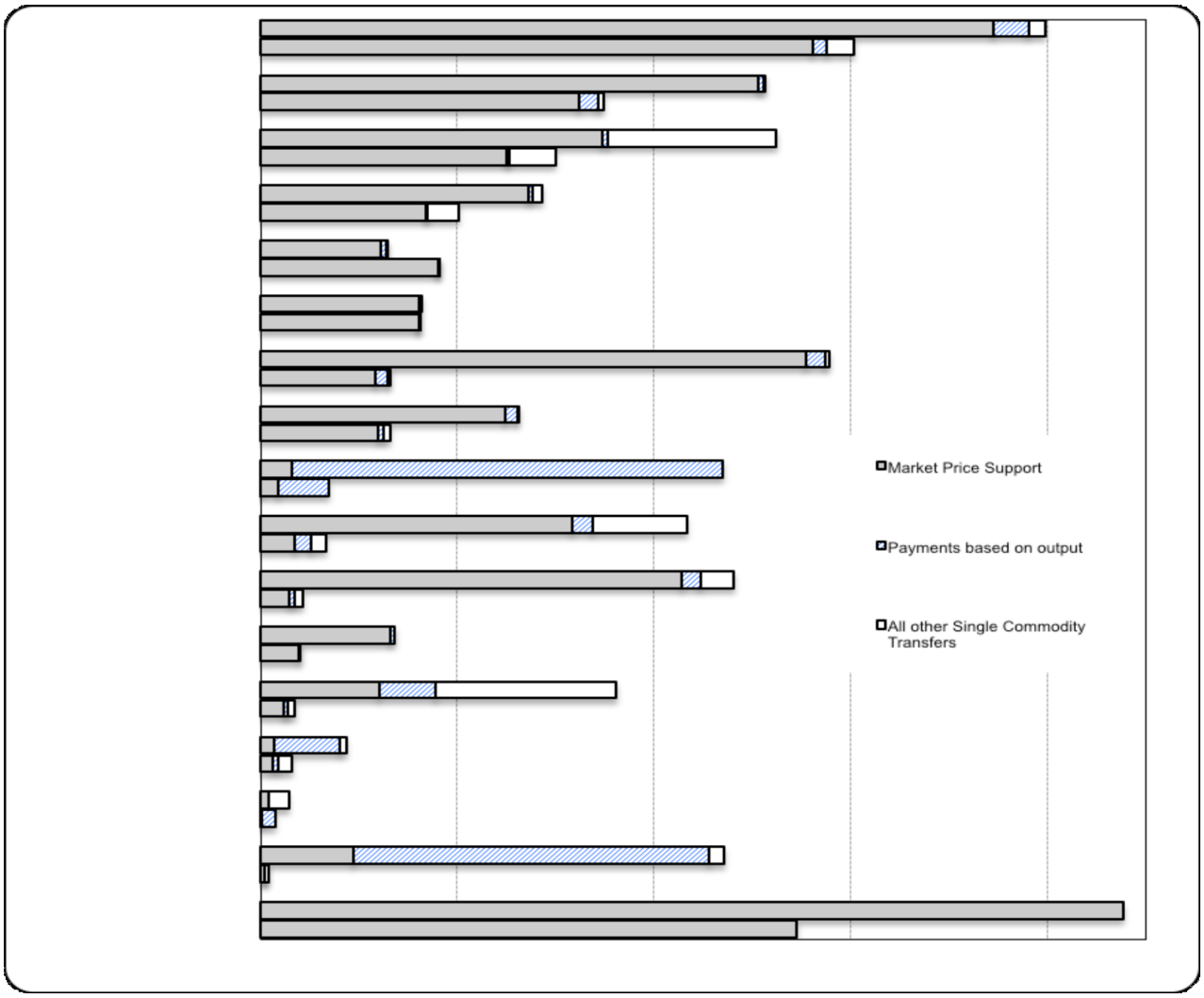
Rice is the most distorted commodity in the world market. Although, overall support to farmers in OECD countries has been declining, rice is as an outlier. State support amounted to 60% of total producer rice receipts in 2006-08, which equates to US$17.6 billion (figure 2)

The small volume of rice traded, relative to the quantity produced, concentration on a few major exporting, importing and producing countries, and domestic support policies, provide a potential for highly fluctuating world prices resulting primarily from sudden changes in exportable supplies in the major exporting countries and/or domestic production shortfalls in large consuming countries. [17]

The global rice market landscape is changing. Two distinct developments may affect the rice economy in the future. First, as developing countries are industrialising, land, water, and labor may move away from rice to other activities. Second, the potential for productivity through the adoption of high-yielding varieties, fertilizer and irrigation systems has almost been exploited since the beginning of the Green Revolution in the 1960s. Rainfed agroecosystems, which account for about 45% of global rice area, may have to bear the major burden of a future increase in rice production. In this scenario, the potential for increasing yields in rainfed agroecosystems is significant, as average yields amounts to only 1.5–2.5 tons per hectare. [18]

Certainly, the conclusion of the Doha Round, but most of all the conclusion of regional trade agreements, may contribute to more investment in rain-fed rice production by partially liberalizing the domestic rice market.

Figure 2. OECD: single commodity transfers (1986-88 and 2006-08)



Source: OECD, PSE/CSE database, 2009.

4. The Rice sector in Costa Rica

Rice is the most important staple crop of Costa Rica. Costa Rica is ranked second in the Americas in rice consumption per capita and this level is similar to Japan's (57 kg per capita). Rice represents 8% of the total value of the food basket and is a key source of total calories and proteins intake. [19] Rice cultivation accounts for 2.3% of total value added of agricultural production in Costa Rica. [20] In 2008, area planted with rice accounted for 62,411 hectares, equivalent to 13% of total agricultural area in the country. There are 1082 farmers in the rice business. [21]

5. Primary production

Costa Rica is a very small player (ranked 55) in the global rice market, amounting to 0.027% of paddy production in the world. Output is highly concentrated as 3% of farmers account for 50% of total production, while 83% of them represent just 20% of production. [22] The average farm size is of 65 hectares. However, 34.4 % of rice producers cultivate less than 10 hectares and their share of total rice cultivation area is 3.4% In contrast 6% of producers have 55% of the land.

This makes it hard for most small farmers to achieve economies of scale. The role of economies of scale may be relevant in producing rice efficiently. The production cost varies depending on farm size and is higher on small farms than on larger farms in Turkey. The production cost was on average 18% higher in the group of smaller farms than of the biggest farms. But they also find differences of up to 56% in the production cost between the lowest (largest farm group) and the highest cost (smallest farm group). [23]

Moreover, in the case of Costa Rica there is an important difference in costs between the two common production methods: irrigated and rainfed production. Irrigated rice is the most productive method of production in Costa Rica producing on average 24% more than rainfed rice production. [24] Nevertheless, most

of rice farmers in Costa Rica (70%) use the rainfed method. [25]

Irrigated fields are concentrated in the Tempisque River Basin where 45% of total national production originates. It is important to note that rice has nevertheless the lowest productivity per hectare compared to alternative crops in the Tempisque River Basin. [26]

Table 1 shows the production costs for the season 2007/2008. The average cost per hectare was US$1,555. Taking the United States as country of comparison (excluding opportunity costs), average production costs are similar to farming costs in Costa Rica. Although, it is important to consider that yield is significantly higher in the United States. Between 2002 and 2008 average yield was 7,66 t/Ha. vs. 3,52t/ha in Costa Rica. The cost / yield ratio (season 2007/2008) was 128% higher in Costa Rica than in the U.S.A. Therefore, if we consider both issues -costs and productivity- the unit cost of rice production in Costa Rica is more than twice the one of the United States.

6. Milling

The Costa Rican rice milling industry is highly concentrated. Four out of the fifteen mills currently operating comprise 70% of the production. The Herfindahl Hirschmann Index for the 10 largest mills went from 954 in 2001 to 1454 in 2005. [27] Vertical downstream integration is standard for the four largest mills, as they source paddy rice from their own fields. Because primary production of rice does not satisfy total consumption demand, paddy rice (rice in the husk) is imported from the United States to keep the mills operating. The import mechanism (explained in section 4) prevents economic agents to import ready to consume milled rice.

7. Trade

Costa Rica imported in average 155 thousand tons of paddy rice during the 2003-2008 period, to satisfy the demand of the milling industry. In the rice year 2007/08, imports totaled 117,032 tons of milled rice equivalent. This figure represents 50% of total rice demand in Costa Rica. Table 2, shows the evolution of the share of imports in total rice demand in the country between the years 2003 and 2008. All rice is imported from the United States. There is a phytosanitary ban imposed on rice originating from South East Asia due to *Trogoderma granarium*. Although the risks associated with this pest have been estimated as being very low, the ban is still enforced.

8. Support policies for the rice sector

The most important form of support to the rice industry in Costa Rica is market price support. Market price support is defined by the OECD as an indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policy measures creating a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level. [28] In the case of rice production, market price support is granted through a combination of tariff protection and price controls. The rice industry is highly protected as tariffs of 35% apply to the importation of paddy and milled rice. A combination of the Special Agricultural Safeguard of Article 5 of the Agreement of Agriculture and GATT Article XIX Safeguard had raised the tariff level up to 71%. Other levies and fees related to phytosanitary measures are applied as well.

The rice market in Costa Rica is thoroughly regulated. At almost every step along the production chain, as rice passes from the farmer to the miller, to the wholesaler, to the distributor, to the retailer, and finally to the consumer, the price of rice is controlled by the government through a system of established price floors and ceilings. Indeed, the only price in this chain not subject to regulation is that paid by the wholesaler to the miller.

The National Rice Corporation (CONARROZ), created in 2002, is the coordination institution of the rice sector. It is a non-governmental public enterprise managed by a board of producers, millers and Government representatives. CONARROZ has the authority, given by the Ministry of Economy, of defining productive policies and has mechanisms for controlling imports and exports of rice. Likewise, CONARROZ sets the price levels of rice in every step of the value chain. The Ministry of Economy implements all recommendations by CONARROZ. In the case of imports, CONARROZ has the authority to import rice when needed, benefiting from a tariff free treatment.

The objective of CONARROZ is to protect and promote the rice sector through the establishment of a corporate regime whereby farmers and millers obtain a 'fair' and equitable share of the economic benefits of their activity. In its mission statement, CONARROZ mixes food security with food sovereignty concepts. It proclaims that Costa Rica's food security should be accomplished through domestic production, given the distortions in the international market. It aims at improving the livelihood of farmers and millers, assuring affordable consumption to the poorest households. Raising yields and production are part of its official mission statement.

The CONARROZ model has been criticized because it assigns several market competitors to the same institution and is governed by policies that can potentially encourage a monopolistic behavior. One of the most disputed actions is CONARROZ participation in the importation of paddy rice. When imports are needed, the Government lowers the tariff to zero, but the right to import at this level is exclusively given to CONARROZ. In such cases, authorization is given to import the quantity required to satisfy local consumption at a reduced tariff or tariff-free. Any other economic agent who imports rice has to pay a 35% tariff, which is the bound tariff inscribed in Costa Rica's schedule of market access concessions to the WTO. Once it has imported the volume determined to meet the shortage, CONARROZ distributes the paddy rice to the millers in quotas proportionally to their participation in buying domestic production. The rents involved in the transaction are captured by CONARROZ, through a hedge fund, and

then are transferred to the growers, proportionally to their level of production. Nevertheless, being a vertically integrated industry, part of the rent is captured by the millers too.

The National Service for Irrigation and Drainage (SENARA), as manager of the Arenal-Tempisque River Irrigation District (PRAT), is also a key player in the rice sector. It sets the irrigation tariffs. according to area subject to irrigation. This means that the famers pay on the total land they irrigate irrespective of the water consumed. Current tariff is equivalent to $40 per hectare per year. According to the Price Regulation Agency (ARESEP), this tariff is highly subsidized as total costs of operation and maintenance are not covered. Total transfers of the Government to the water users in PRAT were US$1.37 million in 2005. The estimates from ARESEP are that the irrigation tariff should be at least US$400 per hectare per year to cover all the costs. [29]

The producer support equivalent (PSE) for rice production was calculated in 2003 as part of an Interamerican Development Bank (IDB) project to quantify agricultural support in Central America. [30] The estimates were a PSE% of 45, which translates into the equivalent of US$19 million per year. This means that without the different forms of support, rice farmers in Costa Rica would receive only 55% of their total revenues from rice production. Costa Rica's support to rice tops the one of the United States and the European Union, and after taking out Japan and Korea, is higher than OECD average (table 3). Although, PSE methodology and domestic support calculations differ, as the latter does not include the transfer effect of the tariff, Costa Rica has never notified to the Committee of Agriculture its rice domestic support programs.

9. Impacts of rice policy on sustainable development

9.1 Economic and social impacts

Economic distortions in the rice sector are found resulting primarily from a combination of tariff, tariff-rate quotas and regulation of domestic prices. In general, economic theory suggests that market price support raises domestic producer and consumer prices and thus increases production and decreases consumption, implying a transfer from consumers to producers. Therefore, the market price support system distorts both production and consumption decisions. Through the application of these instruments, rice policy in Costa Rica has not been effective in increasing the planted area, production or yields (see table 4); nor has it improved the livelihood of the small and independent farmers. Last but not least, it also failed to expand the consumption opportunities for the poorest households.

Rice market price support teamed up with the special import regulation mechanism has failed to stimulate domestic production but has encouraged paddy rice imports. Because most mills are vertically integrated, they prefer to import instead of embarking on the risky process of rice cultivation even if they have to pay an import duty fee. However, gains from trade have benefited the millers and not the consumers, as the lower international prices are captured in the form of rents by these firms.

These regressive policy effects have fallen back on the most vulnerable sectors made up of small independent farmers and consumers. The price received by rice farmers in the period 2002-2005 fell notoriously behind the Consumer Price Index (CPI), indicating deteriorating income among independent farmers. [31]

A study to estimate profitability and fertilizer demand for rice production around the Palo Verde National Park, determined that profit levels of small farmers with adjacent fields to the park area are highly influenced by the application of the import tariff. Considering a tariff-free scenario, only close to 9% of the farmers in this area would earn a profit above the line of poverty for a household in Costa Rica. [32] These farmers are characterized by using high capital intensity production systems, as expressed by the sum of agrochemicals, machinery and transportation costs. As it is difficult to achieve economies of scale in small plots, their fixed costs are very high.

The rice millers have been able to maintain its margins throughout the decade, especially since the foundation of CONARROZ, to the detriment of farmers and end consumers. [33] Figure 4 shows the prices received by rice millers are higher compared to their competitors in major exporting countries. It is clear that Costa Rican millers, through the protectionist policies implemented, have benefited from prices that are consistently above world market levels.

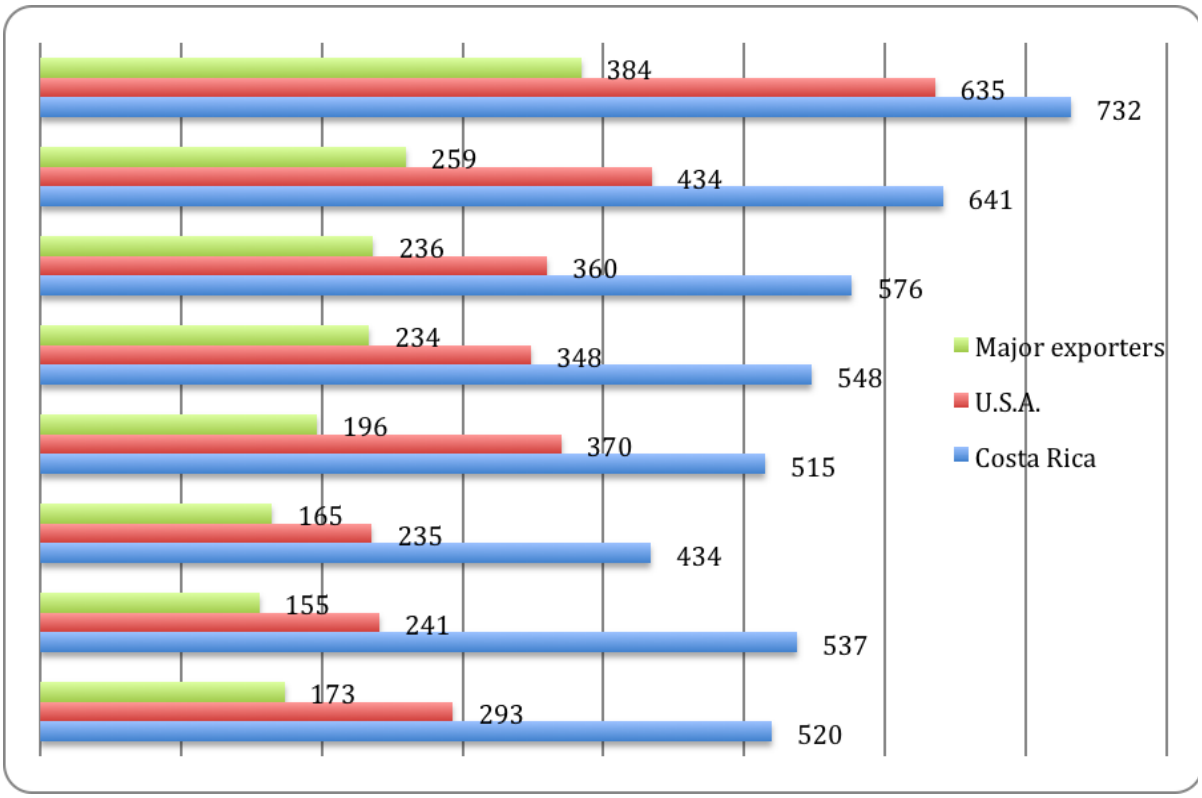
Furthermore, the quota rents resulting from the monopolistic import mechanism are assigned by CONARROZ through a fund, in proportion to the quantity produced. According to the estimates made by the Government Accountability Office, three percent of the farmers received 50% of the import rent, while 71% of the farmers received only 13% of the fund administered by CONARROZ. The main conclusion of the report by the CGR (2004) was that the original objectives of CONARROZ were not being addressed at all. [34]

According to welfare economics models the transfers from consumers to the rice industry (growers and millers) - reached an accumulated 10-year amount of US $396.4 million, from 1996 to 2005, of which 80% was absorbed by the millers and only 20% by farmers.[35] Similarly, the net present value of income transfers from consumers to rice producers was calculated at US$428 million.[36]

The impact of these transfers is socially regressive, since per capita spending on rice is conspicuously more significant in lower income households. Price to consumers, measured by the Consumer Price Index, indicates deteriorating purchasing power among consumers – and especially among the poorest households. [37] A study report an 8% increase in the total basic food basket because of higher local prices compared to international CIF prices calculated for a small basket of agricultural foods that include rice, poultry, dairy and beef. [38]

Table 5 shows the incidence of expenditure on rice per

Figure 4. Wholesale rice prices in Costa Rica, U.S. and major exporters (US$/ton)



Source: BCCR (2009), CONARROZ (2009) and USDA (2009).

Notes: Costa Rica: refers to price of 20% broken / 80% whole grain (regulated price); USA: refers to average price, F.O.B. mills, at selected milling centers (Louisiana, Texas, and Arkansas); Major exporters: refers to average prices F.O.B. vessel, corresponding home port for milled rice export price quotes (Vietnam, India and Pakistan). Average price of 15% and 25% broken

income quintile. In the poorest households, rice expenditures represent 6% to 7% of per capita income and only 0.4% to 0.5% of per capita income in the more affluent households. Another study estimated that in absence of market price support, consumers in the I quintile will expand their consumption possibilities by 6%. [39]

Summing up, rice policy in Costa Rica is the result of a successful rent- seeking group of well organized millers, and the misguided government concerns over the potential negative effects of trade liberalization on small farmers and consumers. Instead of pursuing a coherent productive development policy for the sector, the main policy has been import protection and price controls that have been unsuccessful to improve productivity, have created significant rents for rice millers, transferred significant income from consumers to producers, and maintained local prices above international prices for years. [40]

Regulatory capture in the rice sector has prevented domestic actions to remedy policy incoherence. It required the negotiation for a Free Trade Agreement with United States – DR-CAFTA, to liberalize rice trade. Although only after a 20-year phase-out period, rice trade between Costa Rica and the United States will be completely duty free. According to a partial equilibrium analysis of the impact of DR-CAFTA on the U.S and Central America rice sector, the FTA will have a profound effect in the rice economy of Central America and Costa Rica in particular. [41] Important welfare effects to consumers are expected, while production decreases and prices to producers lower significantly (tables 6). Nevertheless, longer phase out periods in DR-CAFTA for tariff elimination would cause welfare losses and inefficiencies in resource allocation, which represent a present value of US$895 million. [42]

9.2 Environmental impacts

Although indicators like the producer support equivalent (PSE) have been developed for measuring economic distortions arising from agricultural policies, these indicators do not reveal the direct effects of agricultural policies on the environment. Nevertheless, one would expect that the same agricultural policies that could distort production decisions and trade could also have an environmental impact. As market price support policies distort the production factor markets, changes in input consumption are to be expected. Fertilizers and water for irrigation are

classical examples. Subsidies for agrochemicals and water of agricultural use distort the real price of these inputs and encourage overconsumption due to lower effective prices. Irrigation subsidies encourage intensive farming, which in turn leads to higher levels of chemicals use than would occur otherwise. Moreover, irrigation subsidies can lead to the underpricing of irrigated water, which promotes the inefficient use of water. In these cases, the economically optimal rate of input use would exceed the environmental optimal rate. [43]

The Tempisque river basin is located in northwestern Costa Rica and is one of the most economically productive regions of the country. The irrigation district associated with this watershed – known as PRAT - is also the largest in the country and the premier producer of rice, melon and sugarcane. Its landmass represents 10% of the country. This basin has been the site of important biological, physical, productive and social transformations since colonial times, which have shaped it into a complex matrix of agricultural lands, wetlands, protected areas and human settlements. [44]

The basin has the most extensive hydrological system of Costa Rica and combines the greatest concentration of wetlands on the Pacific plain of Central America with more than 100 hectares of swamps, marshes, and mangroves. It contains 73,000 hectares of protected areas, including a Ramsar site – a wetland of international importance. The Palo Verde National Park with a total area of 20,000 hectares has seasonally dry forest on limestone outcrops and extensive wetland vegetation. This park is the major bird sanctuary in Central America and the host to thousands of migratory birds flying between the north and the south. [45]

Thousands of waterbirds pass through Costa Rica during their migrations, using diverse wetlands (e.g. river mouths, beaches, swamps, ponds and lakes) as stopover sites. The Palo Verde National Park is very important for waterbirds due to their wetland characteristics (providing opportunities for feeding, breeding and wintering) and because it is located near or along the migratory ways. Several wetlands in Costa Rica including Palo Verde National Park are threatened by agricultural runoffs, sedimentation, drainage and habitat destruction. [46]

The irrigation project (PRAT) was conceived between 1975 and 1978 and is administered by the National Service for Irrigation and Drainage (SENARA). In total, close to 30,000 hectares are currently under irrigation benefiting close to 800 producers. Small farmers with 7 to 10 hectares manage more than 50% of this area. A total of 234 kilometers of channels have been built, as well as 89 kilometers of drainage canals and 230 kilometers of roads and paths. [47]

Rice is grown twice a year thanks to the irrigation facilities of the PRAT. Mechanized land preparation and harvesting represent the common techniques used among farmers to cultivate the rice. The use of agrochemicals (fertilizers, pesticides and herbicides) is highly intensive. Technological package for rice cultivation demands four fertilizations of approximately 184 kilograms per hectare. Nitrogen, phosphorus, potassium and zinc constitute the principal chemicals applied during the fertilizations. To control pests and common diseases, the use of chemicals is also intensive mainly due to the high pest susceptibility of the seeds varieties used in this area. Application of agrochemicals airplanes and tractors is almost 100% mechanized. [48]

Rice cultivation consumes large quantities of water. Water demand for rice fields is up to thirty thousand cubic meters per hectare. The conversion rate of water to rice is seven thousand liters per kg of milled rice, according to average yield in Costa Rica. [49] Researchers agree that the introduction of irrigation water could have a major impact on the original ecosystems. [50] Information collected on the cultivation methods used, suggests that rice farming in the Tempisque River Basin could be associated with a high level of soil erosion, lixiviation and agricultural runoffs. [51] Likewise, waterfowl and local fauna nest or forage in rice fields with high levels of agrochemicals. [52]

As a matter of fact, in 2008, agencies from the Government of Costa Rica went to a legal dispute over the pollution and flooding of more than 3,000 hectares of protected areas in Palo Verde National Park. The polluted water contained traces of pesticides, herbicides and fertilizers allegedly originated in the rice fields adjacent to the park. The Ministry of Environment presented a compelling case to the Environmental Tribunal regarding the ecological damage caused by the polluted waters. The conflict was resolved when SENARA the responsible agency for administering the PRAT and the Institute for Rural Development (IDA) in charge of land reform, agreed in an *ad-hoc* conciliation process to pay the equivalent of US$6 million dollars as compensation for ecological damage to the park.

10. Conclusions

This paper reviewed Costa Rica's Rice Support Policy Program, which was conceived as a way to preserve national food sovereignty in the face of fluctuating World market prices. For that purpose we did a Sustainability Impact Assessment that considered the economic, social and environmental dimension of sustainable development.

Although, supporting rice at levels beyond United States of the European Union, current support for rice in Costa Rica proved to be ineffective in promoting economic development for the rice sector. Planted area, productivity and production are decreasing, and imports are growing. Moreover, tariffs, water subsidies and price controls did not benefit small farmers as millers have largely captured the rents associated with protectionism. Similarly, consumers, especially the poorest, are spending a considerable amount of their income for purchasing rice whose price is above world market levels. These results contrast with the original goals of CONARROZ, to create support mechanisms for local production growth, productivity improvement and food security. Furthermore, there is empirical evidence of environmental damage associated with these programs, especially to protected and valuable ecosystems in the Tempisque River basin, whose impor-

tance transcends Costa Rica.

Policy coherence for sustainable development can be achieved. Trade liberalization and the elimination of water subsidies and price controls accompanied by competition policy enforcement would contribute to food security as price levels decrease; and send market signals that would lead to a better allocation of resources towards more productive and environmentally friendly activities in the Tempisque River basin. Small farmers may be better off, as their fate will not be tied to the current regressive mechanisms.

Liberalization in the rice market can be expected to reduce environmental pressure over the wetlands in Palo Verde National Park. The elimination of market price support and irrigation water subsidies will reflect the true costs of inputs and production factors, which in turn diminish the economically optimal rate for agrochemicals and water use.

The policy reform process should include a thorough review of CONARROZ, as the main political and executing agency in the rice sector, in order to align its objectives and programs to the national goals of sustainable development.

Regarding productive development policies for small farmers, conditional cash transfers, are better alternatives to market price support policies when promoting rural livelihood and agricultural productivity. These transfers should be decoupled from production or area planted, as decisions for farming should be based on market incentives. They could provide the same economic transfers but will not tax the consumer and have the political benefit of transparency. They will act as safety nets while promoting human capital. Costa Rica has the right institutional environment for supplying good quality health and education services required for the success of these programs. Similarly, the implementation of agro-environmental programs can reduce adverse environmental impacts of agriculture and may also enhance the provision of environmental benefits. Some successful projects are being implemented in this subject matter by leading research institutions and advanced farms in the region.

One important lesson drawn from the analysis of rice policy in Costa Rica, is that regional trade agreements, i.e. DR-CAFTA, have shown to be powerful instruments to deal with the political economy problems arising from vested interests of rent-seeking groups. In this particular situation, not even Costa Rica's commitments to the WTO or the Ramsar Convention had been enough to prevent the implementation of the ineffective and inefficient policies.

Foot notes

1. By Law No. 8285 on May 30, 2002

2. CONARROZ Mission, values and objectives statements. Found at www

3. This statement clearly resembles the actual definition of food sovereignty posed by Via Campesina (http://viacampesina.org/en/index.php?option=com_content&view=article&id=47:food-sovereignty&catid=21:food-sovereignty-and-trade&Itemid=38)

4. **Producer Support Estimate (PSE):** An indicator of the annual monetary value of gross transfers from consumers and taxpayers to support agricultural producers, measured at farm gate level, arising from policy measures that support agriculture, regardless of their nature, objectives, or impacts on farm production or income. The PSE indicator can be reflected as a total monetary value (US$) or as a percentage of the overall price paid to producers (PSE%)

5. IDA distributed almost 10,000 hectares to small farmers, adjacent to the Palo Verde National Park.

Table 1. Costa Rica: Average costs of rice production (irrigated ecosystem) (US$/Ha.)

	Sep-07	%	Nov-07	%	May-08
A. Labor	38.1	2.94%	57.9	4.02%	60.8
B. Mechanization	475.2	36.63%	510.1	35.44%	565.8
C. Inputs	469.0	36.15%	524.7	36.45%	717.3
D. Other expenses	98.1	7.56%	105.7	7.34%	119.4
E. Administrative and selling costs	172.5	13.30%	191.6	13.31%	221.7
F. Financial costs	44.3	3.42%	49.5	3.44%	57.4
TOTAL COST $ / Ha.	**1,297.3**	**100.00%**	**1,439.6**	**100.00%**	**1,742.4**

Source: CONARROZ, 2009

Table 2. Costa Rica: Rice total demand, imports and share of imports in total demand.
Tons of Milled rice equivalent

Year	03/04	04/05	05/06	06/07	07/08
Total demand	214,102	236,526	235,167	233,532	236,218
Imports	77,847	157,402	76,885	79,496	117,032
Share	0.36	0.67	0.33	0.34	0.50

Source: Calculations based on CONARROZ, 2009

Table 3. Producer support estimates (PSE) for the Rice Industry in Costa Rica and selected comparators. 2000 - 2003

	2000	*2001*	*2002*	*2003*
Costa Rica	36	32	52	45
United States	45	53	50	31
OECD	82	81	78	76
European Union	17	40	34	32

Source: Arias, 2007

Table 4 . Costa Rica: rice area planted, production and yield. 1997 – 2008

Year	**Area** (hectares)	**Production** tones of paddy rice	**Yield** t/ha
1997/98	59,333.00	242,359.00	4.08
1998/99	56,185.00	263,491.00	4.69
1999/00	66,096.00	319,565.00	4.83
2000/01	66,083.00	274,595.00	4.16
2001/02	56,165.00	221,414.00	3.94
2002/03	48,906.00	208,506.00	4.26
2003/04	52,835.00	207,585.00	3.93
2004/05	60,414.00	233,660.00	3.87
2005/06	54,093.00	201,114.00	3.72
2006/07	47,252.00	190,131.00	4.02
2007/08	54,053.00	208,555.00	3.86

Source: CONARROZ, 2009

Table 5. Costa Rica: Incidence of expenditure on rice in each income quintile

Year	Country level	Per capita income quintiles				
		I Quintile	II Quintile	III Quintile	IV Quintile	V Quintile
2008	1.35%	5.76%	2.99%	1.95%	1.20%	0.45%
2007	1.36%	5.99%	3.05%	1.99%	1.22%	0.44%
2006	1.47%	6.77%	3.27%	2.09%	1.27%	0.47%
2005	1.54%	6.84%	3.23%	2.09%	1.28%	0.52%
2004	1.39%	6.55%	3.09%	1.93%	1.18%	0.47%

Source: Calculations based on: INEC, (2009); CONARROZ (2009)

Table 6. Change in important variables for the rice sector as consequence of DR-CAFTA. Partial equilibrium model results

	U.S.	CAFTA countries
Rice Production	0.5%	-6.5%
Producer Price	1.7%	-22.4%
Producer Surplus	1.6%	-25.1%
Rice Consumption	-0.2%	6.5%
Wholesale Price	0.9%	-20.5%
Consumer Surplus	-0.4%	12.7%
Milling Activity	8.1%	-38.1%

Source: Durand-Morat and Wailes (2005)

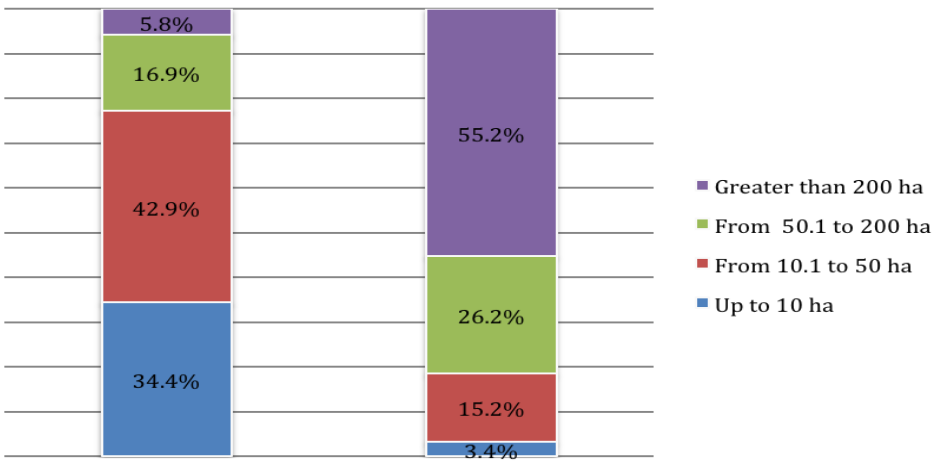


Figure 3. Costa Rica: Relative distribution of rice farms by size and number of famers

Source: Calculations based on CONARROZ, 2009

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