Institutional Environments for Certified Organic Agriculture:

Enabling Development, Smallholders Livelihood and Public Goods for Southern Environments?

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Abstract

This paper presents the case for research on institutional environments for organically certified agriculture in developing countries. Observing that some analyses hold Southern organic agriculture as pro-poor and perhaps also more energy efficient than fossil fuel dependent industrialized agriculture, the paper explores differences and similarities in the policy rationale of promoting certified organics in North and South. Based on analysis of institutional environments for COA in Brazil and China, the paper proceed to identify some challenges, opportunities and policy options for strengthening not only certified organic agriculture per se, but an environmentally and socially sustainable food system, providing smallholder livelihoods and rural development.

Introduction

The USD 40 billion global market for certified organics is a fraction of the world food market. Yet, certified organic agriculture (COA) is one of its fast growing and globalising segments, with COA products increasingly entering Europe from low income countries. This process transforms the organic food system from a sum of local producer-consumer networks, to include a global system of regulated trade, linking socially and spatially distant parties. (Halberg et al 2006, Kristiansen et al. 2006, Lockie et al 2006, Willer and Yussefi 2007). With markets in certified organics increasingly involving developing countries and urbanization driven supermarkets gaining shares of food sales in domestic markets of low income countries, the relevance of policy studies on institutional environments for COA in these countries increase too.

In principle, the globalisation of COA could move tropical organic agriculture towards agribusiness-like models along a trajectory as seen in the state of California (US) and described by Pollan (2006; 264) as involving giant "organic factory farms". Development trajectory wise, however, agriculture develops differently under different rules and institutions, as illustrated by the different courses of organic agriculture within Europe and compared to the USA. The European CAP has its Rural Development Programme. In

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the US, lively debates on organic "bifurcation" (Constance 2006), about "the true cost of food" (Sierra Club), the importance of local farmers markets and - as in "The Albion Statement: A 2025 Vision for Michigan's Food and Farming"- on the fate of rural America, illustrates some of the crossroads in the US rural development trajectory. In principle, therefore, even smallholders in low-income countries could see further rural development and income opportunities emerge along with the increasing demand for organics. In Brazil, for instance, 15 - 30% of organic premiums paid by consumers stay with Brazilian smallholders (Fonseca & Campos, 1999).

Certainly most African smallholders use few, if any, external inputs of pesticides and fertilizer. African, Asian and Latin American smallholders could stand to gain from increasing global awareness about the international public goods they actually produce, based on solar powered and biodiversity based, environmentally knowledge intensive and eco-economically sound farming methods. In theory, their common farming methods would appear readily, if not easily certifiable vis-à-vis internationally agreed organic principles/market standards. While most recent case studies re-confirm benefits for smallholder farmers of participating in certified organic farming schemes (e.g. Eyhorn 2007), and some even claim major yield increases where traditional systems of low input agriculture convert to COA (Halberg et al 2006), yet, as giant supermarket chains such as Carrefour and Wal-Mart increase their sourcing of organic produce from China and Brazil and developing countries, one could ask whether or when tropical smallholders currently enjoying price premiums from being organically certified will become subject to a price squeeze.

Supermarkets are no longer just niche players for rich consumers in the capital cities in Latin America, Africa and Asia. The rapid rise of supermarkets in these regions has recently transformed agri-food markets and present challenges for small farms. The challenges developing country smallholders face pursuing aspirations of tapping into the organic markets, are perhaps different from the broader challenge of pursuing sustainable agricultural development. It remains a major question whether the linkage to the markets – facilitated through organic certification – can lead to overall improved resource management and under which conditions this may indeed happen.

Knowledge on how smallholder organic farms may use new opportunities or defend their role as suppliers under these conditions is rather incomplete. In this connection, it seems worthwhile reflecting on the fact that in the industrialized countries, the organic agricultural sector did not materialize from an institutional vacuum overnight, but evolved out of a combination of agency of civil society, market forces, state regulation and institutional development.

This paper presents our theoretical considerations and preliminary findings of case studies on institutional environments for COA. It takes its point of departure in discussing how the field of agricultural policy and development has evolved into a field of food system and development policies and points out how changes in economic paradigms has perhaps influenced this move towards not only understanding agriculture as multifunctional, but also towards a multidimensional and perhaps multi-agency concept of "agricultural" – or rather food system – policies. The paper then discusses North – South differences and similarities with regard to policy rationales of supporting COA, and moves on to identify the main challenges for smallholders opting for COA in low

income countries, in the context of changing principles for OECD agricultural subsidies. The paper proceed with a discussion of the implications of these various changes for International Agricultural Research Centres facing a transformation of their research orientation from one focusing on crop yields to one serving a more multifunctional agriculture for development. The same discussion includes a section on eco-efficiency measures, with a view to focus on the strength of low input systems and smallholder agriculture rather than seeing these as mainly representing a development problem. The paper also analyzing policy perspectives flowing from the changing nature of the international agricultural challenge, from one of surplus in the North and malnutrition in the South to a complex situation everywhere with obesity epidemics co-existing with under-nutrition within neighboring geographies, In conclusion, the paper pursues some main points and identifies some policy challenges for any decision-makers planning to promote favorable institutional environments for COA.

Point of Departure: a New Food System and a New Economics

The concept of policy in relation to agriculture, food and development continually evolves and we are challenged to reconsider our policy concepts and options in the context of a world market which is now so globalised or strong that conventional ag-policy instrumentation has long represented rather theoretical options for single nations, particularly say post-structural adjustment African countries to pursue (Ellis 2001). To current and future policy designers and certainly according to analysts such as the late Ellis (2005) and Maxwell and Slater (2003), many of the classical ministry-of-agriculture "agricultural" instruments and policies are no longer dominant. A broader or multidimensional set of "agricultural" policies are relevant if one wish to understand the incentives for private industry to produce different mixes of agricultural products in different ways with different social and natural resource management implications. In addition to the classical distributional factors investigated as part of the so-called "pro-poor" research agenda, the very same set of policies influence a multitude of factors determining the levels of eco-efficiency at which a calorie of food reach rich and poor consumers plates respectively. What we have is new food system or perhaps agro-eco food system and thus agro-eco food system policies. Illustrations of what such a multidimensional policy concept entails are easily available in the European context (see e.g. Dabbert et al 2004), but less common in the context of low income country agriculture. Exceptions exist, of course, including Pretty (2002). We share optimistic, if not knowingly naive, assumptions that better policies can indeed help or more precisely; policy frameworks integrating support for farming along with rural development and the environment, can create new jobs, while improving natural resources and support rural communities at the same time (Pretty 2002; 122-124).

The evolution of the economic sciences in the last few decades has been significant in that while the mainstream economic discipline may be said to continue externalising values of ecosystems and natural resources, the new disciplines of environmental and ecological economics help economic science integrate the same values. Environmental economics developed pursuing integration of information on natural resource functions into the market through pricing. Ecological economics developed pointing to the limits of that integration: the economic system is a subsystem of our life support system, human

made and natural capital is not necessarily substitutable (Daly and Cobb 1989) and – to the extent "we" [economists] try to sustainably manage our economic subsystem through pricing, who are "we" to impose a certain, [monetary] language of valuation? (Martinez-Allier, 2002). These developments in environmental and ecological economics have led to increased documentation, including OECD statistics, of positive as well as negative externalities associated with the agricultural sector: the developmental benefits of organic farming include environmental protection, biodiversity enhancement (providing conservation biological control), reduced energy use and higher quality landscapes (Dabbert et al 2004). In the UK, for instance, the social costs of water quality reduction caused by pesticides have been calculated to reach about EURO 190 million a year. Pro-poor agricultural development is therefore no longer only a question of "Agricultural Growth for the Poor" (as in World Bank 2005), but also a question of the nature and eco-efficiency of that growth.

This paper is rooted in a tradition of development studies embracing a concept of institutional environments with institutions understood as "rules of the game" sensu North (2005). At the most general level of abstraction our subject matter is partially the same as North's: (how humans, as economic agents, understands, learns and act as economic agents) *within incentive structures that determines* a pathway (our emphasis). Only, in our case, the "economic" activity in question is organic agriculture and the pathway not measured in terms of monetary growth, but in broader development terms. More importantly perhaps, we focus more on the incentive structures than of people's perceptions. Still, we share North's understanding that institutions are subject to continuous change by agency of the same humans designing the rules or playing them out. (One illustration of our evolving framework for analyzing institutional environments for COA can be found in Egelyng 2006). Consequently, our research explores formal and informal institutions and forms of agency, viewing the spread of COA as influenced by a wide range of factors. We assume that the sum of all the rules and policy interventions mediated up and down the value chain either encourages or discourages the continuation, introduction (or re-introduction) of intrinsically sustainable technologies such as crop rotation, management intensive grazing, soil and water conservation practices and the use of biological and cultural means of pest control. We focus, therefore, on how public policies form institutional environments that encourage or discourage farmers to use methods that conform to organic requirements. For intrinsically sustainable agricultural technologies to be used, enabling environments or "ecological institutions" are needed (Egelyng 2000).

From a development studies perspective, valid evidence on the benefits of COA in developing nations remains in an early stage. Adding complexity, the question of developmental benefits can be answered at many different levels in the range from global to local and market-non-market. For instance, going organic may not only provide price premiums, but might involve non-market value or environmental income calories such as fish and lizards caught and eaten by kids along (organic) rice fields. And long distance transport (food miles) of organic products is but one factor that might compromise global environmental benefits of COA products, when comparing imported with locally produced products. Product-oriented environmental assessments may be needed in order to include these aspects in relation to the amount of food delivered and to aggregate emissions with global impact such as Green House gasses measured in "CO2-

equivalents". Life Cycle Assessment (LCA) methods and ecological footprint analysis (EFA), aggregating and transforming environmental impacts to an area-based unit, would appear to be relevant research tools in this work. In short, whether serving to inform consumers and markets, policy-makers considering institutional designs and choice of policy instruments, or informing bewildered international donors, there is a need indeed for knowledge of both the environmental and developmental aspects of tropical organic farming systems. (Egelyng, Halberg and Høgh Jensen 2006).

North – South differences

Agricultural systems differ in their capacity to produce eco-efficiently. Energy wise, for instance, Conforti and Giampietro (1997) compared output-input (O-I) ratios of 75 countries world-wide and found O-I ratio variations from 156 to 0.41 (SIC). The countries shown to have the most in-efficient agriculture (O-I ratios < 2) included mostly rich countries! The countries seen to have the most efficient agriculture (ratios > 30) included Ghana, Niger and Uganda. In other words, the North is reforming agricultural policies to reduce surpluses and reconcile agricultural and environmental policies (Scialabba). The South has some interest in the latter objective, but not in the former. As far as organically certified cash crops are concerned, Southern interest seems much based on exports of organic products helping to gain foreign exchange, while saving on imports of agrochemicals.

In the new age of multifunctional agriculture and environmental and ecological economics documenting the cost shifting and externalities associated with chemical and fossil fuel dependent agriculture, a major policy rationale for public support to *COA* in the North emerged. This included supporting COA to reduce negative environmental impacts of agriculture and reward production of positive development benefits. While a complete European conversion to COA and a global end to agricultural subsidies are two different scenarios, it is interesting that according to calculations by in casu the Danish Food and Resource Economic Institute, Denmark would gain ½ a percent in GNP and at the same time save 9 % and 16 % of pesticides and fertilizers currently used, if all agricultural subsidies were removed. The 9000 Danish jobs lost in the process and normalisation of land prices (decapitalisation of subsidies reflected in same) would have to be compensated otherwise. In an economy currently reported as labour-starving as the Danish, the order of magnitude of this potential "employment problem" is perhaps less dramatic than the problems produced by subsidies on the side of negative, global and local, externalities.

The European CAP may be developing towards singling out COA as one multi-tasking sui generis public policy instrument for pursuing multi-dimensional development benefits - an instrument through which the environmental incomes from agriculture are – gradually - becoming public goods produced and paid for, first by a segment of consumers (of organic food) paying voluntary "taxes" and then by the general public through their standard taxes (Egelyng and Høgh-Jensen, 2006). Two thirds of OECD subsidies are both environmentally and economically harmful - and therefore represent "win-win" policy options: when removing economically and environmentally distorting agricultural subsidies a nation gains a double dividend, it gains environmental benefits and economic efficiency and it can use the freed resources for better purposes.

In many low income countries, government interest in organic agriculture remains low and weakly institutionalised. The development of COA in such countries is mainly driven by demands from consumers in the North – representing more than 90% of the USD 40 billion global market value (Organic Monitor and Willer and Yussefi 2007). From a development policy perspective, the major paradox of course is that drawing the global common good consequence of the above rationales, a complete conversion of European farming towards COA could probably produce not only major savings (on CAP budgets) potentially available for being pocketed by European tax payers and not only allow the same Europeans have surplus Euro to spend on tropical COA products.

To the extent the same (European) conversion to COA spurred developing country governments to follow suit, conversion to the knowledge intensive organic methods might help turn agriculture in developing countries into a more "sustainable" engine of rural development (rather than simply growth) than an extrapolation of current developments suggests. Increasing conversion and organic certification thus appear to have a possible development potential even in poor countries in the South, but for different reasons than in the North.

Two BRIC countries moving organic: Brazil and China

Among the giants of "developing" nations, Brazil and China already developed national level policies that promote COA. In Brazil, federal state law(s) and three ministries supports organic agriculture through a range of policy instruments. Brazilian organic farming is already well integrated into some rural development programmes, but remains a "policy ghetto" and poorly integrated with other policy areas such as tax. Chinas National Action Plan for Rural Environment Protection envisages establishing three hundred organic food production "bases" covering between hundred to ten thousand hectares by 2010. Brazilian policies on organic agriculture do nevertheless play out in a broader context, including a health context (public provision of children's meals). In Brazil, agrarian reform and civil society may be seen as enabling institutions driving certified – or compliance assessed as some Brazilians prefer it - organics into policy discourses and measures. The opportunity for exporting COA products with a price premium has been a strong driver for conversion attracting private companies, but hand-in-hand with involvement from the public sector and civil society (Egelyng et al. 2007). While knowledge about organic farming and labels is restricted to educated segments of their consumers, both Brazil and China have e-commerce of organic produce in their major cities. Public sector support for the organic sector through advice, marketing, training, and research was found in both Brazil and China. In Brazil, independent farmers' organizations played a role in the development of organic agriculture and CSOs are involved in organic activities and exert a policy influence. In both countries, however, smallholder farmers report significant difficulties in meeting certification – i.e. quality, safety, packaging and labelling - standards.

The institutional environments for organic agriculture in China and Brazil now does offer the formal support needed to accredit and certify COA products to gain price premiums, especially for export (Kledal et al. 2007, Egelyng, Yuhui and Li 2006). What is not in the making is any multi-dimensional institutional macro-environment sufficiently embedded and conducive to accelerate large scale conversion towards embracing the agricultural

sectors as a whole. Neither country seems to have operationalized the polluter pay principle – in the form of for example fertiliser or pesticides taxes - as an incentive for promoting organic agriculture beyond its current largely market-led niche. Smallholders of most African countries are probably facing similar or even greater difficulties in their attempts to pursue any opportunities that the current growth of the market for certified agricultural products seems to offer.

Challenges for COA in Developing Countries

While official interest in organic agriculture is thus emerging in developing countries and while increasing numbers of these develop national certification organisations, producers may face foreign standards not necessarily adapted to their country conditions, tropical agro-ecological and socio-economic realities. Organic producers are probably constrained by many of the common obstacles facing agriculture exports of low-income countries outlined a.o. by Maxwell and Slater (2003). These include limitations of traditional production systems in terms of efficiency; high costs of production (air freight, quality standards); poor infrastructure (handling facilities, cool chain); limited production capacity from the viewpoint of the private sector, corporate responsibility issues and other institutional challenges. Access to information on regulatory requirements, quality factors, prices, demands, marketing practices and logistics in foreign markets by small suppliers, may also work against smallholder's opportunities to participate in the certified organic markets. Expertise is needed to meet modern organic certification or compliance requirements, as per the international (EU and Codex Alimentarius) regimes. It is important to realize, however, that national certification challenges is just one side of the coin. The other one is about a much broader institutional vacuum.

Part of the challenge of low income countries, of course, is located in rich countries: agriculture is the most heavily subsidized sector in the world and 85 % of total agricultural subsidies are found in OECD countries in the form of market price support and area payments as well as input subsidies - all policy interventions with purposes and intended and unintended effects. Currently in the order of DKK 5.000.000.000.000 including fisheries, forestry, energy, transport and water, two thirds of the subsidies are believed to be both economically and environmentally damaging. A vast body of literature exist proving that subsidies delay introduction of new (resource efficient/less polluting) technologies, delay much needed structural adjustments, damage the environment and reduce economic growth, renders production less efficient – and largely only helps artificially prolong the lives of old technologies and industries (Kjellingbro and Skotte 2005). Adding insult to injury, perhaps, most subsidies have low transfer efficiency ratios, meaning that only a small share eventually end up in farmer's pockets.

Removing agricultural subsidies not only proved feasible, but developmental, when after 7 years of adjustment New Zealand's agriculture had gained efficiencies, including eventually not reduction, but re-direction of agro-chemicals and fertilizers towards higher value usage (horticulture and dairying). In principle, an almost universal political consensus exists on the desirability of removal of agricultural subsidies, because of triple win options. 1) Reduction of subsidies can reduce government spending and pollution and environmental policy costs. 2) Reduction of the government support can stimulate overall economic efficiency and 3) direct technological change towards improved

resource efficiency. Existing studies estimate gains of USD 400 billion (1991 values) from full trade liberalization. Mainstream studies suggest that approximately 207 out of the total of about 376 billion USD handed out as conventional agricultural subsidies, worldwide, can be categorized as both environmentally and economically harmful.

The EU has transformed about half of its annual DKK 800 billion support, from price support to area based support or other support forms that are perhaps not as environmentally damaging as price support were. However, less than 4% of total OECD support to agriculture is targeted towards environmental objectives (Kjellingbro and Skotte 2005; 43). While the EU commission, has allowed its member countries earmark a fifth or 20% of its agricultural subsidies for environmental purposes, potentially including organic agriculture, this move was too progressive for some governments. This is true, at least for the (center-right) Danish Government of 2006-2007, which did not wish to earmark any share of the subsidies for environmental purposes. It is well known that the political feasibility of actually doing away with agricultural subsidies is less promising. Historical evidence, however, suggest that faced with strong necessities, government agricultural price interventions can go and fertilizer subsidies can be removed as demonstrated in the case of New Zealand.

The situation in low and middle income countries are typically different, but in some cases of national agricultural development, the trajectory or pathway of agriculture takes such countries closer to the same dilemmas facing rich countries. The case of policy challenges facing Turkish policymakers is illustrative: the energy output–input ratio of Turkish agriculture decreased from 2.23 in 1975 too 1.18 in 2000 (Ozkan, 2004). Turkish agricultural production in other words is "modernizing" from being a net producer of food energy to become a system for net fossil fuel consumption or transformation of oil calories into (less) food calories, along with global warming, nutrient loading and pesticide pollution. Therefore, also Turkey may wish to consider pursuing different policies towards a more environmentally sustainable food system.

Analysis of some Policy Perspectives

Globally speaking, the agriculture & food challenge to development policy makers is no longer one of under-nutrition only, but equally one of over-nutrition and over-supply[3]. Globalisation has given rise to a new and even more complex international situation food-supply wise. The agri-business food system has grown capacity to influence, if not create or super size demands and consumer choice (Pollan 2006). It has developed in terms of oversupply production capacity and has become so systemic in nature that change has become increasing difficult to bring about for "willed" policy efforts. At the same time, Globalisation has raised fundamental questions of whom to turn to, in nevertheless presenting policy options: does it make sense at all to turn to national level policy-makers? (Bonanno,2006). In adopting rhetoric of letting the markets and consumers decide, have national policy-makers in reality given up? Even if some have not, are vested interests so strong that in the process from policy formulation to implementation, all pro-poor and pro-environment potentials for change are neutralized?

[3] See for instance Development Policy Review. 2003. Volume 21. Number 5-6.

After all, significant room for manuevre exists in policy implementation of international trade agreements (Leland 2006).

If the environment and poverty really mattered to finance ministers and OECD taxmen, they would probably introduce higher taxes on fertilizers and pesticides, translating into more Northern organic area and thus qua more market "equilibrium" resulting from lower yields, less need to subsidize by way of what still according to OECD (2005) remain the most economically and environmentally distorting of policy instruments: agricultural subsidies tied to production/commodities. Any plausible future featuring absence of dramatic reforms, remain with a rather comprehensive challenge of facilitating for instance:

- Water saving in food production cycle
- Minimizing use of fertilizer and energy input peer (energy) unit of food output in the farm to table, product cycle.
- Pest management minimizing use of pesticides or active ingredients per calorie produced.
- Replacing human labour only to the extent the same labour can find alternative livelihood.
- Balance mechanization and replacement of human energy in agriculture with agricultural (energy) efficiency.

The worlds organic farmers and agricultural R&D institutes including IARC´s such as ICRISAT and IRRI have already developed quite a range of eco-efficient technologies, the use of which are constrained, however, by the fact that most often it remains cheaper to overuse natural resources and to pollute than to employ resource saving methods and cleaner technologies[4]. The irony, of course, is that given incentives to economize in priced factors of production, the private sector has almost always proven capable of delivering factor efficient solutions.

In our development studies perspective, a concerted effort of helping to certify or compliance assess solar powered and non-spraying African smallholder farmers as "organic" might be an idea worth considering for donor agencies (Egelyng, Halberg and Høgh Jensen 2006). The foundation on which this idea rests include analysis of the African agricultural and food challenge: including discussion between institutionalists and technological transformers, the latter now including the Gates Foundation. Indeed, academic discussions on the policy options facing global and national agencies/politicians acting on the African food crisis, remains split between one view continuing to draw lessons from the Asian Green Revolution (see e.g. Djurfeldt et al 2005) and another view focusing on the absence in Africa of the kinds of both economic, geographical, infrastructural, institutional and (geo) political conditions that characterized Asia at the time of the Green Revolution (Ellis 2005). The challenges following from this, seems enormous. For instance: asking where all the farmers have gone, Sumberg, Gilbert and Blackie (2004) identifies disproportionately large transaction costs involved with diversification of production in Africa as well as mechanisms significantly constraining impacts of agricultural research on poor farmers. Therefore, any potential

[4] ICRISAT in the International Crop Research Institute for the Semi-Arid Tropics and IRRI is the International Rice Research Institute.

for agricultural growth in Africa will hardly be rooted in technological transformation among millions of small-scale, poor and diversified farmers. Weak infrastructure and economic policies are obstacles to expanding intra-African trade that are rather Africa specific (Longo and Sekkat 2004). All this, of course, severely threatens the prospects of high development returns (perhaps, but not necessarily, including economic or monetary returns) to investments of the kind recently committed by the Gates Foundation, investments which are rather unilaterally based on, and assuming validity of, the said technological transformation model.

Based on our analysis of North-South differences above, we would suggest to include among policy options: to avoid simply grafting the kind of government support initiatives known from the history of organic farming in Europe (see e.g. Dabbert 2004) or similar ones known from the US (see e.g. Bloom 2006). For institutional design, we share Loehman and Kilgour´s (1998) preferences for economic policy instruments and find that in terms of enabling environments, COA could gain more from a global wave of ecotax reforms (as theoretically explained in the ecotax "classic" of Repetto et al (1992) and O´Riordan (1997), including eco-footprint taxes and food-mile taxes – on food imported into say Africa, from Europe and the US. Support for research on agricultural methods of the kinds that an eco-tax-reformed economy will need, also calls for continued support for research of the kinds that organically certified smallholders competing in global markets will demand. One concrete set of development context agricultural policy options potentially helpful in this regard, are those already suggested by Pretty (1995; chapter 9). Pretty promoted a set of twenty five (25) policy proposals or "policies that work for sustainable agriculture". These include national strategies for IPM, prioritization of Research into resource-conserving technologies, transitionary support to farmers shifting towards sustainable methods, linking support payments to resource-conserving practices, setting appropriate prices penalizing polluters with taxes and levies, and encouraging adoption of natural resource accounting. Egelyng and Høgh Jensen (2006) proposed a global research programme for organic food and farming.

A fundamental question is to what extent agricultural development in the South is left for more or less informed urban consumers in the North and South to decide upon when choosing among products and perceptions of environmental and socio-economical implications. To the extent such apparent responsibilities are passed on to consumer's shoulders, it would seem important to provide the same consumers with environmental profiles for a range of conventional and organic products, travelling long vs. short food chains. Air freight consumes about 15,839 kilojoules per T-Km, compared to 2,890 by road, 423 by boat and 677 by rail (Hird et al 1999). Such profiles, therefore, could be based on studies of transport and energy use and of any nutrient recycling on smallholder farms – assuming that consumer motivation to buy organic, goes beyond biodiversity, consumer health and pesticide avoidance concerns - and include concerns about recycling of nutrients and reducing dependence on fossil energy.

Whether and to what extent a tax "bad´s"- not goods, ecotax reform implementing the polluters pay principle and introducing further energy taxes is at all feasible in low income countries, and will include significant fertilizer taxes and significant pesticide taxes is a question for future research to pursue. The logic of the latter types of taxes could be to avoid current distortions that make human capital intensive and

environmentally sustainable resource management methods less competitive. And therefore makes man-made capital and throughput intensive methods more competitive, even when environmentally destructive. Theoretical policy options seem to exist for decision-makers to break a vicious circle. Instead of using tax-payers money – the generation of which currently depends on a throughput intensive human economy - as source of monetary payments to "bribe" or motivate individuals/companies into maintaining ecosystem services in socalled Payment for Environmental Services (PES) schemes, it could be useful exploring the ecotax reform alternative.

The world food system, Poverty, Eco-efficiencies, Smallholders and IARC´s

For forty years between 1960 and now and even into our new millennium, some of the international agricultural research centres (IARC´s) based their raison d´etre on linking crop yields and poverty, hunger, and malnutrition and therefore carried a major burden: a perceived and a voluntarily accepted co-responsibility for the existence and extent of poverty, hunger and malnutrition in the world. In a globalised and interdependent world, time is running out for this construction of poverty as if it resulted from low agricultural yields. A strange construction anyway, given histories of industrialized countries leaving little doubt that basic poverty is a matter for social policies and social reformers to deal with. It is not a matter best left to soil scientists and plant genome engineers. In Europe, poverty problems were tackled with policies of redistribution. The poverty resulting from the US farm crisis of 1933 was met with Roosevelt's Agriculture Adjustment Act (AAA) = public subsidies (Roodman 1998) and does not seem to have been linked to yield levels. We shall leave it to (cold-war) historians to explore how poverty and yields became so intertwined and came to permeate certain IARC´s strategies so much. What we would like to pursue here, is the course and policy options that follows from freeing ourselves (and perhaps international agricultural research institutes), from the simple causality that made agricultural researchers around the world walk around with that major burden on their shoulders: a responsibility that can and should rest one place only: with politicians, governments and their bureaucracies and the whole economic machine of the society they command. International agricultural research institutes may represent neither a good nor effective nor efficient set of instruments to help solve basic poverty problems. Such institutes may have little, if any, comparative or competitive advantage in poverty reduction. While acting as if poverty was not a social construction has perhaps been a part of the problem of IARC´s. Policy-makers - who understand that environmental problems and poverty are indeed socially constructed - can help increase the chances that the intrinsically environmentally and socially sustainable production options that already exist and those that IARCs provides, are used, reintroduced or – when new - leave the shelves of science institutes, as result of the same policy makers creating economic and institutional environments conducive to their use. Many poor smallholders use agricultural practices that lead to losses of biodiversity, deforestation and soil erosion. Depending inter alia on any future reductions in export subsidies paid to Northern farmers, more demand for African agricultural products could either increase the risk of intensified agricultural production leading to environmental costs, including overuse environmentally sensitive areas, or perhaps help minimize such risks. These multidimensional challenges and opportunities is therefore one area existing international agricultural research institutes may wish to further their focus on.

For instance, a calorie or joule of food energy can be produced with very different implications in terms of biodiversity profile, energy and water use, employment generation, and - in the classical abstract terms of economic and development studies - with more or less forward and backward "linkages" to the - national or local - economy. This is true, of course, also for COA (Egelyng, Halberg and Høgh-Jensen 2006). According to Cornell Professor Pimentel, the US agriculture and food system use more than 4.600 (four thousand and six hundred) fossil fuel calories to deliver 80 (eighty) calories (in the form of chilled, washed and packed salad) on the consumers plate (Pollan 2006:273). Lettuce aside and originating perhaps from Cox and Atkins (1979) is a claim that on average the same food system generally require about 10 fossil fuel calories as input for a single food calorie produced. Current trends are toward even greater consumption of fossil fuels globally, by further intensifying the dependence of the food system on fossil fuels.

Indicators can be applied on concrete and particular commodity chains/lines, and operationalized and implemented in policy terms so that – for instance – food calories in a form implying a very large ecological footstep, long food miles and negative net energy can be taxed. In addition to ecotaxes, a "fat" tax, for instance, might not be completely irrelevant given a context of increasing obesity epidemics and the-fatter-the-cheaper consumer prices, as a combined health-environment policy instrument, also reflecting perhaps a lower environmental impact of a less energy intensive diet. Solid Indicators may be needed for policies and institutions to be able to meet, enforce, promote, or reach environmental and pro-poor objectives. Taxing ecological footsteps, for instance, may require a measure of ecological footsteps which is very operational. In contrast, food miles - a calculation of total food (tonnes) travelled by total distance (in Km) – would appear an operational and easy indicator by which to introduce a new tax instrument/institution. In order to serve the policy options outlined above, Net Energy (Food system) and LCA (Life Cycle Analyses) are types of indicators with clear relevance to new taxing instruments and with potential to release triple dividends for society (public purse). Facilitation of such policy instruments or options would probably have to involve provision of new statistical options, for instance on measures on effectiveness in terms of eco-efficiency. The term eco-efficiency is used here as a generic measure to provoke an expansion of a range of relevant efficiencies, including the following:

- Energy efficiency – to include output of (food) energy (calories/joule) per input of energy, in life-cycle field-to-table agricultural product chains analysis.
- Water efficiency – as output of (food) energy (calories/joule) per input of water, in life-cycle field-to-table agricultural product chains analysis.
- Fertilizer efficiency – to perhaps include output of (food) energy (calories/joule) per input of man-made synthetic fertilizer/man-made biofertilizers and naturally occurring biofertilizers/soil organism respectively, in life-cycle field-to-table agricultural product chains analysis.
- Pesticide efficiency – to perhaps include output of (food) energy (calories/joule) per input of pesticide (active ingredient), in life-cycle field-to-table agricultural product chains analysis.

- Biodiversity efficiency – since a given amount of food calories may be produced in a manner conserving, using and relying on natural biodiversity (e.g. use of natural enemies or conservation biocontrol, biofertilizers, soil organisms) or in a manner not (or only indirectly) relying on/destroying natural biodiversity.

Options exist to create more indicators capturing such and similar eco-efficiencies. Likewise, options exist for refined or revised social indicators, perhaps as social sustainability indicators or equity efficiency: a given amount of food calories (at a given level) may be produced in a manner involving livelihood for a broader or smaller segment of the population. (Egelyng, Halberg and Høgh-Jensen 2006).

Conclusion

The organically certified food system is globalising and therefore relevant to explore in the context of different institutional environments, now also in the South, where COA is truly market driven, with high incomes and low food prices having increased consumers willingness to pay organic premiums for tropical certified organic foods and fibre. This trend raises questions on the conditions under which COA may provide opportunities for low income country smallholders as well as questions on the environmental sustainability of certified organics in a globalized value chain. Existing institutional environments for the world's agro-food system may not automatically ensure a pro-poor and globally sustainable aggregate result of market driven organics. In the absence of targeted investments in smallholder "organic" sector institution building by international donors, if not Southern governments, smallholders and small and medium enterprises may not be able to seize the opportunities that are seemingly and theoretically presenting themselves in terms of a growing global market for certified organics of tropical origin. In the absence of resource (energy) and polluter taxes and in the continued presence of distorting agricultural and energy subsidies, the (perceived) environmental benefits willingly paid for by organic consumers, could end up neutralized in the bigger picture. On top of this, existing rules (cheap energy) may have some degree of "perverting" influence even on the organic market – sending organically certified products 20.000 kilometres around the globe to compete with local equally, de facto or de jure, organic products. Despite this bigger picture being as it is, developing country governments may opt to help along COA in their countries, as part of a strategy of environmentally sustainable poverty alleviation. In practise, this option may prove constrained to major countries such as Brazil and China. Where pesticide use is high and inefficient, such a strategy might help reduce human health problems and pollution, help conserve and sustainably use biodiversity and help conserve soil nutrients. To what extent introduction or strengthening of – knowledge intensive certified organic farming methods has potential to help farmers increase their net gains or environmental-income-inclusive livelihoods, remains a research question destined for empirical and case by case answers. Also cases further exploring say African food systems on eco-efficiency counts, i.e. not only in terms of food miles, but also ecofootprints based on the Life Cycle Analysis approach, are relevant due to the indications are that Northern food systems are highly energy intensive. Given the complexity of the livelihood question and complexity of eco-efficiency factors in the contemporary world food system, much research remains to be done, however, to enable quantitative concluding evidence in these matters. The same, of

course, apply to the complexity of global and national institutional environments for organic agriculture and analyses of the conditions under which COA may enable smallholder livelihoods and sustainable rural development at global, national and local scales.

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