Farmers moving out of poverty: what are the challenges? [1]

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Summary:
This paper draws upon the results of various research works undertaken between 1998 and 2007 in Indonesia while the author was working at the Centre for Poverty Alleviation through Sustainable Agriculture (CAPSA), in Bogor Indonesia. CAPSA, formerly the Coarse Grains, Pulses, Roots and Tubers (CGPRT) Centre is a subsidiary body of the United Nations Economic and Social Commission for Asia and the Pacific. It intends here to discuss the implications of the multiple dimensions of poverty based on field observations and to relate them to policy issues with a focus on poverty alleviation in rural areas and the role of agriculture in poverty alleviation.

After setting the stage with a policy matrix framework, it raises a couple of challenges about poverty in rural areas with a focus on agriculture and then provide field based evidence of the role of agriculture in poverty alleviation and the conditions under which one might expect agriculture to significantly contribute to reducing poverty. Field evidence is largely based on Indonesian situations. In the final part of this paper the future challenges of poverty reduction are discussed with a forward looking anticipatory approach based on recent works the author analysed in his current position of Senior Foresight and Development Policies expert with the Executive Secretariat of the Global Forum on Agricultural research.

The study of farm trajectories indicate that agriculture has potential as a buffer against crisis and shocks and therefore can contribute to rural poverty alleviation, but it is neither sufficient nor necessary. This is further confirmed by the case of tree crops showing what would be the requirements for a household to reach cross-generation resilience. With a case of secondary crops we see that it is possible to define a framework for poverty alleviation which is people- centered. All these cases converge towards a shift in the concept of battling poverty, switching from a growth-based technological paradigm to a human-centered understanding of the drivers of rural poverty. The analysis of foresight works, though not centered on poverty enables us to derive implications in terms of poverty reduction according to different scenarios. Thus, the role of social sciences and humanities is to contribute to our understanding of the transformations which are shaping the paths to the different scenarios and inform about the actions that would lead to one or another, so that the future state of poverty will not be longer the results of implicit effects of human agency but the results of explicit societal choices.

Keywords: Poverty, agriculture, economics, households trajectory, secondary crops, tree crops, Indonesia, Asia, foresight

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Introduction

This paper draws upon the results of various research works undertaken between 1998 and 2007 in Indonesia while I was working at the Centre for Poverty Alleviation through Sustainable Agriculture (CAPSA), in Bogor Indonesia. CAPSA, formerly the Coarse Grains, Pulses, Roots and Tubers (CGPRT) Centre is a subsidiary body of the United Nations Economic and Social Commission for Asia and the Pacific. I intend here to discuss the implications of the multiple dimensions of poverty based on field observations and to relate them to policy issues. As CAPSA's focus is on agriculture I will tackle poverty alleviation in rural areas and the role of agriculture in poverty alleviation.

I will first set the stage with a policy matrix framework, then raise a couple of challenges about poverty in rural areas with a focus on agriculture. I will then provide field based evidence of the role of agriculture in poverty alleviation and the conditions under which one might expect agriculture to significantly contribute to reducing poverty. Field evidence is largely based on Indonesian situations. In the final part of this paper I will discuss the future challenges of poverty reduction with a forward looking anticipatory approach based on recent works I have analysed in my current position of Senior Foresight and Development Policies expert with the Executive Secretariat of the Global Forum on Agricultural research.

Setting the stage: the political dimension of poverty reduction

Pro-poor growth is today the paradigm that is expected to lead to poverty reduction. It consists in a combination of *robust, broad-based growth and improved access to social services* (OECD, 2001:31). In the 1990s the world experienced an average growth of 2.6% per capita that was considered as a reasonable rate, but the number of the world poor remained the same. According to some World Bank studies, the growth of mean income plays an important role in overall poverty reduction but it only explains half of the growth income of the poor. Thus, even if there is a relation between growth and poverty, it is at best limited (Dollar and Kraay, 2000; Ravallion, 2000). The "pro-poor" dimension now systematically emphasized by all international agencies clearly witnesses that even for those who believe in growth as a key factor for poverty reduction, it does not work systematically that way. This is a major rupture in the mainstream economic thinking where growth was expected to lead to a Pareto-optimum. If growth needs to be pro-poor, it means also that it can be (and has been) anti-poor. Inequalities are also considered as a major issue both within countries (OECD, 2001) and between countries (World Bank, 2007).

Thus, in designing and implementing policies that simultaneously favour the creation of wealth and poverty reduction, two dimensions must be addressed: growth and equity. As pointed by Ravaillon (2004:1) "*the task of making growth more pro-poor (meaning more poverty reducing) entails some combination of higher growth and a more pro-poor distribution of the gains from growth*".

This is where the concept of "equity" fits, helping to take into consideration this redistribution dimension. Equity defined here as "*the state, quality, or ideal of being just, impartial, and fair*" relates to the way the benefits of growth are redistributed towards the poor in the society.

The combination of growth and equity concepts by means of a matrix provides a useful analytical framework to assess to what extent a particular policy has the characteristic and potential for generating the desired pro-poor growth. The matrix below (Table 1) shows how such an analytical framework can be created. It was used in a study of smallholder contribution to growth and equity in Indonesia (Susila and Bourgeois, 2007). It crosses three levels of growth

and equity, resulting in a nine-cell table that provides a typology of policies. Each cell indicates the nature of a policy according to its contribution to growth and equity.

The policies located in the three cells at the lower left part of the table form a set of redistributive-type of policies aiming at preserving or enhancing the welfare of the poor under less favourable growth conditions. They lead to situations where the social dimension is at the forefront through *social welfare*, *social reform*, or *social safety*. Land reform, safety nets and social programs belong to these policy types. In the three cells that are diagonally opposite to them, policies tend to support growth without considering fair redistribution towards the poor. They lead to further discrimination against the poor either by *rising inequality*, *marginalization* or *polarization*. Many policies promoting agricultural productivity based on technologies that poor farmers cannot afford or on market mechanisms that exclude subsistence farmers fall into these categories.

The three cells on the diagonal line that goes from the lower right to the upper left cell represent three contrasted states, ranging from *full recession* (the worst case of lower growth and lower equity) and *stagnation* (no change in growth and equity) to *pro-poor growth*, the desirable case of growth and poverty reduction.

Table 1. A growth x equity policy matrix

		Equity		
		Higher	***No change***	***Lower***
Growth	***Increase***	**Pro-poor growth** **+++**	**Rising Inequality** **+-**	**Polarization** **--**
	No Change	**Social Welfare** **++**	**Stagnation** **+-**	**Marginalization** **--**
	Decrease	**Social Reform** **+-**	**Social Safety** **--**	**Full Recession** **---**

Note: + a positive effect on poverty reduction; - a negative effect; +- effect is unclear

Pro-poor growth appears here as only one case in a growth-equity two-dimensional space. While it is understandable that it represents the most desirable situation where increased redistribution is made acceptable by increased benefits for all, the matrix shows also that pro-poor policies are not always necessarily linked with a higher and simultaneous growth and equity.

As a policy is never implemented in isolation and is part of a more general public sector strategy, policy coherence is a key issue. Coherence, which relates to the design and implementation of various policies, has two dimensions: co-ordination and consistency (OECD, 2001). While co-ordination relates more to the important process of designing policies, consistency is about ensuring that individual policies are not internally contradictory, and identifying those that are incompatible with the attainment of a given objective, such as poverty reduction. Assessing policy consistency is a challenge and a growth-equity matrix such as the one presented above has potential as a tool. It may provide not only a useful framework for designing and monitoring pro-poor policies, it can be used to ensure overall policy coherence as well.

Some key policy challenges in tackling rural poverty, where do farmers fit?

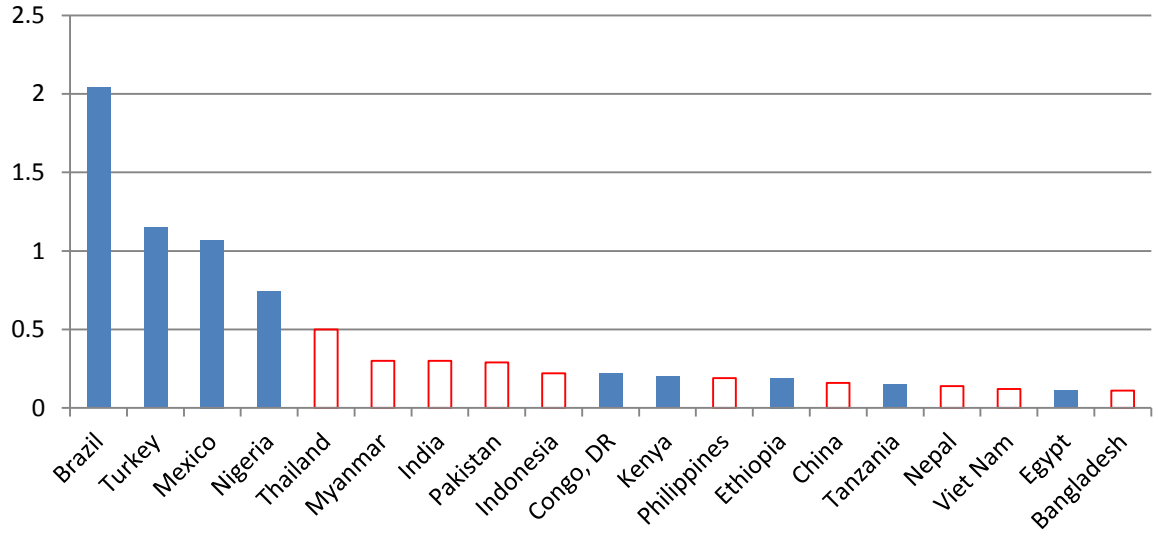
I will develop here some field research-based reflection about a few challenges I observed in conducting field research on poverty-related issues in Asia and the Pacific and particularly in

Indonesia. These relate to size (Bourgeois, 2004), institutions (Bourgeois, 2006) and markets (Bourgeois 2005).

Size: When is small too small? Land size, poverty and agricultural productivity.
A salient constraint related to rural poverty in Asia and the Pacific is land access (Hossain, 2001). Rural poverty hits mostly highly populated agricultural countries. The simple ratios of agricultural and arable lands available to total population and agricultural population indicate clearly that the poorest rural Asian populations, who mostly rely on agriculture-based activities for their livelihood, are likely to further sink into misery.

Among the 19 countries in the world whose agricultural population exceeded 20 million people in 2004 (Figure 1), ten were Asian countries, six were found in Africa and only two in America. Furthermore the five largest countries are found in Asia.

Figure 1. Ratio of arable land/agricultural population (in hectare).



Source: FAOSTAT June 1, 2004. Asian countries in red.

Asia[3] concentrates 60% of the world's population on slightly more than 20% of the world's land area, thus available arable land is a major constraint. Farmers in Asian countries have access to arable lands that are 100 times smaller than lands in developed countries. With exception of Thailand (0,5 ha) the size of available arable land does not exceed 0.3 hectare in all the selected Asian countries, and not even 0.2 hectare in six countries.

A trend analysis of the evolution of average size of holdings in a number of selected Asian countries show a general move towards smaller holdings in major Asian countries (Table 2). The gap in holding size between the most developed countries and countries with the most numerous and poorest agricultural populations is widening.

However, this data does not fully reflect the real conditions of the poor farmers. It assumes that land access is evenly distributed among agricultural households, while this is just not true. In Nepal, 44 per cent of the agricultural households operate 14 per cent of the total agricultural land area, while the top 5 per cent occupy 27 per cent. The concentration index for agricultural land is 0.54 reflecting a highly uneven distribution of farmland (Sharma, 2000). In Bangladesh, a holding

[3] Asia represents here the set of countries referred in FAO database up to 1991, that is without the eight countries that where part of USSR until 1991.

size distribution from the 1996-97 census shows that small farms increased in number up to 83 per cent and operated 23 per cent of farmland, against respectively 75 per cent and 15 per cent in 1984 (Absan and Ahmed, 2000). In India, there were more than 105 million agricultural labourers in 2004 compared to barely 27 million in 1951 and this number is further increasing. Within fifty years, the ratio of agricultural labourers to cultivators increased from 2/5 to 4/5. (Department of Agriculture and Cooperation, 2004).

Table 2. Evolution of average size of holdings for selected Asian countries

	1930	1950	1960	1970	1980	1990	2000
Bangladesh	--	--	1.4	--	1.3	--	0.3
China	--	--	--	--	--	--	0.7
India	--	2.2	2.7	2.3	2.0	1.6	1.3
Indonesia	--	--	1.2	1.1	1.1	0.9	0.8
Nepal	--	--	--	1.0	1.1	0.9	0.8
Pakistan	--	--	3.5	5.3	4.7	3.8	3.1
Philippines	4.1	3.5	3.6	3.6	2.9	2.2	2.0
Sri Lanka	--	--	1.6	1.2	1.1	--	0.5
Thailand	--	--	3.5	--	3.7	3.4	3.2

Source: Adapted from FAO data on agricultural census, various years. – indicates no data available.

Literature often mentions an inverse correlation between land size and productivity (Maxwell and Wiebe, 1998; Banerjee, 1999), arguing that smaller farms make a more rational and efficient use of resources and face fewer costs such as transaction costs. If this is true, would then the observed trend mean that Asian countries agriculture will be more competitive thanks to this shrinking land ratio?

A regression conducted for 18 of the above-mentioned countries (no data available for Myanmar) between the agricultural value added per agricultural worker over the 1998-2000 period (World Bank, 2003) and the arable land ratio per farmer for the year 2000 shows, with a 0.83 R^2 at the 95 per cent significance level and t-test value at 8.7, the opposite situation. This means that the arable land ratio explains most of the observed variation in agricultural productivity in the selected countries. As the size of arable land further shrinks, productivity gains that were highlighted by various authors disappear. Several reasons may explain this fact. As small land area is associated with poor households, it is likely that farmers cannot afford to buy the input needed to increase production; they have also to engage in other activities as labourers and cannot give sufficient attention to the care of their plots. Another possibility is the overexploitation of resources over time such as land and water leading to degraded soils and lack of irrigation facilities in the most fragile areas. Actually the same regression run for 1988-1990 data shows a somehow weaker still high R^2 (0.7) confirming this temporal trend.

A key question thus is : How small is too small? When the number of landless households or micro households that cannot provide livelihoods for the family members increases, rural poverty increases and productivity decreases. It also draws attention to the size factor in land redistribution policies as these are commonly advocated as useful means to increase productivity.

Institutions: The (Agrarian) Institutional Poverty Trap

Since the majority of Asian "farmers" have either no access to land, or very limited access through cultivation agreements or access to microscopic parcels. They largely rely on selling family manpower, mainly as agricultural wageworkers in order to provide or supplement income

sources. However, neither small parcels nor standard agricultural wages permit land less and small farmers to save capital and enter into an accumulation process. Any significant large scale improvement in the situation of the rural poor, especially in the marginalized areas of less developed countries where agriculture still represents the main source of livelihood (Syed, 2003) is therefore directly dependent upon the possibility to change the patterns of land access and labour remuneration. However, these patterns are institutions, socially and economically embedded in the functioning of the rural societies. Changing them is thus primarily a matter of institutional change.

However, institutions tend to become autonomous (Walliser 1989). In an evolutionary society, somehow the reasons why institutions emerge and function may have changed but the related institutions outlast them. Labour arrangements or tenure systems do not escape this rule in the Asian context. For instance, sharecropping agreements traditionally dividing the rice harvest between landlords and tenants on a 50% share is acceptable when both are farmers and rely on agricultural production for the subsistence of their households. However, it is no longer appropriate for the development of a competitive commercial agriculture when landlords have migrated to urban areas, making most of their living from non-agricultural activities. Investments to increase agricultural productivity are not anymore the landlord's priority, and for tenants, it is not affordable. Yet, the arrangement endures and agricultural development is trapped in an obsolete and counterproductive institutional design.

Institutions are also path dependent (North, 1990). This means that the existing pattern of behaviour influence the way new behaviours can develop and prevent changes. As a result the scope of alternative behaviours is limited and changes are difficult. The case of agricultural wages follows this trend. Wages paid to male agriculture workers throughout Asia are higher than those paid to female workers for the same amount of time, reflecting the social recognition given to the role and place women have in the society and not the economic value of their actual work. Changing the relative levels of these gender biased agricultural wages would require a reconsideration of more fundamental values embedded in the whole society. Similarly, it appears that in rice cultivation wage levels are defined by employers at local levels, using traditionally the unhusked paddy market value as a reference. During the 1998-1999 crisis period in Indonesia, agricultural wages increased along with the local price of paddy. This change however did not last and wages rapidly dropped to their before-crisis level when the relative paddy prices stabilised (Bourgeois 1999, Bourgeois and Gouyon, 2001). This increase was not the result of a negotiation, but a tacit adjustment to cope with an exceptional event using an existing implicit rule.

Limited access to land and low wages, in marginal areas where alternative employment opportunities are scarce, contribute to maintain the rural Poor in poverty. However this situation also serves the interest of better-off groups for whom the permanency of an abundant underpaid labour force becomes a factor of competitiveness and enrichment. The "poverty trap" so often denounced as the reason why the Poor remain poor cannot operate alone; it has to be permanently reset.

This is the major reason why agrarian institutions are so difficult to modify. It is agreed that institutional changes are more likely to take place when expected benefits outweigh the cost of change and there are powerful stakeholders supporting them (Feeny, 1988). In the case of wages and tenure agreements there are no such conditions at local level. To modify these arrangements in favour of the Poor means a change in wealth redistribution. The share of the land rent received by landowners will decrease; the benefits of people employing agricultural workers will be reduced. As owners and employers are usually influent and powerful people, it is unlikely to expect these changes to occur at local level. The status quo is maintained because the situation of

the rural poor in the agricultural sector does not enable them to claim for these changes (Brinkerhoff and Goldsmith, 1992). Prospects for institutional changes to occur through the pressure of interest groups (here the rural poor) or in reason of expected benefits are very small. To the opposite, powerful groups of stakeholders see these changes likely to bring disadvantages to them and therefore contribute passively or actively to uphold the institutional poverty trap.

Under such conditions, it is easy to understand why, with few exceptions, government policies in Asia and the Pacific allegedly targeting rural poverty alleviation mostly consist in patchy poverty reduction programmes and systematic capitalistic investment in industrial cultivation of export crops (usually tree crops) rather than on changing agrarian structures. This choice leads to a growingly dualistic rural sector with a large number of people living on the remnants of a growth that do not reach them while a few others capture the lion's share.

Markets: Can Fair Trade Fare Well for the Rural Poor?

From a theoretical viewpoint, free trade, that is, the unrestricted exchange of goods and services is advocated as the most efficient mechanism to produce and distribute welfare among economic agents. While economists tend to agree that this may be true over the long term, short-term evidence of significant improvements in the situation of the Poor due to trade liberalization is rare. Free trade of agricultural and agro industrial products, for instance, remains more a rhetorical stance than a reality, a standpoint that has little impact on the current situation of the rural poor (Madeley, 2004; Ravallion, 2004).

Fair Trade, alternatively, is a concept that embeds the idea of justice in the exchange process. Because the terms of trade between developed and less developed countries are biased in favour of the more developed ones, Fair Trade proponents argue that actions should be taken to counteract uneven exchange. For instance, coffee growers receive 80 cents of the dollar per pound of coffee sold at 4 to 11 dollars in the USA, but could get up to 1.25 dollars per pound through Fair Trade[4]. As such counteraction involves not only the less developed countries that produce goods but also the developed countries that consume these goods, Fair Trade builds thus upon different trade relations. It is not aid but a way to provide people with earnings, to live decently, from the goods or services they produce, they sell or from the labour they put into the production of these goods.

Fair Trade by definition intends to benefit rural poor populations. It reached US$ 400 million sales per year, with yearly growth of 30 per cent (Raynolds), and 2.6 billion in 2006 (Source Fair Trade Federation website). According to Global Exchange statistics[5], 800,000 farmers were said to be part of it in the beginning of the 2000s up to more than 1,2 million today (Fairtrade International, 2011). However, it inherently has features that limit its wider application as a pervasive poverty alleviation mechanism for almost one billion rural poor in Asia and the Pacific. These features are the products concerned, the size of the market and access barriers.

A limited range of products: While the number of commodities under Fair Trade has grown to include for example wine, flowers, juices or rice, the bulk of Fair Trade products is made by coffee, bananas, cocoa and cane sugar (Fairtrade International 2011). There is no Fair Trade for soybean, cassava, sweet potato or mungbean. Therefore, the room for rural poor populations living of agriculture is very limited since the commodities they produce are not in demand by the Fair Trade and other similar alternative networks' consumers.

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[4] Source is Fair Trade Federation 2003, cited by Raynolds et al, (2004).

[5] See http://www.globalexchange.org/fairtrade/coffee/cooperatives. Global Exchange is widely cited on the web for this statistics.

The size of the market: The number of people in developed countries who are willing to contribute to the Fair Trade system limits the market. Coffee Fair Trade which is the most developed market accounts for less than 0.5 per cent of the total value of coffee globally exchanged. Handicrafts, jewellery, papermaking, pottery etc. are the most traded items, but they all compete for the same markets and clientele looking for exotic items. With the noticeable exception of coffee and bananas, traded items do not belong to the group of mass consumption items and therefore prospects are limited to some niche markets, at least on the short term.

Access Barriers: There is evidence, based on the large and long experience with Fair Trade coffee that educational levels (including speaking the requisite language, literacy), capital and labour resources influence the success of producers in establishing and maintaining connections to Fair Trade coffee networks (Raynolds, 2002). This indicates that the institution of Fair Trade agreements may create barriers that marginal populations who have limited education, no land or capital and a small labour force cannot overcome. Interestingly, the recent report of Fairtrade International on "Monitoring the scope and benefits of Fairtrade" does not even mention once the word "poverty". Though Fair Trade wants to involve "the world's most economically disadvantaged artisans and farmers", these disadvantages may foreclose the poorest rural segments from its benefits. Given these constraints, there is little hope that Fair Trade would significantly improve the livelihood of most rural poor people. However, some basic "fair" principles that make up the backbone of Fair Trade remain valid such as fair wages, fair cost of land access, and fair share of margins. Fair policies implemented by fair policy-makers and enforced by a fair justice system could also fare well. The issue is to determine what is "fair", and this has to be negotiated with the poor, so above all else, "fair sharing of decisions" should not be overlooked.

The role of agriculture in poverty alleviation

Between 1998 and 2007 I conducted several field works on rural poverty in Indonesia and in Asia and the Pacific, most of them based on extensive survey of agricultural and rural households. I highlight here three of them. The first one is a study of tree crop smallholders and the contribution of three crop to poverty reduction, developed under a World Bank grant scheme, whose results were also partly used for a publication (Susila and Bourgeois, 2007). The second one is a regional analysis of the contribution of secondary crops to poverty alleviation in Asia and the Pacific funded by the Government of Japan (Bourgeois, Svensson and Burrows, 2006). The last one, published in *Mondes en Développement* (Bourgeois and Meuriot, 2011) analysed farm trajectories related to poverty in Indonesia with data derived from a panel of around 1000 households over a six year period used for the evaluation of a World Bank project.

An outlook analysis of the tree crop sector and poverty alleviation

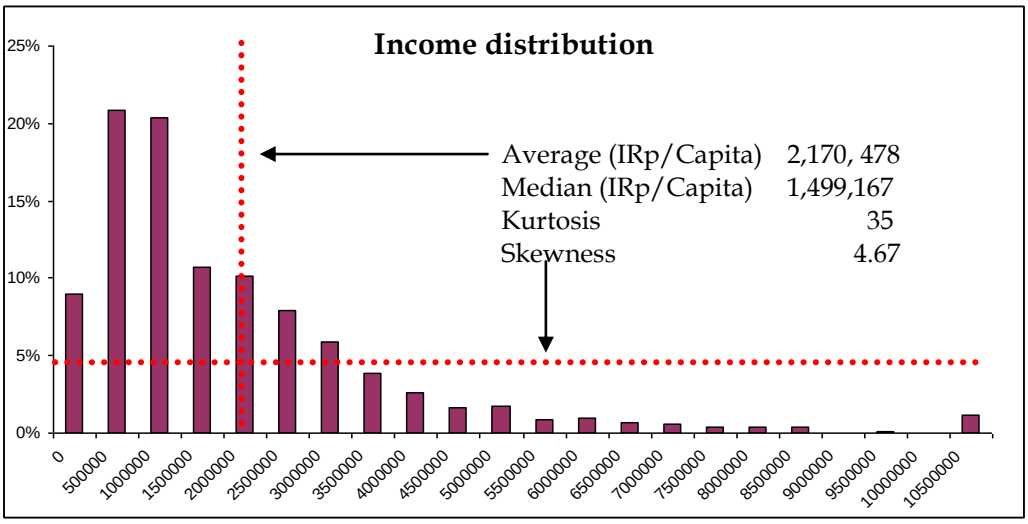
The main objective of the "Studies on Smallholder Tree Crops Production and Poverty Alleviation" was to establish a benchmark allowing monitoring the evolution of this sector with regards to its contribution to growth and poverty alleviation. While the analysis of the situation of the smallholders presented here is essentially static it lead to relevant considerations as how the tree crop sector could contribute to poverty reduction.

We built a 1172 smallholders sample, covering four provinces and eight districts, witnessing the situation of agricultural households involved in tree crop in Indonesia. Each district sample was also representative of the district situation. However, the aggregation of the eight districts sample was not fully representative of the situation of Indonesia as a whole, since these provinces and districts were selected for their concentration of tree crop activities and smallholder presence. Furthermore, the need to ensure that the six main selected commodities were included in the sample (cashew, cocoa, coconut, coffee, oil palm, and rubber) also determined the

selection of the sampling sites. Some biases had to be introduced, in particular with oil palm and cashew growers being somehow over-represented in this sample. This bias, however, does not mean that analysing the result of the whole sample was not relevant. To the contrary, it makes it much more appropriate to discuss the future of tree crop smallholders in Indonesia as more and sufficient data was available to analyse properly all crops.

As displayed in Figure 2, income distribution presents a Gauss shape centred on 1.5 million Rupiah per capita per year, while the average income is 2.1 million. The concentration of households in the upper left quadrant defined by the average and skewness value lines indicate a rather unequal distribution of income per capita in this sample, a fact further confirmed by the high positive kurtosis value indicating a tailed distribution toward the right where a few number of wealthy households are found.

Figure 2. Income distribution of household samples



Source: Own data

With the poverty line for the rural households in the whole sample set at IRp 1,000,000 per capita, several thresholds were defined as indicated in Table 3, and the sample was accordingly categorised in six groups ranging from "poor" to "wealthy".

Table 3. Distribution of household based on poverty line

Status	Income level (IRp)	Type	Share (%)
Below poverty line	< 1 million	Poor	30
Up to twice the poverty line	1-2 million	Fragile	31
Up to threefold poverty line	2-3 million	Sensitive	18
Up to four times poverty line	3-4 million	Secure	10
Up to five times poverty line	4-5 million	Safe	4
More than five times poverty line	> 5 million	Wealthy	5

Source: Own data

Our results indicate that, in terms of absolute poverty and equity, tree crop smallholders' situation was particularly worrying for a sector that was supposed to be far better off in terms of economic contribution to rural income in particular out of Java.

Table 4 indicates that in the sample population, tree crops provide an average income of Rp 1 million per capita per year, but this distribution is rather uneven since half of the households get no more than around Rp 500,000 per capita per year from tree crop. The ratio tree crop

income/total income is 1 : 2 for the average income and 1 : 3 for median income. This indicates that a higher number of wealthier people get a higher income share from tree crop. The difference in the kurtosis value confirms this observation since the right tail of the distribution is longer for tree crop income than total income.

Table 4 Tree crop and total income of household samples

Indicators	Tree crop income (IRp)	Total income (IRp)
Average	1,039,099	2,170,478
Median	513,622	1,499,167
Kurtosis	49.18	34.98

Source: Own data

The contribution of tree crop income to total income follows a non-gaussian multi modal distribution with two clear peaks at the extreme and a central concentration. If we keep in mind that this sample is somehow biased towards a focus on tree crop farms with special attention paid to six of the major estate commodities in Indonesia, it appears quite clear that the concept of tree crop smallholder as understood of a small entrepreneur fully dedicated to the growing and production of tree crops is so far rather a fantasy. For more than half of the household sample, tree crop does not bring even half of the household's income, and only 16% can be labelled as genuine tree crop farms.

Table 5 displays correlation coefficients among the constituting variables selected to represent equity and growth contribution of the smallholder tree crop sector. The nine cells marked in the lower left part of the table represent the cross links between equity and growth variables. The only apparent link is between the added value per hectare and income per capita, and still the correlation remains rather weak (0.55). All other correlations are insignificant. This leads to the conclusion that there is no particular link between the welfare level of the tree crop household and the economic contribution of tree crop to the household economy, at least in this aggregate sample. Further investigation will be needed at the district level to take into consideration more homogenous samples where the variability induced by the type of crop and the location specificity will be limited.

Table 5. Correlation coefficients among the constituting variables selected

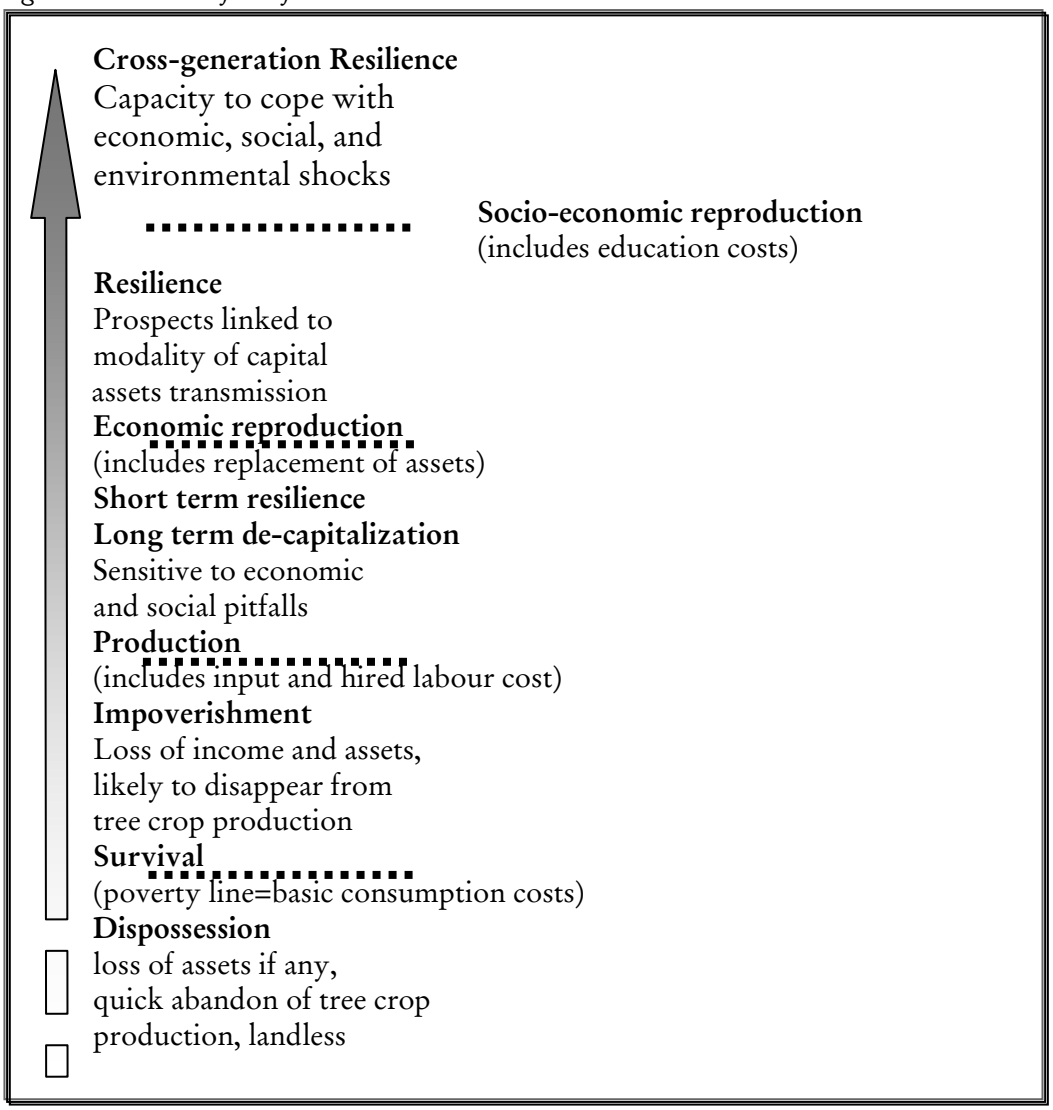
Variables	*Food Share*	*Income/ Capita*	*Asset/ capita*	*Tree crop Share*	*Plantation Size*
Food Share					
Income/capita	0.48				
Asset/capita	0.28	0.54			
Tree crop share	0.07	0.04	0.07		
Plantation size	0.18	0.22	0.13	0.15	
Value added	0.38	0.55	0.27	0.57	0.36

Source: Own data

In order to explore future perspectives for tree crop smallholders we built a model of tree crop smallholder households. The objective was to define several levels of welfare corresponding to various socio-economic situations, and to use them to assess the likely future of each household respondent in the sample.

Four welfare thresholds defined five types of process (Figure 3). The model is based on a standard household of 5 members with a labour force of two adults. The household relies only on tree crop for its livelihoods and is considered as conducting a single cropping activity in a first stance. However, this model can be adapted to diverse situations by replacing an equivalent income from other tree crop or non tree crop activities in the calculation of the thresholds.

Figure 3. Levels of welfare and related socio-economic situations



The Survival threshold separates households which are in an de-possession process leading to rapid loss of assets and termination of their activity as farmers (below the threshold) and those which are in an impoverishment process leading to dispossession (above the threshold). At threshold level, households can only get only the basic needs for survival measured by the poverty line in the corresponding area. Households engaged in tree crop farming and with an income per capita below this level is considered to be likely to disappear as a tree crop smallholder household either by quitting plantation activities (selling their land and asset) and/or selling their labour force as only source of income (impoverishment).

At Production threshold households are able to maintain their plantation activity in addition to fulfilling their basic need. However they will be still sensitive to any economic accident (such as climatic adverse conditions, price fall) or adverse social circumstances such as illness, the reason why households above the threshold are in double process of short-term resilience threatened by long-term potential de-capitalization..

The Economic Reproduction threshold includes the capacity to save for the replanting of the productive system ensuring long term reproduction of the livelihoods. It is calculated by including amortisation taking the current value of all the tools divided by the years of life expectancy of these tools on one hand, and the cost for replanting divided by the crop productive cycle on the other hand. Households above this threshold are in a resilience process ensuring that the current generation of farm has economic stability.

The Socio-Economic Reproduction threshold includes, in addition to the preceding one, the costs equivalent of raising three children up to the last grade of high school. This is meant to make possible for some of the children to acquire sufficient qualifications to find good livelihoods opportunities. Households above this threshold are in a cross-generation resilience process providing the next generation the capacity to develop without having to divide the farm in ways that would bring the next generation below this threshold.

Table 6 displays a comparison of the required minimum area of productive plantation corresponding to each threshold for each commodity under the assumption of a mono-cropping model. Coffee, cocoa and oil palm plantations, at the time of this study, required less land for reaching these thresholds than coconut and particularly cashew plantation. This scale makes possible by combination of different crops and additional non-estate income to classify the sample households in one of the five such defined categories.

Table 6. Areas of productive plantation per crop and threshold (ha)

Commodity	Survival	Production	Economic reproduction	Socio-economic reproduction
Oil palm	1.79	2.04	2.34	3.56
Rubber	1.44	1.63	2.47	2.80
Cocoa	1.14	1.44	1.52	2.65
Coconut	3.84	3.92	4.62	5.45
Coffee	1.30	1.65	1.94	3.10
Cashew	5.30	5.45	6.05	7.70

Source: Own data

The comparison of these levels of welfare and the situation of the sample households is displayed in Table 7. This table was obtained by calculating for each "commodity sample" the distribution of households according to the thresholds using their rupiah equivalent. A commodity sample included all households operating more than 0.1 hectare of that commodity.

Table 7. Distribution of households according to the thresholds

	Dispossession	Impoverisshment	Short-term resilience	Resilience	Cross-generation resilience
Oil palm	18.7	6.7	11.6	26.3	36.6
Rubber	11.9	3.1	24.8	9.5	50.7
Cocoa	35.6	11.8	1.6	23.5	27.6
Coconut	79.1	0.2	6.5	3.1	11.1
Coffee	32.3	10.7	5.9	34.4	16.7
Cashew	99.0	0	0.3	0	0.7

Source: Own data

These results show that rubber-based, oil palm-based, coffee-based and cocoa-based systems allow smallholders to reach welfare levels that are significantly higher, since more than fifty percent of the sample population has reached at least the resilience stage. However, coffee-based and cocoa-based systems present also a high number of people in an impoverishment or dispossession situation, showing a potential bipolarisation of these production systems.

Conversely, coconut-based and cashew-based systems present the highest levels of households in an impoverishment situation, especially for cashew. Since a lot of hope is placed in these crops as a way to help poor farmers to get out of poverty, in particular cashew, these results must draw attention about the risks that government intervention through projects may induce if measures are not taken to consider the real size of tree crops plantation needed to fulfil the development needs of these poor households.

The picture derived from this fieldwork and data analysis shows a wide heterogeneity of situation, with local dynamics depending on the type of commodity and the willingness of local authorities to promote an enticing environment for the development of the tree crop smallholders.

All tree crops, as far as smallholder are concerned are not associated with a higher welfare level. In particular, it is very unlikely that the poorest smallholders develop from the tree crop sector as the main source of income unless they get access to sufficient land. So far, in most of the development schemes or project, the allocated land is not sufficient to enable farmers to reach the Socio-economic reproduction thresholds as defined in this study. Most of smallholders who reach this level have other economic activities that enable them either to acquire the needed land assets or to rely less on tree crops.

Secondary crops: Farming a way out of poverty

The real contribution of growing secondary crops to poverty alleviation was a key question at the CGPRT centre before it evolved into CAPSA. It was believed that secondary crops had the potential to improve the livelihoods of poor rural populations, as sources of raw materials for new or rapidly developing processing industries, in addition to their important uses as fresh and dried foods. For example, the food industry uses more and more starch and flour from these crops; the feed industry is developing at a high rate and demands products derived from a wide range of crops and their by-products. Agro-industries find in secondary crops a cheap and appropriate source of renewable material.

But this potential requires conversion into pathways towards alleviation of local poverty. The question is whether the value added generated by this potential accrues to the rural poor, and what strategies and policies are needed for this purpose. Since research and rural development policies in Asia and the Pacific had so far largely ignored the local and regional specificity and needs of the rural poor, little attention was given to the potential these crops have for lifting the living standards of rural populations, and little attention was given to the mostly marginal populations for whom these crops bring significant food security and occasionally cash.

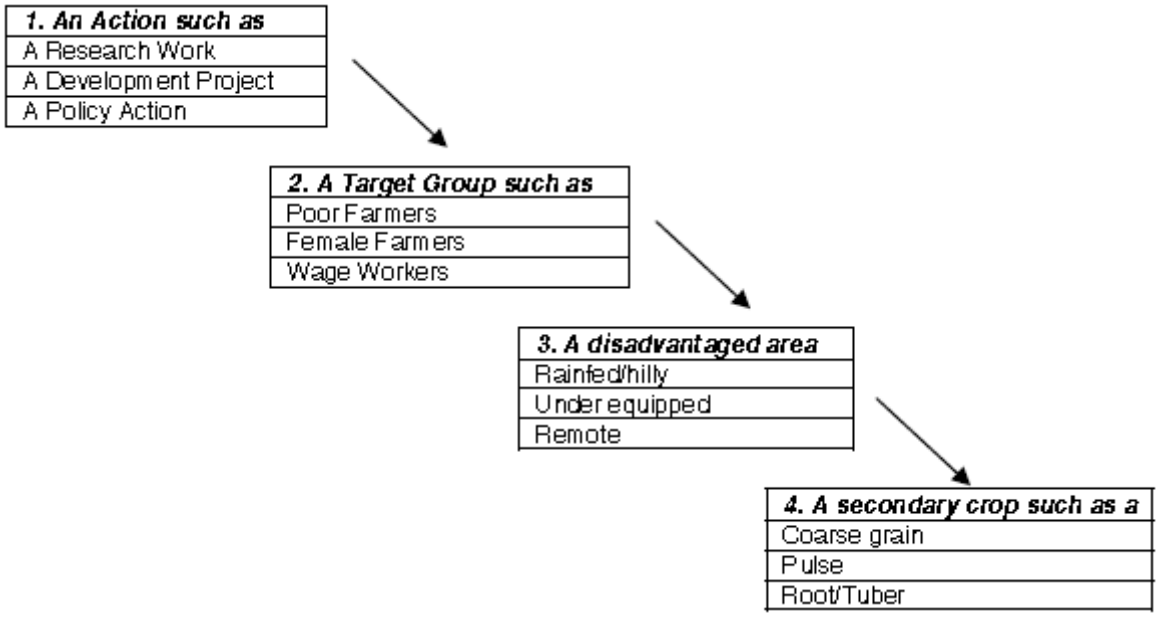
In order to raise the awareness and commitment of scientists and policymakers on the importance of these crops, CAPSA in association with ICFORD, the Indonesian Government and the Japanese Government, organized the capitalization of existing experiences which culminated in December 2005 in a four-day workshop with 17 contributions from 14 Asian and

Pacific countries[6] and four regional/international organizations[7]. The theme of this initiative focused on rural prosperity and secondary crops, with special attention on applied pro-poor research and policies.

The workshop aimed at promoting interactions between the authors of the case studies and invited national policymakers from the participating countries so as to expand the debate from field results and scientific approaches to more practical policy and implementation issues. A full day of working group sessions was organized to facilitate interaction between all participants and provide more substantiation on how the lessons learned from the cases could be turned into pro-poor action.

The authors used a common framework for reporting on the case studies in order to facilitate the discussion of similarities and differences. The framework, as indicated in Figure 4, consisted in a comprehensive analysis of a successful case where resource poor rural populations in disadvantaged areas had directly benefited from the potential of a secondary crop through either research or policy actions (people, crops and change).

Figure 4. The frameworks used for the case studies



Source: Bourgeois, Svensson and Burrows, 2006, p8.

A resource poor population was defined as a population living in rural areas and belonging to the lowest decile of income distribution. A disadvantaged area was generally considered as rainfed, remote and poorly equipped. A research or policy action was defined as a specific intervention in a specific area for a specific target group that introduced a significant change in the welfare of the target group due to a change in its relation to a secondary crop.

Table 8 shows a remarkable diversity of countries ranging from large open ones (China, India, Indonesia) to small, landlocked ones (Lao People's Democratic Republic, Nepal, Cambodia), from South Asia to Southeast and East Asia, with a diversity of cultures and agro ecological

[6] They included eight countries from the UNESCAP-CAPSA AGRIDIV project, namely Bangladesh, India, Indonesia, Lao People's Democratic Republic, Myanmar, Sri Lanka, Thailand and Viet Nam. In addition seven countries, Cambodia, China, Nepal, PNG, the Philippines and Pakistan were invited.
[7] GFU/FAO in Italy, CIP in Indonesia, CIAT in Thailand and AVRDC in Taiwan.

conditions. Secondary crops' diversity is also well represented with all major groups (coarse grains, roots, pulses and tubers). The types of change also include great diversity ranging from the more traditional technological changes (introduction of new varieties) to more economic ones (post-harvest processing, diversification) or social and institutional ones (contracts, training/education).

Table 8. Details of the selected case studies

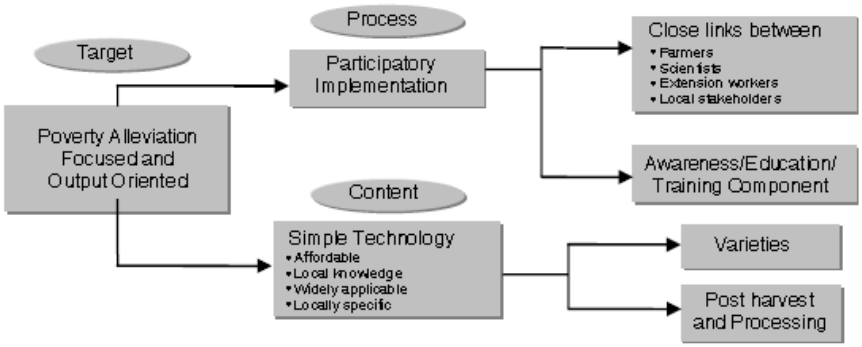
Country	Commodity	Type of change	Place	Target group
India	Maize	Improved cultivars	Northern and Central	Resource poor farmers
Cambodia	Soybean, mung bean, maize, sesame, peanut	Diversification	Kampong Cham and Battambang	Upland crop farmers
Bangladesh	Lentils, millet, maize, potato, mung bean, sweet potato	Diversification	Maize growing area	Poor farmers
Lao PDR	Job's tear	Marketing	Luang Prabang	Upland farmers
Nepal	Finger millet	HY disease resistant varieties	Rainfed uplands	Upland poor farmers
Viet Nam	Maize	Maize feed development	Northern Mountains	Upland poor farmers
Sri Lanka	Maize	Forward Sales Contract	Highlands	Small farmers
Thailand	Soybean	Value added	Uplands	Ruamjai Women's Group
Myanmar	Green gram	Transition to market	Lowlands	Farmers and landless labourers
Papua New Guinea	Yam	Improved variety	Markham Valley hills and dry plain	Rural poor population
Philippines	Maize	Farmer Scientist Programme	Cebu and Siquijor	Upland communities
Indonesia	Cassava	Small-scale processing	Lampung	Small-scale farmers/ co-operatives
China	Sweet potato	Small processing machinery	Sichuan	Small households/ entreprises

Source: Bourgeois, Svensson and Burrows, 2006, p8.

The synthesis of the case studies and group work between scientists and policymakers resulted in the identification of key factors in three categories. The "R&D" category corresponds to factors relating to the characteristics of successful research and development actions implemented; the "Policy" category refers to the form of external intervention taken which positively affected the well-being of the appropriate target group. The "Local Situation" represents specific factors linked to local conditions crucial for the success of the activity.

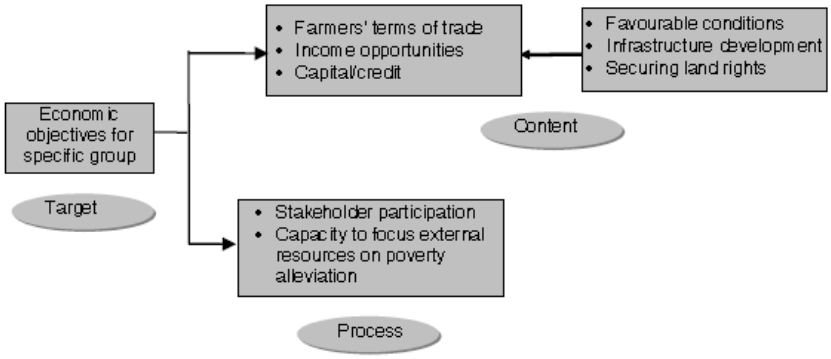
For each of these categories success factors were identified. They are depicted in the three figures below (Figures 5 to 7).

Figure 5. Articulation of R&D-related factors of success



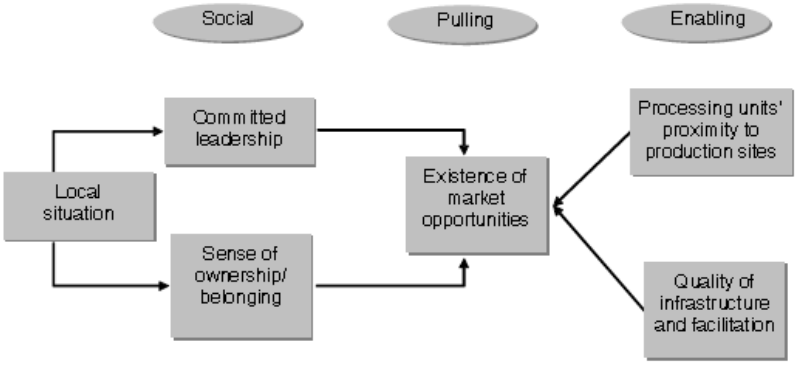
Source: Bourgeois et al, 2006, p339.

Figure 6. Key factors linked to successful policy intervention



Source: Bourgeois et al, 2006, p341.

Figure 7. Key factors linked to the local situation and their interaction



Source: Bourgeois et al, 2006, p342.

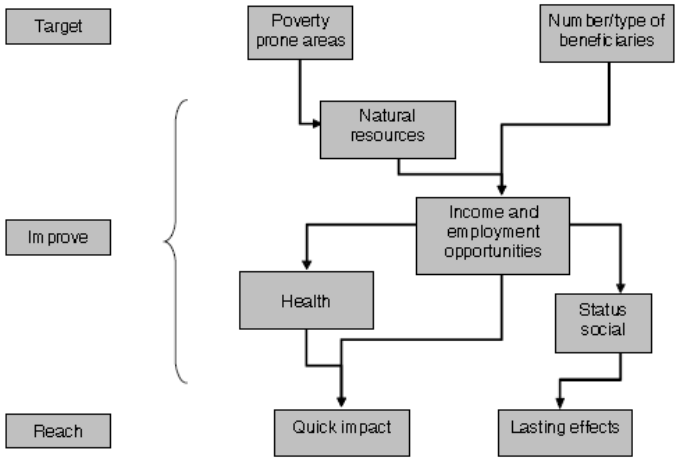
The key result of the analysis of these experiences and stakeholder group work is a set of practical criteria/indicators that can be used to assess "ex ante" to what extent poverty alleviation is genuinely addressed in research, in policies and in development programmes. This framework classifies criteria into two clusters, one dealing with the technical content of the action, and one related to the implementation process.

All case studies had in common that the actions described had rather quick effects on the target group. A staggered "target-improve-reach" process as displayed in Figure 8 was proposed as a means to identify the content of this kind of intervention. "Target" means here to ensure that there is a clear understanding of who the beneficiaries are and where they are. It is mandatory as too many allegedly pro-poor measures turn out to be so broad and generic that when implemented they fail to reach the expected local and human impact. If genuine pro-poor actions are the key, then these should take place in particularly poverty-prone areas and with well identified beneficiaries (who and how many). Then the "Improve" step comes second after defining target groups and areas.

This is usually by-passed and consequently R&D projects or policies targeting poverty alleviation in agriculture become technology oriented rather than people oriented. When "Improve" follows and is closely connected to "Target" then will the content be more likely to address the needs of the poor. These needs relate to four dimensions whose improvement is crucial for poor rural population: health, income and employment, social status and environment.

The "Reach" is made of two complementary time dimensions. Successful intervention must demonstrate quick impact and lasting effects. This also shapes the content of intervention.

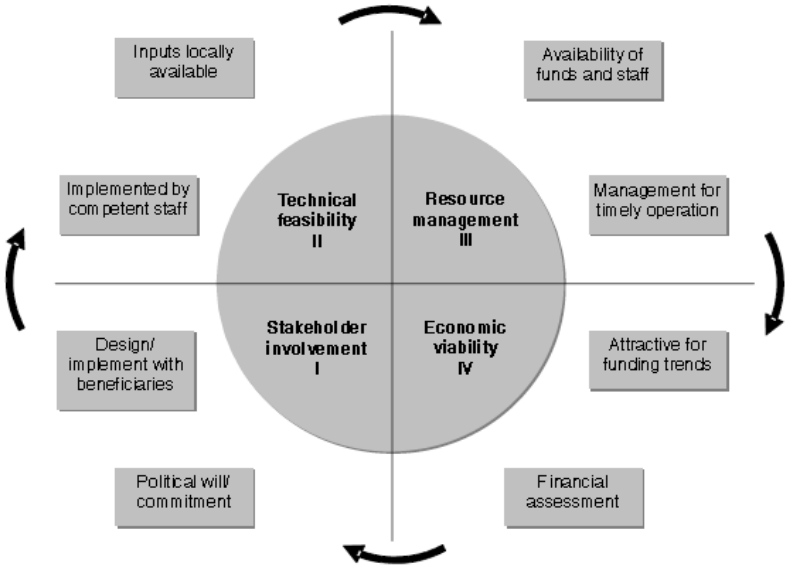
Figure 8. A set and sequence of criteria for ex-ante pro-poor content assessment



Source: Bourgeois et al, 2006, p344.

The implementation process was also considered as a key factor for successful pro-poor intervention. Four domains and a certain number of related criteria (Figure 9) were identified as determinant to assess whether an implementation process was consistent with a pro-poor focus.

Figure 9. A set and sequence of criteria for ex-ante pro-poor implementation assessment



Source: Bourgeois et al, 2006, p345.

Stakeholder involvement was extensively highlighted in the case studies and is reflected here by two criteria: the extent of beneficiary participation in the design and implementation of the activities; and the political will/commitment to carry out the activity. The former was further detailed in one group as follows: distribution of the impact, empowerment of the poor through information and training, and empowerment of socially neglected people.
Technical feasibility refers to whether in the implementation process staff have the necessary competence. This and the existence of locally available resources/inputs would enable the activity to rely much more in its implementation on local capacity.
Resource management criteria include both the availability of funds and time as well as the timeliness of delivery. As most genuine pro-poor research or development actions have to take

place in marginal areas with poor infrastructure, particular attention to how and when resources are available is crucial. Transparency and accountability were also highlighted.
Economic viability is the last criteria for assessment. It is given here in two dimensions, one is the classic financial assessment that is performed for any project and the other is the possibility to attract external sources of funding.

In summary, it appeared clearly, based on evidence, that successful propoor research and/or policy intervention was the result of a combination of many factors related to the type of intervention itself, the local situation, and the context. It was also clear that the implementation process mattered as much as the process of designing the technical content. Secondary crops can play a role in poverty alleviation because they are the crops of the poor, but this not a sufficient condition. How secondary crop development processes fit into the societies they are supposed to help is a major issue. This analysis showed that it is possible to produce a multi-dimensional pro-poor framework for screening and prioritising research and policies.

Agricultural growth and exit from poverty: what can be learned from farm trajectories?
In order to further explore the dynamics of poverty reduction, we wanted to analyze the link between agricultural production growth on rural households' exit from poverty. In fact most research works on the relationship between growth and poverty reduction conclude on a positive role of growth on poverty reduction under the hypothesis that income distribution remains more or less constant (Bourguignon, 2004). However, this occurs only at country level with growth rates above 6% (DFID, 2005). This rate is rarely achieved in the agricultural sector in developing countries, while improving productivity is the paradigm out of rural poverty in selected interventions by development assistance (OECD, 2006).

At macro-economic level using aggregates on panels of countries results are equivocal. Positive results on the link between growth and poverty (Srinivasan, 2001) and on agricultural growth (Rao et al., 2004), as well as on the role of other variables such as inequality (Salama, 2007) have allowed international bodies to conclude that growth had a positive effect (Bourguignon, 2004). Pathways out of poverty are then proposed for rural households (World Bank, 2007;Janvry and Sadoulet, 2000) focusing on technology (Pender, 2008) or defining the macro-economic policy framework for the pro-poor growth.

However the growth-poverty linkage under the assumption of a more or less constant income distribution does not reflect the real situation of rural households. The problem is the relationship between growth, inequality and poverty (Attanasio, 2004, Bourguignon, 2004). Here again, econometric treatment of growth-inequality relationship does not give decisive results, leaving open the conclusion that any growth is good for the poor (Dollar and Kraay, 2002). The limits of using large aggregates are known and it is necessary to analyze what happens beyond global averages (Ravallion, 2001).

The objective of the research we conducted in Indonesia on agricultural growth and poverty alleviation was to test the hypothesis of a positive and causal link. A panel of farm households surveyed in 2001 and 2006 was used to characterize the evolution of the poverty of these households in the form of trajectories.. The hypothesis was formulated as follows: the increase of agricultural production explains the pathways out of poverty of agricultural households.

In order to test this hypothesis we first measured the variation of gross agricultural production between the two observation rounds. Then we compared the variation of agricultural production in the poverty-exit trajectory and other trajectories.

Data for testing this hypothesis was obtained from a longitudinal survey conducted in 2001 and 2006 with a true panel of households (Deville, 1998). The survey was originally designed for an impact evaluation of a World Bank project using the double difference methodology. From the original sample of 1067 rural households, 965 households with agricultural production activities were finally selected for the purpose of this analysis. The average size of the farms was 1.2 ha, above the national average. This was not surprising as most of the households were spread around the country and I particular out of Java where agricultural farms are significantly larger. This was however not a problem for the analysis given that this situation would have a positive implication for the hypothesis of an effect of agricultural growth on exit out of poverty.

The economic situation of the households was characterized with the following variables.

Family Members	Number of family members
Assetcap	Value of assets per capita
Selfcons	Weeks rice self-sufficiency
Foodconscap	Amount of food expenditure per capita
Totconscap	Amount of total spending per capita
Sharefood	Budget share devoted to food expenditures
Othincnotagcap	Non-production-related income from agricultural activities
Othincrelag	income non-agricultural activities
Totothinccap	All calls outside agricultural production
Plot area	Cultivated area (ha)
Totgrossprodcap	Total value of agricultural output per capita
Totgrossprodha	Total value of agricultural production per ha
Totprodcostha	Production costs per hectare cultivated
Totnetmonetprodinccap	Net sales of agricultural products
Totnetinccap	Total net income per capita

We then established a typology of households for 2001 and 2006 using hierarchical cluster analysis (HCA) on two variables: TotConsCap and AssetCap. The value of self-consumption was included in TotConsCap. But land value was not included in AssetCap due to the absence of local land markets. The size of the cultivated area is however integrated to take into account this important component of household assets and access to land (Winters et al, 2009;. Booysen et al, 2008). The typology of trajectories is built on the observation of classes 2001 and 2006 for each household (Table 9).

Tableau 9 : Hierarchical cluster analysis applied to the 2001 and 2006 samples

		AssetCap	TotConsCap	Number	Class*
2001	1	2 461 644	992 074	636	Poor
	2	8142535	2 569 529	271	Non poor
	3	15 551 534	6 781 076	50	Well off
	4	23 399 583	16 625 969	6	Wealthy
	5	211 213 750	9 745 750	2	na**
2006	1	6 755 418	3 281 597	307	Poor
	2	2 795 155	1 155 120	579	Non poor
	3	24 168 761	3209534	49	Well off
	4	24 035 499	12 227 272	25	Wealthy
	5	104 607 938	6 014 857	4	na**
	6	134 531 190	62 223 206	1	na**

Source: Bourgeois and Meuriot, 2011.
** Based on poverty line set as 1825000 IRp/cap/year in 2006 (BPS, 2007) and 1155000 IRp/cap/year in 2001 (deflated). ** Outlyers for variable AssetCap.*

We then characterized the evolution of households by their initial and final classes, and established a typology of seven trajectories as presented in Table 10.

Tableau 10 : Trajectories of the farm households

Nom	Trajectory	%	Number		%	
RP	Stay poor	*46*	446		*70*	of the Poor class
SP	Exit poverty	*19*	188		*30*	
EP	Enter poverty	*14*	133		*40*	of the Non poor class
RNP	Stay non poor	*12*	113		*34*	
C	Becomes better off	*5*	47			
D	Becomes less wealthy	*3*	27			
I	Undetermined	*1*	11			
Total		*100*	965			

Source: Bourgeois and Meuriot, 2011.

These trajectories were further grouped into three categories: "status quo" when there is no change of class (RP and RNP), "upward" when households passed into an upper class (SP and C), and "downward" when households pass into a lower class (EP and D). Approximately 58% of households are in the "status quo". Almost a quarter of households are in the "upward" path trajectory, while 17% are in a "downward" path. Fourty percent of the households change classes over the five years of analysis showing the sensitivity of Indonesian rural households to economic changes (Swastika et Supriyatna, 2008;Widyanti et al., 2009).

Table 11 shows a negative agricultural growth (in constant term) associate to the status quo (RP and RNP). The trajectory out of poverty (SP) is associated with a positive agricultural growth while the situation of households that fall in poverty (EP) accentuates the association with negative growth.

Tableau 11 : Evolution of agricultural production and income per type of trajectory

	Δ ToTGrossProd	ΔToTGrossProdCap	ΔTotAgNetIncCap
RP	-35%	-36%	-34%
SP	+43%	+60%	-20%
EP	-65%	-69%	-73%
RNP	-14%	-16%	-74%

Source: Bourgeois and Meuriot, 2011.

A first interpretation is that the evolution of the value of agricultural production determines the trajectory of households in poverty (RP, SP and EP). Negative growth is associated with a final state of poverty, positive growth is associated with a final state out of poverty. This observation is supported by the association of the lowest negative growth of net farm income to poverty exit. However, this is a very general interpretation because it is based on average growth in each category of trajectory. A more detailed examination of variations within these trajectories provide deeper insights as individual growth rates can reach extremely high values (> 1000%) due to initial conditions of very low farm incomes. To overcome this bias, we identified four classes of increasing net farm income (Δ): 100% <Δ, 0% <Δ <100% -100% <Δ <0% and Δ <-100%. The share of these classes in each trajectory his presented in Table 12.

In the SP trajectory, over 40% of households have a negative agricultural growth. The exit from of poverty is not always associated with an increase in farm income. The latter contributes to, but is not a necessary condition for poverty exit. More than 30% of the households which remained poor (RP) had a growing farm income. The latter is therefore not a sufficient condition to get out of poverty.

Tableau 12: Distribution of households according to their income growth rate and trajectory

	100%<Δ	0%<Δ<100%	-100%<Δ<0%	Δ<-100%	Total
SP	71	38	63	16	188
RP	63	74	261	48	446
RNP	17	26	61	9	113
EP	10	7	104	12	133
D	2	3	19	3	27
C	9	9	27	2	47
Total*	172	157	535	90	954

Source: Bourgeois and Meuriot, 2011.

However, a negative growth in agricultural income is a factor for remaining in poverty. This finding is reinforced by the fact that over 85% of households becoming poor (EP) had a negative agricultural growth. This is also confirmed in the case of the very wealthy and affluent households downward path (D).

We can therefore conclude that agricultural growth (positive) is neither a necessary nor a sufficient condition for the removal of agricultural households out of poverty. In contrast, a reduction in the value of agricultural production appears as the main input factor in poverty. Agricultural activity provides protection against impoverishment, but does not guarantee exit out of poverty. This implies that rural poverty alleviation is not just a matter of agricultural productivity.

Further analysis which is not detailed here but available elsewhere (Bourgeois and Meuriot, 2011) indicated that income from non agricultural production activities played an important role in getting out of poverty, confirming other empirical results (Rousseau, 2004).

This work highlights that contrary to the common belief by the government and the international community that agricultural growth is the priority in the fight against poverty in Indonesia, we show that poverty reduction does not automatically result from growth. There is no mono-causal explanation of poverty (Boyer, 2007); likewise there is no mono-causal way out of poverty. It takes much more than simply promoting growth to reduce poverty (Balisacan et al., 2002). Yet, without a minimum growth opportunities in agricultural production, households vulnerability increases. This vulnerability is reflected in quantitative and qualitative changes in access to land, which induce an increasing differentiation between households on their way out of poverty and increasing their land assets, and households remaining poor with decreasing land assets.

Pulling out any state intervention in agricultural development in favor of market forces can further enhance this differentiation as it was already observed 10 years ago (Dorward et al, 2004). Indeed, the variability of the trajectories of households and the complex structure of their income witness that there is no guaranteed pulling effect from a sector whose growth would result in human development and in particular development of the poorest population.

If we accept that the human factor is a major source of differentiation (Hossain, 2001), then the only policy likely to induce a flow of households out of poverty is to offer a range of opportunities for diversification activities that the poor can take advantage of. Our results support a multi-sectoral policy development of rural areas through structural investments for diversification of activities from daily labour opportunies to business development.

Future prospects for poverty reduction

In order to bring a more long term and broader perspective on the issue of poverty alleviation I would like to share at this stage some results from an inventory of future works I recently reviewed in preparation of the 2nd Global Conference on Agricultural Research for Development (GCARD 2). The GCARD 2 took place last year in Uruguay and one third of the conference was dedicated to foresight.

The inventory was based on a meta-analysis of recent foresight works in agriculture combining different sources. These sources included a worldwide survey, examination of websites of organizations for information related to foresight and document review. From over 5000 contacts, 411 respondents indicated that they were willing to share their works in foresight activities related to agriculture, rural development or farming systems. We contacted all of them and a group of 11 foresight specialists[8] screened their documents using the three following criteria: i) recent (less than 5 years), ii) looking at least 10 years ahead, and iii) related to agriculture/rural development/farming systems. Only documents scoring a positive answer to all three criteria were finally kept for the analysis. We identified more than 60 relevant foresight works. We organized three write workshops for the authors to enable them to produce the briefs and interact with their colleagues. One workshop was conducted for Europe, Central Asia, Near East and Africa, one for Asia and the Pacific, and one for the Americas. Some of the authors who could not attend the write accepted to work on the Brief remotely. We created a series "*The Futures of Agriculture*" which is available with open access from the GFAR website.[9] The series has so far 40 Briefs.

I am highlighting here some elements from the reports presented to the GCARD (Bourgeois et al, 2012) which in my opinion can help us in our understanding of the poverty challenges in the future and the role social sciences may play.

The foresight studies from which information has been collected directly from their authors show the following spread of focal topics.

- 15 global foresight studies, of which 12 had a focus on food security and agriculture and three on bio-physical factors;
- 13 national foresight studies: seven focusing on the future evolution of agriculture, three on research priorities and system, two on territorial development and one on climate change;
- Eight regional foresight studies, four focusing on food and agriculture, three on rural societies, one on low carbon society;
- Six specific foresight works, two focusing on commodities, two on technology and two on others;
- One foresight work focusing on capacity development.

We can observe that no foresight work focused on poverty, nor was centred on people, be they farmers or rural households. However, some of them indirectly provided some useful ideas about future challenges with some bearing on the prospects of poverty in rural areas. These challenges can be summarised as questions with uncertain answers and strong implications on poverty: What could be the farming patterns of the future? What could happen to agricultural land? How could the link between consumption and production of agricultural goods evolve?

[8] Reviewers came from Universities (3), National research Centers (3), International Research Centers (4) and Organizations (2); they are citizens from eight different countries: Argentina, Australia, Brazil, France, Germany, The Netherlands, South Africa, Tanzania and the UK.

[9] http://www.egfar.org/our-work/shaping-future-together/global-foresight-hub/publications

Farming patterns of the future are characterized by a major opposition between two types: industrialized large-scale agriculture and small-scale agriculture. The first type is associated with trends towards more and more concentrated mass commodity production. It could take various forms ranging from the current agro-industrial farms similar to the large private sector oil palm plantations in Indonesia to new forms of production consortia attracting investments from diverse sources. The second type could take different forms according to the location (small-size family farming in regions where people are poorer and levels of education low or where it can play an important role in the economy and social life), hobby- or part-time farming for niche markets. Small size farming patterns would have to adjust to climate change to survive. It is considered having an untapped potential since agriculture is very local context dependent.

Some works considered that the first type is likely to dominate in the future because agricultural intensification is still needed and surviving farms will need to be more and more market oriented. This is also associated with a strong concentration of ownership in order to take advantage of economies of scale. In developed countries there would be fewer and larger farms, with a growth of non-family farms producing for energy and bio-based industries. Small farms could be progressively replaced by larger agribusiness buying and merging smallholdings into larger, more efficient farms. Agro-enterprises with access to capital, market and technologies will increase.

Other works consider that there could still be room for coexistence of commercial (medium, large scale) with family agriculture or with very extensive agriculture, with the appropriate policies aiming at the preservation and development of the diversity of farming systems. A mix of systems could therefore emerge, to benefit from local knowledge and biodiverse production systems on one hand (family scale), and skills in marketing and processing on the other (industrial scale).

Most of the works agree that the futures of farming patterns are determined by the simultaneous and interconnected play of multiple drivers. The most frequently mentioned drivers are policies, power relations and institutions, economic forces, climate change, technology development and population growth and ageing. Access to, and use of natural resources, including energy and consumption patterns are also mentioned.

Policies, through incentives, criteria of performance (economical vs. environmental and social), land rights reform, investment in research and development are seen as a driver that could counterbalance the play of effect of economic forces leading to the concentration of production and the predominance of large-scale industrial farms, or the transfer of less competitive crops to soils with less productive potential. The future of the smallholder farming patterns appears to be determined by the conjunction of the evolution of market forces, public policies and capacity of the small farmers to adapt to and influence these evolutions.

Future uses of agricultural land. Future agricultural land expansion is seen as a likely development taking place mostly in the developing world, particularly in Africa and until 2030, and in other land-rich countries like Brazil, while it stabilizes or shrinks in developed countries. Agricultural expansion would have large impact on environments with two contrasted situation: the separation between spaces for agricultural production and natural spaces or multifunctional uses of land, with agriculture offering ecosystem services. While there is theoretically sufficient land available for agriculture to nourish nine billion people in 2050 even preserving forests, there would always be arbitration between cultivated land expansion and elevation of crop-yield. However, some scenarios signal also the possible abandonment of land due to urban migrations, loss of fertility, overexploitation of resources and climate change.

A new crop geography is expected, caused by among others, the switch from beef production to dairy production, more land devoted to production of agro-environmental products and services, confinement of former extensive livestock production freeing more land for food crop production, the opening marginal lands for agriculture, the displacement of less competitive crops to less productive land.

At least seven key drivers are considered as having a major influence on future land uses. These are:

- Climate change and particularly the rising sea levels which would force farmers to shift to higher attitudes, modify the possibility to farm (abandonment of agricultural land, exploitation of new land);
- Urbanization understood as the patterns of population moves between rural and urban areas, essentially conditioned by the services offered in urban areas that people cannot access in rural areas. Competition on land between activities (urban development, tourism, agriculture) is seen as increasing;
- Land acquisition by foreign investors (also sometimes called land grabbing) such as China, Japan, and South Korea buying/leasing land overseas for agriculture production;
- Changes in consumption pattern, especially meat consumption, dairy products and cereals, with contrasted patterns between regions, especially developed and developing countries;
- Land management policies have major consequences for future land use, whether they would focus on a balanced allocation between different activities or not. This includes the evolution of customary law and local institution;
- Prices of commodities and other products that can be competing from the same land;
- Demand for non-food products which could be produced on agricultural land, such as bioenergy, forest products, mining products and environmental services.

How food consumption might shape agricultural production. Though largely recognized, the links between agricultural production and food consumption are not often explicitly analyzed in the foresight works. Possible evolutions consider an increasing amount of food exported for foreign consumption and growth in the amount of food sold locally through direct farm sales or farmers markets with the integration of smallholdings into formal supply chains, in connection with the development of new markets for local products and short chains (urban consumers, tourism).

Diet changes and production patterns are inextricably linked but in the future, evolution of consumption is seen as the driving force. Dietary patterns are considered the key determinants of production targets, especially the animal content of the diets. How consumers modify their diet in the long-term is a key issue. This includes changes related to food quality (certification) and diversity, switching from food prepared at home to food prepared outside, concerns for integrated production systems (fair trade), animal welfare, or environmental sustainability (waste management, agro-ecological production). Urban consumers in developing countries will be carrying much more weight than today. Consumer behaviour is also driven by other factors such as urbanization and economic growth and market-clearing prices. Consumption will gain growing influence on the production periods.

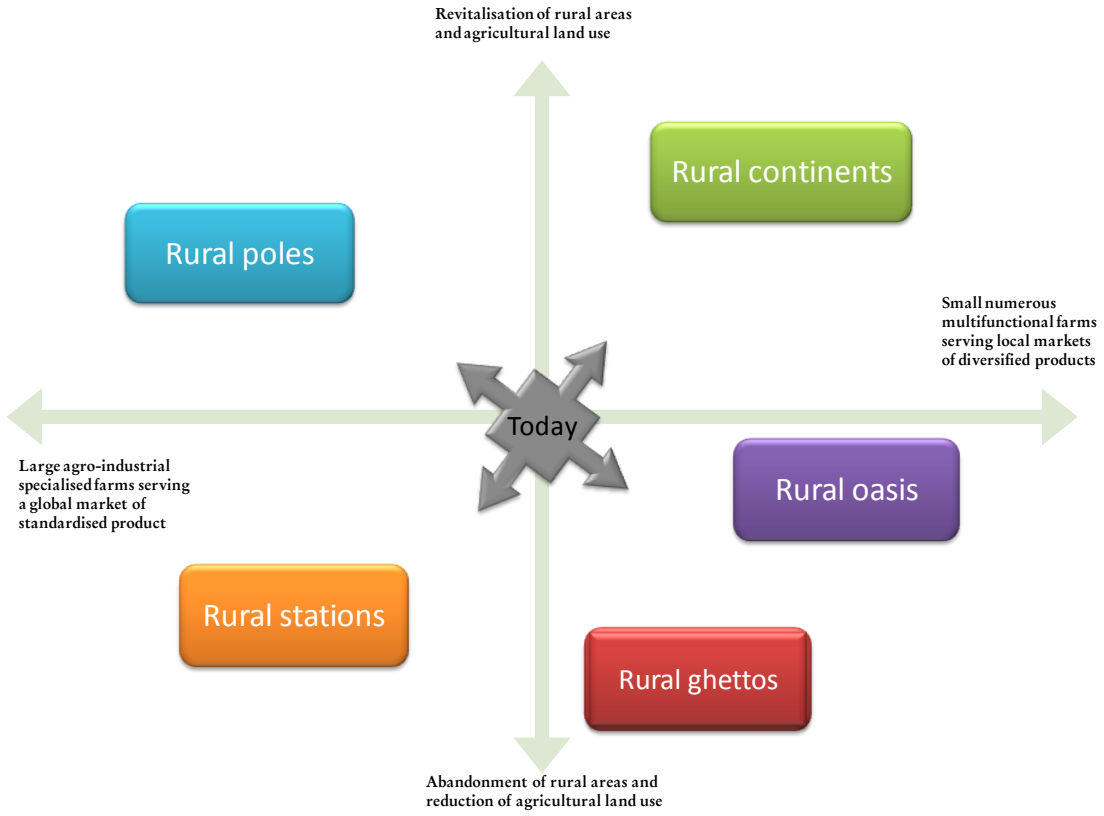
The development and strategy of firms (food industry as well as retail) is also a key driver. These include integration and spread of supermarkets with cold chains which can boost local production. Policies targeting consumers are also seen as having a substantial role through their potential to influence food consumption habits. Waste management emerges an area where policies can influence both production and consumption sides.

Conclusion: Trans-disciplinarity and poverty, a case for foresight?

The analysis of recent foresight works highlighted several controversies, or better speaking great uncertainties about key drivers of the futures of farming, agricultural land use and how consumption may shape production. It is possible to use some of the foresight scenario building tolls to provide alternative visions of the futures of the rural world and what this might mean in terms of poverty. The following table display the these three dimensions and the future states they might take.

Variables	Future Contrasted States	
Type of farm	large and concentrated	small and numerous
Food source	ensured by agro-industrial farms	ensured by family farms
Ag. Land dynamics	reduction	expansion
Use of ag. land	specialization	multifunctionality
Rural Dynamics	abandonment	revitalization
Consumption pattern	global-market based consumption standard consumption patterns	local-market based consumption diversified consumption patterns

It is possible to draw a graphic representation of possible futures combining contrasted states of these variables in a coherent and plausible representation using two axes as shown below.



The horizontal axis combines type of farm, consumption patterns and use of land It provides a continuum ranging from large agro-industrial concentrated and specialized farms producing for global markets supplying a demand for standardized products to small scale of standardized products to numerous small-scale multi-functional family farms serving local markets supplying a demand for diversified products. The vertical axis provides a continuum between abandonment of rural areas and reduction of agricultural land use to revitalization of rural areas and expansion of agricultural land use.

The resulting five scenarios correspond to future contrasted worlds. Their purpose is not to predict what will happen but to show what directions could take our actions. Foresight helps therefore to bring together many different dimensions in order to anticipate future transformations and explore the options we have to design the future we want.

Each scenario as multiple implications for rural poverty and the role of agriculture. Some of them (rural stations, rural ghettos, rural oasis) would lead to further massive migration from rural areas to urban areas where decent employment will not be available for a massive number of migrants. As a result rural poverty may decrease and urban poverty would then become the new issue of the future. However, it will have been rooted in the disappearance of countryside or rural life. In some of them agriculture may contribute to a stabilization (rural poles) or expansion (rural continent) of rural employment. Yet even in these cases agriculture will have to be part of a societal choice concerning the future of rural areas.

The study of farm trajectories indicate that agriculture has potential as a buffer against crisis and shocks and therefore can contribute to rural poverty alleviation, but it is neither sufficient nor necessary. This was further confirmed by the case of tree crops showing what would be the requirements for a household to reach cross-generation resilience. We have seen with the case of secondary crops that it is possible to define a framework for poverty alleviation which is people centered. All these cases converge towards a shift in the concept of battling poverty, switching from a growth-based technological paradigm to a human-centered understanding of the drivers of rural poverty. The analysis of foresight works, though not centered on poverty enables us to derive implications in terms of poverty reduction according to different scenarios. The role of social sciences and humanities is to contribute to our understanding of the transformation which are shaping the paths to the different scenarios and inform about the actions that would lead to one or another, so that the future state of poverty will not be longer the results of implicit effects of human agency but the results of explicit societal choices.

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