Agricultural Policy Synthesis

Rwanda Food Security Research Project/ MINAGRI

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Changes in Allocation of Land Holdings, Production and Farm Size in the Rwandan Smallholder Sector Over the Period 1984/1990 to 2002

By

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1. Changes in Allocation of Land Holding Patterns Between 1990 and 2002

Figure 1. Land Allocation in Rwanda, 1990

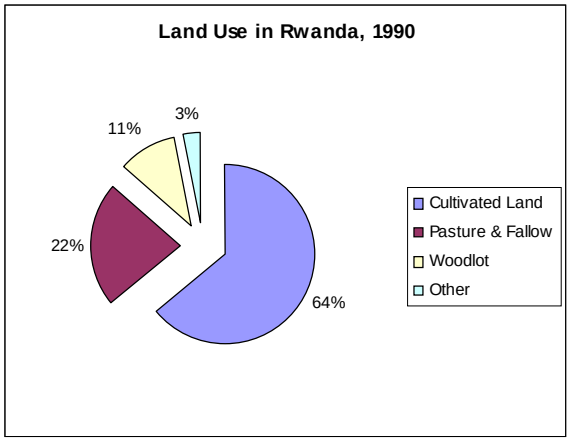
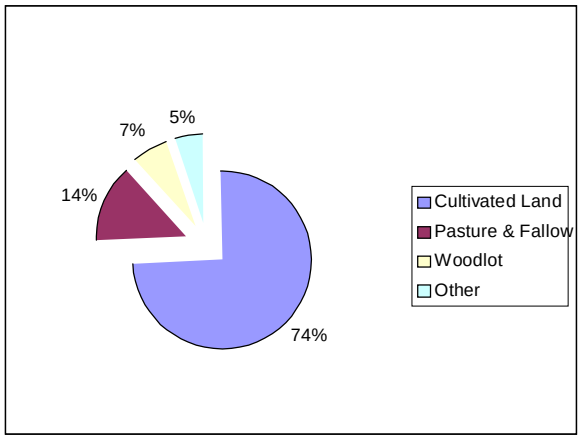


Figure 2. Land Allocation in Rwanda, 2002



The figures above show that there have been major shifts/changes in land use patterns in Rwanda over the past twelve years. Noted below are a few striking observations.

- As a percentage of total farmland, cultivated land increased from 64% to 74%. (In absolute terms cultivated land increased from 782,500 ha to 899,133 ha.)
- The increase in cultivated land occurred at the expense of pasture and fallow and woodlot. The share of pasture and fallow decreased from 22% in 1990 to 14% in 2002 and woodlot decreased from 11% in 1990 to 7% in 2002. (See table 1 below for absolute figures and to make additional comparisons to changes since 1984.)
- This trend of increasing cultivated land is apparent from the mid-eighties to today (see table 1 below).
- These observations imply that land is being farmed much more intensively without much time to fallow and allow the soil to rejuvenate. Pasture and woodlot are also being cut down at the expense of cultivation. This has important potential implications for productivity as well as for the environment. Average calorie production per person per day in Rwanda is believe to have dropped significantly during the war period, and then has increased on average in 2002 to levels near those measured in 1984.
- The rural population dependent on the land has increased some 27 % since 1984.

Table 1. Land Use, Rural Population and Calorie Production in Rwanda, 1984-2002

Land Use	1984	1989	1990	2002
Cultivated Land (ha)	701,500	776,000	782,500	899,133
Pasture & Fallow (ha)	261,500	233,000	274,500	174,225
Woodlot (ha)	104,000	115,000	129,000	79,629
Other (ha)	44,500	62,000	38,500	60,583
Total (ha)	**1,111,500**	**1,186,500**	**1,224,500**	**1,213,571**
Rural Population	**5,552,309**	**6,582,169**	**6,793,208**	**7,089,429**
HH/Prod/Kcal/pp/pjour	**1,932**	**1,552**	**1,565**	**1,878**

Source: FSRP and DSA Annual Reports

2. Changes in Crop Distribution by Area of Cultivated Land

Figure 3. Crop Distribution by Area, 1990

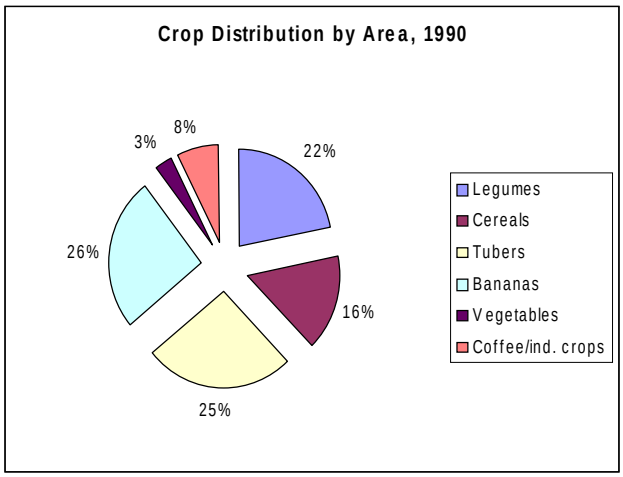
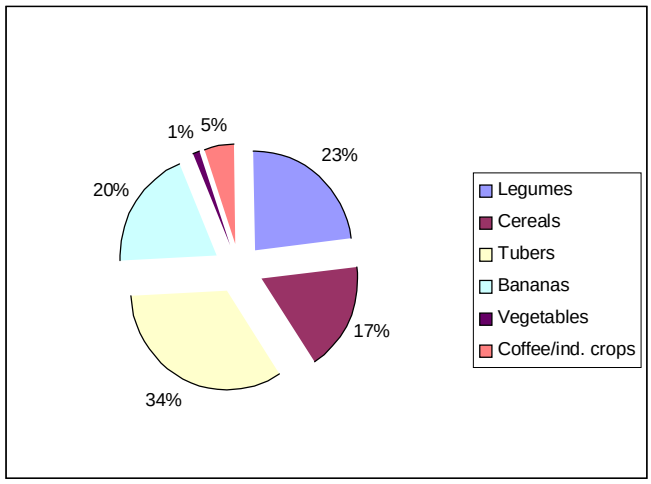


Figure 4. Crop Distribution by Area, 2002



Of the cultivated area, there have been some significant changes in terms of crop distribution by area occupied.

- As a percentage of cultivated area, the area occupied by legumes and cereals has remained fairly constant over the period 1990-2002 (although there was some increase in absolute terms).
- There has been a significant increase in the area occupied by tubers from 25% in 1990 to 33% of total farmland in 2002 (an increase of about 97,140 ha absolute terms).
- Area under bananas has dropped from 26% of cultivated land in 1990 to 23% in 2002, although in the last three years banana area has been recovering quickly from recent drought and disease problems. Upward trends in banana will likely continue as many farmers rely heavily on bananas as part of their cropping system.
- The area occupied by vegetable has also dropped from 3% in 1990 to 1% in 2002.
- There has also been a decline in the area covered by coffee and other industrial crops from 8% of total farmland in 1990 to 5% in 2002. This is largely due to a drop in land allocated to coffee. A 1991 DSA/MINAGRI survey reported that approximately 55 % of farms had coffee trees, whereas a FSRP Rural Household Coffee Survey found that only 30 % of smallholders had coffee trees in 2002.
- Shifting relative area to tubers and continuing to use bananas helps small farmers produce more calories for the growing rural population.
- Without productivity increases in food, as well as cash crops, it is difficult for increasingly land constrained farmer to free up area to plant to cash (industrial) crops.

Table 2: Crop Group Distribution in Hectares, 1990 and 2002

Crop Group	1990	2002
Legumes (ha)	172,345	209,172
Cereals (ha)	126,218	155,819
Tubers (ha)	202,165	299,305
Bananas (ha)	200,285	180,289
Vegetables (ha)	22,244	9,739
Coffee and other industrial crops (ha)	59,215	44,809
Total Cultivated Area (ha)	**782,470**	**899,133**
Source: FSRP and DSA Reports		

3. Changes in Average Farm Size in Rwanda

Figure 5. Household Distribution by Farmsize, 2002

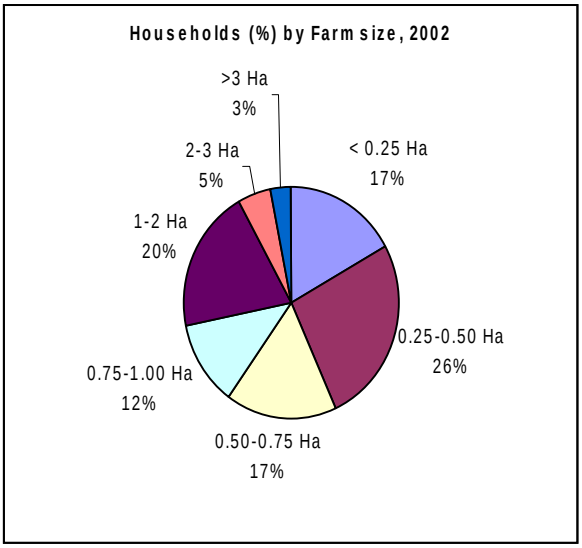
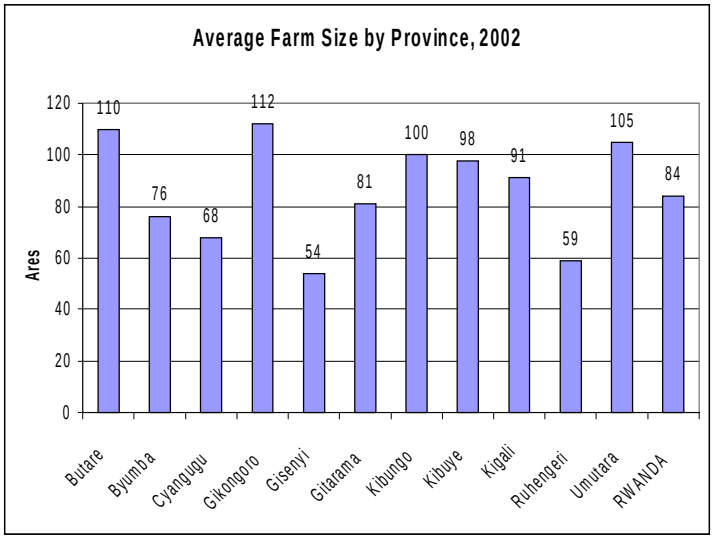


Figure 6. Average Farm Size in Rwanda, 2002



The figures above show the distribution of households in Rwanda by farm size (Figure 5) and the ranking of provinces in terms of the average farm size in each province (Figure 6).

- Figure 5 above shows that in 2002, 17 % of rural households in Rwanda own less than 0.25 ha and an accumulated total of 43% of households own less than 0.5 ha. Seventy two percent of rural households own less than 0.75 ha.
- An accumulated total of 28 % of rural households in Rwanda own more than 1 ha.
- The provinces with the largest average farms are Gikongoro, Butare, Umutara and Kibungo, while the provinces with the smallest average farms are Gisenyi, Ruhengeri and Cyangugu. Soil fertility does vary across Province, and sometimes can help offset very small farm size.
- These increasingly small farm sizes can pose some serious social and economic problems unless on-farm productivity of both food and cash crops can be improved. Ways will also have to be found to more effectively stimulate growth in the rural non-farm sector.

Table 3. Average Farm Size in Rwanda

Province	Butare	Byumba	Cyangugu	Gikongoro	Gisenyi	Gitarama
Ares/Ha	110	76	68	112	54	81

Province	Kibungo	Kibuye	Kigali	Ruhengeri	Umutara	Rwanda
Ares/Ha	100	98	91	59	105	84

Source: FSRP 2002 Annual Agricultural Statistical Report

4. Changes in Farm Size and Land Distribution from 1984 to 2002

Table 4. Distribution of Land Owned at the Household Level in Rwanda By Farm Size Category and Year

Farm Size Classification By Area Owned	Households		Total Land Owned	
	% in 1984	% in 2002	% in 1984	% in 2002
Less than 0.25 ha	7.4	16.8	1.0	3.3
0.25 - 0.50 ha	19.0	26.4	5.9	11.8
0.50 - 1.0 ha	30.4	29.7	18.4	25.4
1.0 – 2.0 ha	26.7	19.5	31.8	31.7
Greater than 2.0 ha	16.4	7.6	42.9	27.8
Total	99.9 %	100 %	99.7 %	100 %
Average Farm Size-Rwanda In Ha. Per Household	# Rural HH's 1,111,897	# Rural HH's 1,442,681	1.2 ha	.84 ha

Sources: Agricultural Production, Area Planted and Land Utilization for the 2002 Agricultural Year in Rwanda: FSRP : and, Résultats De L' Enquête Nationale Agricole 1984, MINAGRI. Vol 1, Page 68, Table 3.1.1

- National policy discussions about a new land law and about minimum farm size of 1 ha. has generated lots of interest in Rwanda's farm size strategy.
- In 1984, some 43 % of rural households had farms of 1 hectare and larger. These farms occupied 75 % of the total land owned.
- In 1984 some 16 % of households had farms greater than 2 hectares, and this group occupied 43 per cent of the land.
- By 2002, the percent of households with farms of 1 hectare or larger has dropped to 27 but this group still occupies some 60 percent of the land.
- The percent of households with less than .5 hectares has grown from 26 % in 1982 to 43 % in 2002, but as a group these farms only occupy about 15 % of the land.
- Considerations about pros and cons of land consolidation need to take into account the reality of considerable fragmentation already (for example 43 % of smallholders have .5 or less ha), but also the fact that relatively little absolute land is used by these very small farmers (only 15 % of the land). Thus trying to consolidate these plots would involve a relatively large number of farmers who would have to find positive ways to earn a living outside of farming, and the absolute amount of land freed up for consolidation would be relatively small. This derives from the fact that land distribution is already somewhat skewed. Given the current limitations of rural labor and other non-farm employment options, large number of rural households have few current options other than trying to produce more food and cash crops on their limited plots. See additional comments below.
- As shown in IDP # 24, smallholders with access to larger plots of land are located in many of the same villages as those who have relatively little land on a per household basis. This finding holds powerful implications for policy if it can be shown to be widespread. It can help get more dynamic labor and service markets, and other employment opportunities in the very locations where some smallholders are investing and raising their output and productivity. This finding also can help reduce land constraints if land reform can result in more land rental and fair arrangements for sharecropping that will facilitate land constrained farms getting access to more land. See MSU IDP # 24 (http://www.aec.msu.edu/agecon/fs2/papers/idp24.pdf)

Table 5. Household Attributes by HH Per Capita Land Access Quartile

Year	Dimension	Average	Quartiles of HH Per Capita Land Access			
			1	2	3	4
1990	HH Land access (ha)	.94	.32	.64	1.01	1.80
2002 (A)	HH Land access (ha)	.80	.23	.49	.82	1.68
1990	Per capita land access (ha)	.20	.06	.11	.19	.43
2002 (A)	Per capita land access (ha)	.19	.04	.09	.17	.42
1990	% female headed households	18.5	15.5	16.9	18.1	22.3
2001	% female headed households	34	31	33	34	37
1990	# of household members	5.3	5.5	5.8	5.5	4.4
2001	# of household members	4.9	5.4	5.4	4.8	4.1
1990	# of adults in household	2.7	2.5	2.7	2.8	2.6
2001	# of adults in household	2.6	2.7	2.5	2.4	2.3

Source: FSRP data

Although on the surface it appears that the most of the farms in Rwanda are relatively small, there are still large and significant variations within landholding size, especially when taking into account the number of household members depending upon a given amount of land . For example, in 2002, households within the highest per capita land holding quartile have access to about 10 times as much land as those in the lowest quartile. Table 5 above shows a further breakdown of average land owned into quartiles and includes some specific household characteristics. It gives us a clearer picture of who owns what land and how much, after taking into account the number of members of each household.

- The average farm size in Rwanda in 2002 (Season A) was 0.80 ha, down from 0.94 ha in 1990. Although there was an overall decrease over these twelve years, the average amount of land per hh (and per capita), this reduction was most significant in the households with the least amount of land. If you look at per capita land access, you can see that land access to the bottom two quartiles (1^{st} and 2^{nd} quartiles) has decreased between 18 and 33 percent between 1990 and 2002 while in the upper two quartiles (3^{rd} and 4^{th} quartiles) changes have ranged from zero to 10 %.
- The number of female headed households almost doubled over this period from 18% in 1990 to 34% in 2001, and there may be a slight tendency for the proportion of female headed households to go up with the larger household per capita land quartiles.
- The overall number of members, and adult members, in a household has hardly changed between 1990 and 2002. When you look at this characteristic across hh percapita land access quartiles, it does not vary much either. This result is interesting and important, since a widely held belief in Rwanda is that the farm size is often dependent on the number of adults in a household.
- Land is one of the most important assets in Rwanda. Relative inequality in land access may have a strong relationship with economic growth and poverty reduction.

6. Comparison of Household-Level Per Capita Land Access Category, Coffee Production and Selected Coffee Practices in 2001 For Growers and Non-Growers of Coffee

Table 5. Land Access Per Household Per Capita and Other Characteristics for Smallholder Coffee and Non-Coffee Growing Households In Rwanda

Household Characteristic	Quartiles Of Total Acreage Per Household Per Capita (total ares per person/household) (Using FSRP 1st season 2002 land, production, special coffee survey and 2001 demographic data)				All Households
	1st quartile (4 ares)	2nd quartile (9 ares)	3rd quartile (17 ares)	4th quartile (42 ares)	(19 ares)
	---------- Percentages of households ---------				
Household Status	25	25	25	25	100 %
Coffee Grower Household	25	31	30	35	30 %
Non-Coffee grower Household	75	69	70	65	70 %
Coffee Grower-Tree Category	--------- Percentage of households ----------				100 %
5 to 49 trees per farm (30 trees/.42 kg/tree ave.)	31	26	19	15	21 %
50 to 97 trees per farm (65 trees/.49 kg/ tree ave.)	25	26	16	23	23 %
100 to 198 trees per farm (131 trees/.33 kg/tree ave.)	22	22	28	30	26 %
200 to 1350 trees per farm (331 trees/.25 kg/tree ave.)	22	25	36	32	30 %
	--------Number or percentage per household ----------				
Total land per household	.23	.49	.82	1.68	0.80 ha
Non-Coffee Growers	.22	.47	.80	1.51	0.73
Coffee Growers	.25	.52	.86	1.99	0.98
Household members	5	5	5	4	5
Non Coffee Growers	5	5	5	4	5
Coffee Growers	6	6	5	5	5
Adult workers per HH	2	2	2	2	2
Non Coffee Growers	2	2	2	2	2
Coffee Growers	3	3	3	3	3
Total # coffee trees/hh for Coffee Growing HH's	118	131	165	181	154 trees
Coffee trees per adult worker on the farm	26	31	44	56	42
Coffee Yield-Kg/Tree	.50	.42	.37	.33	.35 kg
Total Smallholder Coffee Production in 2001	2,476 mt	3,202 mt	2,624 mt	3,551 mt	12,097 mt.
% coffee hh using cem. fert on coffee	12.3 %	12.7 %	2.9 %	7.7 %	8.7 %
% coffee hh using pest. on coffee	55 %	59 %	50 %	58 %	56 %
# of pesticide treatments per year for users	1	1	1	1	1
Source: FSRP Surveys 2001 & 2002					

- Information in Table 6 is arrayed to help examine the interaction of access to land with farmer cropping and managerial decisions, especially on coffee, one of the key cash crops for Rwandan smallholders.

- In 2002, 30 % of rural households were cultivating coffee, and there is relatively little difference in the likelihood of growing this crop across hh land per capita quartiles.

- Coffee tree grower categories developed by Loveridge are cross-tabulated with hh per capita land quartiles in Table 5. Results do suggest some pattern of those with fewer coffee trees being more likely to fall in lower hh per capita land quartiles.

- Overall growers of coffee have some additional .25 ha per household, as compared to non-growers.

- There is little difference in average household member size between growers and non-growers, but coffee growers do appear to have one more adult worker per household, and this is a consistent pattern across all hh per capita land quartiles.

- The average coffee growing household has some 154 trees, but this varies a lot across hh per capita land quartiles. Those in the lowest quartile have on average 118 coffee trees/hh, and those on the high end have 181 trees/hh.

- The number of trees per adult worker in the household tends to vary significantly, from 26 trees/worker on the lowest hh per capita land quartile to 56 trees per worker in the top quartile.

- Perhaps reflecting a situation where workers with fewer trees to attend to can give more careful management attention, coffee yield per tree is highest among the lowest hh land per capita land quartile, and goes consistently lower toward higher hh per capita land quartiles.

- From a crop management perspective an important set of issues to explore further is a possible pattern of land constrained households getting higher yields. Understanding the extent to which this obtains is important, as is gaining insights on how to improve farm-level incentives for households to produce high quality coffee. Also, while overall use of chemical fertilizer on coffee is low, it is somewhat higher among lower hh per capita land quartiles.

- Coffee, as well as food/cash cropping researchers working in Rwanda should review finding of Kangasniemi (http://www.aec.msu.edu/agecon/fs2/rwanda/1998_Dec_Kangasniemi_People_n_Bananas.pdf), also quoted in Loveridge et. al (http://www.aec.msu.edu/agecon/fs2/rwanda/ps_2e.pdf) about the complex and productive, economic as well as environmental, relationships between bananas and coffee, as well as bananas and other crops under many cropping conditions in Rwanda.