Agro-ecological zones : The development of a regional classification scheme for Rwanda

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Summary

This paper discusses the need for a regional classification scheme that enables agricultural planners and researchers in Rwanda to take account of the country's major variations in agro-ecological conditions. Using data from the National Agricultural Survey, combined with previous work in this area, a five-zone classification scheme is developed and empirically tested. A regional comparison of such variables as farm size, land fragmentation, crop production and livestock production shows that the proposed classification scheme effectively captures the major regional variations in Rwandan farming systems.

Résumé

Le besoin d'une classification régionale au Rwanda se fait sentir afin de soumettre à la disposition de la recherche agricole et des planificateurs un instrument pouvant inclure les variations agro-écologiques principales. En partant des données recueillies par l'Enquête Nationale Agricole, une classification en 5 zones a été développée et testée empiriquement. Pour chaque zone les variables telles que la superficie totale de l'exploitation, le morcellement des terres, la production végétale et animale, ont été comparées. La comparaison a démontré l'utilité de la classification régionale développée.

1. Introduction

1.1. Background

Though small in size, Rwanda is characterized by a relatively high degree of agro-ecological diversity. One of the principal causes of this diversity is the country's topography. The Zaire-Nile divide runs north-south along Rwanda's western provinces at an average altitude of about 2000 meters along its crest. The northern portion of this mountain range, located in the Ruhengeri prefecture along the border with Zaire, is higher still, and is known for its rich volcanic soil. Rwanda's topography gradually becomes less mountainous, though still quite hilly, as it slopes off into the eastern plateau. The altitude drops accordingly to around 1200 meters along the eastern savanna and Tanzanian border. Closely associated with variations in altitude is the pattern of rainfall. Naturally, rainfall is most abundant in the west, where, because of the altitude, cooler weather prevails. The average annual rainfall varies from around 1500 mm in the western provinces to 900 mm in the east.

Altitude, then, is a major feature distinguishing the environmental conditions to which Rwandan farmers must adapt, for it is variation in altitude that accounts for regional differences in temperature, rainfall and, to some degree, the nature and quality of the soil. For example, in the mountainous areas, where problems of soil erosion are particularly acute, the erosion of top soil has undoubtedly affected soil fertility.

Because of this regional variation in agro-ecological conditions, agricultural planners and researchers in Rwanda are constrained in their ability to address major policy issues for the country as a whole. Instead, such planning and research has often been fragmented into many smaller units and dealt with on a commune-by-commune basis. Communes, numbering 143 in all, constitute Rwanda's secondary administrative subdivisions. In other instances agricultural development has been viewed as a problem best confronted at the prefectural level. Although 10 prefectures comprise Rwanda's principal administrative subdivisions, and are therefore relatively attractive in terms of the administration and implementation of development projects, they have little to offer in terms of agro-ecological homogeneity. Consequently prefectures are ineffective geographical units in targeting specific projects designed to address specific agricultural development problems.

This paper explores the question of regional classification in Rwanda in an attempt to build on previous work and to stimulate some new thought on this important subject. Using data from the National Agricultural Survey, a regional classification scheme is proposed and tested which, when combined with previous work, is designed to facilitate the analysis of agricultural information at the national level.

Even in a geographically small country such as Rwanda, variations in econological conditions, cultural heritage and socioeconomic activity from one

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area to the next create the need for a regional classification scheme which "captures" these variations. Properly defined regions provide an opportunity for comparative study, where farm characteristics can be analyzed vis-à-vis the specific contexts in which they are found. Knowledge of the ecological, cultural and socioeconomic contexts can go a long way toward developing an understanding of the local farm population and the agricultural system they employ. One area of study that has been built on the concept of regional variation is known as regional economics. Hoover and Giarratani (5, p. 3) remark that:

> *"... regional economics represents a framework within which the spatial character of economic systems may be understood. We seek to identify the factors governing the distribution of economic activity over space and to recognize that as this distribution changes, there will be important consequences for individuals and for communities."*

The particular regional characteristics that are used by regional economists to help understand most spatial and regional economic problems are (1) natural-resource advantages, (2) economies of concentration of economic activity, and (3) costs of transport and communication (the mobility of goods and services). Going beyond the general purview of regional economics, however, there are often many other criteria on which to base a regional classification scheme. Farming systems can be heavily influenced by socio-cultural factors such as ethnic and tribal traditions, language, values, beliefs and so forth. Similarly the importance of traditional land settlement patterns and population density cannot be overlooked in the delineation of agricultural regions. Historical events and political circumstances may also contribute significantly to regional variations in farming systems.

As suggested above, the intention of a regional classification scheme is to help explain variations in a particular set of variables. In the present case, the concern is with the agricultural sector and the principal variables that comprise Rwandan farming systems. In order to be effective, regions need to be created in such a way as to maximize **intra-regional** homogeneity among farmers and their farming systems and minimize their **inter-regional** homogeneity. In other words, farmers must have more in common with other farmers in their own regions than with farmers in other regions. A regional scheme that fails to distinguish groups of farmers on the basis of land use patterns, population characteristics, land fragmentation, livestock ownership, and other such variables, can contribute relatively little to our understanding of how farming systems vary from one part of the country to another. On the other hand, where farming systems are shown to vary significantly as a function of the particular ecological and socioeconomic contexts in which they are found, a great deal can be learned by spelling out the causal linkages between these regional contexts and the various types of farming systems that emerge within them.

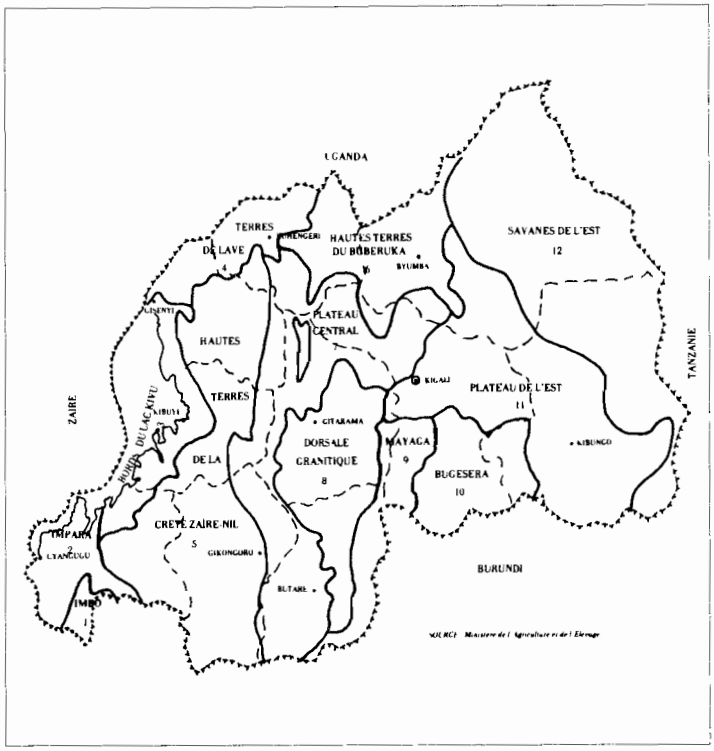

Figure 1. — Twelve Agro-ecological Regions in Rwanda.

1.2. Regional Classification: The Twelve Agro-ecological Regions

Recognizing the limitations of using prefectures and communes for agricultural planning and research, a pioneering effort was made to create a regional classification scheme based on three important agro-ecological variables: altitude, rainfall and soil type (3). According to this scheme there are 12 relatively homogeneous combinations of these three criterion variables (see Figure 1). The particular characteristics of these agricultural regions are summarized in Table 1. Since 1974 this regional classification scheme has been broadly used and supported for agricultural research purposes as well as for some of the more applied aspects of agricultural development. In fact, the sample design for the 1983-84 National Agricultural Survey was strongly influenced by the need to publish baseline survey results by agricultural region. These baseline statistics can be found in a document entitled "Résultats de l'Enquête Nationale Agricole, 1984, Volume 1: Rapport 1" (7).

Though useful for many purposes, this system of 12 agro-ecological regions has two significant limitations. The first is that it can be analytically cumbersome. It is one thing to focus on a specific set of

variables within one particular region of the country; it is another to broaden the analytical focus to look at regional variations in that set of variables. In effect, Rwanda's 12 agro-ecological regions must be viewed as relatively unique and independent environmental situations, or "contexts." To compare, for example, relationships among key variables such as farm size, crop production and family size in 12 different regions is a complex and confusing enterprise.

TABLE 1.

Altitude, rainfall and soil type for the twelve agro-ecological regions

No	Region	Average Altitude (in meters)	Average Rainfall (in mm)	Soil Type
1	Imbo	1 100	1.200	Alluvial soils
2	Impara	1.700	1.400	Heavy, clayey soils derived from basalt
3	Bords du Lac Kivu	1.600	1.200	Clay loam soils
4	Terres de Lave	2.200	1.500	Ultisols derived from volcanic materials
5	Crête Zaire-Nil	2.100	1.600	Humic acid soils
6	Hautes Terres de Buberuka	2.000	1.200	Oxisols at high altitude
7	Plateau Central	1.700	1.200	Humic soils at medium altitude
8	Dorsale Granitique	1.600	1.100	Gravelly sandy loam soils
9	Mayaga	1.450	1.050	Clayey soils derived from shale
10	Bugesera	1.400	900	Oxisols
11	Plateau de l'Est	1.500	950	Oxisols with high iron oxide
12	Savane de l'Est	1.400	850	Old infertile soils with texture variable

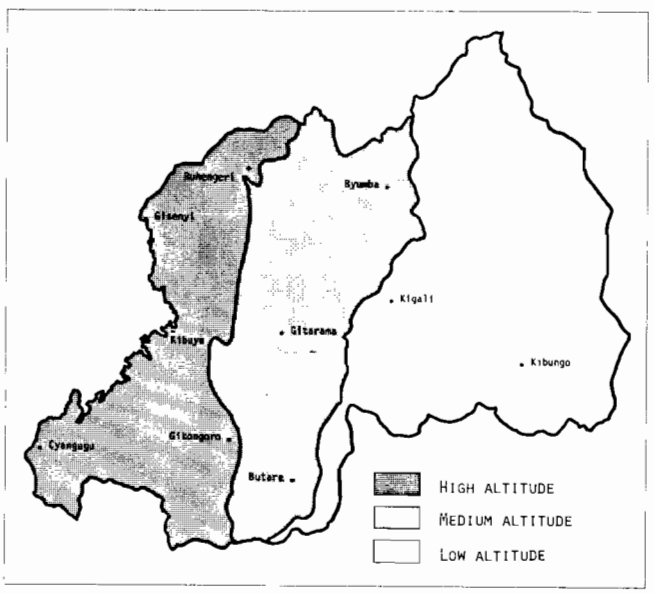

Figure 2 — Three altitude zones in Rwanda.

The need for a less cumbersome regional classification has long been recognized, and in the absence of any systematic work in this direction, Delepierre (3) has described the use of three "great zones" delineated simply on the basis of altitude (see Figure 2). The high altitude zone occupies the entire western portion of the country and is comprised principally of the highlands of the "Crête Zaïre-Nil". Also in the western region are the "Bords du Lac Kivu", the "Terres de Lave" toward the North and Imbo and Impara in the far southwest. The central portion of the country, including the "Plateau Central", the "Dorsale Granitique" and the "Hautes Terres du Buberuka", comprises the medium altitude zone. Farms in this central zone average around 1800 meters above sea level. The entire eastern plateau and savanna, along with Mayaga and Bugesera, make up the low altitude zone, with an average altitude of some 1450 to 1500 meters.

The second limitation is that the criterion variables, those on which the regions are based (altitude, rainfall and soil type), ignore the existence of regional variation in the social, economic and cultural characteristics of Rwanda's population, and the importance of these variations in explaining regional differences in farming systems. Because the 12 agro-ecological regions are highly dependent on altitude, which varies principally from east to west, there is a tendency for these regions to follow the north-south contours of the altitude isolines. This is particularly evident in three cases : the "Bords du Lac Kivu", the "Crête Zaïre-Nil" and the "Plateau Central". Naturally, the altitude zones described above also follow the same north to south pattern. As a consequence, socioeconomic and cultural differences, as well as differences in various soil characteristics between northern and southern portions of the country, and the effects of these differences on local farming systems, go entirely overlooked.

1.3. Regional Classification : New Developments

In order to adjust for existing limitations in Rwanda's regional breakdown, an attempt has been made 1) to reduce the number of regions from 12 to a smaller, more manageable number, and 2) to introduce a regional split capable of distinguishing between farming systems of the north and those of the south. It was reasoned that to capture the country's predominant ecological variations it would be necessary at the very least to base the reclassification scheme on the three altitude zones. Not only do these zones reflect changes in altitude but they also represent, as a consolidation of the 12 agro-ecological regions, major differences in rainfall and soil type. Initially, several cutting-points were experimented with for both altitude and rainfall. Communes were shifted about and regrouped in various ways in search of the optimal regional breakdown in terms of "simplicity," or "parsimony" (4, p. 40), i.e., a regional classification scheme that would maximize explanatory power while maintaining the manageability necessary to be used as an effective analytical tool. It was discovered that significant differences in

farming systems appeared almost regardless of how the three altitude zones were formed. Since no one regional breakdown seemed to predict differences with any greater accuracy than the others, the original 3-altitude delineation described by Delepierre (2) was retained because of its compatibility with the 12 agro-ecological regions.

The next step was to introduce a regional boundary to distinguish between northern and southern communes and provide for a systematic comparison of the structure of agriculture in these two regions. To preserve as much as possible of the original 12 agro-ecological regions, all of the "Dorsale Granitique" was situated in the southern region. For those areas farther west, i.e., the "Plateau Central", the "Hautes Terres de la Crête Zaïre-Nil" and the "Bords du Lac Kivu", the north-south dividing line was established close to the national route between Kibuye and Gitarama. This route runs along a low altitude point in the mountain chain where rainfall is correspondingly low. As Rwanda's eastern plateau and savanna show relatively little variation in either farming systems or ecological conditions it was reasoned that a north-south split would offer little analytical advantage there.

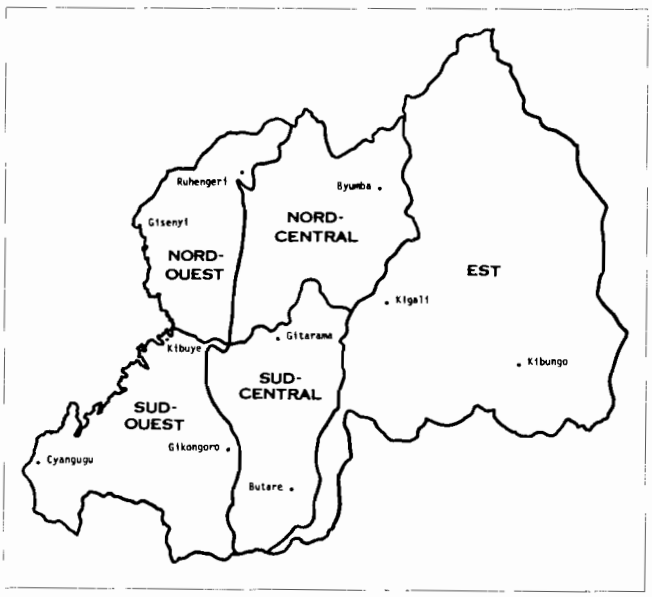

Figure 3. — Five agro-ecological zones in Rwanda.

The resulting regional classification can be seen in Figure 3. In summary, there are five regions whose boundaries, for the most part, correspond with those of the 12 agro-ecological regions when grouped by altitude. Additionally, the western and central portions of the country are further divided into northern and southern halves. Though quite simple this regional breakdown offers some degree of analytical flexibility. Depending on the particular objectives of a given analysis, regions can be merged in a number of useful combinations. If the influences of altitude and rainfall are the focus of attention, then the three altitude regions can be recreated by merging the two western zones (high altitude) and the two central zones (medium altitude). The eastern zone represents the low altitude, low rainfall region in its entirety. Similarly, if the socioeconomic and cultural differences between northern and southern Rwanda are of interest, then it may be advantageous to create one large northern region by combining the northwestern and north-central zones, and a unified southern region by merging the two corresponding zones to the south.

A recent analysis of how Rwandan farming systems have been influenced by variations in regional population density (1) demonstrates still another useful way in which these zones can be combined. According to the 1980 Census estimates of population density (6, p. 15) the two most densely populated regions are in south-central Rwanda in the area of Butare and in the northwestern communes near Gisenyi and Ruhengeri. The concentration of population in these areas varies from about 300 to 375 persons per square kilometer of available land (3). When combined these areas comprise the country's high density region. The medium density region is formed by merging communes in the southwest and north-central parts of the country. Population density in these areas ranges from 200-300 persons per square kilometer. The eastern portion of the country is viewed as Rwanda's low density region since the number of persons per square kilometer there is in the 125-225 range, roughly half that of the high density region.

2. An Empirical Test

As mentioned earlier, for a regional classification scheme to be meaningful and effective for analytical purposes it must maximize variation in ecological conditions and farming systems among different regions while minimizing such variation within each region. The present 5-zone breakdown is analyzed in terms of its between-zone and within-zone variation using data collected during the implementation of the Rwanda Agricultural Survey and Analysis Project. This project was jointly sponsored by the Rwandan Ministry of Agriculture and the U.S. Agency for International Development (USAID). The zones are first compared on their average altitude and rainfall, the two primary ecological variables on which the zones are based. Then, in order to examine the extent to which the zones differ in the types of farming systems they support, 25 key farm characteristics are compared across the 5 zones. Farm size, land fragmentation, crop production (for 12 major crops), household size, and livestock ownership are among the characteristics compared.

Table 2 summarizes the results of the regional comparison of means. The first column of the table lists the particular farm household characteristics to be

analyzed. Reported next are the mean values for each of the 5 zones. The two columns under the general heading "Mean Squares" are the average squared deviations from the mean first between zones and then within zones. The purpose of this analysis of variance is to determine the extent to which variation between the five zones exceeds variation within the zones. The ratio of between-zone to within-zone variations is reported in the "F Ratio" column. An F ratio of 1.0 for a given characteristic indicates that there is as much variation within zones as between them or, in other words, that the zones are unsuccessful at explaining variation in that particular characteristic. However, where mean values for a given characteristic actually do differ from one zone to the next, between-zone variation will ordinarily be larger than within-zone variation. Under these circumstances the F Ratio will be greater than 1.0. Statistical significance is reported in the last column to the right indicating the probability that the observed difference in means, and the resulting F ratio, are simply due to sampling error.

The sample for the National Agriculture Survey was drawn using a multi-stage cluster design in which 2,100 farm households were selected and interviewed in depth. To compensate for the fact that the analysis of variance assumes simple random sampling, a more stringent criterion for assessing the statistical significance ($p \leq .025$) is adopted as the standard, with all values off falling at or above this level being considered significant. Under the .025 criterion, the probability of falsely making a claim for statistical significance is only 1 in 40, compared to the more liberal (and conventional) criterion of .05 in which the probability of making a false claim is doubled, or 1 in 20.

Altitude and rainfall are two principal characteristics of any farm's agro-ecology. Compared across agro-ecological zones both altitude and rainfall show highly significant differences. The expected general pattern of higher altitude and rainfall in the western zones, dropping off to increasingly lower levels in the central and eastern zones, is supported for the most part. One exception to this pattern is that the altitude of farms in the southwestern zone is actually slightly less than that of farms in the north-central zone due largely to the fact that the low altitude Imbo valley falls into the southwestern zone.

The amount of land farmers operate and the degree to which that land is fragmented into smaller parcels are integral features of Rwandan farming systems. Averaging 1.21 hectares divided into approximately 5 distinct parcels, farms show considerable variation in these characteristics from one zone to the next. Farm size varies from just under 1 hectare in the northwestern zone to 1.61 hectares in the east. Though it was expected that the general pattern of farm size and land fragmentation would reflect regional variations in population density, (the two highest density areas in Rwanda being, as mentioned earlier, in the northwest near Gisenyi and Ruhengeri and in the south-central zone, notably in the vicinity of Butare), such does not appear to be the case. Throughout the western and central zones, farmers operate roughly the same amount of land, just upward of 1 hectare each. Farmers in the east, however, differ from all others in that their average farm size is at least 50 % higher than the average for farmers elsewhere. The problem of land fragmentation appears to be most severe in the two northern zones, where farms are broken up into an average of about 6.3 parcels. The two southern zones are next with an average of 5.2 parcels per farm, and farms in the low-density eastern zones, as anticipated, are the least fragmented of all, averaging 3.4 parcels each.

Turning to three important characteristics of the farm population — age of the head of household, the total number of persons in the household, and the number of working-age persons (15-64 years) in the household — a regional comparison is of only marginal utility in helping explain variation in these household characteristics. The data suggest that Rwanda's farm population is relatively homogeneous, as no notable differences are found among the five agro-ecological zones. The average age of heads of households in Rwanda is 43.6 years; regional deviations from this figure are no more than 2.2 years in either direction. The number of persons per household is similarly invariant, ranging from 4.9 to 5.2. And for working adults, the number per household ranges from 2.3 to 2.6, a negligible difference.

In the area of crop production the data show considerable regional variation. All 12 major crops were found to have significant differences from one zone to another. In large measure, crop production seems to vary according to either altitude or rainfall. Crops that conforms to variations in rainfall area beans, sorghum, and bananas. Production of these three important subsistence crops is lowest among farm households in the high rainfall western zones and increases significantly among households in the central and eastern portions of the country. Other crops, such as manioc, peanuts and wheat appear to be linked to variations in altitude, though not all in the same way. Manioc and peanuts are produced in large amounts among households in the lower, southern and eastern zones. As altitude increases, production of these crops decreases. Conversely, wheat is most often produced in the high altitude areas of the north and seldom produced elsewhere. Other crops are produced predominantly in the northern climate, but do not seem to maintain a close linear association with altitude are corn, peas and potatoes. Potatoes are particularly concentrated in the northwest where farms produce over 1100 kg. per year on average; farmers average barely 60 kg. of potatoes per year outside of the northwest.

TABLE 2.

Comparison of means for five zones across selected characteristics

Household Characteristic	Agro-ecological Zone					Mean Squares			
	North-west (N=292)	South-west (N=348)	North-central (N=497)	South-central (N=444)	East (N=500)	Between Zones	Within Zones	F Ratio	Sig.
Altitudes (meters)	2,093	1,783	1,871	1,692	1,487	19,850,968	37,043	535.9	<.0001
Rainfall (mm)	1,382	1,435	1,193	1,181	996	13,549,637	13,982	969.1	<.0001
Size of farm (ha)	0.99	1.08	1.08	1.15	1.61	295,548	12,507	23.6	<.0001
Number of parcels	6.0	4.6	6.4	5.8	3.4	729	9.7	75.1	<.0001
Age of head	42	43	44	46	42	1,506	241	6.3	<.0001
Size of Household	4.9	4.9	4.9	5.0	5.2	4.74	5.36	0.9	.4731
Number of persons aged 15-64	2.4	2.5	2.3	2.6	2.5	5.72	1.61	3.5	.0069
Production* (in kg)									
Beans	153.4	156.1	204.2	237.1	349.2	2,554,747	36,122	70.7	<.0001
Soybeans	0.8	9.1	4.9	3.2	2.6	1,938	202	9.6	<.0001
Peas	23.0	6.3	15.3	7.4	7.8	17,830	1,282	13.9	<.0001
Manioc	74.8	267.5	192.7	389.0	461.1	11,071,148	177,854	62.2	<.0001
Potatoes	1141.8	33.5	45.4	51.5	75.5	82,319,259	856,851	96.1	<.0001
Sweat Potatoes	389.3	662.0	849.6	824.2	510.5	17,970,518	309,653	58.0	<.0001
Wheat	8.4	0.7	6.0	0.0	0.0	6,734	488	13.8	<.0001
Sorghum	62.5	40.1	87.3	165.0	341.0	6,060,282	67,419	89.9	<.0001
Peanuts	0.0	6.5	1.1	11.1	39.4	129,247	1,905	67.8	<.0001
Corn	363.1	74.6	62.5	23.2	46.1	4,968,122	40,401	123.0	<.0001
Bananas	951.6	1342.9	1362.4	1571.3	3174.2	341,092,972	3,455,958	98.7	<.0001
Coffee	17.6	60.5	20.9	32.9	33.0	120,197	4,825	24.9	<.0001
Total production (in millions of kcals)	3.47	2.48	2.92	3.36	5.12	439,979	5,937	74.1	<.0001
Production (in Kcals per person-day)	2,129	1,602	1,848	2,086	3,158	148,882	2,896	51.4	<.0001
Number of livestock per household									
Cattle	0.82	0.46	0.52	1.05	0.88	26.4	3.4	7.8	<.0001
Pigs	0.05	0.32	0.14	0.40	0.12	9.6	0.7	13.8	<.0001
Sheep	0.68	0.23	0.96	0.41	0.21	53.0	1.5	35.4	<.0001
Goats	1.86	1.74	1.36	1.37	3.26	66.6	5.0	13.3	<.0001

* Average production per household.

The two remaining subsistence crops in Table 2 are sweet potatoes and soybeans. Though produced in large quantity throughout the country, sweet potatoes are exceptionally abundant in the two central zones; sweet potatoes are produced the least in the northwest, where potatoes are the more important tuber. Soybeans are clearly a secondary crop in Rwanda. Even in the southwest zone, where the soybean harvest is most abundant, farms average only 9.1 kg per year. Coffee, exclusively a cash crop in Rwanda, is produced throughout the country but, like soybeans, is produced in the southwest zone more than anywhere else.

By converting the production of individual crops into their caloric values and then aggregating these values at the household level, a standardized measure of total production can be obtained. Though crop production has been shown to vary considerably for many crops when viewed individually, regional differences in total crop production are generally less extreme. This finding is quite understandable since households in a given region will often compensate for a deficiency in one crop with the cultivation of another. For example, it is not surprising to find that in the eastern zone where the production of potatoes and sweet potatoes is low, the production of manioc is high. Nevertheless, even total production varies some by zone. Shown in Table 2 are total production figures in millions of kilocalories and production of kilocalories per person-day. Not surprisingly, the eastern zone stands out from the rest in both total and per capita production. It was observed earlier that the households in this eastern zone also operate considerably larger farms than do households in other parts of the country.

Table 2 ends with a regional comparison of livestock ownership. The data show significant regional variation in all four categories of livestock: cows, pigs, sheep and goats. Looking first at cows, the average number per household is .75 head. This figure ranges from .46 in the southwest to 1.05 among households in the south-central zone. Compared to the distribution of cattle in Rwanda, pigs are both fewer in number and heavily concentrated in the two southern zones where they were first introduced.

While farmers in the two northern zones are not strong producers of cattle or pigs, the data indicate that the average number of sheep they raise there is 2 or 3 times that of farmers living in other parts of the country. Goats are the most widely held type of livestock in Rwanda and it appears that this finding holds in all of the country's agro-ecological zones. Only one zone, the eastern zone, stands out from the others because of the prevalence of goats raised by households there. There do not appear to be any consistent patterns of east-west or north-south differences in the ownership of goats in Rwanda.

3. Conclusion

In conclusion, this paper has addressed the need for a regional classification scheme that is 1) analytically more manageable than existing classifications, and 2) capable of distinguishing farming systems of northern Rwanda from those of the south. In reviewing data collected during the Rwanda Agriculture Survey and Analysis Project, it has been demonstrated that the proposed 5-zone classification scheme can be quite effective at capturing major regional variations in Rwandan farming systems. Farm size, land fragmentation, crop production, and livestock ownership are among the farm characteristics that showed significant differences from one zone to the next. Characteristics of the farm population, on the other hand, showed considerable homogeneity both within and between the proposed zones. Among characteristics that did vary regionally, there was no dominant pattern to these variations. Certain characteristics seemed to vary mostly from east to west along with altitude and rainfall, while other characteristics varied largely from north to south or as a function of regional population densities.

It must be recognized, however, that despite its apparent effectiveness in illuminating certain regional differences in farming systems, the 5-zone breakdown presented here represents only one small step forward in the process of regional classification in Rwanda. The data reviewed here reflect but a small fraction of the multitude of social, economic, cultural and environmental characteristics that comprise farming systems in Rwanda. There is a clear need for further application, refinement and expansion in the proposed classification, particularly in the areas of soil type, soil fertility and other information compiled through extensive pedological research. Current efforts by the Ministry of Agriculture, such as the "Carte Pédologique du Rwanda", will undoubtedly go a long way toward establishing a more solid agronomic foundation to work developed here.

Furthermore, this analysis has demonstrated only how farming systems can vary among zones, not how the unique agro-ecological and socioeconomic circumstances that comprise the different zones actually give rise, in a causal sense, to the development of regionally distinct farming systems. Spelling out the causal linkages between regional contexts and particular farm-level characteristics is another fertile area for agricultural research. In the meantime, however, it is hoped by researchers at the "Service des Enquêtes et des Statistiques" (SESA) that this discussion will serve as an open invitation and as a useful point of departure for a multidisciplinary dialogue aimed at improving regional classification in Rwanda in years to come.

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