Appendix 1

Agricultural Statistics in Zambia: Institutional Arrangements for their Production and Use

by

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LIST OF ACRONYMS

ACF	Agricultural Consultative Forum
AMIC	Agricultural Market Information Center
AMIS	Agricultural Market Information System
ASIP	Agricultural Sector Investment Program
ASMIS	Agricultural Statistics Management's Information System
CFS	Crop Forecast Survey
CPI	Consumer Price Index
CSA	Census Supervisory Areas
CSO	Central Statistical Office
DRC	Democratic Republic of the Congo
FANR	Food, Agriculture and Natural Resources
FAO	Food and Agriculture Organization of the United Nations
FBS	Food Balance Sheet
FEWSNET	Famine Early Warning System Network
FHANIS	Food, Health and Nutrition Information System
FNDP	Fifth National Development Plan
FRA	Food Reserve Agency
FSRP/MSU	Food Security Research Project/Michigan State University
GART	Golden Valley Agricultural Research Trust
GOZ	Government of Zambia
HIV/AIDS	Human Immunodeficiency Virus/ Acquired ImmunoDeficiency Syndrome
IMF	International Monetary Fund
INESOR	Institute of Economic and Social Research
InWEnt	Internationale Weiterbildung und Entwicklung gGmbH (German Capacity Building Center)
IRIN	Humanitarian news and analysis service of the UN Office for the Coordination of Humanitarian Affairs
LCMS	Living Conditions Monitoring Surveys
M&E	Monitoring and evaluation
MACO	Ministry of Agriculture and Cooperatives (formerly MAFF)
MAFF	Ministry of Agriculture, Forestry and Fisheries (now MACO)
MIS	Market Information System
MOA	Ministry of Agriculture
NEPAD	New Partnership for Africa's Development
NEWU	National Early Warning Unit
PHS	Post-Harvest Survey
SADC	Southern Africa Development Community
SARCOF	Southern African Regional Climate Outlook Forum
SEA	Standard Enumeration Areas
SS	Supplementary Survey to the Post-Harvest Survey
USAID	United States Agency for International Development
WFP	World Food Program
ZARI	Zambian Agricultural Research Institute
ZMD	Zambian Meteorological Department
ZNFU	Zambian National Farmers Union
ZVAC	Zambia Vulnerability Assessment Committe

1. INTRODUCTION: AN OVERVIEW OF WHO DOES WHAT AND HOW THEY ARE ORGANIZED

There are two key sources of agricultural statistics in Zambia: The Central Statistical Office (CSO) and the Ministry of Agriculture and Cooperatives (MACO)[1]. In addition, there are a number of actors who collect data and provide information to CSO and/or MACO for use in various types of reports and analyses; many of these actors are also users of statistics produced by CSO and MACO. This group of main actors includes the:

- Zambian Meteorological Department;
- Zambian National Farmers Union (ZNFU);
- Food Security Research Project managed by Michigan State University (FSRP/MSU);
- Agricultural Market Information Center (AMIC);
- Zambia Vulnerability Assessment Committee (ZVAC);
- Food Reserve Agency (FRA);
- The Cotton Development Trust and the Tobacco Association of Zambia; and
- Export Board of Zambia.

Since independence in 1964, Zambia has had a centralized statistical service with responsibility for a wide range of national statistical needs. The CSO is now headquartered in the Planning Division, which is attached to the Office of the President, and maintains a staff of statisticians at the Provincial level as well. CSO's mission is to "provide for a comprehensive National Statistical Database yielding timely, relevant and high quality statistical information to institutions of the Government, private sector and the wider national and international community" (CSO 2007a).

In 1993, CSO created three subject matter branches, one of which focuses on agriculture and the environment; the other two cover economic statistics and social statistics, and there is a technical branch for over-reaching technical issues, such as mapping. When agricultural statistics are viewed in a narrow sense (primarily crop production and food security), the Agriculture and Environment Branch bears the primary responsibility for data collection and reporting. It is the Branch that conducts the two most important annual surveys: the Crop Forecast Survey (CFS) and the Post-Harvest Survey (PHS). Since 1996 and the establishment of the Agricultural Sector Investment Programme (ASIP), CSO does this work under contract to MACO each year. This annual contract arrangement provides MACO with an opportunity to interact with CSO and jointly make decisions about survey content, sampling, and implementation issues. The economic and social branches also produce statistics of relevance to the agricultural sector (e.g., the national census, the economic census, poverty assessments, living standards studies, etc.).

The Policy and Planning Department of MACO is the key actor in terms of determining what types of data and information are collected in the annual surveys conducted by CSO. They also have a major responsibility for collecting supplemental information through the monitoring and evaluation activities of the extension service, and for policy analysis and dissemination of results. Both the Policy and Statistics and the Program Planning, Monitoring and Evaluation branches of MACO are involved. The Policy and Statistics branch includes three units: Agricultural Statistics, Early Warning, and Policy Formulation.

[1] Formerly the Ministry of Agriculture, Forestry and Fisheries (MAFF).

Table 1 presents a list of seven types of surveys of direct relevance to the agricultural sector that have been conducted during the previous 30 years by CSO and/or the Ministry. In addition to the annual CFS and PHS, there has been a series of supplemental surveys attached to the PHS conducted in conjunction with the Food Security Research Project (FSRP) of Michigan State University (MSU), Living Conditions Monitoring Surveys (LCMS), Food Health and Nutrition Information System (FHANIS) monitoring, a Census of Agriculture, and the general Census of Population and Housing. In a new activity, an Economic Census is planned for 2007 and will include an agricultural component. The table summarizes information on the time periods covered by the surveys, changes over time, crops and other agricultural activities covered by each, type of farms covered (small, medium, or large scale), types of information collected, and key characteristics of the sample design.[2]

The next section of the report presents more details on these survey efforts; but we do want to signal here that the CFS has proven to be the most difficult to manage institutionally and politically. The existence of many actors other than CSO who are collecting information and using it to make preliminary crop forecasts before the official CSO results become available contributes to the management difficulties. Although there is one official CFS coming from the CSO (there were two until 1989/1990: one preliminary in December and one final in March), MACO's field staff continue to conduct monthly monitoring of local livestock and crop development trends using non-survey techniques. MACO National Early Warning Unit (NEWU) combines this information with data and analyses from the Meteorological Department to develop MACO preliminary forecasts that are released before the CFS becomes available. ZNFU also collects data and makes a preliminary crop forecast that is focused on maize. In addition, when there are potential crises, the ZVAC, with strong support from regional and international collaborators, conducts surveys using mixed methods, including CSO-developed household surveys, but usually limited to selected areas of the country (Tango International 2005). When all these actors work together to develop a joint preliminary forecast and this forecast is in line with the CSO forecast, all is well. When there is a lack of coordination or different results due to different methods of data collection being used, the danger of political interference increases as well as the danger of inappropriate policy decisions made by the Government and donors. Zambia experienced problems of this nature in 1998/1999 and more recently in 2005 (see Box 1).

Although the field of participants in Zambian agricultural statistics is broader than the CSO and MACO, these two institutions are presently the key agents for developing a combined strategy for a solid agricultural statistics program, so the rest of this report focuses heavily on their activities and how they link to those of others. Section 2 assesses the strengths and weaknesses of the full range of actors involved, what they contribute in terms of data and analyses, the methods they use, and how they coordinate with other actors. Section 3 addresses staffing, budget, and information dissemination issues for CSO and MACO. Section 4 summarizes the principle problems identified and makes recommendations for improvements. Section 5 considers the relevance of the Zambian experience for other agricultural statistics systems in Africa, with particular attention to the institutional organization of the system and how it affects (1) access to resources and (2) interactions with policy makers.

[2] There are other examples of CSO work that have some relevance to agriculture and rural development in general that are not mentioned in Table 1. Recent examples include: Employment and Earnings Inquiry Report January 2006; National Accounts Statistics Bulletin No.9 2005; Selected Socio-Economic Indicators 2004 – 2005; Labour-Force Survey Report 2005; and Zambia Sexual Behaviour Survey 2005.

Box 1

Political and Economic Fallout from Incorrect Crop Forecasting

For the cropping year 1997/1998, there were early predictions of widespread drought due to indications of a strong El Nino effect, similar to the events in 1991/1992 when crop production was dramatically reduced throughout Southern Africa. With the threat of drought and the fear of famine conditions due to production shortfalls, the Southern Africa Development Community (SADC) invested in the Southern African Regional Climate Outlook Forum.

As the season progressed, the predicted effects did not materialize, as seen in the remote sensing analysis (Kafuli et al. 1999). However, as Kafuli et al, documented, the CSO Crop Forecast came out with 7.1 Million bags of maize produced, compared to the 1992-97 average of 11.5 million bags. ZNFU polled its members and then estimated 6.8 million bags. Due to the earlier predictions of possible disaster, an FAO Mission was called in during late April-early May, and their forecast was even less, 6.1 million bags, due to reduced planted area and reduced yields in drought areas.

Having taken to heart the predictions of crop failure from the early climate models, Zambian politicians and donors in the food aid community arranged for large food aid supplies to avoid disaster, but they failed to review their decisions in light of the official CSO CFS results, which in hindsight proved to be fairly accurate. The failure to rely on them led to excess imports of food aid, but the debates delayed the decision-making such that the food aid was still arriving during the following good harvest. The food aid donors and government were blamed for difficulties in the market (low producer prices in particular) due to the unnecessary supplies made available. "What stands out most is that the 1997/98 crop forecasting system failed to send clear, time-bound messages needed to formulate an appropriate response….the 1997/98 forecasting exercise was marked by confusing and often contradictory reports, late delivery of essential information and little attention to important methodological issues" (Kafuli et al. 1999, p.75).

In 2004/2005, Mwanaumo et al. (2005) document the missteps and miscalculations that led the government to a situation of conflict with the private sector and donors. Once again, the crop forecasting results were questioned and various actors developed different estimates. The debate delayed decisions and, as in 1998, there were repercussions for farmers, traders and consumers.

Table 1. Agricultural Data Available in Zambia

	MACO Preliminary Crop Forecast Survey (CFS)	**CSO Crop Forecast Survey (CSO CFS)**	**Post Harvest Survey (PHS)**	**Post Harvest Survey (PHS)**	**Supplemental Surveys to the Post-Harvest Survey**	**Price Information:** **CSO**	**Price Information:** **MACO**	**Census of Agriculture**
Time Frame	1970/71 to present, conducted in Feb-March	1970/71 to present. Ministry of Agriculture, Forestry and Fisheries (MAFF) & CSO started conducting a joint CFS in 1989/90 through to present day. Previously there were two "crop forecasts". One from CSO and another from MAFF. Ideally conducted in March-May each year, but variable w/ funding	Annually following 1970/71 Agricultural Census, with the exception of the 1977/78 to 1982/83. Following 1990/92 Census, new sample frame with annual surveys.	Annually following 1970/71 Agricultural Census, with the exception of the 1977/78 to 1982/83. Following 1990/92 Census, new sample frame with annual surveys.	2000 and 2004. Panel data following the households from the 1999/2000 PHS sample.	Monthly monitoring in provincial capitals, 1994 – present	Data are collected weekly in each district center in country, but AMIC only reports data in two week intervals,	Census of Agriculture 1970/71 and 1990/92; Ag sector portion of Economic Census 2007 will considered new Ag Census
Crops Covered & other Agricultural activities	Eight main crops: Maize, rice, sorghum, millet, wheat , sweet and Irish potatoes, and cassava	Maize, rice, sorghum, millet, sunflower, groundnuts, soyabeans, seed cotton, Irish potatoes, Virginia tobacco, Burley tobacco, mixed beans, velvet beans, Bambara nuts, cowpeas, cassava, sweet potatoes, paprika, castor beans, coffee, kenaf, cashew nuts, pineapples. Wheat is added to the list for Large-scale producers only	Maize, rice, sorghum, millet, sunflower, groundnuts, soyabeans, seed cotton, Irish potatoes, Virginia tobacco, Burley tobacco, mixed beans, velvet beans, Bambara nuts, cassava, sweet potatoes, paprika. In 1999/2000, vegetables and fruits were included Livestock & poultry	Maize, rice, sorghum, millet, sunflower, groundnuts, soyabeans, seed cotton, Irish potatoes, Virginia tobacco, Burley tobacco, mixed beans, velvet beans, Bambara nuts, cassava, sweet potatoes, paprika. In 1999/2000, vegetables and fruits were included Livestock & poultry	All crops included in PHS, plus more information on cropping practices at field level; production and income from livestock products, fruits, vegetables	Maize, and maize meals, wheat, sorghum, millet, rice, bread flour, beans, cassava, Irish and sweet potatoes, soybeans, groundnuts Also, maize hammermilling costs, fertilizers and seeds for maize, groundnuts, sunflower, soybeans	Maize, and maize meals, wheat, sorghum, millet, rice, bread flour, beans, cassava, Irish and sweet potatoes, soybeans, groundnuts Also fertilizers and seeds for maize, groundnuts, sunflower, soybeans	All crops and livestock covered, as well as fisheries

	MACO Preliminary Crop Forecast Survey (CFS)	CSO Crop Forecast Survey (CSO CFS)	Post Harvest Survey (PHS)	Post Harvest Survey (PHS)	Supplemental Surveys to the Post-Harvest Survey	Price Information: CSO	Price Information: MACO	Census of Agriculture
Sectors Covered	Small, medium and large scale production	Large scale, medium scale & small scale	Medium scale and small scale with one survey instrument; large scale with separate survey instrument	Medium scale and small scale with one survey instrument; large scale with separate survey instrument	Medium scale and small scale	Private sector trader prices	Public market prices	Ag households only
Types of Information	Estimates of land cultivated, total production and yields	Content has evolved. Generally crop production, projected sales, retention. fertilizer and seed source in 2004/2005; input use and tillage added in 2005/2006. Detailed cassava processing and marketing components added in 2005/2006.	Crop production, sales, retention, purchase & sales of input, labor input by crop	Crop production, sales, retention, purchase & sales of input, labor input by crop	PHS information, plus demographic characteristics, migration, education, income generating activities, asset ownership, access to services	Retail prices	Retail, wholesale prices (into-mill prices until 2000)	Production and area for all crops; land use; stock of livestock as well as use, loss, and acquisition numbers (using PHS instruments)
Sampling Design	Statistical sampling not used., rather estimates made from District Agricultural Coordinating Officers (DACOs), based on their expert assessment and administrative records of producers	Through 2002/2003, approximately 8,000 households stratified into small, & medium scale, with full enumeration for large scale. In 2004, 14,000 small and medium scale households.	Approximately 8,000 households stratified into small and medium scale; full enumeration for large-scale	Approximately 8,000 households stratified into small and medium scale; full enumeration for large-scale	Panel data based on 1999/2000 PHS sample, about 8,000 households. In 2004 SS, about 6,400 households (overall attrition of 17% from 2000 SS sample)	identified formal sector agents in provincial capitals	Identified public markets in district centers, (but only provincial capitals maintained in database)	Sample for 2007 is projected to be 40,000 hhs

Source: Authors' table, based upon Zulu, Ballard, J.J. Nijhoff, T.S. Jayne, and Asfaw Negassa. 2000. Is the Glass Half-Empty or Half Full? An Analysis of Agricultural Production Trends in Zambia. FSRP Working Paper No. 3. Lusaka: Food Security Research Project (FSRP), Michigan State University.

Table 1 Agricultural Data Available in Zambia (continued)

	Census of Population and Housing	**Living Conditions Monitoring Survey (LCMS)**	**Food Health & Nutrition Information System (FHANIS)**
Time Frame	2000; next one programmed in 2010	LCMS III (2002/2003); LCMS II (1998), the LCMS I (1996), as well as Social Dimensions of Adjustment Priority Surveys in 1991 (PS I) and 1993 (PS II)	Variable: Bimonthly and Quarterly (but discontinued 1999/2003, re-started in 2004) (funding dependent and not regular)
Crops Covered & other Agricultural activities	Small section, with yes/no "practice" on a set of 19 food and cash crops and on 6 types of livestock/poultry, as well as fish farming	Cassava, millet, maize, sorghum. Livestock and poultry	None
Sectors Covered	Demographics, Assets, income activities, agriculture (small)	Rural and urban household level-subdivisions of small, medium & large scale although considered only for rural households is not used in the reporting	Rural and urban households for consumption and expenditure

	Census of Population and Housing	**Living Conditions Monitoring Survey (LCMS)**	**Food Health & Nutrition Information System (FHANIS)**
Types of Information	Basic population and housing data, ag sector participation, income activities, migration, fertility, mortality, education	Food production, demographic characteristics, migration, education, health, income generating activities	Monitoring of Household Food Security, Health and Nutrition in Urban and Rural Areas: employment, expenditures, food prices, house ownership and mobility, savings, food consumption, water & sanitation, health, nutrition,
Sampling Design	Full enumeration census, all households in country, urban and rural	16,710 households (8487 rural & 8223 urban)	Urban and rural households (sample numbers variable)

Source: Authors' table, based upon Zulu et al. 2000, with additions from Mayaka 2002.

2. STRENGTHS AND WEAKNESSES OF KEY AGRICULTURAL STATISTICS PRODUCERS AND PRODUCTS

This section takes on the ambitious task of describing the key actors in Zambia's agricultural statistics system, describing the types of data and information they produce, and assessing the general strengths and weaknesses of the actors and their products. The section begins with a discussion of the CSO census work that underlies all other statistical work in Zambia. It then describes MACO monitoring and evaluation activities, which are used primarily for preliminary crop assessments prior to the release of the official CFS results. The joint MACO/CSO effort on the CFS and the PHS is addressed next as it is closely related to the MACO Monitoring and Evaluation (M&E) in terms of content and use. This is followed by a discussion of the multiple actors mentioned in the introduction who are involved in crop forecasts and food security assessments. The remaining sections look at actors involved in supplemental activities in MACO that are not yet permanent components of the system (FSRP/MSU and Agricultural Consultative Forum , ACF) and key actors from other government services, research institutes, or the private sector who provide and/or use statistics of relevance to agriculture.

2.1. Agriculture Coverage in National Census Data

There are three national census of relevance to the agricultural sector:

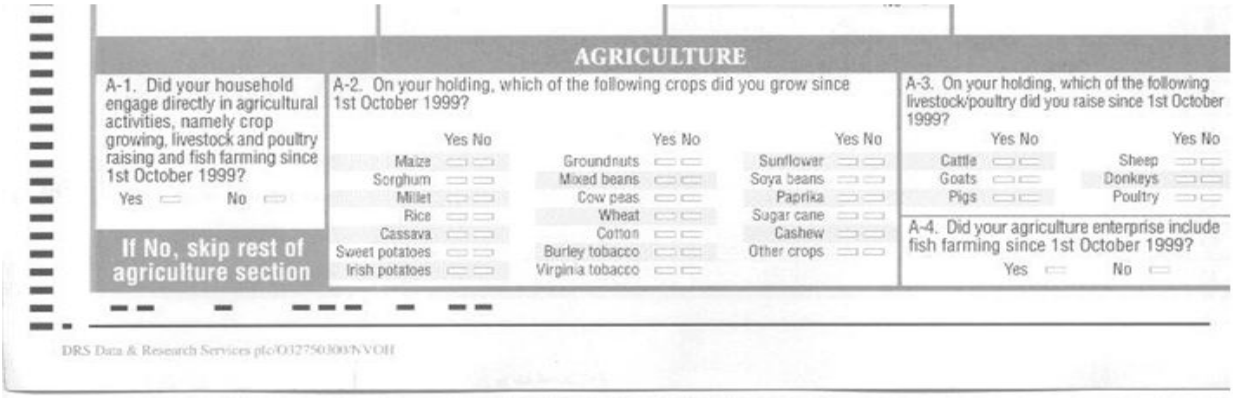
- Population and Housing Census
- Census of Agriculture
- Economic Census

The most recent general census of Population and Housing was conducted in 2000 and was a full enumeration census. This general Census included basic agriculture indicators, used to establish a new sample frame to provide more accurate estimates of agricultural and livestock production in Zambia (Megill 2003) and the specifically agricultural content is indicated in Figure 1.

There has been no specific Census of Agriculture since 1990/92; the plan is to use the Economic Census of 2007 to fill the gap. The Economic Census of 2007 is a new survey proposed to cover each basic economic sector. It is designed to establish the new benchmarks for economic activities to be assessed against the goals in the Fifth National Development Plan (FNDP). According to the May 2007 Bulletin of CSO (page 1), the specific objectives of the Economic Census are:

a. "To measure the full value added (GDP) of the Zambian economy;
b. To provide data which will enable the CSO to compile a full set of national accounts (input-output tables, Gross Fixed Capital formation, Investment, etc);
c. To measure the true extent of investment in Zambia, both foreign and domestic;
d. To provide a basis for setting up Balance of Payments statistics;
e. To provide a basis for the production of different kinds of Economic Statistics (Producer Price Index, Index of Industrial Production, etc.); and
f. To provide a comprehensive frame of establishments for all economic surveys."

Figure 1. Zambia Census of Population and Housing 2000: Agriculture Section (Page 2)



AGRICULTURE

A-1. Did your household engage directly in agricultural activities, namely crop growing, livestock and poultry raising and fish farming since 1st October 1999?

Yes ☐ No ☐

If No, skip rest of agriculture section

A-2. On your holding, which of the following crops did you grow since 1st October 1999?

	Yes	No		Yes	No		Yes	No
Maize	☐	☐	Groundnuts	☐	☐	Sunflower	☐	☐
Sorghum	☐	☐	Mixed beans	☐	☐	Soya beans	☐	☐
Millet	☐	☐	Cow peas	☐	☐	Paprika	☐	☐
Rice	☐	☐	Wheat	☐	☐	Sugar cane	☐	☐
Cassava	☐	☐	Cotton	☐	☐	Cashew	☐	☐
Sweet potatoes	☐	☐	Burley tobacco	☐	☐	Other crops	☐	☐
Irish potatoes	☐	☐	Virginia tobacco	☐	☐			

A-3. On your holding, which of the following livestock/poultry did you raise since 1st October 1999?

	Yes	No		Yes	No
Cattle	☐	☐	Sheep	☐	☐
Goats	☐	☐	Donkeys	☐	☐
Pigs	☐	☐	Poultry	☐	☐

A-4. Did your agriculture enterprise include fish farming since 1st October 1999?

Yes ☐ No ☐

DRS Data & Research Services plc/0327503003/VOH

In looking forward to the monitoring and evaluation that will be required for the FNDP, participants at a 2007 workshop expressed concern about the capacity of the current MACO/CSO system for data collection and analyses to meet the challenge:

> "The fragmented efforts by the different institutions for data collection must be joined together in a methodologically harmonized and cohesive system. This means that common definitions and classifications should be applied, preferably in line with the requirements of the FNDP and the recommendations for MDG indicators" (InWent 2007).

The workshop report also recommended:

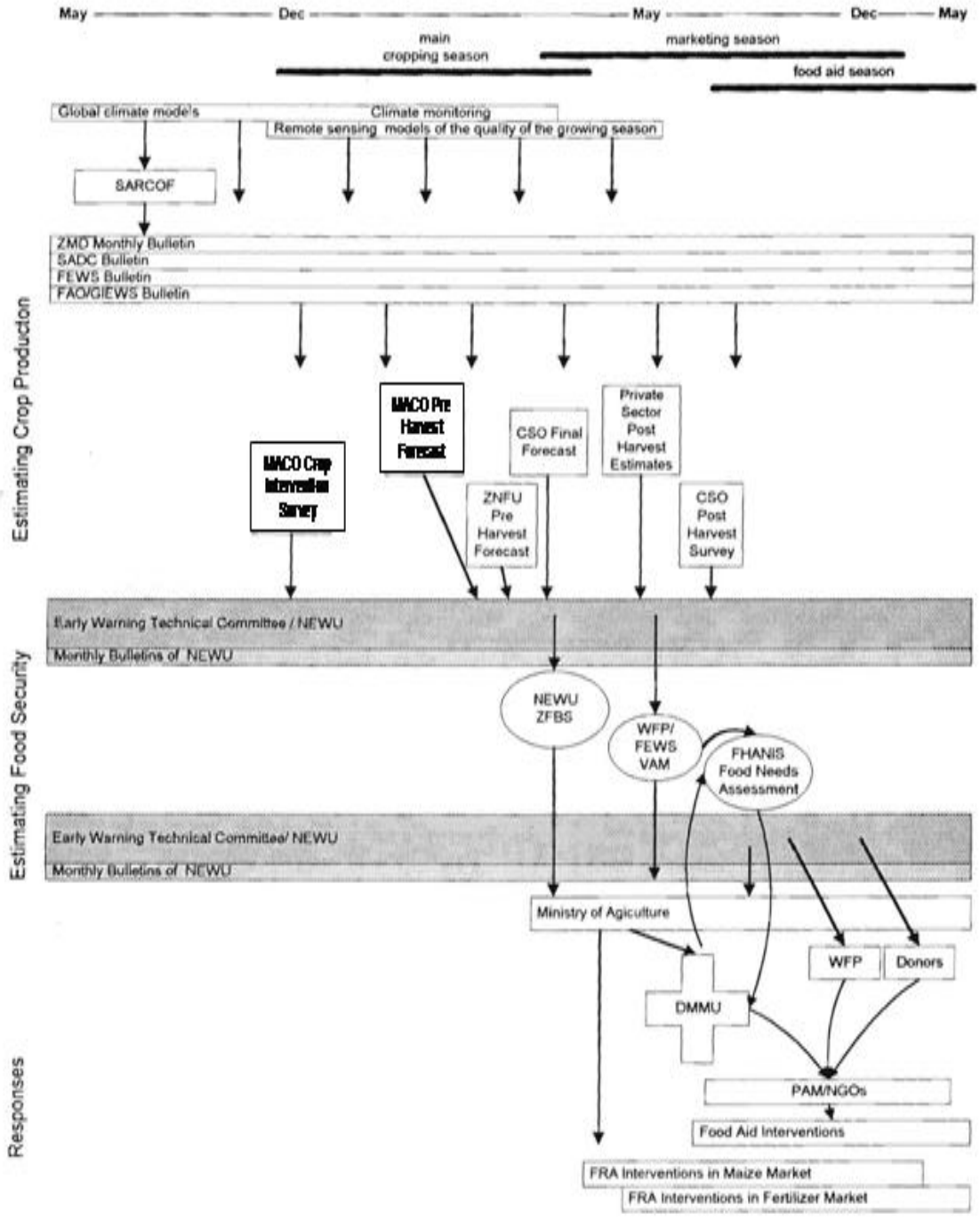
> …the establishment of a Sub-committee on FNDP Indicator Monitoring that would ensure the coordination between MACO and CSO to develop an information system that could respond to the need for the measurement of indicators for FNDP" (InWent 2007).

For the agricultural sector, the Proposal for the Economic Census indicates that there may be a new Post-Harvest Survey (PHS) conducted, with up to 40,000 households (PHS is currently 8,000, with possible expansion to 14,000). The results of this larger sample will be considered the Census of Agriculture and will be used to update the numbers from the previous Agricultural Census. The data collection will cover the crops in the PHS (see list in Table 1) and add more horticultural and fruit crops, as well as additional livestock products, in order to have a full agricultural sector baseline.

2.2. MACO Institutional Arrangements for Crop and Livestock Monitoring

The MACO extension system manages crop and livestock monitoring. It collects information needed for crop forecasting in a more rapid but less statistically rigorous manner than the surveys conducted by the CSO and described in the next section. The NEWU, assisted by the National Early Warning Technical Committee comprising a range of actors in the agricultural

Figure 2. Diagram of Major Flows of Information in the Zambian Crop Forecasting System



Source: Kafuli, D., T.J. Cusack, J.C. Keyser, G. Olesh, and J. Wright. 1999. Final Report of the MAFF/USAID Crop Forecasting Study: Understanding the Impact of Crop Forecasting on Public and Private Sector Decision-Making, and Improving Crop Forecasting Capacity in Zambia. Washington, DC: Associates in Rural Development RAISE Consortium.

sector and in disaster management, coordinates the field information to develop what is commonly referred to as the MACO Crop Forecast.[3] The results of the monitoring are expected in February-March and the NEWU uses it to establish a preliminary forecast. It is this forecast that appears in the Food Balance Sheets (FBS) until CSO's survey-based numbers from the CFS and later the PHS are available. Figure 2 diagrams the flows of information and helps one understand how the Ministry M&E activities fit into the general information channeling that occurs with the Zambian crop forecasting and food security system. MACO's Policy and Planning Department has the ultimate responsibility to bring all this information together to advise the Minister, the President, and Parliament. The system is evolving and currently, MACO intends to have CSO conduct a CFS in March each year with a sample of 14,000 households and the first such exercise was completed for 2006/2007.

In the 1980s, the field monitoring by MACO staff was to cover all farm households (full enumeration), but by 1990 it was clear that such a system was not workable. Staff were taking shortcuts that resulted in unreliable reporting. MACO shifted to sampling methods for the monitoring, but evaluators in 1998 were unable to assess how these were being applied in the field (Kafuli et al. 1999). The Food and Agriculture Organization of the United Nations (FAO) supported monthly field monitoring from 1998-2003, but it has been irregular since then.

The extension system that collects the M&E information is hierarchically and geographically organized. Information flows from camps (about 1500 nationally) which are grouped into blocks (ten camps to a block) that are located within administrative Districts (about six blocks per District). A camp officer is assigned to each camp. They report to Block Supervisors, who report to the District and the Provincial Agricultural Officers. These officers are jointly responsible for field monitoring all agricultural activities in their areas, and conducting rapid appraisals when needed. M&E information is gradually aggregated and reported at the District and/or Provincial levels. At the District and above, the administrative organization is comparable to that used for CSO and other data collection systems. Below the District level, however, the camps and blocks do not correspond to the Census Supervisory Areas (CSA) and Standard Enumeration Areas (SEA) used in CSO data collection systems and it is unclear what, if any, weighting system is used to aggregate the M&E data coming from the camps. We mention this because it may be a source of differences between CSO survey results and MACO M&E results (Tango International 2005). The extension system camps and blocks are selected to reflect homogeneous agricultural production areas whereas the CSA and SEA are selected to represent administrative sub-divisions.

The costs of the monitoring are fairly low, since this is conducted by local officials as a part of their job responsibilities; however in a recent workshop, participants from MACO and elsewhere indicated that the livestock sector was not adequately addressed. One critique was that crop specialists rather than livestock specialists reported the livestock numbers, resulting in questionable estimates (InWEnt 2007). Although the system lacks statistical rigor, it incorporates the knowledge of local specialists with a good grasp of changes over time. One of the issues noted in the recent workshop was that the data are not always available on a timely basis (InWEnt 2007), even though this system theoretically should produce timely results.

[3] MACO was formerly MAFF. The MAFF/MACO Crop Forecast should not be confused with the CSO Crop Forecast which is based on household surveys.

2.3. MACO/CSO Surveys: Crop Forecast and Post Harvest

2.3.1. Objectives and Types of Data Collected for CFS and PHS

MACO contracts the Crop Forecasting Survey (CFS) and the Post Harvest Survey (PHS) to CSO. Although sampling procedures for the two surveys are similar, sample sizes differ and the data collected with the CFS is designed to be collected in March with production estimates available by April or May for use in food security monitoring, while the PHS data are only available at the end of the season and sometimes not until the end of the year. The combined systems of CFS and PHS ideally meets the following objectives (CSO 1999):

> (i) provide annual agricultural data that helps to facilitate comprehensive analysis of the agricultural sector's contribution to the national economy, on an annual basis;
> (ii) develop the Agricultural Statistics Management's Information System (ASMIS) to a level such that it accommodates advances in information technology; and
> (iii) provide annual agricultural data that is useful for the generation of performance indicators to facilitate interventions.

Crops and activities covered by the CFS and PHS have expanded during the past decade. Prior to 1998, CFS collected data on maize, sorghum, paddy rice, millet, sunflowers, groundnuts, soybeans and mixed beans. Nonfood cash crops (cotton, burley tobacco, Virginia tobacco, paprika) were added in 1998, along with castor beans, bambara nuts, cowpeas, velvet beans, with wheat and barley for large-scale farmers only. Then in 1999, Irish potato, sweet potato and cassava were added. In the most recent CFS, coffee, kenaf, cashew, and pineapples were added. The PHS for small and medium scale farmers currently covers all the crops by the CFS in 1999 except wheat and barley (covered for large-scale farmers only); in addition, the PHS covers livestock and poultry.

CSO has also experimented with different field work approaches to collecting the CFS data in an effort to realize economies in resources and time. Beginning in 1997/98, the CFS for a coming year was timed to take place concurrently with the previous season's Post-Harvest Survey (PHS). Three implementation systems have been used: 1) CFS and PHS are separate exercises; 2) CFS is conducted at the same time that the listing is developed for the PHS; and 3) the CFS was conducted as a section of the PHS for the previous season, but the CFS was given priority for data entry and analysis over the PHS data. Currently, the timing of each survey is based on statistical and agronomic criteria, not on any link in activities. The CFS is conducted in March because it is viewed as the best time in the growing season prior to harvest in which a fairly good production estimate can be obtained. The PHS is conducted in August-September because the harvest is generally complete and the next season has not yet begun. The first two implementation systems noted above were the result of budget problems and timing of resource availability to conduct the surveys, and were seen as second-best options.

Figure 2 showed the two MACO/CSO forecasting surveys (preliminary in December and final in March) that MACO contracted CSO to conduct during most of the 1990s. Following problems with an inaccurate preliminary forecast during the 1998/1999 season (see Box 1), MACO and CSO moved to a single CSO Crop Forecasting Survey (CFS) that corresponds to

the final (March) Crop Forecast in Figure 2. MACO continues to conduct its own monitoring work to develop a preliminary forecast (here indicated as the MACO preliminary CFS), but that is not linked to the CSO CFS. Figure 2 also identifies a number of other actors in the crop forecasting process: The Meteorological Department, the National Early Warning Unit, the Food Reserves Agency, and the Vulnerability Assessment Committee. MACO/CSO work closely with most of these actors, whose individual roles are described in Section 2.4.

Given the objectives for the PHS, a core set of data has been collected through time, including production and area of food and cash crops, as well as livestock herds. [4] In most years, input use and quantities purchased were also included, sometimes at a field/crop level, but often at a general household level. Other information covered include crop management practices, household assets, and household demographics. The PHS instrument has been modified over time to respond to specific information needs. For example in 1997/98 and 1998/1999, a few questions were added concerning accessibility and use of the Rural Investment Funds.

"Prior to 2006, the Crop Forecasting data produced by CSO for the 12 major crops were used in National Accounts estimates produced by the CSO Economic Statistics Department, at least in part due to the more timely availability of the estimates. CFS numbers will continue to be used for initial estimates but the PHS numbers are now taken into account for the final results on the following crops: Maize, Sorghum, Rice, Sunflower, Soybeans, Groundnuts, Millet, Mixed Beans, Wheat, Cotton, Burley Tobacco and Virginia Tobacco" (CSO 2007b, p.4.)

2.3.2. Sampling and Data Quality Issues for CFS and PHS

In 1990 CSO moved to stratified, clustered sampling techniques for small and medium scale households for both the CFS and the PHS, significantly improving the statistical quality of the surveys. Prior estimates were based primarily on area and production estimates made by local MACO staff (Jayne et al. 2007). Improvements in sampling and data collection methods continued with the Agricultural Structural Adjustment Programme in the late 1990s and ASIP, both of which increased investments in agricultural information systems, providing more resources for the CSO Post-Harvest and Crop Forecasting systems.

The sampling focus of both CFS and PHS surveys is on the small and medium scale farmers. A full enumeration of large scale, commercial farmers is done separately and supplemented with information provided by the commercial farm sector. As noted by Mayaka (2002), the response rate has not been good and the results are not considered reliable. Changes were made in the data instrument to simplify the questions and the large-scale producer system is still undergoing changes to increase the response rate, through links with the private sector. It remains to be seen of the efforts will be successful as the system is still under development.

The sample frame for the small and medium farms was based on the 1990 Census through 2001/2002. Since 19992/93, the CFS and PHS sampling strategies have been similar in each period, although not the households. A continuing issue is the shifting sampling frame due to changes in administrative districts (increased from 57 to 72 following the 2000 census),

[4] Selected PHS survey instruments and modified "synthetic" instruments are available at http://www.aec.msu.edu/fs2/zambia/index.htm.

frequent changes in sampling strategies, and adjustments to get reliable population estimates. In 1995/96, for example, the CSA and SEA were both chosen with probability proportional to size while in other years they were selected randomly. For the 1999/2000 PHS, non-agricultural households were excluded at the listing stage rather than maintaining them in the sample, but then getting no agricultural information and terminating the interview on the first page. While results from the population census in 2000 permitted an updated sampling frame for the 2002/2003 season, several problems were encountered in the transition. The 2003 frame was based on the population estimates from the preliminary Census mapping rather than the final Census results, producing overestimates of the population (Megill 2005). Also, the subsequent classification of CSA and SEA as urban or rural in the CFS and PHS has not been consistent with the Census classifications, contributing to additional problems with population estimates. Furthermore, the frame is still being modified in an effort to obtain more robust estimates for crops that are important but grown in narrow geographic areas (see Box 2 for more details). In 2005/2006, the CFS sample was expanded from 6,000 to 14,000 households in order to respond to needs for district level information; the PHS stayed at 6,000 households. While the increased CFS sample size is intended to improve the accuracy of estimates, it has also increased the amount of time and resources needed to collect and analyze the data. Consequently, CSO has had trouble meeting their reporting deadlines; in 2007 this resulted in late reporting for not only the CFS but other reports such as the Food Balance Sheets and vulnerability assessments that depend on the CFS data.

Efforts to expand the crop coverage and the level of disaggregation for which the data are relevant are understandable given the need for this information in policy discussions and for monitoring agricultural productivity growth; nevertheless, the results to date lead one to ask if MACO/CSO are trying to do too much with the resources at hand and ultimately taking a step backwards in terms of data quality, timeliness of reporting, and user confidence.

Not surprisingly, the technical debates on the statistical validity of the CSO small and medium farm results filter to the public and undermine confidence in the numbers. This is particularly true for crop forecasting, which raises questions among users when the CSO CFS differs from preliminary forecasts made by MACO (see Box 1). The problem is often compounded by late reporting of the CFS because this leaves policy makers with only the MACO forecasts for guidance at the time that key food aid decisions must be made. In both 1998/99 (Kafuli 1999) and 2005 (Mwanaumo et al. 2005) food aid decisions gave more weight to MACO preliminary results than to the CSO CFS results; in both years there was excess maize on the market and farmers suffered from lower producer prices than usual. Although MACO Preliminary CFS methods based on extension service M&E activities are criticized by some for lack of statistical rigor and possible political manipulation (Kafuli 1999), government and donors both seem comfortable using them to make food aid program decisions. These problems of confidence in survey results are not unique to crop forecasting. At the InWEnt (2007) workshop, participants indicated that MACO staff were not using the PHS and Supplemental Survey data due to inadequate understanding of the sampling issues and the implications for the statistical validity of the results. Overall, resolving the sampling and weighting issues of the CSO agricultural surveys is critical to building demand for and confidence in the CFS and PHS results.

Box 2
Overview of Current CSO Sampling Procedures and Problems for Agricultural Surveys

Zambia is administratively divided into 9 Provinces and 70 districts. Each district was divided into Census Supervisory Areas (CSA), the area which one supervisor could reasonably cover during a survey. Each CSA was then divided into Standard Enumeration Areas (SEAs), an area considered reasonable for a single enumerator to cover during a household survey, based on population (about 100 households) and area. There were approximately 12,000 SEAs in the country at the time of the 2000 Census. For each District, CSAs were chosen using probability proportionate to size and then in a second stage, one SEA per CSA was selected. Within each SEA, all the households were listed and information was collected on total land area and livestock holdings. Based on land and livestock, each household was classified as small scale (<5 hectares and fewer than 50 cattle, 20 pigs, 30 goats, or 50 chickens) or medium scale (5-<20 hectares or livestock amounting to any of the following: 50 or more cattle; 20 or more pigs; 30 or more goats; or 50 or more chickens). The medium–scale households were over sampled, with up to 5 per SEA selected randomly among them; the remaining cases per SEA were randomly selected from the small-scale households, up to 20 cases per SEA. Large-scale farms were included in a separate full enumeration survey.

Analysis in 2003 (Megill 2003) revealed a very wide range in the confidence intervals for eight important crops: sorghum, rice, cotton, Burley tobacco, Virginia tobacco, sunflower, soyabeans and paprika. These crops tend to be limited to narrow geographic areas and are not generalized among the farmers. In 2003/2004, the final sampling stage was modified to over-sample households that cultivated these crops. The new sampling was expected to increase the number of farmers with those crops included in the sample, such that the estimates of production would be more reliable. Subsequent work has demonstrated that there may be difficulties with the weights used to extrapolate out to population level in the various CFS and PHS surveys; efforts continue to resolve these problems, which tend to raise questions among policy makers and other users about the reliability of the survey data.

In addition, some analysts are inclined to push for a more integrated system between MACO's preliminary CFS and other monitoring activities and the two CSO survey activities, highlighting the best use of each type of information and ensuring that information is available on a timely basis (Kafuli 1999).

Generally unsatisfactory results (low response rates) from the enumeration of large-scale commercial farmers within the PHS has resulted in MACO/CSO drawing on additional sources of information provided by ZNFU, the Cotton Development Trust and the Tobacco Association of Zambia to improve their CFS and PHS estimates. The data collection systems are separate, such that the PHS data available with FSRP do not include the large-scale commercial farmers.

ZNFU collects production statistics each year for selected crops, particularly those grown by the large scale commercial farmers, such as wheat and soyabeans, but also maize. Wheat is almost exclusively a large farm crop in Zambia, while soyabeans and maize are also included in CFS and PHS surveys, such that the commercial farm data can be merged with the small-medium farm data. At various times, ZNFU has questioned the MACO announced production numbers on the basis of underestimation of commercial sector production, both in MACO Crop Monitoring and in MACO/CSO surveys. The controversy has made it into the news in recent years since the public sector estimates on production are published in the Food

Balance Sheets and used to justify government import and export policy, as well as the Food Reserve Agency purchasing and sales, all of which affect the private sector's markets (see Box 1).

The Cotton Development Trust and the Tobacco Association of Zambia are commodity-based organizations that report on the production of those cash crops. While these crops are included in the CFS and PHS, large commercial farm production has been largely absent, due to problems with design and administration of the large farm surveys, so the industry information is critical for a full estimate.

2.4. Other Key Actors Contributing to Crop Forecast and Food Security Analyses

2.4.1. The Zambian Meteorological Department Supplies Climate Information

The Zambia Meteorological Department (ZMD) uses remote sensing as the agricultural season develops to understand potential problems and to assist with crop forecasting. The National Early Warning Unit (NEWU) in MACO is responsible for pulling the information into the crop production forecasts. ZMD collaborates with the Southern Africa Regional Climate Outlook Forum (SARCOF), an agency within the Southern African Development Community (SADC) that works with global climate models to provide regional climate forecasts.

The ZMD collects rainfall, wind and other data from weather stations throughout the country, in addition to coordinating the information from other data sources, including SARCOF (Kafuli et al. 1999). The critical role played by meteorological data in the overall crop forecast process is underscored by Figure 2, which placed all the weather modeling at the top of the information flow chart from where it is fed into all the other analyses. According to a recent assessment, "only 36 stations out of 72 currently function, making it difficult to monitor rainfall with great accuracy", and this is coupled with the lack of a remote sensing data analyst (Tango International 2005).

2.4.2. The National Early Warning Unit Coordinates the Food Balance Sheet Estimates

This unit, located within MACO, coordinates the estimates reported in the national FBS, using FAO methods (ZVAC 2003 and ZVAC 2005). As part of its task, NEWU oversees the crop and livestock monitoring done by the extension system and synthesizes the results, which feed into the early versions of the FBS before CSO data are available. The basic FBS table covers maize, rice, wheat, sorghum/millet, sweet and Irish potatoes and cassava. For these foods, analysts estimate the production, trade for the coming marketing year, losses, and consumption demand. Losses are a combination of quantities lost to pests and diseases, as well as non-human food consumption uses, such as animal rations. Crop production is converted into maize energy equivalents and then the availability of kilocalories is compared to the district populations and energy needs per person, to identify the districts in potential production deficit. The FBS is the most widely circulated use of agricultural statistics in the country and used extensively by policy makers when looking at subsidies, import/export regulations, and key food security issues. A sample FBS for 2007/2008 is presented in Table 2.

2.4.3. The Zambia Vulnerability Assessment Committee (ZVAC) Conducts Rapid Vulnerability Assessments

This Committee, based in the Disaster Management and Mitigation Unit in the Office of the President, is responsible for evaluating food security and conducting vulnerability assessments using a multi-agency approach. They also helped coordinate a recent assessment of the Food Balance Sheets and data needs (ZVAC 2005). ZVAC draws on CFS and FBS data and, when indicated, conducts site visits to assess potentially vulnerable areas.

A recent review of the ZVAC methodology revealed challenges in the determination of quantities produced and consumption needs, as well as issues relating to substitutability of commodities in consumption (Tango International 2005). Normally, ZVAC would use CFS estimates in making decisions about site visits and rapid assessment needs. In March 2005 (before CFS was available), however, ZVAC had already selected and visited districts in five provinces considered most affected by erratic rainfall, drought, and flooding (ZVAC 2005). Late arrival of the CFS data hampers their usefulness for and the timeliness of the FBS and vulnerability assessments. The publication of the 2007 FBS did not occur until June when it is usually requested by decision-makers in May.

ZVAC is also active in regional efforts on Food Security through the SADC Food, Agriculture and Natural Resources (FANR) Vulnerability Assessment Committee.

2.4.4. The Food Reserve Agency (FRA) Manages Food Reserves and Reporting

In the 1980s, producer prices for the main agricultural commodities were controlled by the government through the national FRA. Since the mid-1990s, FRA's primary objectives have been to:

- administer the national food reserve; and
- establish and operate a market information system for agricultural food commodities and agricultural inputs.

In its current form, the FRA purchases substantial quantities of maize and other selected commodities (soyabeans, cassava, beans) at publicly announced prices, for the food reserve. It then sells the commodities domestically or for export when harvests are good. FRA publishes a monthly bulletin on their basic activities (FRA, 2007), including information on their retained stocks, imports and exports of maize. They are not involved in the AMIC market information system based at MACO and described below. Instead, the FRA is a key user of production and input information produced by MACO and CSO.

In addition to their food marketing responsibilities, FRA had a temporary mandate from the mid-to-late 1990s to supply fertilizers at subsidized prices and report input market information. This distribution represented the major part of the public sector input program, which supplied fertilizer quantities estimated to have a value of approximately $16 million in 1998 (Kafuli et al. 1999). Currently the FRA has no responsibilities for fertilizer supplies and thus does not provide input market information.

Table 2: Food Balance Sheet for 2007/2008 Agricultural Marketing Season

			Maize	Paddy rice	Wheat	Sorghum/ Millet	Sweet and Irish Potatoes	Cassava flour	Total (maize meal equivalent) /12
A.	**Availability**								
	i) Opening stocks (1st May 2007)	1/	433,031	931	0	4,712	0	4,459	398,614
	ii) Total Production (2006/2007)	2/	1,366,158	18,317	115,843	34,480	75,664	1,185,600	2,476,734
	Total Availability		1,799,188	19,248	115,843	39,192	75,664	1,190,059	2,875,349
B.	**Requirements**								
	i) Staple food requirements								
	Human Consumption	3/	1,132,880	30,332	132,708	35,468	71,880	700,442	1,837,314
	Food Reserve Stocks	4/	250,000	0	0	1,000	0	2,949	228,609
	ii) Industrial requirements								
	Stockfeed	5/	65,000	0	0	0	0	0	58,500
	Breweries	6/	15,000	0	0	0	0	0	13,500
	Seed	7/	18,000	0	1,500	1,000	0	0	18,183
	iii) Losses	8/	68,308	916	5,792	1,724	3,783	23,712	90,846
	Total requirements		1,549,188	31,248	140,000	39,192	75,664	727,104	2,246,952
C.	**Surplus/deficit (A-B)**	9/	250,000	-12,000	-24,157	0	0	462,956	628,396
D.	**Commercial requirements**	10/	12,000	24,157					
E.	**Food aid import requirements**	11/							

Source: CSO, The Monthly, Vol 51 (June) 2007, page 16.

Notes:
1/ Stocks expected to be held by commodity traders, millers, Food Reserve Agency and commercial farmers as at 1st May 2007, including stocks held by small-scale farmers in rural areas.
2/ Production estimates from Ministry of Agriculture and Cooperatives/Central Statistical Office (MACO/CSO). Cassava production is based on the total area under cassava, using an annual yield figure of 11.7 tonnes per hectare (MAFF Root and Tuber Improvement Programme 1996). A flour extraction rate of 25% is used. Other tubers are sweet potatoes and Irish potatoes.
3/ Staple foods are assumed to represent 70% (1,421 KCal/person/day) of total diet (2,030 KCal/person/day), converted to crop requirements for the national 2007/2008 population of 12.1 million people.
4/ Locally purchased FRA stocks expected to be carried over into the next season. (This does not indicate total FRA purchases on the local market nor imports)
5/ Estimated requirements by major stock feed producers.
6/ Estimated requirements by industrial breweries.
7/ Estimated seed crop grown for seed companies.
8/ Post harvest losses are estimated at 5% for grains and sweet potatoes in line with estimates from other Southern African Development Communities (SADC) and 2% for cassava.

9/ Expected surpluses or deficits that arise after meeting minimum overall staple human consumption requirements as well as industrial requirements. Cassava and maize may be substitutable with other crops and may result in different exportable volumes than the ones indicated here. The total is expressed as maize meal equivalent using energy values.
The rice deficit is based on what is known to be imported each year, as indicated under D.
The wheat deficit is based on the estimated market size as indicated in B, less availability as indicated in A.
The maize meal equivalent and cassava flour surplus represents an overall surplus of staple foods. Cross-substitution may make this surplus partly available in the form of other crops.
10/ Imports required to be made by the private sector to meet the commercial market demands.
11/ Total estimated requirement for food relief among vulnerable groups, to be imported. This could be met with maize or other grains.
12/ Total maize meal equivalent refers to all crops being converted to kilocalories that are equal to the corresponding kilocalories in maize meal form.

In 2007, given the strategic importance of maize in the Zambian economy, the Minister of Agriculture created the Maize Stock Monitoring Committee and gave them the task of evaluating stocks in the public domain as well as in the hands of processors and other private sector agents. It will be responsible for assessing FRA stocks, but it remains to be seen how this committee will operate and the functions that it will fulfill.

2.5. FSRP/MSU Supplemental Agricultural Surveys, Panel Data, and Policy Analysis

FSRP/MSU is designed to play multiple roles in the agricultural statistics program in Zambia: capacity building of MACO staff through on-the-job collaborative research, expanding the agricultural data base through supplementary survey work, and creating demand for empirically based policy analysis, within MACO, legislative bodies, and civil society in general.

In 2001 and 2004, the FSRP/MSU with CSO and MACO designed and implemented two Supplemental Surveys on Rural Incomes and Livelihoods, (SS01 and SS04). The objective of the Supplemental Surveys was to help design appropriate policies and programs in response to crop marketing, food security and HIV/AIDS challenges. Greater information on the use of productivity enhancing inputs also contributed to understanding potential food security enhancements through greater production efficiency. The sample frame for SS01 was the same as that used for the 1999/2000 PHS, and 94% of the agricultural households from PHS 1999/2000 were visited for SS01. To develop a panel data set, the same sample frame of households was used in SS04. Given panel attrition and the lack of inclusion of new households,

SS04 is not representative nationally, but the panel provides data offering a unique opportunity to evaluate changes over time as well as to analyze household dynamics while controlling for unobservable household characteristics.

SS01 and SS04 covered the topics in the PHS surveys and then added sections to cover morbidity and mortality, off-farm income, including business activities and remittances, income from sales of livestock products, forestry products, and fisheries. Each Supplementary Survey to the Post-Harvest Survey (SS) also had special sections related to specific research issues, such as the relationship that cotton farmers have to ginners, or farm household access to land and services. The Survey instruments are available on the FSRP/MSU website (http://www.aec.msu.edu/fs2/zambia/index.htm).

It is important to note that there are various types of agricultural data that are only covered in the Supplemental Surveys, which are not a scheduled regular part of the agricultural statistics system in Zambia. FSRP/MSU works with CSO and MACO to design these surveys and has successfully obtained funding for them from donors. The supplemental surveys collect information on fruit and vegetable production and marketing, as well as production and marketing of various livestock products not incorporated into the PHS, such as eggs. As noted in the InWEnt workshop (2007), CSO and MACO will need to review the importance of this survey and either incorporate selected parts of the SS into the annual planning or change the components of the PHS in order to capture this information.

In addition to conducting the SS, FSRP/MSU has contributed to a wide range of policy analyses and reports produced collaboratively with MACO staff, ACF, and others. This work combines the SS data with CSF and/or PHS data to exam policy issues confronting the

Government of Zambia (GOZ). The project has helped MACO organize workshops and seminars to present the results of different analyses and in a number of cases there is concrete evidence that the work has brought about favorable policy changes. Zambian journalists, for example, picked up on recent work by FSRP with MACO and ACF on changes in the value added tax structure and agricultural sector expenditures to highlight potential food price increases as a result of policies, and the ZNFU has been using the work to lobby government for changes in trade policies and food security programs. PHS and SS analysis on mortality has been used in debates on appropriate intervention strategies with HIV/AIDS (IRIN 2005).

A recent example of the type of analysis done by combining secondary data with survey data is the FSRP/MSU effort to monitor public sector spending in agriculture. Monitoring agricultural expenditures has become an important component of the New Partnership for Africa's Development (NEPAD) agricultural growth strategy following African governments' agreement to allocate a minimum of 10% of public sector spending to the agricultural sector (AU/NEPAD 2006). In collaboration with MACO and the ACF, FSRP/MSU pulled together data from a range of sources in order to assess progress in attaining the 10% goal (Govereh et al. 2007). The authors demonstrated the need to look at more disaggregated investment data to assess how investments were being made within agriculture and also noted the difficulties of tracking allocated versus spent funds, due to the time lag in reporting actual expenditures (see Box 3 for details). The report noted that "serious effort is needed to internalize monitoring and evaluation systems to enable MACO to monitor and evaluate the impacts of various public expenditures and to set future investment priorities to achieve policy objectives. Such a system contributes to accountability, efficiency, and decision making" (Govereh et al. 2006, p.19).

Despite the efforts of FSRP/MSU with MACO and CSO, Zambia's agricultural databases remain under-analyzed and the results under-utilized. Insufficient staff at MACO has been a major impediment in building capacity for this type of work. Now that Zambia has qualified for debt relief under the HIPC, the Government may be able to reconsider the allocation of budgets that results in insufficient resources for staffing and operational funds for research highlighted in the expenditure analysis by Govereh et al. (2006). Another impediment to generating demand for statistically based policy analyses is the lack of understanding of and confidence in statistical survey methods by non-specialists, particularly evident in the debates over crop forecasting, but also a result of on-going debates among statisticians on how to resolve some of the CFS and PHS sampling and weighting issues discussed above.

2.6. Market Information and Price Data Systems

There are three sources of price data for agricultural commodities in Zambia:

- CSO, which collects retail data to produce the consumer price index;
- AMIC, which collects producer, wholesale and retail price data for commodities sold at rural markets; the information is intended for use by traders and farmers; and
- ZNFU, which operates a new small exchange designed to link buyers and sellers

For the estimates of the Consumer Prices Indices (CPI), the Bank of Zambia has commissioned CSO to provide monthly prices for a whole range of consumer and producer goods in the provincial capitals. This price collection system is based on monthly trips by CSO headquarters staff to the cities concerned, where retail establishments (not public markets) are visited to obtain prices. The database is used by international agencies such as the Famine Early Warning System Network (FEWS Net) for tracking price movements. It is

not designed to supply market information to the private sector, as it is only collected once a month, not available immediately, and not systematically published for general diffusion. It is thought to be the most reliable price collection system in the country, but it does not meet all needs. For example, a recent International Monetary Fund mission noted that there is no comparable collection of wholesale prices in the CSO system such that wholesale price indicators cannot be systematically estimated. CPI components had to be used throughout their analyses to convert nominal prices over time to real prices (IMF 2007, p.57).

The Agricultural Market Information Centre of MACO has been operating the Agricultural Market Information System (AMIS) since the early 1990s. Originally established with substantial funding and technical assistance from the Dutch Government through FAO, AMIC has gone through periods of variable performance. In theory, the system collects weekly or bi-weekly observations on key commodities throughout the country, in all the provincial capitals and in the districts, at producer, wholesale, and retail (public market) levels. In practice, AMIC is struggling to meet needs.

AMIC has suffered from staffing problems since the government restructuring in the late 1990s as well as after the withdrawal of donor financing through FAO. It is receiving limited technical assistance from MSU, although the staffing shortages continue to plague operations. The system was designed as a public service system and has demonstrated many of the weaknesses of public systems, as described in the literature (see Shepherd 1997). Capable staff members have been transferred to other programs or left government service; communications with field staff have been problematic, and timely production of bulletins has been undermined by a shortage of materials, late communications, and inadequate staff. Funding is sporadic, contributing to lack of communication between field and headquarters. Policy makers in recent years rarely rely on AMIC for their information.

Comparisons of the CSO and AMIC price data must be done with caution. Although AMIC may have resource and data quality problems, the objectives and data collection methods of AMIC are intentionally different than those of the CSO and likely to produce different price estimates. Among the key differences are the periodicity of data collection (monthly vs weekly), the locations surveyed (public markets vs. commercial establishments and district locations as well as provincial), and the unit sizes of transactions enumerated (generally smaller for the market transactions). Both price collection systems have a place in an agricultural statistics data base, but this requires adequate resources to correctly implement both systems.

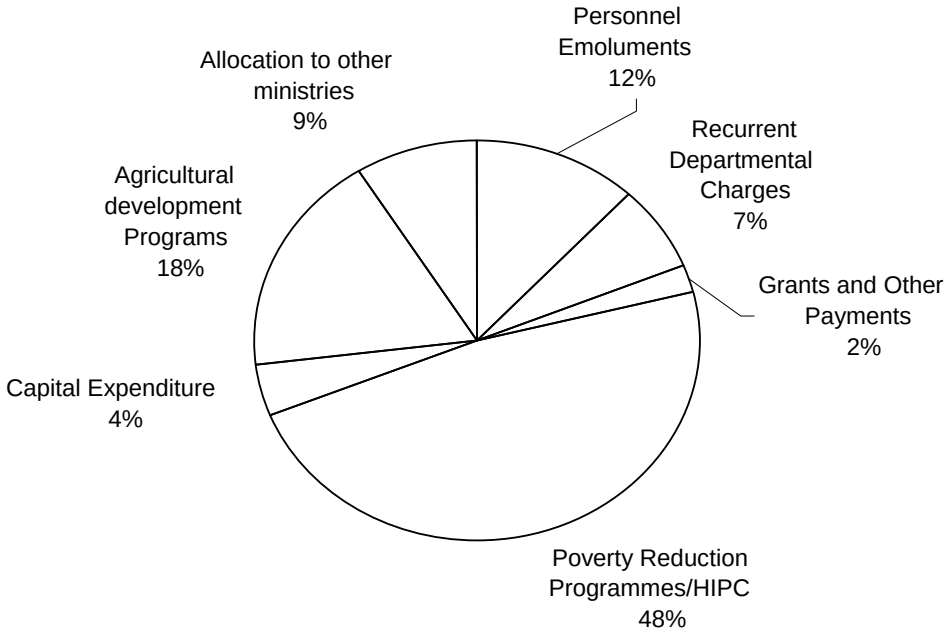
ZNFU recently established a market information exchange designed to provide information about buyers of selected agricultural commodities to potential sellers of the commodities, using a website (www.farmprices.co.zm) and text messaging system (SMS). As of June 2007, information is available on maize, soyabeans, groundnuts, beef and goats. The system collects information from the buyers of commodities on the quantity, quality and price for each commodity that they would like to purchase in the current week. That information is immediately posted to an automated system linked to SMS messaging. Those wishing to sell can then visit the website or send a text message to get the contact details for each buyer of a selected commodity. Information is organized by region and price. The system is relatively new and undergoing an evaluation. According to ZNFU staff and developers, there are controls in place to minimize cases of fraudulent postings and the prices recorded can be used to reflect market conditions, although commodities and locations are relatively limited.

Box 3
Agricultural Budgets and the Importance of Data on Allocation of Resources

While data collection efforts in agriculture focus on sector performance and monitoring impacts changes in the sector, the NEPAD agreements on agricultural development strategy call for an increase in public sector investments. In Zambia, by 2006, the government stood at 6.3% of the national budget allocated to agriculture, well below the 10% figure recommended by NEPAD and well below the 15-22% allocated in the 1980s. With collaborators in MACO and ACF, FSRP/MSU analyzed budget allocations from 1981 to the present.

Figure 3 shows the six major public agricultural sector budget items: 1) personnel emoluments, 2) recurrent departmental operational charges, 3) poverty reduction programs, 4) capital expenditure, 5) agricultural development programs, and 6) agricultural spending allocated through other ministries (e.g., infrastructure and other public payments). During the period analyzed, Zambia spent 48% of its agricultural budget on poverty reduction through support for input subsidies and producer price supports administered by the Food Reserve Agency, as well as on subsidized maize imports. At the same time, capital expenditures were low (4% on average) and declining, such that that facilities and equipment are becoming obsolete or unusable and are not being replaced. Low recurrent charges (7%), which provide the operational funds for research and extension, further compromise the ability of MACO staff to function. (Govereh et al. 2006).

Figure 3: Zambia: Average Share Allocated to Agriculture Budget Items in Real Prices, 2001-2006



Source: Govereh et al. 2006

Given its very specific objectives, not all commodities are observed in all markets and there may be price variability due to conditions of quality or location, minimum quantity to be delivered, or other aspects. Currently the website and messaging just sends the information for the current week, but a database is maintained and may be available for analysts in the future. The extent to which information from the exchange might complement the CSO and AMIC systems has not yet been examined, nor the comparability of prices reported in the three systems.

2.7. Agricultural Trade Statistics

Formal trade statistics are available from the Export Board of Zambia, which is a statutory body established in 1985 to promote Zambian exports, especially non-traditional (non-metal) exports. They work with CSO who maintains the database of exports as a way to measure progress as well as to inform potential and existing traders about current trade patterns. The CSO Monthly, a monthly bulletin usually reports major trade statistics. The Ministry of Agriculture issues import and export permits for commercial trade of agricultural goods, however there is no systematic cross-checking of permits with realized trade. Occasional trade bans are instituted by the Ministry of Agriculture for specific commodities as with the 2005 ban on maize exports, imposed when a shortfall in maize production was predicted.

Informal trade in agricultural commodities was unregistered until a recent initiative of FEWS NET with the World Food Program (WFP) and others to look at regional food security issues including informal trade. Selected border points were chosen for observation by a monitor who counts every large bag or other unit that crosses the border informally, whether by bicycle, by foot or by other means. A monthly report is released for Zambia and another for the region as a whole. Maize, beans, and rice are the three most important commodities for informal trade between Zambia and its neighbors, especially beans to the Democratic Republic of Congo (DRC) (FEWS NET and WFP 2007). Trade depends heavily on the relative supplies and prices in the neighboring countries; maize trade may go in either direction, for example, with imports from Tanzania or exports to Malawi. The selection of sites for monitoring is based on a rapid appraisal and the assessment is an attempt to at least have a minimum estimate of such trade. This effort is additional to formal sector import and exports and only covers trade that is unregistered at the borders. As a large country with porous boarders, it would be difficult to ensure 100% coverage of such exports and imports. As yet, the informal trade statistics are not known to be included in official estimates.

There has been discussion about inclusion of the informal trade information when estimating the National Food Balance Sheets, but it is controversial and as yet not used. However, the information is used in regional discussions. The information is critical to inform policy discussions. Zambia is a country that frequently applies import or export bans in maize and other basic foods, and without this information, the effect of the bans and related policies cannot be assessed. For the present, the informal import and export information is used by the donors and international agencies, as well as ZNFU and others locally to assess potential food shortages and food aid needs.

2.8. Other Complementary Agricultural Data and Analyses

2.8.1. 2000 Census Mapping Data

With improvements in Geographic Information System technologies there will be pressure for Zambia to use these tools to improve its collection and reporting of agricultural data. CSO maintains the mapping from the 2000 Census and it is often made available to others for specialized analyses. For example, data on the location of tarred roads was used by a CSO researcher to associate each of the 1999/2000 PHS SEAs with a distance from tarred road and then used as an indicator of farmer access to transportation and markets (FSRP, 2003). We have not been able to document other uses of this data, but believe it has unexploited potential.

2.8.2. Soil and Technology Mapping

This is another area that has potential but has been superficially exploited to date. In an extension of earlier crop suitability work by Veldkamp (1987), FSRP/MSU and the Zambian Agricultural Research Institute (ZARI) developed maps showing locations where the soils are particularly well adapted for growing maize. The maps are designed to assist in the allocation of farm and research resources, incorporating financial as well as agronomic information. The effort involved the combination of data from soil sampling, experimental trials, and other secondary data to evaluate returns to two levels of input investment (high and low) (FSRP 2003).

2.8.3. Crop and Farm Budgets

Crop and farm budgets are an important tool used in economic analyses of agricultural productivity and farm management. Understanding farm economics will become increasingly important as more Zambian farmers begin to operate their farms as a business. Such budgets cannot be developed from the standard set of data collected by the CFS and the PHS so some type of supplementary survey or research trial data collection is needed. The Golden Valley Agricultural Trust is a private research trust that has developed some crop budgets, for small scale and commercial agriculture but the collection and analysis of the data could be improved. Recordkeeping is based on simple spreadsheets and no coherent database is established. Labor data from the budgets are particularly weak, and with small plots, extrapolation to per hectare amounts means large potential non-sampling errors. Other farm data and budgets come from research station or on-farm trials in the early 1990s when the research system had more donor funding. The recent InWEnt workshop identified the need for crop budget information as an important one and recommended selecting a set of key farmers from which crop and farm budget data could be collected each season. Both ZARI and the Golden Valley Agricultural research Trust (GART) are working to establish a consistent database of information to meet this need.

2.9. Important Users of Agricultural Statistics

In addition to the Government and donors, there are two organizations of note that use agricultural statistics and contribute additional analyses: the Institute of Economic and Social Research (INESOR) and the Agricultural Consultative Forum.

INESOR is the multi-disciplinary research wing that was incorporated into the University of Zambia in 1965. There are six main research programs: Economics and Business, Agriculture and Rural development, Health, Urban development, Governance, and Constitutional Reform. Researchers at INESOR often use the CSO-generated agricultural data to assess public sector performance and to inform on macro-economic issues, including poverty reduction efforts. They are a key analytical user. When the Agricultural Sector Investment Programme was developed, analysis of sector performance was the responsibility of INESOR, using CSO data (Mayaka 2002).

ACF is a nonprofit organization whose objective is to bring together the various stakeholders, including private and public sector agents, in debates on policy issues in agriculture. ACF collaborates with MACO and FSRP/MSU in policy analysis, and makes frequent use of the agricultural statistics generated through CSO. ACF contributes to the definition of policy issues for evaluation, thus helping to guide the development of special sections in the PHS and the SS, as well as providing general guidance for MACO and FSRP/MSU analyses.

3. STAFFING, BUDGET AND DISSEMINATION OF PUBLICATIONS AND DATA

3.1. CSO Staffing and Budget Situation

CSO faces serious staffing problems due to attrition of existing staff without replacement and heavy reliance on various types of temporary contracts for 80% of their workforce, many of whom have been working for CSO for 10 years or more. The budget situation is more difficult to evaluate as much of the work conducted by CSO is funded through special contracts and we were unable to find a consolidated budget covering all CSO activities. The typical CSO budget (personnel emollients and recurrent charges) covered by Government sources is quite limited (e.g., $1,000,000 in 1998) and most likely contributes to the staffing problems.

Staffing is a critical issue in the Zambian public sector in general. Contributing factors include losses due to HIV/AIDS and the brain drain of skilled staff to jobs outside the public sector and to other countries (InWEnt 2007). This has left the CSO with an aging cadre of senior statisticians and very few younger statisticians to replace them. The most recent personnel numbers found show a total 2001 workforce of 1,446, of which only 282 were actual members of the civil service. Statisticians figure prominently among the permanent staff. At the Lusaka headquarters, each of the three main branches has an Assistant Director and every Division within each branch is headed by a senior statistician. At the Provincial level, the Provincial Statistical Officer is a trained statistician as is the Deputy Provincial Officer. Given the survey-intensive nature of the CSO work, there are heavy demands for large teams to conduct surveys and analyze the data. For the 8000-household Supplementary Survey in 2001 CSO estimated a need for 24 Statisticians (including 4 regional statisticians), 5 programmers, 20 data entry clerks, 49 supervisors and over 200 enumerators; most of these positions were filled by temporary hires.

The variety of surveys conducted by CSO and the heavy reliance on temporary staff (particularly teachers and urban residents) have raised questions about non-sample bias being introduced in agricultural statistics by enumerators and supervisors who may not have the skills needed for agricultural surveys (e.g., plot measurement, judging reliability of production estimates) (INESOR 1998). FSRP experience with CSO/MACO surveys indicates that more intensive training and supervision improves the quality of data collection, particularly when subject matter specialists are in the field working collaboratively with the statisticians and enumerators.

The recurrent budget mentioned above gives an incorrect impression of the overall CSO portfolio as it does not include contract work that is frequently paid for by outside funding. For example, the 2001 SS described in the previous paragraph was covered by a $240,000 payment from FRSP/MSU project funds. Another example is the National Census of 2000 with a price tag of approximately $20 million, much of it paid for by donors. FSRP/MSU, for example, paid $83,000 for the small section on agriculture found in Figure 1. This relatively small expenditure permitted CSO/MACO to develop a new sampling frame for the CFS and PHS without having to undertake a very expensive, stand-alone Agricultural Census. Although CSO/MACO are still trying to iron out some of the problems with the new sampling frame, the collaborative effort with the Census is generally viewed as a positive move in terms of managing resources.

3.2. MACO Staffing and Budget Situation

On the MACO side, staffing is also not sufficient. In theory, there are six positions in NEWU, including a Principal Economist supported by a Senior Agricultural Economist and another senior social economist, then an Economist, a Sociologist and a Statistical Clerk. There are no senior Statistical Officers associated with the Unit. Of the six positions, two have staff members present, two staff members are on study leave, and two positions are yet to be hired. The Agricultural Statistics Unit also has six positions headed by a Principal Statistician who is theoretically supported by a Senior Statistician, Senior Systems Analyst, Statistician, Economist and a Statistical Officer. There is one person employed in this unit but away on study leave; the additional staff are still to be recruited. In reality, the two staff members present in the NEWU are trying to do the work that was designed for a team of twelve people. One can ask whether MACO really needs the high level of statistical expertise prescribed for their Agricultural Statistics Unit given that they are currently functioning with just one person and that the CSO also employs a large number of statisticians in their Agriculture and Environment Branch. Since both CSO and MACO suffer from serious under-staffing at present, some specialization in staffing and improved inter-institutional collaboration to get the necessary mix of statistical and agricultural expertise might be in order; but it is difficult to fully understand the staffing issues of both institutions with the documentation available.

MACO faces two major budget issues: (1) a complex, poorly timed budget process, and (2) inadequate and irregular funding. In spite of consultative processes on spending for agriculture, including agricultural statistics, the budget for the Ministry of Agriculture is controlled through the Ministry of Finance. Funds are disbursed based on public sector revenues (Govereh et al. 2006). The statistical work is covered by agricultural sector funding for staff and operations, which has not been stable during the recent past. This contributes to the staffing problems at MACO. Liquidity problems also occur since "the budget cycle does not match the crop growing season" and thus resources are not always available for the surveys at the time when those surveys should be conducted (InWEnt 2007). Procurement regulations, which require centralized purchasing of computers and other equipment, also limit MACO's ability to get its work done in a timely manner.

3.3. Dissemination of Publications and Data

CSO has the authority and responsibility to publish information from the national surveys. CSO maintains a website (http://www.zamstats.gov.zm/) from which some data and a limited number of publications are directly available (e.g., the CSO monthly bulletin, which includes some agricultural data, and the FBS) . The Agricultural Report from the 2000 Census is also available on line, but the CFS and PHS results are not. There have been annual reports completed, with basic tables, for selected PHS small and medium scale surveys, including 1999/2000, 2002/2003 and 2003/4. The PHS Reports for 1996/97 and 1997/8 are available electronically on the FSRP website noted below. The results of the 1990/1992 Census of Agriculture are also available in printed form, although not electronically. The CSO Monthly, a regular monthly bulletin, publishes summary statistics on a wide range of subjects, including Consumer Price Indices, Trade Statistics, Exchange Rates, Food Balance Sheets, Crop Forecasting, Health, and other topics for which CSO is active. The Monthly is available electronically, starting with the April 2003 edition.

There is currently no functioning MACO website or other systematic method of disseminating MACO survey results and analyses. The FSRP/MSU website (http://www.aec.msu.edu/fs2/zambia/index.htm) compensates for this to some extent as it contains a series of reports, policy syntheses and presentations, many of which are joint with MACO staff members. Given the severe understaffing of the Policy and Planning Department at MACO, reliance on the MSU website provides an interim solution for MACO but it is not a sustainable approach. The Market Information System has a website set up and maintained currently by FSRP/MSU, but production of regular bulletins is lagging, so there is very little current information. In short, MACO outreach via publications and the Internet is almost entirely dependent on transitory project funding.

Data documentation and dissemination is an area of weakness for both CSO and MACO. MACO does not make original data available, instead releasing summary reports, such as the FBS, and referring potential users to CSO and FSRP/MSU. CSO does release their data files; however, the limited nature of analyses conducted by CSO means that only basic cleaning has been completed and the data often have inconsistencies. With the large sample surveys, there are also delays of a year or more before release.

FSRP/MSU collaboration with MACO and CSO has contributed to better data dissemination in some cases. All three institutions work with the PHS and CFS datasets. FSRP/MSU maintains a website with copies of survey instruments, although most of the instruments are modified from the original format to a synthetic format that follows the data base organization and facilitates analysis, rather than the original instrument as implemented with farmers. FSRP/MSU also has PHS and SS datasets that are made available to students and other researchers, but that occurs with a delay, as FSRP/MSU researchers work with the data and often interact with MACO and CSO to correct mistakes and provide adequate documentation prior to release. The SS surveys were funded through FSRP/MSU by the United States Agency for International Development (USAID) and so are not managed by CSO after the data entry and basic cleaning are completed.

There is a need for greater coordination in data dissemination and the documentation that accompanies it. For example, FSRP/MSU is now using a revised set of weights that were developed to correct problems with the population weights and estimates of the standard errors. To date, these weights have not been systematically incorporated into the CSO data systems. It is anticipated that the adjusted weights will eventually be adopted by all users and included in data files shared with others. In the meantime, there is a danger of multiple users of the data bases obtaining differing results due to weighting errors.

4. SUMMARY OF KEY POINTS AND LESSONS OF GENERAL RELEVANCE

By way of conclusion, we offer a series of questions that were listed in our terms of reference followed by short responses based on the detailed discussion presented above.

4.1. What Are the Sources of Information for Agricultural Policy Making and Who Does What?

MACO and CSO are the primary sources of data through the MACO M&E effort and the joint MACO/CSO CFS and PHS surveys. It is noteworthy that the ZARI, the national agricultural research center, is not involved in the collection or analysis of the primary data bases used in policy analysis. The University intervenes occasionally through INESOR with specialized policy studies as does the non-profit ACF and the FSRP/MSU attached to the Policy and Planning Branch of MACO. In addition, there are a multitude of smaller actors who contribute directly or indirectly the crop forecast estimates. These crop forecast contributions are coordinated by NEWU in MACO.

Supplementary information often used in policy analysis comes from AMIC which collects price information on agricultural commodities, CSO which collects price data and estimates the consumer price index, and the Export Board with CSO to provide trade statistics.

4.2. What Are the Linkages, Overlaps, Duplications, Conflicts?

MACO and CSO are linked through an annual contracting arrangement whereby MACO contracts with CSO to conduct the CFS and PHS. There is overlap as they both collect data for crop forecasts and have a history of producing conflicting estimates. MACO produces a preliminary forecast based on non-statistical M&E efforts which is subject to potential political pressure, and CSO produces a statistically-based final forecast (often at a date that is considered too late for food aid planning purposes). Given the different methods used, the efforts are not necessarily duplicative but mechanisms for combining the different sources of information into a coherent whole are weak and result in confusion. Generally, the PHS, a large sample household survey with statistically accepted methods, would resolve the final question, but there are doubts about the accuracy of the sample frame and weighting for the PHS. As a result, MACO staff and policy makers prefer to use MACO M&E data and information rather than PHS survey results.

4.3. What Are the General Types of Data Collection Methodologies Used?

CSO uses sample-based statistical methods for collecting data in the CFS and the PHS. MACO uses their extension agents to implement M&E surveys that are not statistically based but designed to capture key indicators needed to forecast crop production and food availability for the upcoming season. CSO data is collected using CSA and SEA established as subdivisions of national administrative divisions (Provinces, Districts). MACO data is collected using camps and blocks that reflect different types of agricultural production zones rather than administrative sub-divisions. Policy analysts tend to use the statistically based CSO data and statistically based supplemental surveys conducted jointly by MACO/CSO and FSRP/MSU, in spite of policymakers focus on the MACO M&E results.

4.4. Do Different Methods Used by Different Institutions Produce Different Results?

YES. This was a major issue in 1998 and 2005, with the preliminary crop forecast by MACO suggesting a need for large food aid imports and the final crop forecast by CSO suggesting a much less serious food security problem. Factors contributing to the differences are thought to include (1) timing of the forecasts, (2) use of statistical vs. non-statistical sampling, (3) use of different types of enumeration areas (CSA/SEA vs. camps/blocks), and (4) political interference. Analysts have suggested a need for more collaboration between MACO and CSO to develop better methods of combining the various sources of crop forecasting data that are available; to date the problem remains.

4.5. Where Are the Methods Stretched and Objectives Unrealistic?

Recent efforts to decentralize government decision making and budgets has led to requests for statistically valid information at the District level. This required a significant increase in sample size for the CFS (from approximately 6000 to 14000 households) and has contributed to delays in reporting because staff and resources are not adequate to handle such a large sample size.

The number of crops covered by both the CFS and PHS has been expanding and this too is stretching resources as well as raising questions about the statistical validity of some of the estimates, which are difficult to obtain through a random sample because of the geographic concentration of the production.

Another issue is serious understaffing at both CSO and MACO. This has been a major constraint to the capacity building activities of the FSRP/MSU program as efforts to build capacity through on the job training are not productive when there are 2 individuals available to do the work anticipated for a staff of 12.

4.6. What Is the Timeliness and Reliability of Data Collection, Analysis, and Publication?

Timeliness and reliability have been hampered in recent years as efforts are made to expand the crops covered in regular surveys and to make them representative at the District level. Timeliness is particularly critical for the CFS results as late reporting leads to major decisions being made on preliminary forecasts. Reliability of the statistical sampling data produced by CSO has increasingly been questioned due to problems encountered in adjusting to the new sampling frame developed after the 2000 Census (population estimates are often incorrect) and trying to get accurate estimates of important crops that are grown in relatively small geographic areas. Publications are a very weak point for MACO, which relies almost entirely on the FSRP/MSU program for policy analysis and dissemination of results through workshops and posting of documents on the MSU website. CSO does do annual reports on the CFS and PHS surveys, but these are limited to preliminary descriptive statistics rather than policy analysis.

4.7. What Needs Are Well Met and Poorly Met for Key Users of Statistics?

In a recent workshop on food security and poverty, a key conclusion was that “Zambia’s agricultural information system must be adapted from the current version, which was originally

designed to address the colonial government's needs. For example, the current system tells us plenty about the maize crop but very little about the cassava crop, and yet this latter is a vital contributor to food security in many areas. By the same token, we know much more about Irish potato, which in Zambia is a luxury vegetable, than about the sweet potato crop, which is a staple" (Chilangwa and Cromwell 2004, p.25). While the system struggles to meet the new demands, we do find that many needs are addressed. The contracting between MACO and CSO successfully motivates MACO staff to participate and guide the development of the survey instrument, to ensure that key policy issues can be assessed.

Regarding central government needs, PHS serves them well for National Accounts and monitoring production trends for major crops although there are still unresolved issues on the use of weights to extrapolate to population and national production numbers. There have been improvements to reduce the problems with large variations in estimates for geographically concentrated crops, with new sampling strategies as of the 2003/2004 PHS and more recently with the expanded sample size of the 2006/2007 CFS. For price collection, the CSO price collection for the CPI has the confidence of users but price data for the wholesale level is inadequate, only available for a limited number of crops and locations with AMIC. FSRP successfully obtained funding and developed panel data sets which are supplemental to the PHS. While MACO participates in the work and FSRP contracts CSO for implementation, these supplemental surveys are not incorporated into the Zambian agricultural statistical system. These datasets are very valuable for looking into dynamics of agricultural production and rural incomes,

As in other countries, the crop forecasts continue to be in the spotlight of controversy. The combination of undocumented methods, reliance on key informants for early forecasts, and possible interference of politicians may all play a role. There is no clear answer on how to combine statistical and non-statistical data. Advanced remote sensing analysis may assist in getting early crop forecasts that are more reliable. Clearer messages on the reliability of qualitative estimates may help the early forecasts to be used more appropriately as indicators rather than firm production numbers. There is a clear challenge in having good early estimates for food security analysis, yet retaining flexibility to respond to updated information.

In general, the efforts of CSO with FSRP to clean and document the data sets into a coherent database will help to increase the value added of the data, for it will enable scholars and other analysts to use the data with more confidence. The lack of a reliable market information system causes problems for the private sector as well as the public sector. Investing in an Market Information System (MIS) that can respond to a range of needs is critical for a market system. The ZNFU system may provide for some needs, but the system is too young to evaluate sustainability and the extent to which it may satisfy more information needs as time goes on.

Currently, the agricultural statistics system is only partially meeting the needs of the private sector. The linkages between the MACO and farmers, traders, and investors is weak, especially the MIS, with infrequent bulletins and inconsistent market coverage. The data on imports and exports is also incomplete and insufficient to meet private sector needs.

4.8. Could the System Be Organized Better? If so, How?

In Zambia the funding and human resource issues are critical in both CSO and MACO. Both institutions are pushing for greater numbers of trained statisticians, in particular. It may be

more cost effective to ensure the statisticians for CSO, with only one or two statisticians at the Ministry of Agriculture (MOA). Similarly, reinforcing MOA analytical capacity is key, investing in the human resources to make use of the agricultural data. Both CSO and MOA staff need to be cognizant of the key aspects of the domain of the other. MOA and CSO will be able to work efficiently together if there is reinforcement of statistical understanding in MOA and of economic analysis in CSO without substantial numbers of additional dedicated specialists. Maintaining two sets of agricultural statisticians and analysts is unrealistic given limited resources. In the recent InWEnt conference, a recommendation was put forth to increase the CSO responsibility for analysis, but MACO policy makers are more likely to rely on in-house analytical results than those from an external unit. Both MACO and CSO will need to work with FSRP and others to incorporate the supplemental surveys into the system.

As indicated earlier, the MOA MIS is currently not serving its role and there is a need to reconsider the establishment of the system in the public sector. The Malian case provides a basis for discussions with ZNFU and other groups to identify a way forward. CSO is not the right institution to operate an MIS for the private sector, and currently collects prices to fill a gap for the Bank of Rwanda and national government for simple price statistics.

4.9. Are There Relevant Funding Issues to Be Addressed?

There are several key funding issues to be addressed. First is the issue of funding rural income surveys. Currently donor funding is obtained in order to fund the supplemental surveys which capture rural incomes and demographics, as well as other special topics. MOA and CSO will need to work together to identify the key components of the supplemental surveys, the information needs, and how to arrange funding to sustain the data collection. The panel data efforts are beginning to pay off with more sophisticated analysis of smallholder marketing behavior and incomes, but finding national (rather than donor) funding for the work remains a challenge.

Another key funding issue is the need to reinvest in permanent staff. MOA and CSO have lost substantial numbers of staff in recent years, due to retirement and staff moves to private sector jobs, but also due to HIV/AIDS. Both statisticians for CSO and analysts for MOA are needed, and part of the challenge is to find funding for advanced formal training elsewhere in Africa, as well as in the North America, Europe and elsewhere. The aging cadre at CSO and the diminished numbers at MOA will force more work to be done through donor-funded expatriate specialists, when Zambian staff can be recruited and trained for a long term approach.

4.10. Are There Important Lessons from the Zambia Experience of Relevance to Other Countries?

Zambia provides an example of collaborative arrangement between CSO and MACO that uses the skills of each to collect basic agricultural statistics, and it is functioning for the narrow range of traditional production statistics. Agents from both agencies are in the field for data collection, and the analysts are knowledgeable on how the data are collected. This is a positive development. These strong ties between CSO and MOA enabled the inclusion of a small agricultural section in the general population census that was used to develop an agricultural sample frame. This efficient organization of efforts saved the central government substantial sums of money, avoiding the need for a full agricultural census before 2007. The ad hoc

nature of the supplemental surveys with panel data needs to be addressed, given the strength of the panel data in answering questions on change over time.

As with Mozambique, there are problems with the linkages between the MACO preliminary crop forecast from monitoring and the CSO CFS from surveys. These problems may be as much in the interpretation and use, rather than in the methods (InWEnt 2007), but the published differences result in confusion, as in 2005 (Mwanaumo et al. 2005) and demonstrate the need to develop reliable crop forecasting methods.

In Zambia, due to the relative lack of analysis, various weaknesses in data collection methods has resulted in data which are often not useful for the types of analysis for which they are used. Land area measurement and cassava production are two aspects in which the data collected may have large measurement error. Large animal estimates are frequently questioned, but survey sampling experts recognize that collection of geographically concentrated elements will have problems in these large sample surveys. Also, the population expansion numbers become unreliable as the length of time from the base period census grows. FSRP and CSO are still working to develop appropriate population weights for the series of PHS since 1996. All systems face this problem, and training on survey sampling strategies and resulting weighting strategies is needed.

As is occurring in other countries, decentralization of government budgets and services has resulted in a major challenge to meet the demand for locally representative and accessible statistics. CSO efforts to achieve this demonstrate the over-stretching of budgets and human resources that occurs due to having the expand sample sizes. The high costs and reliance of external funding for part of the survey effort undermine the sustainability of the system, placing continued importance on the search for efficiency in designing a system of surveys.

In Zambia, legislators, journalists, private sector agents and their lobbying organizations are beginning to use agricultural statistics and analytical output. As analysis gets increasingly into the public domain, the value of agricultural statistics increases dramatically. The quality of the debate on agricultural sector policies improves with reliance on empirical analysis rather than simple logic. The debate surrounding agricultural crop transport levies is one example of how analysis and public sector research can be used by the private sector to lobby for change. The sustainability of the system may depend on its perceived usefulness, especially within the public sector budgeting process. The efforts to tie on journalists and legislators are valuable in creating demand for data and analysis. Greater analytical capacity within the public sector, the university and non-governmental organizations such as ACF is still needed, especially to take advantage of the panel datasets with FSRP.

The Zambian public sector MIS in MOA is an example of the difficulties of a public system. Multiple efforts to establish and reinforce the public MIS for agriculture demonstrate that the government cannot be without such information in their agricultural statistical system. It is a also a key market facilitation activity valued by producers. The price collection by the statistical agency CSO does not meet the needs for policy analysis nor for the private sector traders or producers, although the Ministry of Finance and others rely on the prices for macro-economic analysis. AMIC demonstrates what occurs when there is a lack of political will in the development of an MIS. Collection and dissemination of price and other market information in a way useful to the private sector may best be done by an agency or association within the private sector or with strong private sector linkages.

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