



Best Practices in Agricultural Statistics in APEC Member Economies

Baseline Study

**APEC Agricultural and Technical Cooperation
Working Group**

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Produced by



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Abbreviations

APCAS	Asia and Pacific Commission on Agricultural Statistics (APCAS)
APEC	Asia-Pacific Economic Cooperation
ATCWG	Agricultural Technical Cooperation Working Group
AVHRR	Advanced Very High Resolution Radiometer
CPI	Consumer price index
EW	Early warning
FAO	Food and Agriculture Organization of the United Nations
FAS	Foreign Agricultural Service
FEWS NET	Famine Early Warning System
GIMMS	Global Monitoring and Modeling Systems
IPAD	International Production Assessment Division
IT	Information technology
MDG	Millennium Development Goal
MF	Multiple Frame
MOA	Ministry of Agriculture
MSF	Master Sample Frame
NASS	National Agricultural Statistics Service (of the USDA)
NDVI	Normalized Difference Vegetation Index
NGOs	Nongovernment organizations
NSDS	National Strategy for the Development of Statistics
NSO	National statistics office
OECD	Organization for Economic Cooperation and Development
OGA	Office of Global Analysis
RAP	Asia-Pacific Regional Action Plan to Improve Agricultural and Rural Statistics
SSPARS	Sector Strategic Plan for Agricultural and Rural Statistics
USDA	United States Department of Agriculture

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Executive Summary

Agriculture is vital to achieving Millennium Development Goals that center on improving food security, raising the incomes of the poor, facilitating economic transformation, and providing environmental services.¹ To make sound policy decisions regarding agriculture, policymakers need timely and accurate statistics on the sector's performance. However, the quantity and quality of agricultural statistics is in serious decline.² This decline is occurring even as policymakers require an ever expanding array of data on new areas of concern—global warming, land and water use, use of food and feed commodities to produce biofuels, poverty, and food security.

After consultation with economy-wide and international statistical organizations, agriculture ministries, and other government institutions represented in the Food and Agriculture Organization of the United Nations (FAO) governing bodies, the World Bank published *The Global Strategy to Improve Agricultural and Rural Statistics* in 2010.³ It provides a best practice framework for creating systems that can produce the timely and accurate statistics that policymakers need for well-informed decision-making. Those best practices are based on three pillars:

1. Establishment of a set of core data that countries will collect to meet current and emerging demands for data.
2. Integration of agriculture into domestic statistical systems to satisfy the demands of policymakers and others for comparable data across locations and over time. Integration is to be achieved by developing a master sample frame for agriculture, deploying an integrated survey framework, and housing findings in a data management system.
3. Sustaining agricultural statistics systems through governance and capacity building.

This baseline study of agricultural statistics investigated the websites of APEC economies to determine if key information is being provided. *The Global Strategy's* best practices served as the main guide for the study and its framework relating to the economic, social, and environmental dimensions of agriculture. Recognizing the relationship between rural households, agricultural holdings, land and other natural resources, the framework identifies “indicator” data on conventional dimensions of agricultural production, forestry, fisheries, and land and water use. A set of core data or statistics is then defined as input to estimate the indicators. In this baseline study, the standard of compliance—and the starting point for a

¹ "United Nations Millennium Development Goals". Un.org. 2008-05-20.

² Finding of the 2007 International Statistical Institute Conference on Agricultural Statistics.

³ World Bank, Report Number 56719-GLB, September 2010.

modern system of agricultural statistics—is the minimum set of data based on the three-pillar best practices. Areas assessed are presented in Appendix A and the Global Strategy minimum core data items are presented in Appendix B.

Our baseline study finds that compliance with best practice standards and application to agricultural statistics is quite varied in the 21 APEC economies:

	Fully Compliant	Strong Application	Moderate Application	Weak Application	No Apparent Application
Number/percent of economies	5/24%	3/14%	8/38%	4/19%	1/5%
Compliance of Pillar 1 core data	80.0%	39.5%	62.2%	45.9%	0%
Compliance of Pillar 2 and 3 core data	76.4%	75.8%	54.5%	20.5%	18.2%

Key baseline study findings:

- Thirteen APEC economies are moderate or weak in application of best practices in agricultural statistics, which supports the observation that statistics programs have been deteriorating.
- Overall, compliance with Pillar 1 requirements averages 57.1 percent.
- The five economies in the “fully compliant” group have advanced agricultural statistics systems and the highest average compliance (80 percent).
- The four economies in the “weak application” group on average have less than half of their core data items in compliance (45.9 percent).
- One economy has statistical offices and functions but no apparent compliance with Pillar 1 core data best practices.

As shown in the table, five APEC economies were found to be “fully compliant.” This classification, however, reflects a general assessment of the effectiveness of an economy’s agricultural statistics program; it does not mean that these economies are in full compliance with all best practices (note the percentage compliances enumerated in the table above for each classification).

The *Global Strategy* also recommended improving coordination between a domestic statistics office and other domestic agencies that produce agricultural statistics. One measure of coordination is how easy it is to find information on government websites. A list of agricultural data organizations and websites is available in Appendix C, which also served as the data sources for this assessment. We found that 19 APEC economies have a statistical system but that it is much easier to find information on Pillar 1 core data items than Pillar 2 or 3 items.

The emerging data requirements, the conceptual framework, the assessment of the domestic agricultural statistics systems, and the choice of a core set of indicators all point to the need to integrate agriculture into the domestic statistical systems. Key finding:

- 13 economies have integrated their agricultural statistics into a domestic statistical system.

The *Global Strategy* recommends integrating agriculture data into a domestic system by first developing a master sampling frame (MSF) for agriculture. We found that statistical offices in APEC economies need to improve use of an MSF as the foundation for data collection based on sample surveys or censuses. Key findings:

- 14 economies have an MSF.
- 11 use it as the basis for their population census.

We also found that conceptual use of an MSF needs to be improved to include a data management system for official statistics on agriculture. Key findings:

- 14 economies use an MSF as the basis for their agricultural census.
- 13 use an MSF as the basis for their annual agricultural survey.

Ideally, all data collection is based on sample units selected from the MSF and integrated into the survey framework. The survey framework also takes into account additional sources, including administrative data, agribusiness and market information systems, community surveys, remote sensing, and consistent input from expert data collections. Key findings:

- 11 economies construct an MSF using administrative data for farm registry.
- 4 collect early warning system indications from satellite remotely sensed data.
- 10 collect early warning system indications based on input from expert data collections.
- No agribusiness, market information system(s) or community survey data were found to be integrated on websites presenting agricultural statistics.

Instituting best practices will require improving governance across domestic statistical systems. The integration of agriculture into such systems will affect the roles and responsibilities of statistical offices, ministries of agriculture, and institutions that govern other sectors. Under the *Global Strategy*'s Third Pillar best practices, an economy should establish a *National Statistical Council* to coordinate the integration of agriculture when the economy designs its National Strategy for the Development of Statistics. However, it is up to APEC economies to decide on the precise roles of each organization. Third Pillar best practices are essential to the sustainability of any system of agricultural statistics and we found implementation in this area seriously lacking. Key findings:

- 11 economies have documentation describing the functionality of a domestic statistical council on their websites.
- 8 have documentation on an NSDS on their websites.

The baseline study's website inspections did not enable full assessment of the sustainability of each economy's system of agricultural statistics. Lack of documentation transparency also limited assessment of related capacity building that might be underway. Implementing an NSDS will depend on statistical capacity in each economy.

Instituting best practices is a long-term effort that typically advances in stages. This study identifies the gaps in APEC economies statistical systems as compared against the FAO's best practices for data collection and dissemination - highlighting certain institutional, data and

associated collection process areas that may be targeted for technical assistance. Doing so would support the APEC objectives of improving the quality of agricultural data to support food security, trade and production decision-making.

To support statistical capacity building efforts, the APEC Technical Assistance and Training Facility (TATF), in conjunction with the FAO, is developing the *Handbook to Guide Agricultural Statistics Best Practice Methodology Implementation in APEC Member Economies* to provide guidance in implementing these Global Strategy agricultural survey best practices.

1. Introduction

Agricultural statistics must now go well beyond data on farm-level production. Timely and accurate data are needed to monitor food security, the impact of agriculture on the environment, and the role of agriculture in reducing poverty, particularly with regard to meeting the first Millennium Development Goal (MDG) of cutting poverty in half.⁴ Data must be useful in advancing understanding of the interplay of agricultural development and climate change, water scarcity, pollution, and land degradation. New data are needed to understand how population growth, demand for natural resources, competing uses of food crops, and the effects of extreme weather and climate change affect food security, poverty, and well-being. But these requirements for new data are arising as many countries are no longer able to produce and report on even a minimum set of data to monitor economy-wide trends or guide international development.

The *Global Strategy to Improve Agricultural and Rural Statistics* is the result of three years of work by the United Nations Statistical Commission supported by the Food and Agricultural Organization (FAO), the World Bank, and consultation with domestic statistics offices, agricultural ministries, and other government and private institutions that produce and use agricultural statistics. The *Global Strategy* establishes frameworks for rebuilding systems that produce agricultural data, for meeting new requirements, and for monitoring cross-cutting issues. It broadens the scope of agricultural statistics from conventional treatment of production and rural socioeconomic issues to cover aquaculture and fisheries, forestry, and land and water use; providing an objective and replicable picture of the state of an economy, enable comparisons, and set benchmarks for measuring progress. In this report, “agricultural statistics” refers to all components of this broadened scope.

In 2011, the APEC Agricultural Technical Cooperation Working Group (ATCWG) agreed that it should examine how agricultural statistics support decision making with respect to food security and trade. APEC member economies specifically cited the lack of reliable data, particularly from developing economies, as a problem. Almost all APEC member economies have agencies that collect, process, and disseminate agricultural statistics; however, quality varies greatly. Reliable and timely agricultural data help producers and governments make sound decisions—and they figure in the creation of antipoverty strategies so important to food security.

⁴ The eight MDGs were established after the Millennium Summit of the United Nations in 2000, following adoption of the United Nations Millennium Declaration signed in September 2000. All 193 UN member states and at least 23 international organizations have agreed to achieve these goals by 2015. <http://www.undp.org/content/undp/en/home/librarypage/mdg/>

On October 27-28, 2011, APEC members held a event in Manila, Philippines titled *APEC Workshop to Assess and Improve Agricultural Data Collection and Dissemination by APEC Member Economies*. The workshop focused on best practices in agricultural data collection, reinforced the need for accurate data collection tools, discussed the challenges of collecting such data, and concluded that member economies needed to improve data collection and dissemination in areas such as agricultural planning, food security, and trade. The workshop also concluded that many economies lacked awareness of and political commitment to adequate agricultural statistical systems and to integrating agricultural statistics into their domestic statistical organizations.

PURPOSE

In terms of the *Global Strategy*, good statistics consist of numerical information collected according to a set of good practices including appropriate survey design, data collection, data processing, and dissemination methods. Participants at the aforementioned workshop called for a baseline study of collection practices using this methodology as guidance and as the standard to follow. Through extensive APEC member economy website reviews this study examines how each APEC economy's agricultural statistical data practices align with FAO guidance and how those systems can be upgraded to meet FAO good practices including open and transparent collection methods for data analysis. It is expected that a handbook will also be produced for APEC economies that will provide guidance for implementing FAO statistical standards.

This study uses a Checklist of Best Practices (Appendix A) and inventory of core data items (Appendix B) that were developed to allow for an independent, objective assessment of each economy's agricultural statistics system as available on institutional websites. This report presents a review of agricultural data analysis available on the websites of all 21 APEC member economies (listed in Appendix C) and compares the economies' current statistics programs with FAO best practices as described in its *Global Strategy*⁵ and the *Asia-Pacific Regional Action Plan to Improve Agricultural and Rural Statistics 2013-2017*.⁶

This review identifies where member economy systems are not in accordance with FAO "best" practices. The intention is *not* to score or rank individual economies, nor to suggest that any economy rigidly follow a "checklist" of practices.⁷ In fact, no economy follows all best practices. Economies can improve their agricultural statistics by following a survey design that is within their financial capability, that is not integrated, and that is different from best practice recommendations. They can also improve statistics by applying components of best practices that are pertinent to their needs. The review points out where more attention to best practices can result in complete and comprehensive documentation and data. Attention may be needed in such areas as transparency in methodology, free access to census and survey results, efficiency in sampling frame construction and maintenance, effective data

⁵ Global Strategy to Improve Agriculture and Rural Statistics, September 2010, Report Number 56719-GLB, FAO, Rome.

⁶ Asia-Pacific Regional Action Plan to Improve Agricultural and Rural Statistics 2013-2017, Improving Statistics for Food Security, Sustainable Agriculture and Rural Development, October 2012, Report Number APCAS/12/10, FAO, Rome.

⁷ A true comparative study would require much more information and more formal agreement on quantitative measures.

collection methodology, consistency in market coverage, cost optimization, and coverage of forestry, fishery, human resources, environmental, and trade data.

To fully comply with FAO's guidance, "integrity" refers to the level of transparency in an economy's policy regarding the availability of the terms and conditions under which statistics are collected, processed, and disseminated. It also includes a description of the policy of providing advanced notice of major changes in methodology, source data, and statistical techniques; the policy on internal governmental access to statistics prior to their release; the policy on statistical products' identification. Such an approach builds long term confidence by all stakeholders for which the data are relevant. Transparency and clarity contribute to high levels of trust in the objectivity and accuracy of the statistics. It implies that professionalism should guide policies and practices and it is supported by ethical standards. Lack of data transparency often precluded a more detailed website analysis and was a common challenge under nearly every data type.

We base our assessments on observable capabilities and observed limitations of supportive systems, laws, and regulations posted on the websites. Any website documentation mentioning staffing and/or budgetary constraints on statistical program was useful in explaining the observable outcomes and methodologies of published census and surveys.

RATIONALE FOR BEST PRACTICES

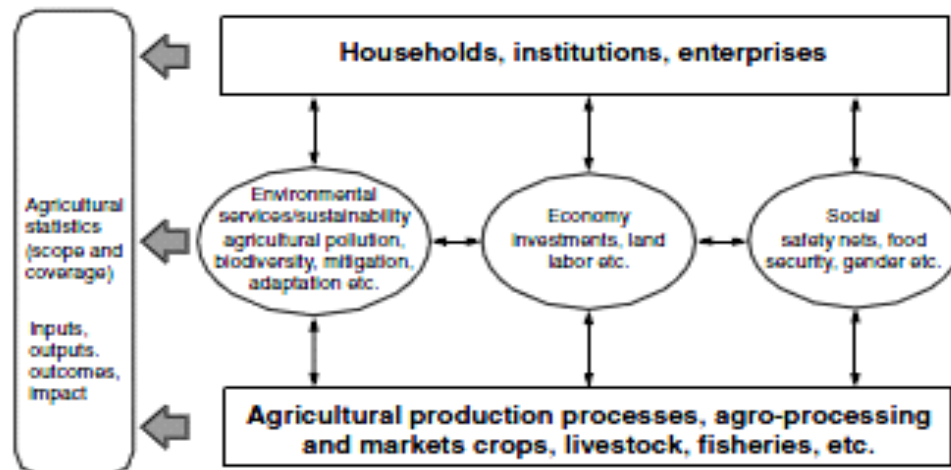
The *Global Strategy* points out that "three out of four poor people in developing countries live in rural areas." Most rely directly or indirectly on agriculture for their livelihoods. Decisions about aid and investments that are intended to foster agricultural growth should be based on sound information about land use, factors of production, the economic and social situations that producers face, and the interaction of these with issues concerning climate change. The impact of these factors can only be measured and evaluated with appropriate statistics. This is the rationale for this study: begin to improve the supply and quality of such statistics.

Framework

The conceptual framework depicted below is from the *Asia-Pacific Regional Action Plan to Improve Agricultural and Rural Statistics* (hereafter, RAP). The framework brings together the economic, environmental, and social dimensions of agriculture and the cause-and-effect inter-relationships that connect them. In terms of statistics, these dimensions relate to agricultural production and extend to processing and markets as well as income distribution, accumulation, and consumption that are translatable into household food security and environmental impact. The relationships are also a function of the institutional framework within which agriculture operates and which needs effective coordination and supervision. The framework favors a centralized system that allows for efficient integration of census and survey infrastructures.

Figure 1-1

Conceptual Framework from the Asia-Pacific Regional Action Plan to Improve Agricultural and Rural Statistics



- *The Economic Dimension:* The economic dimension covers agricultural production, utilization, markets, and farm and nonfarm household income. The recommended minimum interval for agricultural census data providing detailed household and farm data at the lowest administrative unit level is every ten years; surveys of crop and livestock inventory and of economy-wide and regional production estimates should occur annually. This includes data on agricultural production and utilization, markets and farm and nonfarm household income data.
- *Social Dimension:* The social dimension covers the need to reduce risk and vulnerability, including food security, and issues related to gender. In the past these data were obtained by specialized surveys and often sponsored and funded by nongovernment organizations (NGOs) for the purpose of identifying the need of social services and determination of food security issues. The conceptual framework is recommending that these data be incorporated into the institutional data collection regimen of census and surveys.
- *Environmental Dimension:* The environmental dimension of agriculture generally applies to the sector's sustainability and to identification of environmental service needs. Traditionally, the collection and monitoring of this data has been limited to special surveys, but the conceptual framework recommends that these data be incorporated into annual surveys for timely monitoring of the effect of farming practices on the environment and ultimately the economy. This includes aspects relating to the impact agriculture has on the environment, biofuels, land cover/forestry and water use.

2. Review Method

This section summarizes the process used to compare the agricultural statistics programs of APEC's 21 member economies with FAO best practice guidance on the three pillars laid out in the *Global Strategy* and RAP documents. Analysis of the review provides a basis for considering how FAO guidance on data collection and dissemination can improve the quality of agricultural statistics.

CONTENT OVERVIEW

This review covered 59 best practice components—43 under Pillar 1 and 16 under Pillars 2 and 3. Under Pillar 1, 25 components are subdivided into 4 elements of response: “census provided data”, “agricultural survey provides data”, “special/seasonal survey provides data”, and “has estimates from one or more sources.” Four of the components of Pillars 2 and 3 are also subdivided into four elements of response: “National statistics office conducted agricultural census”, “NSO conducted current agricultural survey”, “MOA conducted agricultural census”, and “MOA conducted current agricultural survey.” The following subsections explain these in detail.

In reviewing the websites of statistical agencies of the 21 APEC member economies, we assumed that all reflect the current status of each economy's statistical programs and related data reporting capabilities. Our review was systematic to account for the fact that unduplicated agricultural data can appear on the websites of domestic statistics offices, customs offices, and various ministries (e.g., agriculture, commerce, natural resources and forestry ministries). This independent review covered all possible statistical websites to ensure complete evaluation of core data and with the same internet access as that available to the typical “surfing” individual seeking agricultural data. Some additional information and observations relating to the three pillars is presented below.

PILLAR 1: CORE DATA ITEMS

The phrase “agricultural statistics” brings to mind figures on crop acreage, production, and livestock. Under the RAP's first pillar, these core data items are expanded to coincide with the Global Strategy framework for data relating to poverty and hunger, the environment and climate change, land and water use, and use of food and feed commodities to produce biofuels.

The RAP recommends that survey plans not require data for some core items on a yearly basis because they do not change much from year to year or because the data are difficult, complex, and expensive to obtain annually. Each economy should select which core items to include in its system, determine how frequently data are needed, and determine the level of the coverage required. The RAP suggests that data be obtained annually for commodities that, when

combined, account for more than three-fourths of an economy's value of production. Commodities relevant to the economy but whose production varies significantly from year to year should be included, particularly if production fluctuations put vulnerable households and food supplies at risk. Finally, the RAP outlines that:

The next step is to review the rural development indicators for monitoring and development in the Sourcebook (FAO and the World Bank 2008)⁸ and include those relevant to the domestic situation. Then each economy should determine the level of geographic coverage and detail to be provided for the core plus additional items added. The question of what level of detail is required and how often data are required may be difficult to answer. It is generally true that policy makers will want data for "within" economy administrative areas such as provinces; if so, this should be included in the domestic framework.

On the basis of these recommendations, the first pillar framework expands the scope and coverage of agricultural statistics by identifying aspects of fisheries, forestry, and rural households and associated indicators as core.

When scoring a core item for this study, often only one element of that core data item was available on the official website. For example, the checklist for core data item crops may have multiple elements; "area planted and harvested, yield, and production" has three elements. When an item has several elements and only one is published the checklist is scored "positively" as if all elements were present. This method of scoring overstates the percentage estimate for the core item associated data and is a shortcoming associated with having to accomplish only a website review and not being able to examine all the questionnaire data that might be collected and summarized but just not published.

This shortcoming gives officials a false sense that the high percentage estimate reflects all core item data, and that the rate of compliance is considered satisfactory on the basis of published data. It is quite possible that all elements of core data are indeed collected on the questionnaire, but they are not publicly available so the economy cannot receive credit.

Crops

The review of core data items begins with traditional crops of wheat, maize, barley, sorghum, rice, sugar cane, soybeans, and cotton as suggested by the FAO. We assume that each APEC economy has determined its core items. We acknowledge whatever crops are published on the institutional websites as "core" crops and account for the crop content presence and whether the data come from census or survey as a proxy indicator of data timeliness. Census data are usually available in detail at lower administrative units, but may not be current or very useful because they are collected at ten-year intervals. Survey data are fairly recent, collected in the last two years, but summary estimates are available only at the domestic level and one administrative unit lower. We attempt to accommodate whether the data come from secondary surveys, which are often seasonal, subjective, or gathered by an administrative process (e.g., customs inspections and reporting for import/export data, or a commerce department for weather data).

⁸ Global Donor Platform for Rural Development, FAO and World Bank (2008). Tracking Results in agriculture and rural development in less-than-ideal conditions: A sourcebook of indicators for monitoring and evaluation.

Exhibit 2-1*Use of Census vs. Survey*

Deciding which commodities should be covered by an agricultural census or survey questionnaire can be difficult. If too many are covered, the questionnaire becomes voluminous and costly to enumerate. The RAP suggests including commodities that account for a significant proportion of land used and that have short-term effects on land use and the environment. Sample design and resources are affected when items produced by only a small number of farm holdings and that account for a small share of the land are included. For example, sampling theory indicates that the relative variance of the estimated mean is approximated by the relative variance of the positive sample units plus the relative variance of the estimated proportion of positive population units. $CV^2(Y) = CV^2(Y_p) + CV^2(P)$, where Y_p is the mean of the positive responses and P is the proportion of the population that has the item.	When only one-third of farm holdings have an item, the sample size will have to be four times larger to achieve the same level of precision as compared to when three-fourths of farm holdings have the item. When only 10 percent of holdings have the item, sample sizes will have to triple to achieve the same level of precision as when one-third have the item and will be 12 times greater than if $(P) > 0.75$ for the same level of precision. Thus, minor and rare commodity items should be confined to the 5 to 10 year agricultural census where the data collection provides broad coverage of the farm holding population and omitted from annual surveys where sample sizes are considerably smaller. The exception is when the sample frame contains sufficient data, usually from a detailed and comprehensive agricultural census enumeration that can be used in the survey design to target the rare commodity items.
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The crop review covers ten elements, including traditional crop acreage and production, and extending to producer/customer prices, crop production utilization, and early warning (EW) systems. EW systems are often regulated by the ministry of agriculture (MOA) even when the ministry is not responsible for the agricultural census or surveys. When the MOA monitors crop development or measures disaster effects it is updating the crop estimates of the survey organization. We merely acknowledge the presence of EW system reporting and do not attempt to assess the timeliness or quality of EW data.

Livestock

The review of livestock items include the FAO's suggestion of cattle, sheep, pigs, goats, and poultry, but, as with crops, we assume that each economy has determined its core items; view livestock for which data are published on websites as core; and use data source (census or survey) as an indication of timeliness.

The livestock review covers eight elements, including traditional livestock inventory numbers, and extends to births, producer/customer prices, and products (i.e., meat, milk, eggs, wool). For the purpose of data presence determination we record an acknowledgement whenever any one of several commodities for an element is present. For example, cattle are a common dietary livestock item and data on meat production published on websites commonly include the number of cattle slaughtered and/or the volume/quantity of meat. Even if no other data on livestock meat are published this "checklist" element receives a "positive" acknowledgment of data being present. Where website data do not indicate the presence of sheep or data on sheep inventory, we objectively assess wool production based on the presence of production data.

Aquaculture and Fisheries

The FAO makes no suggestion regarding fish species, and each APEC economy is the best judge of what species it classifies or will classify as core. An aquaculture area is any self-contained inland water used for fish production, while fisheries pertain to all fish production from the ocean to salt/brackish water tributaries. Our aquaculture review covers water surface area, production quantities, producer/customer fish prices, and net quantity of trade. The dataset for fisheries consists of six elements that require species production quantified by quantity landed and discarded, number of days fished, and quantity processed for food and non-food. Our website review attempted to judge timeliness by data source but the terminology of census for fisheries and aquaculture really is indicative of special one-time surveys. Such surveys lack detail on methodology. Annual surveys of crop and livestock by NSOs and MOAs do not cover fisheries or aquaculture unless through an independent survey.

Forestry

The FAO makes no suggestion regarding tree species, and each APEC economy is the best judge of what commercial species it classifies or will classify as core. The FAO does recommend that data distinguish between wooded or /forest area associated with farms and commercial forestry holdings in woodland, plantation, and forest. When we could find forestry data on a website it usually did not make this distinction. Our review of forestry data content covered six elements, including forest area by ownership type and quantity of production. Often only data on area or production were available and production data was in terms of exports. Data on core wooded farmland price or commercial prices of wood and pulp were rarely published.

We attempt to classify the source as an indication of the timeliness, but forests grow slowly and annual surveys are unusual and a census to collect forestry data is usually a one-time domestic survey of commercial and public forest land. Such surveys lack details on methodology and price data are not relevant. In conducting annual agricultural surveys of farmland, an NSO or MOA will usually cover only the farm-associated woodland data items; if collected, core pricing data may be timelier but is not particularly relevant or reflective of commercial pricing.

Agricultural Inputs

Our review of the agricultural input data content covers six elements, three on crop production inputs and three on numbers of workers associated with the farm holdings. These items are often included on survey and census questionnaires but the websites were very inconsistent in publishing the data. Data on cropping inputs are frequently collected on survey and census questionnaires, but again, they are not consistently or predictably published on websites. Regardless, we attempt to classify the data source as an indication of the data timeliness. Data on household farm workers, employment, and hired workers are often collected during a census, because big sampling errors in survey estimates make for imprecise data.

Socioeconomic

Our review of socioeconomic data content covers agricultural household income and rural household income. These data items are often on survey and census questionnaires, but are not consistently published on websites. When website data are available we apply expert judgment in classifying the data source as census or survey.

PILLAR 2: INTEGRATE AGRICULTURE INTO DOMESTIC STATISTICAL SYSTEMS

Pillar 2 of the Global Strategy is the integration of agriculture into the domestic statistical systems. The RAP points out that integrating agriculture data into a domestic statistical system can consolidate overlapping data requirements, improve statistics and methodologies, consolidate budgetary and personnel resources, and avoid duplication of effort. The *Global Strategy* framework attempts to achieve bureaucratic integration on the basis of technical requirements related to the development of a master sampling frame for agriculture, adaptation of the frame to an integrated survey system, and support for a data management system.

The RAP suggests that each economy formulate a statistics mechanism to coordinate the integration of agriculture into its domestic statistical system using a National Strategy for the Development of Statistics” (NSDS) as the tool⁹. Ultimately, a more pragmatic mechanism for approaching coordination is recommended - to be decided by each economy utilizing existing coordination mechanisms when possible rather than establishing new ones. The coordinating mechanism should be able to involve all relevant subsectors: crops, livestock, fishery, forestry, environment, natural resources, food security, etc. The reasoning behind the strategies and policies are difficult to assess solely with a website review.

Evaluating a domestic survey system objectively requires that system documentation be transparent. Each NSO, however, typically thinks of its responsibilities independently of other offices and bases its reporting on administrative regulations and laws that are rarely divulged on a website. Most websites do not identify their organization’s statistical charter or legislative authorization to conduct a census or survey. Often, the statistical agency does not even recognize that it manages a “master” sampling frame that can be shared with other survey organizations to achieve an “integrated” statistical survey system.

To overcome these shortcomings, we scored best practice core items on the basis of our own understanding of master sampling frames and survey integration principles along with any documentation and transparency thereby provided on the website. Our experience with various agricultural survey designs also gave us a sound basis for interpreting survey methodologies and evaluating practices.

PILLAR 3: SUSTAIN AGRICULTURAL STATISTICS THROUGH GOVERNANCE AND STATISTICAL CAPACITY BUILDING

The *Global Strategy* recommends integrating agriculture data into a domestic statistical system by means of a statistics council. Programs have evolved to meet needs that are generally not explained and have evolved with the assistance of donors, who replicate their own systems without regard for local governance.

In our initial review of APEC economy websites, we found it very difficult to evaluate the extent of integration. Few websites are transparent with respect to governance and their

⁹ The NSDS is a strategic planning process that enables developing countries to build a reliable statistical system that produces the data necessary to design, implement and monitor development policies and programs. Furthermore, the NSDS provides an economy with a vision of the development of statistics and a detailed costed action plan over a period of 5 to 10 years that covers the production of all official statistics.

authority under laws related to survey administration, data collection, and distribution. Even when governance is transparent and documented it is buried in website menus that do not seem related to integration or governance of agricultural data and management systems.

Obscurity is worst for “statistical capacity building,” specifically data management systems. Here, the best approach is to directly interview information technology (IT) officials who can fully explain data system capabilities. We therefore defer assessment of data management systems related to the third pillar rather than produce a subjective and largely inaccurate assessment based on highly interpretative analysis of websites.

Lack of website transparency on institutional governance and coordination presents similar limitations. These two topics require in-person interviews with executives to accurately and objectively assess governance; therefore, we defer an assessment of practices in “improving governance and coordination across the institutions producing agricultural statistics topics.”

We found that information available was insufficient to assess integration or governance. Several websites provided a link to statistical law pertinent to a census, or general laws empowering institutions to conduct annual agricultural surveys. But the “legalese” made the laws difficult to interpret with regard to best practices. Information on statistical capacity building was rare (one website announced that project funding was approved but provided no updates on progress). Thus, it was decided to focus on the statistical system’s legality and “economy-wide” basis. Nearly all APEC economies have domestic institutions and they often state the laws behind their statistical authority, responsibilities, and activities. It was difficult to discern whether there was supervision and/or coordination of integrated agricultural statistics by a “council-like” entity and whether the government had an NSDS in place.

TECHNICAL LIMITATIONS

Our evaluation becomes somewhat subjective when we consider whether the data are reasonably current, such that they can still be deemed representative of that economy’s conditions and for accurate determination of supply and demand economics. We do not presuppose that any particular statistical agency is the “correct” agency for supplying any particular core data. Thus, an agricultural census or survey can be conducted by a national statistics office (NSO)¹⁰ or by the Ministry of Agriculture (MOA) depending on which has government legislative authorization.

Another allowance made during the scoring pertains to published agricultural census data. Any one element of core data available on a website obtained from an agricultural census received a positive score regardless of the year of the data as long as the census was conducted within the last ten-year interval of census-taking. If census data are nearly ten years old and this study’s scoring decision provides a “positive” score as if all data elements were equally current as an annual survey the percentage estimate for the core item associated data will be overstated. That said, it was determined important to give credit to economies if there was an attempt to implement the “spirit” of FAO best practices.

¹⁰ For the purposes of this study, NSO serves as the general term of reference for the lead domestic agency involved in the collection and dissemination of statistics.

Given time and resource constraints, a complete review of all aspects of statistical systems in respective APEC member economies was not possible. In addition, information in English was often not available or lacked sufficient detail to enable an objective assessment.¹¹ Lack of transparency with regard to data collection, supervision, review and cleaning, questionnaire response rates, or follow-up or handling of incompleteness used in the summarization process made it extremely difficult to review the effect of best practices on agricultural statistics posted on website pages. This was a common problem for nearly each data item assessed. It was not possible to review the quality and correctness of survey methodology or the application of the probability theory in the sampling framework. A sophisticated sampling frame in one economy, for example, might produce worse results than a simple frame in another. An assessment in accordance with the FAO scheme in the RAP would require months of onsite consultation and enormous amounts of contextual information to understand how census and survey processes operate in each economy, and to relate them to needs for comprehensive environmental, market, and socioeconomic data. These additional items were not assessed as part of this study:

- How to address and coordinate duplicative systems within economies as the FAO RAP deems this the responsibility of each economy.
- How best to organize the roles of NSOs with other ministries that collect sectorial statistics because again the FAO RAP assigns this to each economy.
- The sustainability of the integration of the current master NSO frameworks and agricultural statistical programs from the information available on the web
- The quality of the data management systems based on the data available from the information available on the web.

¹¹ Appendix A presents best practice checklists with the key elements used for the reviews. The primary source material is available from the FAO Global Strategy and The Regional Action Plan, but more source material is available from the U.N. and the World Bank related to the goal of agricultural statistics improvement.

3. Application of Best Practices to APEC Agricultural Statistics

This baseline study reviews the different agricultural statistical data collection systems in APEC member economies and how they vary and/or are complementary on a whole to the FAO guidance. The coverage of agricultural statistics should be as comprehensive as possible, and units should not be omitted based on size, importance, location, or other criteria. These aspects of best practices are not possible to assess from a website-based search and evaluation, and thus, were not considered as best practices criteria for this baseline study. This study combines the review of the second and third pillars because they tend to involve more than one ministry and are less related to what institutions consider publishable on websites (e.g., summaries of questionnaire data).

HOW RECOMMENDED BEST PRACTICES ARE APPLIED

The extent and method of best practice implementation varies widely across APEC economies in keeping with the institutional capabilities and agricultural complexity of each. As previously noted, the RAP states that agricultural complexity means that no single statistical system will fit all needs, and modern probability survey sampling has made such flexibility possible. ***Based on the baseline review it was found that 16 APEC economies have made progress in adapting best practices and one-quarter have mature programs that comply fully with the “spirit” of the best practices.*** This indicates that each economy has developed statistical programs over a number of years, and their current agricultural statistics likely suit their budgetary and structural capabilities while attempting to meet the needs of data users. This is particularly true for decentralized statistics programs that do not conform to the FAO’s centralized approach but accomplish the same objectives.

The websites of all economies were searched to identify which organizations are responsible for publishing agricultural statistics. It was found that multiple institutions were responsible, but that only some document their methods and legal authority. Absent documented transparency, probability sample surveys and census methodology were utilized to classify and evaluate agricultural statistics programs as follows (criteria are in Exhibit 3-1):

- Full compliance: 5 economies have fully implemented the RAP best practice principles in their agricultural statistics programs.
- Strong application: 3 economies have nearly fully implemented the best practice principles.
- Moderate application: 8 have partially implemented the principles.
- Weak application: 4 have not implemented the principles in a majority of their programs.

- No apparent application: 1 does not appear to have an agricultural statistics program.

In sum, application of best practices is fully compliant or strong in eight of the 21 economies and moderate or weak in thirteen. This confirms the FAO's supposition that statistics programs in the region have deteriorated and supporting the premise of the RAP that "agricultural statistics programs must be strengthened as soon as possible to meet twenty-first century data needs."

It must be kept in mind that the agricultural statistics and best practices in among APEC economies are diverse and challenging. Sixteen APEC economies can be classified as having moderate or better application of best practices. Implementing partners of the RAP are continuing to work with a number of APEC economies in the FAO's Asia-Pacific region to improve agricultural statistic programs and it is hoped that the percentage of APEC economies effectively applying these best practices will improve in the medium to long term.

Exhibit 3-1

APEC Economy Classifications Based on Best Practice Application

Fully Compliant (24%)
Established and implemented agricultural statistics governance principles Transparency of statistical laws and survey/census methodology complete Integrated approach to agricultural statistics and using a master sampling frame Current survey and/or census with website access to the agricultural data Website availability of socioeconomic and agricultural input data
Strong Application (14%)
Established and implemented some agricultural statistics governance principles Transparency of statistical laws and survey/census methodology not complete Limited integrated approach to agricultural statistics with master sampling frame Current survey and/or census with website access to the agricultural data Website availability of socioeconomic and agricultural input data mostly available
Moderate Application (38%)
Limited establishment and implementation of agricultural statistics governance principles Limited transparency of statistical laws and/or survey/census methodology availability Lacking Integrated approach to agricultural statistics with master sampling frame Mostly current survey and/or census with website access to the agricultural data Website availability of socioeconomic and agricultural input data limited with some missing
Weak Application (19%)
Lacking established and implemented agricultural statistics governance principles Lacking transparency of statistical laws and/or survey/census methodology availability Lacking integrated approach to agricultural statistics using a master sampling frame Limited survey and/or census agricultural data and/or not current Website availability of socioeconomic and agricultural input data mostly missing
No Apparent Application (5%)
No established and implemented agricultural statistics governance principles No transparency of statistical laws and survey/census methodology not available No integrated approach to agricultural statistics and no master sampling frame Survey and/or census current agricultural data apparently not available No website availability of socioeconomic or agricultural input data

INFRASTRUCTURE FOR IMPLEMENTING BEST PRACTICES

The RAP engages economies mostly through the ministry of agriculture, forestry, fisheries, livestock, etc. The FAO engages with government agencies responsible for agricultural statistics, including the NSO, if appropriate through its offices in member economies. The Asia and Pacific Commission on Agricultural Statistics (APCAS) is the highest regional forum for statistics offices in the ministries of agriculture; it provides coordination and support for the improvement of agricultural statistics.

The primary institutions in APEC economies dealing with agricultural statistics are NSO and MOA. These organizations may have different names and levels of authority but will share similar responsibilities and expertise. The NSO is usually centralized, domestically oriented, headquartered along with the central government facilities, and has the staff and budget for large-scale data collection (e.g. economic, population, and agriculture censuses). The NSO often uses its census expertise to generate sampling frames and conduct economic-related household and consumer/market price surveys.

Recommended Roles for Agricultural Statistics Agencies

The NSO should

- Be centrally organized and domestically oriented.
- Have staff and budget for large-scale data collection.
- Have census expertise to generate sampling frames and conduct household and consumer/market price surveys.
- Collect data that allows poverty headcount determination and calculation of food insecurity indicators.

Our detailed review of website agricultural statistics suggested the extent of infrastructure available to support best practices: ***we found that 20 APEC economies make agricultural statistics available to some degree on one or more of websites.***¹²

PRODUCTION, PRICE AND WEATHER DATA ON WEBSITES

The study review began with examination of three major areas of information related to best practice components: agricultural crop and livestock production data, consumer prices, and weather data applied to agriculture.

1. Agricultural crop and livestock production data

We found that 71.4 percent of NSO websites provided agricultural statistics to some degree, with two-thirds providing data derived from an agricultural census, presumably conducted by the NSO, while 47.6 percent provided data with its source identified as an agricultural survey.

APEC economies making crop and livestock data available on websites

- NSO: census, 66.7%; survey, 47.6%
- MOA census, 14.3%; survey 61.9%

¹² The results of our review are in percentage terms based on all 21 APEC economies as a single entity. The percentage figure for each best practice core item reflects only that the item was found on or was absent from institutional websites. We make no judgment as to an economy's own decision or desire to classify a data item as a core item in measuring agricultural and economic activities. The percentage scores are based on the author's independent evaluation of each APEC economy's websites. The website search for core items and the scores can be considered a "survey" process, and as such, is subject to the same non-sampling errors inherent to any survey.

The MOA has staff specializing in agriculture production, marketing, farm extension work, soil protection, etc., and will often have its own unit for conducting farm surveys, collecting farm-gate and market prices, monitoring weather effects on crop production and livestock, disaster estimation of agricultural production damage and/or reduction, etc. Often the MOA will collaborate with NSO on the design of the agricultural census to ensure their data needs are satisfied, but do not have staff and resources to conduct a large-scale census. We found that MOAs conduct only 14.3 percent of agricultural censuses, but appear to conduct 61.9 percent of annual agricultural surveys.

These percentages do not imply duplication of estimates. Duplication will naturally occur between surveys and census. Even when an NSO conducts the agricultural survey, the MOA may be responsible for economic analysis of the farming sector and will publish “situation” reports that include data it collected to augment the NSO’s survey data. MOA more often has responsibility to report producer prices, livestock slaughter and meat processing along with economic analysis of imports/exports.

2. Consumer price data

The review of all APEC economy websites found that 81 percent make available consumer price statistics in some fashion on one or more of their institutional websites. The “consumer” prices found do not refer to the consumer price index (CPI), but to select components of the CPI that correspond with FAO’s

best practices core data items that examined in detail below. The scores are estimates of only the presence of some of the consumer prices set forth by FAO.

61.9% of APEC economies provide consumer price data on NSO websites; 38.1% provide the data on MOA websites.

However, the study also found that four APEC economies do not collect and provide consumer prices on any official government websites. This estimate should not be interpreted as stating that all core items are provided with a consumer price. It only indicates that at least one core item’s consumer price was found.

The study review found that nearly two-thirds (61.9 percent) of NSO websites provided consumer prices; however, often these consumer prices were in association with publishing the monthly CPI and its sub-indices and component data. These components include food, but often the food items are processed and/or major city supermarket retail prices, not necessarily a market price and certainly not meaningful as a producer price. The remaining 38.1 percent of APEC economy publish the information on MOA websites and were found to publish reasonably current price data reflecting a consumer “market” price that is more representative of the price most households pay for the core agricultural commodities purchased at the market they directly consume (not commercially processed).

How to Improve Consumer Price Data

- All NSO websites should publish consumer prices and CPI for urban and rural households.
- MOA websites should publish current “market” price that is more representative of the price most households pay for core agricultural commodities.
- Publish urban and rural “market” prices separately.

3. Weather data

The review of weather information found only eleven APEC economies have a website(s) maintained by their NSO and MOA institutional websites providing data related to agriculture. The percentage score for weather required more scrutiny than other items because the intent of this review is not to determine the availability of temperature and precipitation amounts such as those widely reported by the local media, but whether the weather “information” is made available in conjunction with agricultural statistics such that it infers a cause-and-effect on production, harvest, livestock conditions, etc.

If the EW is the major factor for monitoring weather for its effect on agriculture, then the NSO and MOA institutional websites are appropriate to evaluate for weather information and not the government weather service website. Most often it is the economics unit within MOA that uses EW information to assess the weather impact and issue alerts to producers, NGOs, government emergency agencies/units, etc.

14.3% of APEC economies provide weather data on NSO websites
42.9% provide the data on MOA websites

How to Improve Weather Data

- NSO and MOA websites' should relate weather to its effects on agriculture.
- An early warning system is needed to monitor weather effects.
- MOA needs to publish monitoring reports that integrate crop area and production survey data with weather effects to forecast damage and loss assessment.

Based on the review explained above for weather data, the study estimates that only 14.3 percent of NSO websites provide agriculturally related weather information compared to 42.9 percent of MOA websites.

CORE DATA ON WEBSITES

The “core” crop items suggested in the RAP are wheat, maize, barley, sorghum, rice, sugar cane, soybeans, and cotton. These account for a major proportion of agricultural land use, of overall food supply, and of value added from agriculture. However, the FAO has allowances for each APEC economy to make a determination regarding the importance of specific crops to its domestic production and demand. . The core item “crops” for example has associated data that are sub-divided into:

1. area planted and harvested, yield, and production
2. amounts in storage at beginning of harvest
3. area of cropland that is irrigated
4. producer prices
5. consumer prices
6. amount utilized for own consumption, feed, & seed
7. amount utilized for fiber, oil for food, bio-energy, and net trade or imports and exports

Core data should provide inputs to the domestic accounts and global balances of supply and demand for food and other agricultural products. The data should be selected on the basis of their importance to agricultural production globally and on the domestic level. When choosing a core item it should be considered as pertinent data capable of supporting a multitude of policy and decision makers, such as to monitor and evaluate development

policies, food security, production, trade. In determining core data for crops, crops that utilize a major proportion of land use, contribute significantly to farm and rural household well-being, and have an effect on the environment and climate should be considered by an economy. It should be the first core data item to be included in the statistical system and the last to be removed as a result of budget shortfalls. The list of core items and associated data should establish the framework for the agricultural and rural components of the NSDS when they are being implemented for each APEC economy.

The World Program for the Census of Agriculture¹³ contains a list of 149 crops, 28 livestock species, and about 1,400 fishery and aquaculture species for which they seek to collect data. The list (Appendix B¹⁴) should be considered as a menu of possible indicators. Not all are produced in every economy, and they are not of equal importance in every economy where they are produced. Many of these crops and species are rare items and attempting to survey all of these data exceeds what any economy can enumerate on an annual basis. For example, only about 10 crops and 4 livestock species account for over 95 percent of the world's production of cereals, meat, and fiber. To have a full picture of an economy's agricultural production on a domestic level, data on inputs, production, and prices for all of those several hundred items are needed for indicators such as GDP growth from agriculture value added and a number of others. The following sections examine how APEC economy's websites score for each core crop item and associated data.

4. Crop area planted and harvested, yield, and production

Discussion: Since each APEC economy makes its own determination of which crops are core items, the review examined each website for the presence of the required elements of associated data, assuming the crops published were core crops.

Data on area planted and harvested, yield, and production provided through

- **Ag census 52.4%**
 - **Ag survey 95.2%**
 - **Special/seasonal survey 9.5%**
 - **Estimates from one or more sources 95.2%**
-

Analysis: The study review gave a positive score to any website that provided any one of the four elements associated with a published crop. The data was scored based on availability (not the source) such as an agricultural census¹⁵ or annual sample survey¹⁶. Some APEC economy sites made data accessible from a database, but it was often unclear if the data collection source was from a census or annual survey.

¹³ A system of integrated agricultural censuses and surveys, Volume 1, World Programme for the Census of Agriculture 2010, FAO Statistical Development Series 11, Rome, 2005.

¹⁴ Asia-Pacific Regional Action Plan (RAP) to Improve Agricultural and rural Statistics 2013-2017, Improving Statistics for Food Security, Sustainable Agriculture and Rural Development, October 2012

¹⁵ A census is the procedure of systematically acquiring and recording information about the members of a given population. It is a regularly occurring and official count of a particular population. The term is used mostly in connection with population and housing censuses; other common censuses include agriculture, business, and traffic censuses. <http://en.wikipedia.org/wiki/Census>.

¹⁶ In statistics, quality assurance, and survey methodology, sampling is concerned with the selection of a subset of individuals from within a statistical population to estimate characteristics of the whole population. Acceptance sampling is used to determine if a production lot of material meets the governing specifications. Two advantages of sampling are that the cost is lower and data collection is faster than measuring the entire population. http://en.wikipedia.org/wiki/Sample_survey.

On the basis of the above scoring criteria the study estimates that 11 economies provide core crop planted/harvested/yield/production data from a recent agricultural census. Data obtained from a census implies that the numbers are available down to lower administrative/geographic/political jurisdictional levels. Precision and accuracy cannot be assumed because sample census are not always transparent. In some situations documentation was available, but it described the census as based on a sampling of households and a target sample size only. What can be assumed is that the sampling of households is substantially larger than that of the annual survey at the lowest administrative summary unit such that the census estimates can be assumed to be more precise than those obtained from an annual survey.

The review found that twenty APEC economies provided their core crop data obtained from an annual agricultural survey. However, the data posted on the websites was often found to be two years old or older. It is not unusual for a survey to take six months for conducting data collection and another six months to process/clean/summarize survey data before it can be published on a website; therefore, this review did not pass judgment on the year of the survey data as long as it is reasonably current.

Some websites made data available from a special survey or census. For crops it was found that only two APEC economies regularly conduct special/seasonal surveys and make the data available on an agency's website. This published data is available on a seasonal basis due to a special survey aimed to update previous survey estimates in response to current conditions.

Lastly, the review considered when one or more sources of the same-year core crop associated data item were made available on websites. Based on this study's findings, twenty APEC economies appear to have at least one estimate or more of these core crop associated data items. This is not unexpected considering the importance of rice, wheat, and corn crops to APEC economies.

To Improve Crop, Area, Yield, and Production Data

- Publish data with documentation explaining the selection and exclusion of core crop determination factors.
- Ensure transparency in agricultural census and annual survey crop data collection and estimation.
- Provide centralized database query and data distribution systems to improve transparency.
- Have the agricultural census emphasize core crop planted, harvested, yield and production data published at lower jurisdictions while annual surveys for budgetary reasons publish at higher summary levels.

To Improve Core Crop Storage Data

- Provide data on crop quantities in storage at harvest for food security and price forecasting purposes.
- Provide quarterly estimates for commercial and subsistence farm holdings.
- Collect and publish data on production use to ensure accuracy in crop storage data.
- Consider crop storage as a time-sensitive and a critical component of the early warning system.

5. Quantity in storage at beginning of harvest

Discussion: An important associated core crop data segment includes the availability of crop quantities in storage at the beginning of harvest. This associated data is considered the “carry-over” from the previous harvest. When added to the current production it is a primary contributor to the total current crop supply. To accurately enumerate crop quantity storage data the census/survey questionnaire needs to also collect data on the type and quantity of storage capacity on the farm. An inventory of how the stored crop will be used should be identified: 1) amounts consumed by the household; 2) feed to livestock; 3) used/saved for seed; and 4) quantity of grain sold. It is important to collect accurate quantities based on use to avoid over reporting quantities of the core crops available for food.

APEC economies providing website data on quantity of core crops in storage at the beginning of harvest (by source):

- **Ag census 14.3%**
 - **Ag survey 23.8%**
 - **Special/ seasonal survey 9.5%**
 - **Estimates from one or more sources 28.6%**
-

The RAP states that the availability and quality of data on food stocks in storage is very low in many economies; thus, strategies (survey designs, sample designs, estimators etc.) are needed to produce more reliable data. Moreover, due to the influence of food stocks on the international prices, better methods for estimating storage capacity and the quantity of stocks in storage will better allow government officials to avert food price crisis.

Analysis: This review found only three websites (14.3 percent) made core crop quantity data available that was based on an agricultural census and only five (23.8 percent) provided data from an annual survey. Two of the five collected this item through both the agricultural census and surveys. It is important that the quantity of these data be asked in association with grain production, utilization and storage. However, most of the data available on APEC economy websites appeared as “stand alone” questions.

Only two economies were found to have the required core crop associated data item available from a special or seasonally conducted survey. Overall, only six economies make available the storage data based on the use of the grain. It is recommended that all economies add this data item along with the crop production, utilization and capacity questions to both their next agricultural census and annual survey questionnaires.

The amount in storage is a time-sensitive statistic because the quantity on-hand changes with usage and sales, and lends itself to being most appropriately collected on annual agricultural or special/seasonal surveys. Early warning systems can assist economies to better monitor storage quantities and update the annual survey estimate of initial amount placed into storage for food security purposes.

6. Area of cropland irrigated

Discussion: Depending on an economy’s staple crop and agricultural infrastructure, the issue of irrigation varies in importance, and thus, the need to include irrigation on the agricultural census and survey questionnaires. This data item provides users with insight as to the amount of production potentially more immune from drought effects and

APEC economies providing website data on area of cropland irrigated (by source):

- **Ag census 52.4%**
 - **Ag survey 61.9%**
 - **Special/ seasonal survey 9.5%**
 - **Estimates from one or more sources 71.4%**
-

may help explain higher or lower yields.

Collection of the number of hectares/acres irrigated will help explain higher crop yield and is an important factor in forecasting crop production. FAO's best practices expect that for each core crop item the amount of crop area cultivated (planted and harvested) land should include whether the land is also irrigated. This study found that often the website data available was just an estimate of irrigated land and not the amount of land by specific crops.

For the purpose of this study, the information available on websites received a positive score when any irrigation data was available. The result should be considered as a general indication of the application of irrigation and not core crop specific as specified by FAO. Publication of the source of the water supply and the water delivery method should be quantified on the data collection questionnaire.

To Improve Data on Irrigated Cropland

- Collect data on each core crop on the agricultural census and annual survey questionnaire if the land is also irrigated.
- Collect data on water source and application method.
- Irrigation will reflect a significantly higher crop yield and is a factor in production forecasts, environmental concerns, and climate change.

Analysis: Eleven APEC economies collect and publish area of cropland irrigated with their agricultural census data. This census information is useful because it demonstrates the impact of irrigated crops and the positive effect it can have on production. It also provides policy makers with an understanding of the extent of irrigation use to support future forecasting of production based on annual survey estimates when changes in cultivated land and natural rainfall occur.

Thirteen APEC economies publish irrigated cropland estimates on their websites based on an annual agricultural survey. That said seven economies fail to collect this information regarding irrigated crops. Two economies were found to conduct seasonal surveys to obtain more detailed irrigation data. Overall, 15 APEC economies provide a degree of coverage for irrigation data.

7. Producer price data

Discussion: Market information affects agricultural activities and farmers' decisions. Most important is timely estimates of supply and demand, ideally before harvest so that producers can make informed decisions to sell or hold

portions of their crop for hopefully better prices following harvest. Producer crop price data are most often obtained through a marketing or specialty survey conducted independently of agricultural census or annual surveys. The independent survey provides producer prices or "farmgate" prices. The farmgate price reflects the actual price farmers receive for the sale of crops in terms of the most common marketing price mechanism (i.e., grain price per kg, milk price per liter, fish price per kg). These prices are of interest to farmers, bankers, NGOs, and the agro-industrial complex and are provided as a service to their public/private sector clients by the MOA.

57.1% of APEC economies provide data on producer crop prices on a domestic website

The most accurate method of farmgate price estimation is to survey a sample of farmers directly as soon as some or all of their production is sold. The problem is that many farmers do not sell at harvest, but place their production into storage which can make timing of a producer price survey difficult to estimate. Obtaining a representative farmgate price can be complicated by the different forms and quality that a commodity can be sold. The data collection questionnaire needs to accommodate the various local reporting units that will allow conversion of the farmer reported data to the standard reporting unit used for estimation and publication.

Farm producers often do not sell their crop directly in the marketplace but sell to a middleman who marks up the price. Therefore it is best to collect producer prices directly from the farm producer for an accurate measure. Because grains often are stored and sold periodically, monthly farm surveys are best suited for obtaining accurate prices and sales. In order to estimate accurate

producer prices for the many different core crops, interviews must be conducted with many single commodity farmers to get a representative estimate of farmgate prices. Because of these data collection issues producer price surveys are usually market oriented with price data collected from local markets selling wholesale or retail directly to consumers.

Because of the special agricultural expertise required to conduct producer price surveys, they are usually done by a marketing unit within the MOA. They will then release the published data on the agency website. Sometimes the MOA economics unit will collect and publish the import and export prices of internationally traded commodities on their website as well. These often are the only sources of core commodity pricing. “Futures” (grain prices for corn, soybeans, and wheat) can provide a means of interpolating an expected relationship between these futures’ prices and the local prices. This comparison may be the only timely price indicator the producer can expect when determining whether to sell their production or hold it in storage.

To Improve Data on Core Crop Producer Prices

Crop producer prices referred to as farmgate prices must reflect the actual price the farmer receives.

- Conduct marketing or specialty surveys independent of agricultural census or annual surveys.
- Collect producer prices directly from farm holdings.
- Conduct monthly surveys of farm sales to ensure that prices reflect current sales.
- Ensure producer prices represent the farmgate price and that data are NOT collected from local markets selling wholesale or retail directly to consumers.

Analysis: This baseline study took a pragmatic approach to reviewing websites with an understanding of the complicated nature of collection and estimation of producer crop prices and scoring their availability. The review process recorded a positive score if any producer price data was found and it was relatively current and no judgment was made as to its relevance to the concept of “core” commodity items. With this flexible scoring rationale, eleven APEC economies were found to publish relatively recent producer prices.

Considerable effort appears needed to bring this core data item up to the “intent” of best practice standards even for those APEC economies that publish producer prices. Five or six APEC economies fully meet best practices standards.

8. Consumer crop price data

Discussion: Consumer prices are similar to producer prices in that they require a marketing or specialty survey by government agencies that is conducted independently of agricultural census or annual survey.

Consumer prices more often are collected and published under the authority of the NSO or a commerce ministry's economic unit rather than the MOA. These data usually are collected independently of any other survey data collection, and are collected on a monthly basis for the purpose of calculation of a Consumer Price Index (CPI).

66.7% of APEC economies provide data on consumer crop prices on a domestic website

Two basic types of data are needed to construct the CPI: price data and weighting data. The price data are collected for a sample of goods and services from a sample of sales outlets in a sample of locations for a sample of times. Because the CPI must accurately reflect the actual prices that consumers pay at markets for retail goods, the sampling frame used is completely different from that used for surveying producer prices. The CPI calculation is formulated such that the NSO's economic unit collects the retail market data and publishing of the index is under the purview of the NSO statistician's expertise.

The CPI is designed to measure changes in the price level of consumer goods and services purchased by households. The CPI in the United States is defined by the Bureau of Labor Statistics as a measure of the average change over time in the prices paid of a sample of representative items by urban consumers for a market basket of consumer goods and services whose prices are collected periodically. Sub-indices and sub-sub-indices are computed for different categories and sub-categories of goods and services, such as food, housing, and clothing, each of which is in turn a weighted average of sub-sub-indices. Sub-indices and sub-sub-indices are a weighted average of different components of consumer expenditure, and combined to produce the overall index with weights reflecting their shares in the total of the consumer expenditures covered by the index. It is one of several price indices calculated by most NSO agencies and is usually computed monthly or quarterly/yearly in a few economies.

To Improve Data on Core Crop Consumer Prices

- Present consumer crop prices collected at the retail market should be presented for unprocessed crops.
- Publish consumer crop prices collected by MOAs separately for urban versus rural consumers.
- Ensure that commodity prices sampled are representative of urban and rural markets across the entire economy and NOT just major city markets.
- Recognize that the CPI or a sub-index alone does NOT reflect prices paid by consumers for crop commodities.

Unfortunately, most NSO formulations of their published CPI and related sub- and sub-sub-indices are heavily weighted based on urban household expenditures. The components are processed commercial products, finished goods, and services. For FAO agricultural statistics best practices the consumer prices refer to the core crop and livestock (commodity) items in their "unprocessed" form. These data will only appear in a sub-index or sub-sub-index component if these commodity prices are made available of the website.

This review found it difficult to score consumer prices found on a number of APEC websites and the decision was to assess a score as consistently as possible based only on the observable data. A positive score was given whenever a website indicated a consumer price or index (or

sub-index for an apparent core agricultural commodity item). Consumer prices available for processed or “finished” goods and services were not considered applicable by this study’s core item review.

Analysis: The review process recorded a positive score if any CPI or sub-index related to a core commodity is present. The rationale used for this scoring is that NSO must have the basic data available including the core agricultural commodity data items. Detailed data on core item prices available on their website is available to publish, and may be easily provided. Thus, with this scoring rationale in mind, fourteen APEC economies were found to publish some form of relatively recent consumer crop price information.

To Improve Core Crop Production Used for Home Consumption, Animal Feed, and Seed

- Accurate production data require estimates of (1) own consumption, (2) animals feed use, (3) used for seed, (4) quantity sold, and (5) amount in storage.
- Accurate production estimates require data on area planted and the area harvested by use (grain, silage, or abandoned).
- Accurate use estimates require data enumerated from the previous season’s crop production.

It is encouraging that fourteen APEC economies collect and publish some form of CPI data with six demonstrating exemplary data fully meeting best practices standards. These six have nearly complete coverage of consumer price index and sub-indices for crops, as well as detailed wholesale and retail price data for commercially traded crop commodities.

9. Crop production used for own consumption as food, feed, and seed

Discussion: The core item of crop production is actually composed of numerous associated pieces of data and partially addressed in the discussion of core item 5 and the need for core crop associated production, utilization and storage data. Essentially, crop utilization refers to its harvested “dry” grain state for all practical purposes; otherwise, the crop cannot be safely placed into storage for utilization. The crop area planted data are typically collected on both agricultural census and survey questionnaires. The area harvested by use (grain, silage, or abandoned) is enumerated to correctly collect and account for all planted area. These core crop associated data are typically collected from a sample of farm households by either NSO or MOA on either the agriculture census or annual survey.

38.1% of APEC economies provide data on core crop production used for farm households’ own consumption as food, feed, and seed on a domestic website

Data on use of grain production is more complete when the accounting includes own household consumption, quantity used on farm for livestock feed, postharvest loss, the amount saved/used for seed, and quantity sold. The quantity of grain in storage at the time of interview can serve as a proxy to include post-harvest loss due to spoilage and insect damage while ultimately representative of the usage in all four fashions (consumption, feed, seed, and sales). It is usually enumerated as the utilization of the previous season(s) crop production for more accurate accounting of reporting of production. Special surveys are often conducted to collect current data crop production expectation and utilization data especially when the crop growth or production level is threatened by drought, frost, or damaged/lost by a disaster.

Analysis: It was known from the initial website reviews that crop utilization data are infrequently published; therefore, this core crop associated data item was scored positively if

any one of the crop utilization components were found on a website and the data reasonably current. Based on this scoring criterion, eight APEC economies publish crop utilization data. There are five economies that have a very comprehensive set of this core item associated data published in one form or another.

10. Crop production used for fiber, oil for food, bio-energy, and net trade (or imports and exports)

Discussion: Core crop production data consist of numerous pieces of data. While production data are obtained from a farm survey, the production's commercial utilization must be accounted for independently from processors (i.e., fiber from ginners, food oil from crushers, and bio-energy from distillation facilities). The "net" trade data from imports and exports based on the website reviews was found to be a mixed-bag as to its data collection methodology and where the summarized data could be found.

Net trade data are very problematic, with issues similar to those discussed for both consumer and producer prices. Often import and/or export data are available but not combined on a net trade basis. The main problem is that net trade data are published on only a few MOA websites. Generally, net trade is not published by the NSO. If MOA has an agricultural economics unit to conduct the research, then it is possible that a "crop situation report" with an analysis of the net trade balance is published. Such "situation" reports are usually published quarterly at most and only for internationally traded commodities (e.g., corn, wheat, and soybeans).

61.9% of APEC economies make data on crop production used for fiber, oil for food, bio-energy, and net trade (or imports and exports) available on a domestic website

Crop Production Issues for Fiber, Oil for Food, Bio-Energy, and Net Trade

- The MOA should coordinate and publish data on crop production components.
- Data on crop production used for fiber, for oil for food is enumerated from commercial processors by MOA, NSO, or commerce ministry.
- Data on crop production used for bio-energy is enumerated from commercial processors by MOA, NSO or energy ministry.
- Net trade of commercial products from crop production is more efficiently estimated from import and export data from customs and commerce ministries.

Analysis: The process of reviewing this data item is typically difficult because of the complexity of the data and the number of possible webpages that might divulge the data. However, APEC websites had very little of this data available. This review awarded a positive score whenever one of the core crops associated data items were found on a website and the data reasonably current. Based on this scoring criterion, and despite the infrequency of the data, the review estimates that thirteen APEC economies publish statistics on at least one of these core crop associated data items: fiber, oil, bio-energy, or net trade data.

Only five economies publish a fairly comprehensive set of this data. Most of the economies scored positively for this core item because their websites published limited amounts of either import or export data, none of which was analyzed in terms of "net" trade as specified under best practice concepts.

11. Early warning indicator items

Discussion: The most intriguing and challenging best practice core items specified in the RAP are the early warning (EW) indicators of (1) precipitation, (2) windshield surveys of crop conditions, and (3) vegetative indices provided by satellite observations. These core item EW indicators require timely and precise estimates of the basic core crop elements of area planted and harvested, yield, and production. These basic core crop elements are needed for the application of the EW indicators. An APEC economy cannot have an effective EW system without readily available basic core crop elements.

Percentage of APEC economies providing data on three early warning indicators on domestic websites:

- **Precipitation 47.6%**
 - **Windshield surveys of crop conditions 47.6%**
 - **Vegetative indices provided by satellite observations 19.0%**
-

1. Precipitation data: is often readily available for most APEC economies from a media website, a government weather service, or from independent field weather stations. For the purposes of this study, the interpretation of EW indicators implies that the precipitation data are related to obtaining an updated estimate of crop production. Precipitation data alone are difficult to relate to crop production. The precipitation data must be mapped and are usually related to a map of soil moisture. The reports form the basis of the EW system and provide farmers, government agencies, and NGOs with an alert mechanism that issues timely warnings of stressful conditions and pinpoints areas potentially in need of interventions. Typically, the crop growing stages and condition monitoring activities are carried out by the MOA agricultural statistics unit's field enumerators or in collaboration with the MOA farm services unit's agricultural extension agents. It should be noted that precipitation is also important for the health of pastures that affect the raising of livestock. These pastures require monitoring with the same diligence as cultivated cropland. The United States Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) publishes a weekly crop progress and condition report¹⁷. Another example of an excellent EW system is the USAID-funded Famine Early Warning System (FEWS NET)¹⁸.

2. Crop conditions: are usually enumerated by members of an MOA unit agriculturally trained in agronomy and plant development. They will utilize a purposefully designed "windshield" survey of crop conditions to quickly collect data for timely summarization, analysis, and publication. These windshield surveys of crop/pasture growing stages and conditions are conducted by MOA units at regular intervals as described in the previous paragraph above. These purposeful surveys are ideally suited to provide timely assessment information when natural disasters strike and measures of damage and estimates of the numbers of affected people and livestock are needed to organize and direct emergency assistance.

3. Vegetative indices: are the most challenging of these three core item as they are typically provided by satellite observations. Remote sensing data have been used to produce vegetation indices that show overall crop conditions plus information about changes in land cover/use. However, decision makers in developing economies seldom use this kind of information

¹⁷ http://www.nass.usda.gov/Publications/State_Crop_Progress_and_Condition

¹⁸ <http://www.fews.net/Pages/default.aspx>

because reliability is not very high compared to surveys. For this reason, the RAP identifies program research for its future improved usage. The RAP also anticipates that new technologies such as GPS, PDA, and remotely sensed data will play an important role in the development of cost effective data collection methods in the future.

Since most APEC economies do not have their own satellites for this purpose, USDA's Foreign Agricultural Service (FAS) International Production Assessment Division (IPAD) of the Office of Global Analysis (OGA) has an excellent website associated with "Global Crop Production Analysis"¹⁹. In addition, NASA/GSFC's Global Monitoring and Modeling Systems (GIMMS)²⁰ group collaborates to analyze and process global vegetation index data from SPOT Vegetation and NOAA-AVHRR satellites for global agricultural monitoring and general environmental monitoring. These data provide a basis for evaluating crop conditions by tracking the growing season change and allow assessment of likely production at the end of the growing season.

Vegetation Condition images at the PECAD site are based on NDVI (Normalized Difference Vegetation Index) values created by the US Geological Survey's "EROS Data Center" using AVHRR (Advanced Very High Resolution Radiometer) sensor data from one of the NOAA weather satellites. A full description of the AVHRR sensor is available at the EROS Web Site. GEOSS prepared a document on best practices for crop area estimation using remote sensing.²¹ Remote sensing data can be used to estimate an economy's cultivated area, or to improve the precision of estimates for specific crops. In this field, the RAP research activities will be devoted to the development of more efficient statistical methods and the assessment of their cost-effectiveness.

Analysis: This study's review of the EW core indicators on APEC websites had multiple challenges. The first and third data items are obtained by auxiliary sources from the mainstream census and/or survey unit activities, while the "windshield" survey often is an independent activity. As with some of the other more difficult core crop associated data items, it was never clear where the data would be found and it remained likely that there was little availability.

The initial decision was to separate the EW indicator into three components since each was unique and has characteristics that allow it to stand alone for assessment. The first indicator, precipitation, must be published in conjunction with agricultural statistics. This negates a spurious positive website score based on weather data alone (e.g. TV weather website, weather service, etc.). It was quite impressive that nearly half of APEC economics (47.6 percent) publish precipitation data along with a crop report on the progress and/or condition of various staple crops of consumer concern for that economy. This data was most commonly found on an MOA website.

¹⁹ <http://www.pecad.fas.usda.gov/>

²⁰ http://gcmd.nasa.gov/records/GCMD_GLCF_GIMMS.html

²¹ GEOSS Community of Practice Ag 0703a, "Best practices for crop area estimation with Remote Sensing", Edited by Gallego J., Craig M., Michaelsen J., Bossyns B., Fritz S. Ispra, JRC Scientific and Technical Journal, June 5-6, 2008.

The second EW component indicator, windshield surveys of crop conditions, was much easier to score because of its association with the precipitation data most commonly found on MOA websites. The review found an identical 47.6 percent of APEC economics reporting precipitation data in conjunction with an EW crop also report on the progress and/or condition of various staple crops. In most cases, the EW reports are made on MOA websites between the dates of published annual surveys, and are used to report abnormal growing conditions that lead to a lower supply of the staple crop production. These windshield survey reports prepare the producer in affected areas for higher prices. Having timely information allows the MOA to procure additional imports if the projected production shortfall is deemed serious enough.

The third EW component indicator, vegetative indices provided by satellite remote sensing, was found in use by only four APEC economics (19 percent), and exclusively on their MOA websites. The research behind the remote sensing methodology is transparent, including literature references, explanations of the methodology and interpretation, as well as explanation of the vegetative indices. The vegetative indices data are available to download for various APEC economies. We recommend that in the future APEC economies explore this data source and use its potential for more efficient and accurate crop area and yield estimation, crop forecasting and early warning, forestry and deforestation and land use/land cover monitoring using remote sensing (e.g., automatic change detection and quality control and validation of land cover databases). These program enhancements are possible only if core crop production and associated data are up to best practice standards.

To Improve Early Warning Systems

- Each APEC economy needs an early warning indicator system.
- MOA should lead coordination of multifaceted monitoring of indicator approach (weather effects, crop condition, remote sensing).
- MOA should prepare EW reports at regularly scheduled intervals with soil moisture map(s) and timely warning of stressful conditions.
- EW report should include monitoring of crop development and condition of plants and livestock.
- EW system should use remotely sensed data with its own report interpretation(s).

Best Practices for Core Livestock Items and Associated Data

The basic “core” livestock items as suggested in the RAP include cattle, sheep, pigs, goats, and poultry. These livestock account for the majority of food (meat) supply and a considerable portion of agricultural income. They also represent a large amount of agricultural land devoted to pasture and the growing of roughage, i.e. hay, haylage, silage. However, as has been previously emphasized with identification of core “crops”, each APEC economy makes its own determination on specific “livestock” species it will consider as “core”. As with crop core data items, this study’s core livestock data scoring has been objectively applied

12. Livestock inventory numbers and animal birth data

Discussion: The inventory consists of each livestock item’s number of head or number of birds by sex and age. The inventory should be classified by sex as breeding stock versus animals intended for

APEC economies providing livestock inventory numbers and animal birth data on domestic websites (by source):

- Ag census 52.4%
- Ag survey 90.5%
- Special/ seasonal survey 4.8%
- Estimates from one or more sources 90.5%

use as meat, milk, egg production, etc. The inventory needs to include the number sold, slaughtered, born and purchased during the entire last year.

Best practices dictate for livestock inventory that the numbers should also be differentiated by the type of agriculture holders - subsistence vs. commercial. Care must be taken to clearly differentiate a subsistence holder whose household will consume much of their agricultural production or use it for bartering purposes, versus a commercial holder whose production mostly is sold. Large commercial swine and poultry farm operations often dwarf total subsistence farm production by comparison. For publication purposes, it can be instructive to know the contribution of household (or patio), subsistence, and commercial farm sources.

Analysis: The study review scoring mechanism gave the “benefit of the doubt” by giving a positive score to any website that provided any livestock inventory numbers. The assessment process also assumes the species reported on the website has been deemed a core livestock item. It was not deemed important which institution collected the data, but rather, the data was scored by whether the source was from an agricultural census or annual survey. As with crops, lack of transparency on some sites resulted in intuitive decision-making based on the year of the data and other clues associated with any methodology available on the website. This was especially true for centralized database query systems that identified the year of the data but were nondescript as to the data source.

To Improve Core Livestock Inventory and Birth Data

APEC economies need to publish data with documentation explaining the selection and exclusion of core livestock determination factors. The inventory should:

- Consist of each livestock item's number of animals by sex and age
- Be enumerated by sex as breeding stock versus animals intended for use as meat, milk, egg production, etc.
- Include the number sold, slaughtered, born and purchased during the entire last year.
- Contain estimates for food security and price forecasting.

Based on the scoring criteria described above, the study review estimates that eleven APEC economies provide core livestock data obtained from a recently conducted agricultural census. Census data implies that the numbers are available at a lower administrative level of summarization.

It was found that nineteen APEC economies make one or more sources of the same-year core livestock data available on websites. This is not unexpected when one considers how important meat production is to APEC economies and farm income.

It can be assumed that the census sampling of households is substantially larger than that of the annual survey when the data meets three criteria: 1) documentation is available; 2) the census is described as based on a sampling of households; and 3) the census provides a target sample size. Larger sample sizes provide more precise estimates at the lowest administrative summary level. It was surprising to find that many websites published only a single inventory number by head. They failed to provide complementary estimates of livestock numbers by sex or age of the animals and the number of births. It is typical for a census enumeration to provide more detailed information related to inventory.

13. Livestock product production items

Discussion: The RAP best practices livestock product production data serves essentially the same purpose as crop utilization data. However, it is recommended that livestock product data interpretation should be used to improve the quality of data collected by questionnaire. The interview is thorough and obtains the inventory using a balance sheet approach: purchases, births, deaths, live sales and slaughter (both on and off farm).

Table 3-1

APEC Data on Livestock Products, by Data Source

	Meat	Milk	Eggs	Wool
Census	28.6%	33.3%	28.6%	23.8%
Survey	90.5%	85.7%	85.7%	52.4%
Special	4.8%	4.8%	4.8%	9.5%
One or more	90.5%	85.7%	85.7%	52.4%

The livestock inventory data are typically collected through agricultural census and survey questionnaires. Data are typically collected from a sample of farm households by either the NSO or the MOA. Best practices dictate that for livestock production websites should provide estimates by subsistence vs. commercial vs. patio production.

The “balance sheet” approach is an excellent means of obtaining more accurate livestock production data. To obtain more accurate fluid milk production estimates the cattle inventory must be divided among cows used for beef and cows used for dairy production. Data on fluid milk production from dairy cows can be obtained more accurately by product.

Accounting of production for poultry, turkeys, and fowl (ducks, geese, etc.) requires a more complex approach than implied by the RAP core item list. Turkeys and fowl are most frequently reported on farms as patio production, and their production is implied as being for meat. Poultry in the form of chickens found on subsistence farms are mostly raised for eggs and meat. When the data are collected by agricultural census and survey, estimates must be divided among subsistence farm, household patio, and commercial poultry production.

Commercial poultry production is usually the preponderance of total production and can change quickly depending on supply versus demand, price of feed and other input production costs, weather, disease, etc. Best practices should dictate that commercial production is more frequently surveyed, and that inventory is collected by sex and purpose of production: breeding stock (hens, layers, and roosters), quantity of eggs, chicks, and meat (fryers, broilers, etc.).

The best practices for handling sheep production dictate that meat estimates are divided among slaughtered sheep and lambs. The quantity and price for sheep and lambs are usually substantially different, but published import and export data do not always clearly differentiate between these products. Wool production can be estimated using a farm survey by obtaining the number of sheep shorn and the total quantity (weight) of the wool. Survey estimates can be compared with the total amount of wool commercially processed.

Analysis: The initial website reviews of livestock production data availability indicated that the data are inconsistently published depending on the economy. The general (1) meat category used in the best practices does not take into the account the important differences among species. Therefore, this core item was scored based on the RAP classifications of livestock production “positively” if any one of the core species meat product was found on a website and the data reasonably current. Based on this scoring criterion, the review estimates that six APEC economies published meat production statistics based on agricultural census obtained data. Nineteen APEC economies conducting an agricultural survey were found to publish meat production statistics. However, these were most often survey data collected from commercially licensed slaughter facilities. Only one economy was found to publish the meat statistics as a special report and this was in a “situation” report prepared by the economic analysis unit of the MOA. Overall, nineteen APEC economies have meat production statistics available on a website. Unfortunately, this tends to overstate the reality of the meat statistics. In many cases the published quantity of meat included only cattle despite the presence of inventory numbers for other species of livestock.

For (2) milk production the review found that seven APEC economies published milk production statistics obtained from an agricultural census, eighteen conducted an agricultural survey for publication of milk production, and only one was found to publish the milk statistics within a special situation report prepared by the economic analysis unit of the MOA. Overall, a preponderance of APEC economies (eighteen) have milk production statistics available on a website. While fluid milk was scored for this study, it is recommended that all APEC economies take the initiative to collect and publish both fluid milk and manufactured products.

The prevalence of (3) egg production data on APEC economy websites was found to be nearly the same as for milk, with six economies obtaining egg production from an agricultural census, and eighteen conducting an agricultural survey for publication of egg production. Only one was found to publish egg statistics based on a special survey, and eighteen APEC economies have egg production statistics available on a website. While egg production was scored for this study, it is recommended that all APEC economies take the initiative to collect and publish poultry production data in more detail and more in line with the intent of best practice objectives, e.g. meat and eggs.

Data on the production of (4) wool data was found far less frequently on APEC economy websites compared with the other three livestock products. Among APEC economies, five obtain wool production estimates from an agricultural census, eleven obtained the data from an agricultural survey for publication of wool production, two were found to publish the wool statistics based on a special survey, and eleven have wool production statistics available from one or more websites. While wool

To Improve Data on Livestock Product Production

- Each APEC economy livestock product needs transparency to determine species relevance based on supply and demand (consumption & export) importance.
- Survey accuracy requires enumerating large commercial producers and sampling agricultural holders
- Accurate livestock production estimates are required by inventory “balance sheet” approach.
- Accuracy requires estimates by each form of production use.
- Food security dictates data collection by commercial and subsistence holdings to ensure decisions are based on accurate and timely data.
- Patio production from non-holding households can be substantial.

production was scored for this study based on all 21 APEC economies, not all economies estimate sheep – likely because they do not have wool to report.

14. Livestock net trade or imports and exports

Discussion: The availability of data on the net trade of livestock production is very problematically similar to that of crop net trade, as well as consumer and producer price statistics. Livestock meat products are subject to restrictive international trade regulations in general, so it was not surprising that the study’s review of APEC websites found the “net” livestock trade statistic calculated on only a few MOA websites. However, it was refreshing that on some websites the production was quantified in both local numbers of animals and live animal imports such that the core “net” trade statistics could be determined for staple dietary (or core) livestock species.

81.0% of APEC economies make livestock net trade or import and export data available on a domestic website

A number of APEC economy websites publish trade data only on a full-year basis in a statistical yearbook format. This can lead to a substantial delay in data reporting.

Analysis: This study found some inconsistency regarding where core livestock net trade data or import and export data could be found on APEC websites. The numbers accounting for the net trade data include the local slaughter, live imports as number of head along with dressed weight, live import slaughtered with dressed weight, and imports both chilled and frozen. Often the numbers of chicks exported are reported. Because of the diversity of the data it is possible to find these core data by searching any number of the MOA, NSO, or customs inspection websites.

To Improve Core Livestock Net Trade Data

- Net trade data should distinguish live animals from cold storage, and live weight from dressed weight.
- MOA agricultural economic units should publish a “meat situation report” with analysis of net trade balance on semi-annual or quarterly basis.
- Import and export data should be published monthly.
- Import and export data should distinguish between slaughter and breeding stock.

A positive score was awarded whenever any of the livestock net trade component data items are found on a website and the data are reasonably current. Based on this scoring criterion, the review estimates that seventeen APEC economies publish statistics on at least one livestock item, either net trade or any import/export livestock data. This study review found that not all APEC economies publish both crop and livestock import and export statistics.

15. Livestock producer prices

Discussion: Weather has an especially large impact on agricultural activities and decisions related to livestock production. The livestock producer has animals at hand that need tending and caring for on a daily basis. These animals are valuable and often serve a dual purpose. They 1) supply milk, eggs, etc. to the household and 2) their offspring can be sold for important income. At the onset of drought, the reduction of cattle herds can drastically reduce the producer price per head. With high feed costs the

71.4% of APEC economies make livestock producer price data available on a domestic website

producer is less inclined to expand livestock numbers that later result in higher producer prices.

As with crops, producer livestock price data are most often collected through a marketing or specialty survey, and independent of agricultural census or annual surveys. The independent survey is useful because producer livestock prices have (1) fewer marketing channels and (2) auction marketing and state regulation of livestock slaughter allows more efficient (centralized) and timely collection of producer prices. Poultry, turkeys, and fowl are an exception, as they can be sold directly by the producer in the marketplace in small numbers whenever the farmer needs the income. Commercial poultry are usually sold by contract and these prices can be enumerated independently and directly from the producer or the contracting processor.

Representative farmgate prices can be difficult to obtain due to the different forms and quality in which a commodity can be sold. For example, a young animal fed and raised for slaughter will be of much higher quality and bring a much higher price than an older work animal or one used for many years for breeding purposes. Likewise, subsistence farmers most often do not sell their livestock in the market but sell to a middleman who will truck the animal(s) directly to auction or the slaughter house. Therefore, prices quoted from these facilities are not reflective of the true subsistence farmer farmgate price. The data collection questionnaire needs to accommodate the various local reporting units and grades of meat that require conversion to the standard reporting unit used for estimation and publication.

It is best to collect producer livestock prices directly from the farmer, but the infrequency of sales requires interviewing many farmers each with a single commodity farmgate price to report. Because of these data collection issues the producer price surveys are usually market oriented and the price data are collected from auctions or slaughter houses that post daily prices. Regulation of livestock slaughter requires visiting different facilities to acquire prices for each species.

Because of the expertise required to collect producer livestock prices, surveys collecting livestock prices are usually done by a marketing unit in the MOA and the data published on the MOA website. In some cases, the only source of a core commodity's pricing will be the livestock import and export quantities and prices of commodities published on an MOA website. These commercial prices are related to prices on the local market, and are provided as a service to producers. The MOA website might be the only pricing data available to assist the producer in their sales decision-making process.

To Improve Data on Livestock Producer Prices

- MOA should survey livestock live auctions and slaughter houses on a monthly basis.
- Poultry prices should include producer direct live market sales and contracted processor pricing.
- Commercial versus subsistence producer farmgate price should reflect direct sales to middleman and quality of animal (finished animal fed grain ration versus retired work animals and breeding stock).

Analysis: Understanding the complicated nature of the collection and estimation of producer prices, this study's review took a pragmatic approach to scoring websites. The review process recorded a positive score if any producer livestock price data was found and it was relatively current. No judgment was made as to producer price relevance to the concept of "core" commodity items or a "true" farmgate price as opposed to an auction/slaughter house price

quote. With this flexible scoring rationale fifteen APEC economies were found to publish relatively recent producer livestock prices.

Six APEC economies provide websites that fully meet best practices standards. They feature nearly complete coverage of producer index and price data for commercially traded commodities, e.g. grain crops, vegetables, fruit, livestock, fish.

16. Livestock consumer price data

Discussion: The collection of consumer livestock price data survey contrasts greatly from that of producer livestock prices discussed above. The producer price is derived from the cash received from the sale of the animal divided by the gross weight, while the consumer price is the retail price the consumer pays for meat products at the butcher shop, store or market. Data for both are collected by surveying the same markets and are independent of agricultural census or annual surveys of farms. These retail market prices are collected for the purpose of calculating the CPI.

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- **66.7% of APEC economies make livestock consumer price data available on a domestic website**
-

Unfortunately, most published CPI and related sub- and sub-sub-index formulations are heavily weighted based on urban household expenditures. Price components are for processed commercial products, finished goods, and services. By contrast, RAP agricultural statistics best practices consumer prices refer to the core crop and livestock (commodity) items in their “unprocessed” form. Often this study’s review found that the consumer livestock data will only appear as a sub-index or sub-sub-index component of the CPI if the data are made available in published form.

Analysis: The review process recorded a positive score if a website contained any CPI or sub-index related to a core “meat” commodity as being priced. The presumption used for this scoring is that the NSO in calculating the CPI or one of its sub-indices must have basic data available including the core agricultural commodity data items. If this is true, then data for core livestock meat prices is available to be published on the website. Consumer prices available for processed meat products were not considered by this study’s review process.

To Improve Data on Livestock Consumer Prices

- Consumer price must be the retail price for meat products at the butcher shop, store or market.
- CPI and sub-indices for livestock must be differentiated from retail price data.
- Representative sampling is required for urban and rural markets with correct weighting of product prices for each core livestock meat.

With this scoring rationale in mind, fourteen APEC economies were found to publish some form of relatively recent consumer livestock and/or meat price information. This is the same number of APEC economies that publish some form of producer crop prices.

17. Amount of inland aquaculture water surface area cultured

Discussion: Aquaculture now contributes significantly toward the diversification of agricultural production, farm employment and income, as well as increased food supplies and exports.

A complete agricultural sampling frame would be able to identify all agricultural producing households. Fisheries households are usually a very small subset of the total agricultural producer households. This small percentage would qualify them as a “rare” item in statistical terminology. In recent years more emphasis has been placed on enhancing probability sampling methodology to improve the estimation of “rare” items, particularly from a large population of subsistence farms. One of these enhancement methods is for the NSO or MOA to build lists of commercial aquaculture producers. These lists are built in cooperation with government business license authorities, aquaculture agents/associations and feed suppliers that can identify fishery businesses and the associated households.

APEC economies providing data on aquaculture inland water surface area cultured (by source).

- **Ag census 28.6%**
 - **Ag survey 57.1%**
 - **Special/ seasonal survey 0%**
 - **Estimates from one or more sources 57.1%**
-

RAP best practices require that APEC economies address the following issues related to estimating subsistence fisheries: (1) improved sampling frame methodology, (2) development of methods for appropriate data collection (e.g., integration of fishery livelihoods in population census and/or agriculture census, and (3) home-consumption production utilization estimation. This study cannot evaluate these best practice attributes to aquaculture website data because of a lack of transparency in the related census and/or survey methodology. Marine saltwater fisheries data are excluded from this core item review as it is not applicable to freshwater aquaculture.

There are several APEC economies where aquaculture and/or fisheries play a minor or marginal role in the agricultural sector and would not be considered as core data items. For these economies, surveying non-core aquaculture data on an annual basis and by census is an acceptable application of best practice standards.

Analysis: The review gave a positive score to any website that provided inland water surface area used for aquaculture production. The score was based on whether the source was from an agricultural census or annual survey, without regard to which institution collected the data.

To Improve Data on Aquaculture Water Surface Area

- Inland freshwater fisheries and aquaculture require enhanced survey sampling methodology for estimation.
- Agricultural census and annual surveys should include aquaculture (commercial and subsistence) water surface data.
- Inland freshwater fisheries, aquaculture, and marine fisheries require separately published estimates and methodology transparency.

Six APEC economies provide core aquaculture inland water surface area data obtained from a recently conducted agricultural census. While the presence of census data implies that estimates are available at lower administrative unit levels, there is no guarantee of precision or accuracy in screening for small scale fishery households. Precision is generally higher with an agricultural census than with an annual survey.

Twelve APEC economies provided core aquaculture inland water surface area data obtained from an annual agricultural survey. Unfortunately this data was often found to be two years old or older. The review also found that no APEC economies have conducted a reasonably current special aquaculture survey and made the data available on any agency’s website.

18. Amount of aquaculture production

Discussion: Many of the methodology considerations discussed above also apply to aquaculture production. Freshwater hook-and-line subsistence households are excluded from consideration for this core item. Issues and sampling methods used to collect data on inland fisheries and aquaculture production are the same as those for water surface area as discussed earlier.

Because aquaculture harvest occurs on a regular schedule that requires capturing all of the fish/shrimp at the same time, producers will have accurate data on quantity of production. Harvest is often coordinated between the producer and the processor on a contract basis, meaning that price data are easily obtained.

Analysis: Core aquaculture production data can easily be collected on the questionnaire in relation to the water surface area in production, but websites generally only provided the quantity of production based on annual agricultural survey published data.

Only six websites (28.6 percent) provided agricultural census data on surface area compared to five (23.8 percent) that provided the quantity of production. Aquaculture tends to be a “rare” statistical item to estimate. This data may be easily collected on an agricultural census, because water surface area is a fairly stable statistic. However, accurate estimates must still be secured so that there is a basis of comparison with subsequent annual surveys.

This study estimates that sixteen APEC economies provided production data from an annual survey compared to twelve providing surface water area obtained by survey. Production estimates can be more volatile and will change much more rapidly based on economic conditions.

The review also found that no APEC economies have conducted a reasonably current special aquaculture survey and made the data available on an agency’s website. Such data may be located on some less-identifiable ministry website associated with fisheries. When considering aquaculture production data found on one or more websites for the same-year, the same sixteen APEC economies publishing survey data also provided core aquaculture inland water production data. This estimate may appear low, but often the fisheries data published on websites are marine (saltwater) species data that are core items reviewed below. Marine fisheries website data consists mostly of production estimates.

APEC economies making data on aquaculture production available on websites (by source):

- **Ag census: 23.8%**
 - **Ag survey: 76.2%**
 - **Special/seasonal survey: 0%**
 - **Estimates from one or more sources: 76.2%**
-

To Improve Data on Aquaculture Production

- Include Inland freshwater fisheries and aquaculture (commercial and subsistence) water surface area and production data on agricultural census and annual surveys.
- Separately publish production estimates for inland freshwater fisheries, aquaculture, and marine fisheries.

19. Aquaculture net trade (or imports and exports)

Discussion: Data on net trade of aquaculture production are even more problematic than the data related to crop and livestock net trade statistics and consumer and producer price data. The problem is not with net trade statistics, but rather with differentiating inland and freshwater aquaculture data from marine saltwater data. The review found that “net” aquaculture trade statistics are infrequently published. Since all APEC economies calculate domestic accounts and balance of trade statistics, production and import/export statistics are generally published and available on either the MOA or NSO websites in monthly or yearly summary form.

Ten APEC economies make data on aquaculture net trade or imports and exports data available on a domestic website

Aquaculture plays a minor or marginal role in the agricultural sector of several APEC economies. It is understandable that these economies do not publish aquaculture data more than annually and/or only by agricultural census. Six APEC economies provide detailed import/export information to include fisheries, but the data are almost exclusively on marine fisheries. The “net” trade statistic always seems to be missing. The more detailed APEC economy websites report very current fishery data.

Analysis: The available detailed information is almost exclusively for marine species of tuna, sardines, mackerel, shellfish, etc. The data can be published for both fresh and frozen products, but without distinction between fresh versus saltwater.

To Improve Data on Aquaculture Net Trade

- Make sure net trade data (import and export) clearly distinguish freshwater from marine quantity data.
- Publish “net” trade in aquaculture species more often.
- Publish a monthly and yearly summary of import and export website data.

A positive score was given whenever any fishery data items are found on a website and not specifically identifiable as exclusively marine species and the data are reasonably current. Based on this scoring criterion, ten APEC economies publish statistics on at least one core aquaculture associated data item, either net trade or any import/export fishery data.

20. Aquaculture producer prices

Discussion: Within each economy, aquaculture usually operates as a small and unique industry with a limited number of farmer producers. It has its own suppliers of inputs as well as processors that contract for the production - meaning that the quantity of production and prices are readily available. This core item by definition would exclude any inland freshwater fisheries production and price data from either commercial or subsistence households.

57.1% of APEC economies make aquaculture producer price data available on a domestic website

Analysis: The clarity of quantity and price mean that accurate data reporting is contingent mostly on the design of the data collection questionnaire. Aquaculture data in a farming population for sampling purposes are a “rare” item in statistical terms. Conducting an independent monthly farmgate price survey is both costly and inefficient. Published aquaculture prices are usually included along with aquaculture area and production on an

annual agricultural survey questionnaire. Aquaculture prices collected on an agricultural census are not timely enough to be relevant in the terms of best practice standards. It would be more relevant to collect and publish contracted producer prices on a monthly basis.

With some pragmatic flexibility in website scoring rationale, eleven APEC economies were found to publish relatively recent aquaculture producer prices. This percentage estimate is consistent with the estimates of area and production coming from an agricultural survey.

To Improve Data on Aquaculture Producer Prices

- Collect data on aquaculture (commercial and subsistence) water surface area, production, and producer prices on agricultural census and annual surveys.
- Use producer and processor contracting to obtain production and price data.

21. Aquaculture consumer prices

Discussion: Ideally the aquaculture producer price is obtained directly from the farmer producer on the annual agricultural survey questionnaire. Consumer fishery prices are published on a monthly and/or yearly basis either as retail prices or as part of CPI sub-index data on NSO websites.

47.6% of APEC economies make data on aquaculture consumer prices available on a domestic website

The problem with this is identifying an accurate aquaculture consumer retail price separately from consumer fishery wholesale and retail prices. Published prices do not differentiate between freshwater and marine species. An example investigation of website fishery data found the following detailed monthly data available from the CPI sub-indices: food and non-alcoholic beverages - Fish: fish and shellfish, fresh fish and shellfish. Data on fishery products was available in the following categories: market landings fish by species: bluefin tuna, albacore, bigeye tuna, etc., and quantity of each marine species, e.g. yellowfin tuna quantity fresh & frozen. Data elements for these categories are: average market price of fishery products at landing markets (assumed to be wholesale prices), price per kg by species, e.g. bluefin tuna, albacore, bigeye tuna, yellowfin tuna quantity fresh & frozen. Retail prices are also published for each of the fishery products and all seem to be marine species.

Analysis: It was especially difficult to score the availability of aquaculture consumer prices found on APEC websites. Consumer prices were most often only for fisheries data and did not identify whether they include aquaculture prices. The idea was to score as consistently as possible based only on the availability of “fish” and not fisheries price data. A positive score was given whenever a website appeared to provide a consumer price or CPI sub-index for an aquaculture consumer price item and only if it was clear that marine species were excluded from the published price. Ten APEC economies were found to publish some form of relatively recent aquaculture consumer price information.

To Improve Data on Aquaculture Consumer Prices

- Report freshwater aquaculture consumer retail prices separately from marine fishery wholesale/retail prices.
- Report actual aquaculture consumer retail prices, rather than NSO monthly CPI and sub-index published data.

There are six exemplary APEC economies that provide extensive monthly consumer crop, livestock, and fisheries price data that fully meet best practice standards.

22. Amount of marine fisheries production based on quantity of fish landed and discarded

Discussion: Fisheries data are much different from the previously discussed core aquaculture items. Fisheries data are based on the interpretation of APEC economy website terminology referring to “fisheries” as marine species data. For this reason the study decided to evaluate fisheries data availability as exclusively marine or open ocean saltwater species data. This interpretation also implies that the data comes from commercial landing and dock markets (e.g. small launch operator, open ocean troller or netter), but excludes the products of open ocean factory ships.

APEC economies making data on fisheries production (quantity of fish landed and discarded) available on websites (by source)

- **Ag census** 14.3%
 - **Ag survey** 81.0%
 - **Special/ seasonal survey** 4.8%
 - **Estimates from one or more sources** 85.7%
-

In the previous discussion on aquaculture consumer prices there is a detailed example description of the various fisheries data available related to consumer prices. That descriptive example also provides the quantity of marine species sold. These are average market wholesale and retail prices of fishery products at landing or docking site markets. These prices are highly unlikely to include freshwater fish. Fisheries data are typically obtained by a fisheries survey unit of the NSO or a fisheries agency that collects data on the quantity of fish by species from sampled landing sites. There was no apparent data made available on the quantity of discarded fish.

Analysis: This core fisheries associated data item on production was found readily available on either the NSO website as part of monthly the CPI and sub-indices data or it was published as a complementary service by the MOA along with other agricultural producer and consumer data. Review of websites found that fisheries production data was available on three APEC economy websites (14.3 percent) based on data obtained from a special fisheries census that is also reasonably current data

The review estimates that seventeen APEC economies provided fisheries production data from an agricultural survey that consists of collecting the landing site wholesale and retail fisheries prices along with the quantity sold. Only one APEC economy published special fisheries survey data available that is reasonably current. When considering data found on one or more sources of the same-year core item on websites, eighteen APEC economies provide core fisheries production data.

“Discarded” fish are specified in the RAP as an associated core data item, however it is extremely difficult to determine whether the core fisheries production associated data item of “discarded” fish are collected and used in the correction of the total quantity of production data published.

To Improve Data on Marine Fisheries Production and Quantity Discarded

- Increase transparency of marine fisheries production and quantity discarded reporting.
- Provide data on quantity discarded.
- Use a sampling frame of all docks, including those small, often rural, fishing village docks and small launches (rather than just the large commercial landings)
- Indicate inclusion of factory ship data and whether landing dock data are representative economy-wide.

23. Number of marine fisheries days fished

Discussion: The author is of the belief that this is a difficult core data item to justify.

Analysis: Fisheries data on the number of days fished are almost nonexistent on APEC websites. There were two APEC economies with websites apparently publishing the data obtained from a recent agricultural census; one economy website has published the data obtained from a recent agricultural survey; and, one website apparently published the data based on a special fisheries survey. Overall, only three APEC economies published the number of day's fished data based on published data found one or more websites.

APEC economies making fisheries data on number of days fished available on websites (by source)

- Ag census 9.5%
 - Ag survey 4.8%
 - Special/ seasonal survey 4.8%
 - Estimates from one or more sources 14.3%
-

Challenges in Marine Fisheries Number Days Fished Data

- FAO best practices documentation does not define clearly the purpose of this data and whether it is needed by commercial (including factory ships) or other production.
- Few APEC economy websites provide data on number of days fished.

24. Marine fishery amounts processed for food and nonfood uses

Discussion: Data on marine fisheries amounts processed for food and nonfood uses are not normally obtained through traditional household census or survey activities. The terminology "processed" for food was interpreted for this study to mean the quantity of "marine" fish processed because it falls under the previous interpretation of the term fisheries. Processed for food use includes commercial preparations of frozen, fresh, and prepared quantities. Nonfood uses include pet food, fertilizer, medical preparations, etc. This does not imply the quantity for nonfood use is derived solely from fish byproducts or noncommercial varieties. It is unclear whether factory ship data are in this core data item.

Analysis: Fisheries data on the amounts processed for food and nonfood uses is common on NSO websites associated with CPI sub-indices data and commerce ministry websites oriented toward trade statistics. However, there are several APEC economies where the MOA publishes all of the consolidated fisheries data collated from several different agencies within a single monthly report.

APEC economies providing data on fishery amounts processed for food and nonfood uses.

- Ag census 4.8%
 - Ag survey 47.6%
 - Special/ seasonal survey 4.8%
 - Estimates from one or more sources 52.4%
-

To Improve Marine Fishery Data on Amounts Processed for Food and Nonfood Uses

- FAO should better define the term "processed" as the data are most efficiently collected from commercial "processing" facilities by a government entity.
- APEC economies should provide data on amounts processed for nonfood uses.
- Document whether factory ship production is included in the data.

Only one APEC economy publishes data obtained from a recent census and one published based on a special fisheries survey. Ten APEC economies publish data obtained from a recent survey. Overall, eleven APEC

economies published the amounts processed for food and nonfood uses. No APEC economy website published data on amounts processed for non-food uses.

25. Marine fisheries producer prices

Discussion: Marine fisheries are an important source of commercial enterprise activities in a number of APEC economies. For these APEC economies the fisheries contribution to agricultural statistics is significant because of its contribution to commercial activity. The core fisheries associated data on producer prices are usually found available on the same websites as CPI sub-indices data that include marine species quantities and market landing wholesale and retail fish prices by species.

66.7% of APEC economies make fisheries producer prices available on websites

This core data item is more relevant to traditional agricultural statistics systems and census/survey activities when the prices paid component relates to households and small-scale fishery producers. Such households with an agricultural livelihood are often operating at subsistence levels and their data are needed for food security purposes.

Corporate fishery enterprises dominate the reported market landing data. The websites publishing market landing data often have the data summarized by major metropolitan areas. Prices are not necessarily reflective of small scale producer prices, but are more appropriately defined as wholesale prices. There is no documentation to indicate whether the large-scale fishery boat “catch” is appropriately weighted to reflect its dominant presence for sale on the landing docks as compared to the small scale producer’s catch.

Analysis: While landing dock data may not be representative, fisheries producer prices on APEC websites are easier to score than aquaculture prices. The decision was made to score each APEC economy as consistently as possible based only on the availability of its “fish” price data. A positive score was given whenever a website appeared to provide market wholesale “fish” species prices or producer price indices.

To Improve Marine Fisheries Producer Price Data

- FAO should clearly define marine fisheries’ producer “prices”
- NSO websites should provide marine fisheries’ landing and dock wholesale prices construed as producer prices.
- Document whether factory ships are included in marine fisheries data.

Some APEC economies with advanced statistical programs and major marine fishery industries provided extremely detailed “fish” species level data. They included sub-indices and wholesale market prices of fishery products at selected major metropolitan markets. Fourteen APEC economies were found to publish some form of relatively recent fisheries producer price information. It is uncertain to what degree these producer prices reflect those prices paid to small-scale fishery producers.

26. Marine fisheries consumer prices

Discussion: In APEC economies with large fish economies, fisheries associated consumer prices are related to producer prices because of the large quantity of production and the volume of sales by the

57.1% of APEC economies make marine fisheries consumer price data available on websites

local commercial fisheries industry.

The agency that collects and publishes data on quantity captured and prices by species usually publishes both the wholesale and retail landing market prices. The major marine fisheries economies publish the data for landing site markets that represent the bulk of the commercial catch. This generally coincides with the largest major cities that have seaport facilities. The websites do not make clear whether landing site price data are from all vendors or if vendors are sampled. The level of detail published for each landing site indicates that all vendors are enumerated each day. The landing site data are usually collected either by a “Fisheries Agency” that might be independent or a unit of the NSO, the MOA, or by a commerce ministry.

The MOA often consolidates numerous different agencies’ agricultural fisheries data and publishes it on a monthly basis in a statistical “yearbook” format. These monthly statistical publications are exhaustive in detail with over two hundred pages of data. However, it is unclear how representative these published market landing wholesale and retail prices are to the inland market prices paid by consumers.

Analysis: A positive score was given whenever a website appeared to provide a market retail price, or a consumer price index, or more detailed sub-indices fish data. Those APEC economies with advanced statistical programs usually provided retail prices of fishery products for selected major cities. Using this scoring rationale, twelve APEC economies were found to publish some form of relatively recent fisheries consumer price information.

Challenges in Marine Fisheries Consumer Prices

- APEC member websites do not document their consumer price data methodology.
- NSO websites provide marine fisheries’ landing and dock retail prices construed as consumer prices.
- MOA consolidates marine fisheries data from various agencies and publishes data without transparency.

27. Marine fisheries net trade or imports and exports

Discussion: Consistent with findings for other core items, the net trade figures for marine fisheries production are not published, but fisheries data on exports and imports are individually and readily available. This enables the data user to easily tabulate the net trade numbers. APEC economies with major marine fishery industries publish an exhaustive amount of trade data because of the importance of the industry to their economy and food supply

The commercial fisheries data are usually available with great detail on the quantity of production both fresh and frozen by marine species. The fisheries data are sometimes published on an MOA website but are much more likely to be available on the NSO website. Despite massive daily data collection, publication is often considerably delayed

71.4% of APEC economies make marine fisheries net trade or import and export data available on websites

Challenges in Marine Fisheries Net Trade Data

- APEC member economy websites do not provide document transparency on net trade data collection methodology.
- NSO websites provide extensive marine fisheries’ exports but no net trade figures.
- Trade figures on aquaculture do NOT seem distinguishable and separated from quantities of marine fisheries trade data.

in order for it to be included with other manufacturing trade data that is collected less frequently. These massive amounts of data are often published in one volume on a full-year basis in a statistical yearbook format.

Analysis: APEC websites publish a considerable amount of data attributed to “fisheries.” This includes extensive reporting on commercial marine species such as tuna, sardines, mackerel, shellfish, etc. The published quantity data are usually provided as fresh and frozen and the reported species are always marine species. If aquaculture production of prawns and catfish for example are reported, they are not clearly distinguishable from other fisheries trade data.

This review awarded a positive score on the availability of core fisheries net trade data by whenever any fishery data items are found on a website in terms of marine species and the data are reasonably current. Based on this scoring criterion, fifteen APEC economies publish statistics on at least one fisheries item, either net trade or in the form of any import/export data.

28. Amount of forestry production land area (in woodland/forest) on agricultural farm holdings

Discussion: There are two major types of forestry that need RAP best practices attention by agricultural statistics agencies, (1) agricultural farm holding woodlots/plantations, and (2) commercial corporate/private forests. Typically the two types of forestry are surveyed differently. The farm holder reports small woodlots and parcels planted to plantation

species along with their cultivated land and pasture as part of land use practices on the annual agricultural survey questionnaire. By contrast, the usually large commercial forestry operations are surveyed as part of a forest inventory or census that is conducted infrequently by the forestry agency that is often part of the MOA.

APEC economies providing data on amount of land area in woodland/forest on agricultural farm holdings.

- **Ag census 33.3%**
 - **Ag survey 61.9%**
 - **Estimates from one or more sources 61.9%**
-

The annual agricultural survey can easily accommodate the collection of forestry production from farm holdings as the farm household is the basic sampling element of all agricultural probability sampling frames. The slow speed of forest growth means that surveys do not need to be conducted very frequently. Regularly collecting this core forestry data on the amount of land area in woodland/forest on agricultural farm holdings provides valuable information on changes in the cultivated cropland to organizations monitoring food security and the domestic food supply.

Note that several APEC economies do not have forested land or a forest product industry. If they were excluded from consideration for all related core data items, the percentage of APEC economy compliance with best practices under each category is much higher.

Analysis: The review data available on the amount of land area in forestry production devoted to woodland and/or forest on agricultural farm holdings was both difficult and easy to perform. The assessment was difficult due the lack of transparency related to the collection of forestry data and the large number of potential webpages that could contain pertinent information. The review was made easy because the “forestry” subject was identified

separately and clearly from crops, livestock, fruits, vegetables, etc. if the forestry data was available at all.

The initial review process found no evidence that special/seasonal surveys were applicable to forestry data collection so it was decided that this scoring category would be excluded. Forestry data was found quite frequently and a positive score was awarded during the review whenever survey/census results indicated reasonably current farm holding data on woodland and/or forest land area. Based on this scoring criterion, the review estimates that seven APEC economies publish statistics on the amount of land area in woodland /forest based on an agricultural census. It was not clear if the data pertained entirely to agricultural farm holding land.

To Improve Forestry Production Land Area on Farm Holdings

- Agricultural census and annual surveys should efficiently provide estimates of forest production land on farm holdings.
- Questionnaires should be designed to better collect forestry production data in addition to crop and livestock data.
- Data on total land owned and operated should be collected to obtain a complete accounting of forms of land use.
- Forestry data are best collected periodically to coincide with census data collection.

The website review process also found that thirteen APEC economies published data obtained from a census and/or agricultural survey. This implies that the forestry land was more likely to come from agricultural farm holdings.

29. Quantity of forestry wood/pulp production removed from agricultural farm holdings

Discussion: Forested idle land associated with agricultural farm holdings can generate extra farm income when livestock are allowed to graze and the trees are harvested for their wood and/or pulp content. For this review the term “wood” is interpreted to mean saw timber cut as dimensional lumber. The quantity harvested is reported in board feet or cubic volume. Pulp wood production from farm holdings is collected in units of volume or weight. This interpretation excludes random or indiscriminate cutting of saplings or collection of fallen limbs as firewood.

APEC economies providing data on quantity of wood/pulp removed from agricultural farm holdings

- **Ag census 33.3%**
- **Ag survey 61.9%**
- **Estimates from one or more sources 61.9%**

On agricultural farm holdings, the cutting and harvesting of wood products is more of a “random” event since the slow growth of trees and the tree quantity/quality available is an uncertain event often tied to economic conditions. The quantity of wood or pulp removed from farm holdings is even more of a “rare” statistical event and more conducive to collection on an annual survey or census. A forestry census is usually a detailed inventory of tree species and wood content that is conducted separately from a farm holding related census.

Analysis: Often the forestry production was published on a website but the data consisted of “forestry” land and quantity of production. There was no distinction made between data obtained from agricultural farm holdings and/or non-agricultural holding, e.g. commercial, corporation and private forests.

The websites published forest land and quantity of production as paired data – again without distinction whether it was an agricultural or non-agricultural source. A positive score was given when the quantity of wood or pulp production appeared to be obtained from an agricultural census or survey. Based on this scoring criterion, only seven APEC economies publish statistics on the quantity of wood or pulp removed from agricultural farm holdings.

The review of quantity of wood or pulp removed found that thirteen APEC economies published data obtained from an agricultural survey; implying that the data came from agricultural farm holdings. The same thirteen APEC economies either collected the forested land by census or through an annual agricultural survey.

To Improve Data on Forestry wood/pulp Production Removed from Farm Holdings

- Data are best estimated using an annual agricultural survey.
- Production data requires larger sample sizes to ensure precise estimates.
- Data on annual pulp production can be had directly from commercial pulp mills that keep accurate records on deliveries from farm holdings.
- A specialty survey of sawmills can estimate lumber production if the sawmill operators keep accurate records on deliveries of logs from farm holdings.

30. Prices of woodland and forest land on agricultural farm holdings

Discussion: Data on forestry production helps determine the extra income that sales of the wood products will bring the farm household. During this review, farm holdings forested land price data was infrequently reported. This should be expected as it qualifies as a statistically “rare” and difficult item to survey given the small parcel areas. There remains a need for timeliness of the published survey data when enumerated annually and relates to prices.

Analysis: Forestry land price data are published very infrequently. The scoring criterion was deemed positive when prices of woodland/forest land were published and reasonably recent. Five APEC economies publish prices of woodland/forest land statistics based on results.

23.8% of APEC economies make price data on woodland/forest land on agricultural farm holdings available on a domestic website

To Improve Data on Forestry Land and Woodland Prices on Agricultural Farm Holdings

- Data should be collected using an annual agricultural survey.
- Larger sample sizes are required for acceptable precision of estimates.
- Data may also be sampled from official deed office records using a specialty survey.

31. Amount of land in woodland and forests on nonagricultural holdings

Discussion: This core forestry data item represents the non-agricultural component of total woodland and forest land area and may also represent the land operated as commercial or managed by corporate or large private owners with forestry operations - characteristics that make it difficult to obtain accurate data.

APEC economies providing data on amount of land area in woodland/forest on nonagricultural holdings.

- **Ag census 28.6%**
 - **Ag survey 61.9%**
 - **Estimates from one or more sources 61.9%**
-

When conducting a forestry census, often referred to as a *national forestry inventory survey*, the most efficient means of ensuring complete coverage is to develop a list frame of all commercial, corporate, and large private owners. These lists can be developed from tax or business licensing government offices, forestry associations, etc. A census of agricultural farm holdings usually omits the data from commercial forestry operations.

When conducting a forestry survey or census, the targeted population is the commercial woodland and forest land under management for wood production purposes. For this reason, one would exclude forested land associated with national parks, conservatory land, wildlife refuges or sanctuaries. However, forested land on Indian reservations or tribal lands need to be included as the forests are often managed and production is harvested. It should be noted that coffee plantations typically have forest cover to provide shade, but these trees should not be considered part of commercial woodland or forests.

To Improve Data on Amount of Woodland and Forest on Nonagricultural Holdings

- Use a specialty survey sampled from a list of commercial forestry enterprises.
- Forest land can be estimated in conjunction with the economic census.
- Use special forestry sampling techniques to estimate tree species, quantities of wood and pulp, etc.

Analysis: The difficulty is that the data may be combined with land area on agricultural farm holdings. Therefore, non-agricultural holdings land area in woodland/forest availability was scored positively only when this category was explicitly presented in published data.

Based on this scoring criterion, six APEC economies publish this statistic. This is a slightly lower percentage than that available for farm holdings. It was also found that thirteen APEC economies published non-farm holdings data obtained from an agricultural survey or census – the same percentage as was estimated for farm holdings data.

32. Quantity of wood production harvested from woodland and forests on nonagricultural holdings

Discussion: Forestry associated with nonagricultural holdings is interpreted to mean commercially viable operations that can be either public or private enterprises where woodlands and forests are harvested for “wood” in terms of saw timber and/or pulp. Because of the large tracts of land and accompanying sources of water, these commercial operation’s land use practices significantly impact the environment.

Commercial forestry operations are fairly easy to identify and the list maintained as a sampling frame can be utilized for either census or survey purposes. A single large enterprise can operate and harvest from multiple locations that are extremely difficult to identify when utilizing traditional census and survey sampling methodology. However, relevant data are easily obtained from the company headquarters identified from the sampling frame list.

APEC economies providing data on quantity of wood production harvested from woodland/forest on nonagricultural holdings.

- **Ag census 14.3 percent**
 - **Ag survey 61.9 percent**
 - **Estimates from one or more sources 61.9 percent**
-

The quantity of wood harvested by non-agricultural commercial operations accounts for a significant portion of the annual domestic forestry production output. APEC economies with major commercial forestry operations will find it much more efficient to estimate annual woodland production using a separate dedicated forestry survey of non-agricultural holdings.

Analysis: The difficulties are similar to those previously discussed under the amount of land area in woodland/forest on non-agricultural holdings section. A commercial forestry holding will only report total production harvested without regard for the source of the land ownership from which the wood/pulp was harvested.

The review scored websites positively whenever production quantity data were published. Based on this scoring criterion, the study's review estimates that only three APEC economies publish statistics on the quantity of wood production harvested by non-agricultural holdings - the same percentage as that of wood harvest estimated from farm holdings. Thirteen APEC economies published this data; obtained through a census or agricultural survey – again, the same percentage as that estimated for farm holdings.

To Improve Data on Amount of Wood Production Harvested on Nonagricultural Holdings

- Data should be estimated using an annual specialty survey sampled from a list of commercial forestry enterprises.
- Use special forestry sampling techniques to survey forest land timber production.
- Wood production should be estimated by surveying sawmills to estimate lumber production.

33. Prices for wood and pulp from nonagricultural holdings

Discussion: The information on forestry prices for wood data from nonagricultural holdings is essentially the price paid by the lumber mill to the land owner. This is essentially equivalent to a producer price. Often on non-agricultural holding land, the lumber mill is handling its own timber and prices reflect a wholesale price of lumber. Price information on forest products is collected by the NSO or commerce ministry on a monthly and/or yearly basis in the form of a supply and demand report on wood products. This is often facilitated by the MOA and published on its website.

47.6% of APEC economies make price data on wood and pulp from nonagricultural holdings available on a domestic website.

The price for pulp must come from the processing mills and published prices would reflect the posted price delivered at the mill. The supply demand statistics often quote the quantity consumed and the stocks-on-hand of pulp materials. The forest product report on some APEC economy websites has considerable supply and demand related information that includes quantity and prices for sawlog and lumber. Sawlog

data are typically published in terms of domestic and imported quantities; broken down by species and associated prices (e.g. pine, cedar, cypress, Douglas fir, hemlock, spruce, etc.).

Another wood product with published quantity and price information is plywood (common, specialty and “peeler” log form). Plywood is an important economic commodity essential to the construction industry. The survey source of sawlog and plywood information is often the forestry statistics unit of MOA and details typically include imports, production, shipments, consumption and carry-over.

Analysis: Prices for wood and pulp are mainly collected as related to industrial products. Lesser attention is paid to wood wholesale prices related specifically to non-agricultural holdings. There is usually no indicator if the source is from non-agricultural holdings.

To Improve Data on Forestry Prices for Wood and Pulp from Nonagricultural Holdings

- Prices should be estimated using a quarterly specialty survey sampled from a list of commercial forestry enterprises and sawmills.
- Survey data should be collected by contacting associated enterprises and sawmills via telephone and/or internet.

The review scoring criterion was positive anytime prices were published and relatively current. Ten APEC economies publish prices for wood and pulp data. Lack of transparency makes it difficult to ascertain if the prices are reflective of those received by non-agricultural holdings.

34. Quantities of fertilizer and pesticides used

Discussion: Core data relating to the quantities of fertilizer (inorganic and organic) and pesticides used are commonly collected through agricultural census or surveys of farm holdings. The actual data for each is collected separately. Both fertilizers and pesticides are available to farmers in varying formulations and require differing applications depending on intended use.

Fertilizer data are optimally enumerated when asking the respondent to report the number of acres (hectares) cultivated – planted & harvested. Pesticide data are usually collected in a separate section of the questionnaire because of the difficulty of collecting the data which requires specific questions on the product formulation to determine the quantity of active ingredient applied, number of applications, method of application, etc.

APEC economies making data on quantities of fertilizer and pesticides used available on websites (by source):

- **Ag census 23.8%**
 - **Ag survey 42.9%**
 - **Special/seasonal survey 0%**
 - **Estimates from one or more sources 52.4%**
-

Organic fertilizers include naturally occurring organic materials (e.g. chicken litter, manure, worm castings, compost, seaweed, guano, bone meal) or naturally occurring mineral deposits (saltpeter). Survey data collection of pesticide data are even more complex than fertilizers. The FAO has defined *pesticide* as follows:

Any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances which

may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant or agent for thinning fruit or preventing the premature fall of fruit. Also used as substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport.

Many pesticides can be grouped into chemical families. Prominent insecticide families include organochlorines, organophosphates, and carbamates.²²

Type of pesticide	Target pest
Herbicides	Plants
Algicides or Algaecides	Algae
Avicides	Birds
Bactericides	Bacteria
Fungicides	Fungi and Oomycetes
Insecticides	Insects
Miticides or Acaricides	Mites
Molluscicides	Snails
Nematicides	Nematodes
Rodenticides	Rodents
Virucides	Viruses

These chemicals are quite diverse in their agricultural use, chemical composition and toxicity. When conducting a survey or census and collecting pesticide data, the questionnaire must identify (1) the active ingredient content of the pesticide, (2) the crop and area cultivated that the chemical was applied, and (3) the application rate. The active ingredient is necessary because there are thousands of “brand” name chemicals and each can have its own unique formulation of active ingredients(s).

Analysis: Fertilizer has been a traditional item of interest to data users and data are commonly collected on agricultural census and survey questionnaires. However, these data are typically only on cultivated area of application by crop; complex macronutrient data of particular fertilizers is rarely obtained. Likewise, the active ingredients of pesticides are overlooked with most surveys only collecting data on application on specific crop areas and livestock. To simplify scoring, a positive score was assigned if any data on either fertilizer or pesticide application were published regardless of details. This methodology overestimates the compliance as, in most cases, only fertilizer data was reported.

When collecting Fertilizer and Pesticide Inputs data

- Estimates should be collected through an annual agricultural survey.
- Data should be collected according to cultivated area.
- Remain cognizant that types and application rates can vary by crops and intended use.
- Data collection will be complicated by different formulations of fertilizers and pesticides.

²² <http://en.wikipedia.org/wiki/Pesticide>

Five APEC economies publish fertilizer/pesticide data based on an agricultural census while nine publish data based on an agricultural survey. The review found no websites publish fertilizer or pesticide data based on a special or seasonal survey. Overall, considering estimates from census and survey sources, eleven APEC economies publish fertilizer/pesticide data.

It should be noted that the intent of the RAP best practices is to provide quantitative values that accurately measure the impact that these chemicals have on the environment:

- Fertilizer effects on water quality, fertilizer dependency, soil acidification, trace mineral depletion, over-fertilization, high energy consumption, contribution to climate change, impacts on mycorrhizas and increased pest fitness.
- Pesticide effects on human and animal health, environment effect of reduced biodiversity, reduces nitrogen fixation, contributes to pollinator decline, destroys habitat (especially for birds), and threatens endangered species.

APEC economies with advanced agricultural statistics programs collect fertilizer and pesticide data in quantitative detail, especially in collaboration with their environmental protection agency.

35. Quantities of water and energy consumed

Discussion: RAP has combined water and energy together as one best practices component. Water was previously reviewed under the data item “area of cropland that is irrigated”. As an agricultural input core data item, this study assessed the quantity of either water or energy as that consumed by the farming operation. Energy consumption would include the electric or fuel used in association with the farm holdings agricultural production activities. Cultivating crops with motorized equipment is a major source of energy consumption along with water irrigation pumps.

APEC economies providing data on quantities of water and energy consumed.

- **Ag census 23.8%**
 - **Ag survey 33.3%**
 - **Special/ seasonal survey 4.8%**
 - **Estimates from one or more sources 42.9%**
-

The quantity of household use is problematic if it cannot be separated from the quantity related to the farming operation. Often there is only one meter attached separately for each of the electric or water supply. The quantities of both water and energy are not easy to accurately enumerate unless they can be obtained from recordkeeping.

Analysis: The initial review of websites found infrequent reporting of farm holding consumption of either water or energy excluding water used for irrigation purposes. An APEC economy received a positive score whenever any quantity water or energy usage/consumption farm holding data was found published. Based on this scoring criterion, the study’s review estimates that only five APEC economies publish statistics on the quantities of water or energy consumed based on a reasonably current agricultural

When collecting Data on Water and Energy Inputs

- Quantities are best estimated through an annual agricultural survey.
- Quantities used each year can vary considerably depending on weather conditions.
- Source of water and type of irrigation distribution system dictates quantities of water and energy used.

census. It should be noted that this estimate is considerably lower compared to the core “crop” associated “area of cropland irrigated” data item.

The website review process found that only seven of APEC economies publish water or energy consumed data obtained from an agricultural survey. Only one economy was found to conduct a special or seasonal survey to collect and publish water or energy consumption data. Two economies published irrigation data based on a special or seasonal agricultural survey. Nine economies produced water or energy consumption data. It is interesting to compare this to the seventeen that provide irrigation data.

36. Capital stocks (equipment) such as machinery by purpose (i.e., planting, tillage, harvesting)

Discussion: The societal affluence and size of farm holdings will usually dictate the number, size and types of capital stock that will be reported on an agricultural census/survey.

However, this core item is not restricted to the traditional crop cultivation and harvesting equipment. It includes fisheries machinery, boats, forestry chainsaws, logging trucks and other items that are associated with the

agricultural sectors of interest (crops, livestock, aquaculture, fisheries, and forestry). The data gathered should include characteristics on the equipment size such as the length of the boat, the tractor engine power-take-off horsepower rating, water pump horsepower rating, electric power generator fuel and wattage output.

Analysis: Scoring was not difficult, but the initial review found the data infrequently published on APEC websites. A positive score was given to any website that provided related data even if it is only the number of equipment by general types/categories.

Five APEC economies publish machinery/equipment data from an agricultural census. Ten publish data based on an agricultural survey. The review found no websites that publish machinery data from a special or seasonal survey. Overall eleven APEC economies publish some kind of agricultural machinery data.

37. Demographic data on number of people of working age by sex

Discussion: Many international organizations require basic demographic information to effectively implement and measure the impact of their programs. A population census provides complete demographic information about the economy and includes detailed coverage of urban and rural households. Demographics are typically emphasized in association with the agricultural census to provide detailed information on farm households. For food security purposes, this needs to be expanded in order to cover all rural

APEC economies providing data on capital stocks such as machinery by purpose (i.e., tillage or harvesting) on domestic websites

- **Ag census** 23.8%
 - **Ag survey** 47.6%
 - **Special/ seasonal survey** 0%
 - **Estimates from one or more sources** 52.4%
-

APEC economies providing demographic data on number of people of working age by sex:

- **Ag census** 38.1%
 - **Ag survey** 33.3%
 - **Special/ seasonal survey** 0%
 - **Estimates from one or more sources** 42.9%
-

To Improve Data on Capital Stocks

- Stocks should be estimated using an agricultural census as data are less variable year-to-year.
- Use larger sample sizes in an annual agricultural survey since capital stocks are statistically “rare” items for estimation.

households at the lowest administrative summary units.

A database derived from the rural household census is useful to public agencies and private organizations for identification of vulnerable households and for food security reasons (if appropriately designed). Such a database can provide quantitative estimates on the number of households/persons requiring assistance and services in the case of disaster and emergency situations. The basic information to collect for each household member includes the following: family relationship as a household member, identification of head-of-household, sex, age, marital status (relation to head-of-household), and education/literacy level.

It is important to note that this core item specifies “number of people of working age by sex”. This item is not specific to agricultural holders (households). Thus, when conducting an agricultural census or annual survey, the sampling design should include a subsample of non-agricultural households in order to obtain information required for the creation of a food security rural household database mentioned above. Best practices recommend using a population census to collect information that may supplement an agricultural census.

Analysis: Demographic data on the number of people of working age by sex is problematic. There is lack of transparency for documenting each economy’s interpretation of “working age” and how that might be collected to reflect both agricultural and non-agricultural rural households. Knowing that the definition of “working age” is an issue, it was decided to score positively any website(s) that provided data related to the number of “workers” even if not differentiated by age and/or sex.

When collecting Demographic Data on Working Age and Sex

- A population census is an excellent data source.
- An annual agricultural survey is best for updating estimates of household demographic data with commodity production coverage (e.g. crops, livestock, aquaculture, fisheries and forestry).
- Agricultural census or annual survey sampling design should include a screening process that includes all households – a subsample of non-agricultural households surveyed along with the sample of holding households to obtain a complete estimate of demographic and employment data.

Even with this extremely generous interpretation of this core item, only eight APEC economies provided demographic data on number of people of working age by sex based on their most recently published agricultural census.

The review found that only seven APEC economies provided demographic data on working age people by sex obtained from an annual agricultural survey, and no special surveys were found that provided the data. Overall, coverage of demographic data on working age people was found in nine economies. It should be noted that these estimates do not necessarily represent disaggregated data “by sex”.

38. Demographic data on number of workers hired by agricultural holders

Discussion: Government agencies have started to collect more data on the number of hired farmworkers by agricultural holdings. By definition, a farmworker is a person hired to work in the agricultural industry. This includes work on farms of all sizes, from small, family-run businesses to large agro-industrial operations. Farm workers may be from the economy where they are employed or they may be immigrants. The farmworker may or may not be related to the individuals who own or run the farm holding, but his or her job entails a more formal relationship than a family member or neighbor who might do occasional chores on the farming operation. Depending on the location and type of farm, the work may be seasonal or permanent, work may be full or part time, and definition of “hired worker” may vary. All of this leads to challenges and a best practice of collecting such detailed information on a monthly basis to obtain more meaningful information relating to seasonal work.

Censuses usually have a data collection interval of every five or ten years, and will have the same data collection challenges as an annual agricultural survey. The farm operator’s “recall” of accurate employment/hiring data over an entire 12 month period is problematic, and questionnaire data collected on a calendar year basis causes a delay in field enumeration.

Usually the agricultural survey data collection commences just as harvest of the main seasonal crops are finishing, a period that does not correspond to the calendar year.

Analysis: Data was problematic due to the transparency issues, especially in regards to what constituted a “hired” worker. Scoring was positive for any website(s) that provided data related to the number of “hired workers”. From this interpretation, only seven APEC economies provided demographic data based on their most recently published agricultural census.

The review found that five APEC economies provided demographic data on number of workers hired by agricultural holders obtained from an annual agricultural survey. No special surveys were found that provided the data. Overall the review found coverage of demographic data on number of workers hired by agricultural holders by seven economies.

APEC economies providing demographic data on number of workers hired by agricultural holders:

- Ag census 33.3%
 - Ag survey 23.8%
 - Special/ seasonal survey 0%
 - Estimates from one or more sources 33.3%
-

When collecting Demographic Data on Hired Workers by Agricultural Holders

- An annual agricultural survey provides the best opportunity for collecting detailed data and for estimating hired workers and commodity coverage.
- Hired temporary worker estimates can be problematic due to duplication of workers reported on a yearly basis.

39. Demographic data on employment of household members on agricultural holdings

Discussion: These agricultural production input data are the third demographic core item specified in the RAP Pillar 1. The best strategy

APEC economies providing demographic data on employment of household members on agricultural holdings

- Ag census 38.1%
 - Ag survey 19.0%
 - Special/ seasonal survey 0%
 - Estimates from one or more sources 33.3%
-

for efficient and accurate data collection is to design the questionnaire to integrate the demographic questions into a logical sequence: total household members and workers by livelihood, whether each is a paid and unpaid family household member, full/part-time worker, and pay status.

To accurately record household member “employment”, the paid and unpaid status needs to be enumerated on the questionnaire. Most farming family members work daily at some aspect related to their agricultural holdings, e.g. feeding and watering livestock, moving livestock to pasture, cleaning livestock pens, crop tilling and weeding, fertilizing, applying herbicides/pesticides. Much of this family member labor is intensive work that is “unpaid” and may vary by age and sex. Usually the farm operator/owner does not consider themselves a “paid” worker and their hours and type of work need enumeration separately along with other unpaid household members.

Analysis: As with all of the demographic employment core data items, understanding the usage of “employed household member” becomes an issue of interpretation. It was decided to score employed household member data presence as positive for any website(s) that provided data related to the number of “household workers” Eight APEC economies provided this data based on their most recently published agricultural census.

When collecting Demographic Data on Agricultural Household Member Employment

- An annual agricultural survey provides the best opportunity for detailed data.
- Total household members and workers should be enumerated by livelihood & whether each is a paid or unpaid family member.
- Enumerate hours and type of work needs of farm holding operators and owners separately along with other unpaid household members,

The review found that four APEC economies provided this data based on an annual agricultural survey. No special surveys were found that provided the data. Overall, the review found coverage by seven economies.

40. Agricultural household income by sources

Discussion: Understanding the regional distributions of income by its source and levels and having access to the information in a food security database is vitally important for food security and disaster response purposes.

APEC economies making data on agricultural household income by sources available on websites

- **Ag census** 33.3%
- **Ag survey** 23.8%
- **Special/ seasonal survey** 4.8%
- **Estimates from one or more sources** 47.6%

Agricultural holding’s income includes: sales from on-farm operations generated from crop and livestock production; all off-farm wages/income generated by the household members; farm value of sales of production even if by payment-in-kind in trade for goods and/or services and; work performed for another farmer even if receiving payment-in-kind.

The household income is calculated as the accumulated sum of all household members’ income even when various household members each have multiple sources. A common source of rural income is derived from agricultural day labor that is seasonally dependent and

frequently disrupted by weather. Another source of rural income is derived from domestic day labor.

Subsistence producers that consume all or a portion of their own production will not consider that portion consumed as income. If a portion of the production is sold, then the payment received is considered income even if the cash is immediately used to purchase food, supplies, and pay bills. Unpaid farm labor has value but is not considered income even though it might support the production of crops and livestock that are eventually sold.

Agricultural household income by source survey/census questions are unique and typically must incorporate “rare” items. For some respondents, questions related to income are sensitive and they may refuse to answer. If it is believed that a disproportionate number of refusals may occur, the best strategy is to ask the question at the end of the interview to maximize the data collected. There is also reluctance for a household to report remittance income from family members which is usually a significant portion of the monthly household income.

Analysis: When income estimates were found on websites, there was no information of income by source. Agricultural household income was scored positive for any website(s) that provide income data related to “agricultural holdings”. The assessment tended to be subjective because published income numbers are for households. If the census and survey methodology indicated the sampling frame was composed of agricultural holdings, then it was assumed that the income represented agricultural household income.

Seven APEC economies provided agricultural holdings income data based on their most recently published agricultural census. Five APEC economies provided agricultural holdings income data obtained from an annual agricultural survey, and only one website published the results from a special survey. Overall, ten economies provided coverage of income data.

When Collecting Socioeconomic Data on Agricultural Household Income by Source

- Annual agricultural surveys provide the best opportunity to obtain data on agricultural household member income by source.
- Income varies from year-to-year based on economic conditions and should be estimated for food security purposes by commercial and subsistence agricultural households.
- Remittances are an important contribution to household income, but sensitive and problematic to accurately enumerate.

41. Rural household income by sources

Discussion: The previous data item is a subset of this core item. To obtain a representative estimate, a sample frame that provides complete coverage of the rural population is required. Most area-based sampling frames provide a convenient

mechanism for obtaining a representative sample using survey methodology. This requires screening each household within the sampling unit (usually referred to as a “segment”), and completing a questionnaire from a sample of both non-agricultural and agricultural households.

APEC economies making data on rural household income by source available on websites

- **Ag census 33.3%**
- **Ag survey 19.0%**
- **Special/ seasonal survey 4.8%**
- **Estimates from one or more sources 42.9%**

Analysis: If income estimates were found on a website there was usually no information of the source. Therefore, it was decided to score all rural household's income presence as positive for any website(s) that provided data related to the "rural household". The assessment tended to be subjective as with rural holding income, but if the census and survey methodology indicated the sampling frame was composed of area segments, it could be assumed that the income was likely representative of an average rural household income. With this interpretation, only seven APEC economies provided rural household income data based on their most recently published agricultural census.

The review found that four APEC economies provided rural household income data obtained from an annual agricultural survey, and only one APEC website published the results from a special survey. Overall, when considering estimates from one or more sources, the review found coverage by nine economies. These assessment estimates related to rural household income "only" and not by income deriving sources as desired by best standards.

When Collecting Socioeconomic Data on Rural Household Income by Source

- The population census provides an appropriate sampling frame for an annual agricultural survey to obtain data on household members' income by source.
- A census sampling frame for the annual agricultural survey sampling design will include a screening process of all rural households and a subsample of non-agricultural households surveyed to obtain income by source.
- Remittances should be included as they are an important component of rural household income.

INTEGRATED STATISTICAL SYSTEM, GOVERNANCE, AND STATISTICAL CAPACITY BUILDING (PILLARS 2 AND 3)

For this study it was decided that the more practical approach was to combine the originally separate RAP second and third pillars following the initial review of the 21 APEC economy websites. This combination approach is suggested because the second and third pillar content is more "global" in scope with respect to focusing on a centrally coordinated but flexible "economy-wide" system based on available resource capabilities.

42. Agricultural statistics based on a domestic statistical system concept

Discussion: A domestic statistics system should be based on "official" statistics published by government agencies or other public bodies. These statistics are designed to provide quantitative or qualitative information on all major areas of citizens' lives, such as economic and social development, living conditions, health, education, and the environment.

90.5% of APEC economies have published agricultural statistics based on a domestic statistical system

Governmental agencies at all levels, including municipal, county, and state administrations, may generate and disseminate official statistics. A domestic statistics system attempts to coordinate official statistics resulting from the collection and processing of data and organize this into a cohesively functioning and centralized source of data. The system allows dissemination of the statistical data to help users develop their knowledge about a particular topic or geographical area, make comparisons between economies, and understand changes over time.

The RAP will not state which responsibilities fall on any government agency or institution in particular; it leaves the respective roles of the organizations for each economy to decide. The goal is to build off the strengths of the different government agencies and organizations. While the domestic statistics office has experience with statistical methods, other ministries have more knowledge about agriculture subject matter, land use, forestry, and fishery.

Governance at the domestic level also involves creating a system that brings together the domestic statistics office and sector ministries and other agencies that provide data under the concern of the Global Strategy. The coordination mechanism of a domestic statistical system should ensure that the different data producers adhere to a common set of standards that follow the principles defined in the Global Strategy and brought forward in the Global Action Plan.

Analysis: Nearly all APEC economies were found to have domestic institutions dealing with agricultural statistics and often their websites provided a statement as to the laws in force that legitimize their statistical authority, responsibilities and activities. This study scored having a domestic statistical system positively whenever government websites provided the legal authority for their official agricultural statistics.

To Improve Agriculture Statistics Based on a Domestic Statistical System

- All institutions dealing with agricultural statistics should provide legal transparency on their websites with documentation as to the laws in force that legitimize their statistical authority, responsibilities and activities.
- A statistical system should build on the strengths of various different institutions and attempt to organize a cohesively functioning and centralized source of data distribution.

With this interpretation of the core item, nineteen APEC economies appear to publish their agricultural statistics based upon the broad definition of having the basic foundations of a domestic statistical system.

43. Statistics overseen by a National Statistics Council²³

Discussion: Effective governance of agency's compliance with standards that follow the principles defined in the Global Strategy will prevent duplication of efforts and resources as well as the publication of conflicting data from different reporting agencies. It also ensures statistical integrity by making the data available and accessible in a timely manner.

52.4% of APEC economies have a domestic statistics council overseeing statistics

Multiple governmental organizations are often involved in the collection of data on agriculture, forestry, and fisheries, and as such, most APEC economies will require and benefit from a central statistical coordinating authority. Even in economies where centralized units are already in place within the domestic statistical systems and coordinate data collection and dissemination as part of their larger responsibility for agricultural and other statistics, coordination mechanisms may be required to ensure that the statistical system is fully meeting the needs of line ministries. Thus, the RAP envisions a governance body, such

²³ For purposes of this study, a *national statistics council* is the term applied to a domestic entity involved in the collection/dissemination of statistics within a member economy

as a statistics council, be established to organize the efforts and enable representativeness of statistics stakeholders.

Such a council would include representation from the ministry of agriculture, the statistical office, and other organizations providing statistics or administrative data to jointly organize and coordinate the development and use of the master sample frame, the integrated survey framework, and the corresponding agricultural database.

The first step in implementing the Global Strategy is for economies to determine how agriculture should be integrated into the domestic statistical system and to ensure that the integration is in harmony with the rest of the statistical system. Over time each economy will also face the governance question as to whether the different agencies should be merged as the original purposes and needs for those agencies change.

Governance of the agricultural statistical system entails the establishment, where this does not exist, of a sectoral coordination mechanism that brings together the domestic statistics office and the ministries responsible for collecting agriculture-related data. The RAP best practices identify oversight of the domestic statistical system as a core item – answering the following question: *which agency is best suited to take the lead, or should coordination be accomplished through a national statistics council?*

Analysis: Whether a domestic statistical system is being effectively managed, coordinated, supervised, and policies implemented cannot be accurately assessed with a website review. The decision was to score positively whenever a government website mentioned that its official agricultural statistics activities were under the scrutiny and policy direction of a national statistics council.

With this interpretation of the core item, eleven APEC economies appear to have oversight of their agricultural statistics based upon some form of a national statistics council.

Domestic Statistics Council Should Oversee Statistics

- All APEC economies need an NSC to provide a common voice for seeking adequate resources that support the agricultural statistics system's functioning within the framework of the statistical system.
- The NSC jointly organizes and coordinates the development and use of a master sample frame, an integrated survey framework, and agricultural data distribution system.
- A NSC provides more efficient management, coordination, and supervision of the statistical system.

44. Best practices documentation of a “National Strategy for the Development of Statistics” published

Discussion: A sectoral coordination mechanism should be part of a national system, with a national statistics council providing governance. The Global Strategy envisions that the coordination mechanism for the agricultural sector will be a subcommittee of the national statistics council; helping to ensure that agricultural statistics is integrated into the national statistical system. The system should be able to support the dissemination of data both within and across APEC economies. Integrating agriculture into a domestic system can also diversify the focus of statistical capacity building since current efforts focus mainly on strengthening of the domestic statistical offices.

38.1% of APEC economies have documented best practices for a national strategy for the development of statistics

Best practices governance suggests that the national statistics council will be responsible for carrying out the detailed assessment of the agricultural statistical system's capacity through the agricultural sub-committee (NASC) and with Global Strategy regional coordination. The Council will also be responsible for preparing the Sector Strategic Plan for Agricultural and Rural Statistics (SSPARS) in line with the recommendations of the Global Strategy and in consultation with data users and other stakeholders.

The above governance arrangements are designed to enable the ministries and agencies involved in the collection of agricultural statistics to integrate their "sector strategic plans" into the NSDS. The national statistics council would have the responsibility for reviewing (as needed) the existing statistical legislation in order to ensure that clear responsibilities for data collection are assigned to the "correct" domestic institution(s). The national statistics council should develop a strategy to foster public awareness and mobilize resources in support of the implementation of the SSPARS and the NSDS.

All APEC Economies should have a National Strategy for the Development of Statistics

- NSDS serves as a mechanism that coordinates integration of agriculture into the national statistical system.
- The statistical development effort should include agricultural statistics into the NSDS as a primary element.
- All ministries and agencies involved in the collection of agricultural statistics should integrate their "sector strategic plans" into the NSDS.

Analysis: Best practices recognize the NSDS as an effective mechanism for using the SSPARS for mainstreaming agriculture into an integrated statistical system. This review was able to assess whether a statistical system has the benefit of a NSDS, and a positive score was given whenever a government website documented or referenced that its official agricultural statistical activities were under the influence of some form of a NSDS. For websites lacking transparency and no indication of influence from a NSDS, a subjective decision was made based on any hints derived from available census or survey documentation.

Using above interpretation for scoring of the core NSDS item, eight APEC economies appear to benefit from having guidance based upon a NSDS. A closer examination of websites found both a national statistics council and a NSDS present in six APEC economies.

45. Agricultural statistics integrated into domestic statistical system

Discussion on Integrated Approach: An effective approach to improving agricultural statistics starts with the integration of agriculture into the domestic statistical system. The development of a SSPARS may address the difficulties in creating an integrated agricultural statistics program.

61.9% of APEC economies have integrated agricultural statistics into their domestic statistical system

The centralized survey approach may not always meet the needs of the line-ministries such as a ministry of agriculture. For that reason, the statistical responsibilities in many APEC economies are decentralized with the agricultural statistics produced by the MOA. Both systems have advantages and disadvantages. National statistical offices have experience with statistical methodology and sample frames. However, other ministries have more knowledge about the areas that may be assessed: agriculture, forestry, fisheries, environment, land use, etc. The Global Strategy proposes framework for integration that builds off the strengths of both the NSO and line-ministries.

Within the framework of the Global Strategy, economies can receive help in designing an integrated survey framework that: (1) provides an annual work program that is consistent from year to year, (2) minimizes the required scope of censuses, (3) recognizes that some data need to be collected more often than annually because of the seasonal nature of agriculture and the crop and livestock production cycles, and (4) takes into account the additional data sources that need to be included in the overall framework (administrative data, remotely sensed data, early warning systems, and community-level surveys).

To Improve the Integration of Agricultural Statistics into the Domestic System

- All APEC economies need to improve the transparency of their agricultural statistics integration into their domestic statistical system.
- Agricultural statistics integration into a domestic statistical system is best accomplished by use of a master sampling frame.

The RAP envisions technical assistance to support the establishment of the complementary data management system that fulfills three functions: (1) access to the integrated official statistics for dissemination purposes, (2) storage and retrieval of survey results, and (3) access to farm, household, and geo-referenced data for research. The requirements at the economy level begin with the formation of a domestic governing body.

Analysis of an Integrated System: An objective assessment of whether agricultural statistics are integrated into a domestic statistical system was based on the use of a master sample frame for agriculture. The use of a single standardized sampling frame helps ensure completeness of populations and allows centralization.

A positive score was given whenever a government website appeared to generate its agricultural statistical from a census or survey based on usage of a master sample frame with results published using an official format (i.e. estimates database, official periodical reports, yearbooks, etc.). For websites lacking transparency, a subjective decision was made based on sampling design characteristics derived available documentation.

Thirteen APEC economies appear to have some form of integrated agricultural statistics. It should be noted that this estimate is biased upward because of the necessity for organizations to use commonly available topographical maps as a *de facto* master sampling frame. Maps are often considered a lowest common denominator but are useful for identification of the primary sampling unit.

In several APEC economies such map area sampling frames were described in their census and survey documentation. Sole use of topographical maps is not consistent with best practices, however, the use of agricultural censuses and surveys may be considered an indicator of agricultural statistics integration.

APEC economy NSO and MOA websites providing agricultural census and survey statistics.

- NSO Ag census 61.9%; Ag survey 47.6%
 - MOA Ag census 19.0%; Ag survey 52.4%
-

Analysis of Census and Survey Statistics: Thirteen APEC economy NSO's conduct an agricultural census. This is consistent with the estimate of APEC economies appearing to have some form of integrated agricultural statistics, so it is not surprising that nearly half of NSO's also are found to conduct an agricultural survey.

Four APEC economy MOA's appeared to have conducted a recent agricultural census so that indicates a residual of four members as lacking in an integrated national statistics system.

The study review found that 52.4 percent of MOAs conducted some type of agricultural related survey. Often these are not associated with actual administration of an annual agricultural survey, but with data collection associated with monitoring of an EW system, economic crop/livestock production studies/situation reports, crop/grain/livestock prices, imports/exports, etc.

46. Agricultural statistics generated on basis of Master Sample Frame

Discussion: The integration of agriculture into a national statistical system begins with the development of a Master Sample Frame (MSF) which is the foundation for all data collections based on censuses and probability sample surveys. The MSF must provide the basis for the selection of probability based samples of farms and households. It must also have the capability to link the farm characteristics with the household and connect both to the land cover and use dimensions.

The RAP envisions that a sub-committee of the national statistics council will guide development and use of the MSF, the integrated survey framework, and the database. All survey data collected should be based on the MSF in an integrated survey system with the outcomes stored in a common database. The role of each institution should be clearly defined and based on its respective areas of technical expertise and data collection capabilities.

The integration of agricultural statistics into an APEC economy's statistical system does not mean that all responsibilities fall on the NSO, MOA, or any other agency in particular. Any organization with overlapping data needs will need to accept and adapt to use of the MSF, an integrated survey framework approach and database principles.

To Improve Transparency by NSO and MOA in Providing Agricultural Census and Survey Statistics

- All APEC economies' NSO and MOA need to improve reporting of core agricultural statistics data to achieve best practices compliance.
- All APEC economies need a recent agricultural census as a baseline for their agricultural statistics and integration with the annual agricultural survey into a domestic statistical system.

66.7% of APEC economies are generating agricultural statistics based on the core item concept of a Master Sample Frame

Master Sample Frame for Ag Statistics

- All APEC economies need to integrate their agricultural statistics into a domestic statistical system by developing a MSF.
- The MSF provides the basis for selection of probability based samples of farms and households.
- Future survey design for all APEC economies should focus linking MSF (area frames) with list frames for more statistically efficient "multiple" frame estimation.
- All organizations with overlapping data needs will need to accept and adapt to use of the MSF, an integrated survey framework approach and database principles.

Analysis. Assessment of this core item was subjective since use of a MSF was not explicitly stated on any of the websites reviewed. However, it was estimated that fourteen APEC economies have access to some form of a MSF. Unfortunately there is no reliable method available based on a review of websites to determine the sustainability, quality or completeness of an economy’s current MSF.

47. MSF as framework for population census

Discussion: A population census is one of the most important statistical collections an APEC economy can undertake. It is the primary source of a population’s basic information related to housing, geographical distribution, and demographic characteristics (age, sex, marital status, fertility, education, economic activity, etc.). A census is typically conducted every ten years.

52.4% of APEC economies are using the MSF as a basic framework for their population census

This study is focused on the MSF adaption to agricultural statistics, but the RAP includes use of a MSF as a core item and considers it a best practice that the MSF be designed to accommodate and be used for either a population or agricultural census. The advantages and methodologies of this dual approach are discussed in the next core item review.

Analysis: Conducting a population census is almost unequivocally the purview of each APEC economy’s NSO. Since this study’s review of APEC economy websites included a thorough review of both the NSO and MOA websites, it was convenient to examine all available census documentation and statistics regardless of whether it pertained to the population or agriculture.

MSF as Basis for Population Census

- All APEC economies need to use a MSF for their population census to ensure complete population coverage.
- All APEC economies need to complete a population census every ten years.
- All APEC economies need to consider adaption of a MSF to efficiently conduct future population and agricultural censuses.

Eleven APEC economies appeared to utilize a MSF as the basic framework for conducting the census implementation. The reader is cautioned to use this figure as just an estimate that needs more in-depth research beyond the capability of a mere website search and review.

48. MSF as framework for agricultural census

Discussion: The RAP recommends carrying out the household component of the agricultural census using the list of households from the population census as a frame. In actuality, the MSF becomes the basic framework for both the population and agricultural censuses. The use of a MSF for both the agricultural and population censuses ensures that common statistical standards in data from the two sources are consistent and comparable, making it easier to analyze and interpret the agricultural census data in relation to the population census data. The RAP best practices also emphasize that program concepts, definitions and classifications used in the agricultural census are consistent with international standards in order to effectively coordinate with the population census.

66.7% of APEC economies are using the MSF as basic framework for their agricultural census

Carrying out the household component of the agricultural census using the list of households from the population census as a frame can only be done if the agricultural census is carried out soon after the population census; otherwise, the list of households quickly becomes out-of-date and the list needs to be updated.

Analysis: Earlier sections concluded that all APEC economy population censuses were conducted by their respective NSO and that nearly two-thirds also conducted the agricultural census. It was statistically reassuring to find that fourteen APEC economy NSOs also follow the best practices of using the MSF as the basic framework for the agricultural census.

MSF as Basis for Agricultural Census

- All APEC economies need to use an area-based MSF for their population census to screen & identify farm holdings as an efficient means for conducting their agricultural census.
- Agricultural census coverage should be inclusive of urban and rural occupied structures, including both commercial and small-scale subsistence farm holdings for food security purposes.
- Completeness of the population census as a frame for the agricultural census requires methodology incorporated into the agricultural census screening procedures and sub-sampling to estimate for incompleteness.

49. MSF constructed with administrative data for use as a farm registry

Discussion: This is a challenging item to assess given the typical transparency issues. The primary information for agricultural statistics purposes should be whether the household is associated with a farm holding. The procedures to develop a MSF farm registry using the census of agriculture data can be followed where the data are obtained from administrative information (e.g. tax records, government licensing of holdings, or regulatory registers). Caution must be taken when using such administrative records as not all entities are fully compliant with tax filings, government regulations and licensing requirements.

Analysis: Some APEC economy documentation clearly states that the survey sample was selected from a sampling frame constructed using administrative data.

Eleven APEC economies are using an MSF constructed with administrative data or tax/licensing data as a farm registry for survey purposes.

52.4% of APEC economies construct the MSF with administrative data for use as a farm registry

MSF as a Farm Registry

- All APEC economies need to consider the use of their population agricultural census for adding administrative data to the MSF and formation of a farm registry.
- A MSF farm registry (or list) can be developed from administrative record data but a multiple frame approach is required to ensure complete population coverage.

50. MSF constructed using an area sampling frame

Discussion: When developing the RAP best practices associated with MSF construction the standard methodology discussed is use of an area frame. Traditionally the area frame construction requires use of aerial photography or satellite imagery to delineate the agricultural land use segmentations. An area frame has the universal virtue of being a complete sampling frame if correctly constructed. The main drawback of an area frame is that it becomes out-of-date fairly quickly if it is highly correlated with rapid economic development activity.

38.1% of APEC economies construct the MSF using an area sampling frame

With only a few minor drawbacks, the area frame is an excellent starting point for creation of a MSF. Screening of the area frame to identify farm holdings allows creation of a list-based MSF or database. The problem with a list is that it becomes out-of-date more quickly than an area frame. While a list frame is very convenient for sampling, they are difficult to maintain due to constant changes in the farm holding population. A solution is to implement a “multiple-frame” (MF) probability sample survey approach that combines the positive attributes of a list sampling frame with the completeness of an area sampling frame

Analysis: This assessment was contingent upon census and survey document transparency describing the sampling frame being utilized. An accurate subjective assessment can be made based on a website. Websites were scored positively whenever the sampling documentation mentioned that the sampling unit was “area-based”, e.g. administrative, political, or map.

MSF as Basis for Annual Agricultural Survey

- All APEC economies need to consider the use of a MSF and adoption of the multiple frame survey approach for their annual agricultural survey that is advocated for implementation of best practices.
- It behooves each APEC economy to invest the resources necessary to create and maintain a MSF that will best support census and annual agricultural survey activities for accurate population estimation purposes.

Eight APEC economies are using a MSF constructed using an “area-based” sampling frame for their censuses and/or surveys.

51. MSF as framework for annual agricultural surveys

Discussion: A census is typically distinguished as having each unit (such as person, household or holding) in the population completely enumerated as opposed to a sample survey where information is used to make estimates or expanded to represent the total of all units in the population.

61.9% of APEC economies use the MSF as the framework for annual agricultural surveys

Modern census-taking is conducted using a multi-level universe design that may include sampling at one or more levels, but the enumeration coverage of the population or universe is extensive and complete. An annual agricultural survey by comparison is designed to collect a limited number of specific attributes pertaining to the population of interest based on a relatively small sample that can be enumerated in a timely and cost efficient manner. Since a MSF is maintained to represent the total universe or statistical population of farm holders, it

behooves each APEC economy to invest the resources necessary to create and maintain a MSF that will best support census and survey activities for accurate population estimation purposes.

Analysis: MSF's application as the basic framework for annual agricultural survey is in use by thirteen APEC economies.

Referring back to the integration of agriculture into a domestic statistics system (#45), there were ten APEC economies' NSO and eleven MOA estimated to conduct an annual agricultural survey. Checking the ten APEC economies' NSO conducting an annual agricultural survey finds that nine have a MSF available for use as their basic sampling framework. Checking the eleven APEC economies' MOA conducting an annual agricultural survey finds that only six have a MSF available for use as their basic sampling framework.

Construct the MSF Based on an Area Sampling Frame

- All APEC economies need to consider the use of an area frame for their MSF with the universal virtue of being a complete sampling frame.
- The traditional area frame is required for adoption of the multiple frame survey approach advocated for implementation of best practices.

Checking the estimated 13 APEC economies using a MSF as the basic sampling framework reveals two APEC economies where both their NSO and MOA use the MSF for conducting annual agricultural surveys. Two economies appear to have integrated agriculture into their domestic statistical system but do not have an MSF.

52. MSF and fisheries landing site information

Discussion: This item refers only to ocean saltwater fisheries. This is because the reference is made specifically to MSF "landing site" (landing dock) information. The RAP recognizes the importance of fisheries and is striving to more efficiently sample and estimate saltwater fisheries production data.

19.0% of APEC economies have fisheries landing site information on their MSF

This data are commonly obtained separately from agricultural holder surveys and by a different agency. Aquaculture and freshwater fishing production can be estimated by the annual agricultural survey of farm holders since a subset of farm holdings represent aquaculture producers and also households of freshwater hook-and-line/spear fishermen.

Landing sites are the appropriate unit for surveying saltwater capture fishery production but the MSF can also serve a dual purpose of estimating incompleteness by sampling and screening other fishery-related units such as households, holdings, and enterprises.

Analysis: The assessment was contingent upon website description of the sampling frame being used for fisheries estimates. This proved problematic as detailed the fisheries data was often obtained from a commerce ministry or its fishery agency unit. It was difficult to find any supporting documentation on the survey methodology from the originating agency that defines the sampling frame.

For a given economy, the fisheries data was published for only three to five of the largest apparent fisheries markets. There was no corresponding documentation on how or why these markets were selected. Likewise, there was no information on whether these markets have single or multiple landing sites or if a sampling frame existed with landing sites identified. Thus, this study scored a website positive if the published fisheries' survey was documented and it indicated that data was obtained by sampling.

Based on these scoring criteria, four APEC economies are using a MSF that includes landing site information for fisheries survey sampling purposes.

Referring back to the fisheries core item #22 (the quantity landed and discarded), there were 17 APEC economies that conducted an agricultural survey as opposed to four economies that included landing site information on their MSF. Referring to core item #24 (amounts processed for food and nonfood uses), there were only ten APEC economies estimated to conduct an agricultural survey. Based on these two comparisons there is considerable difference between the estimate of fisheries surveys and the apparent use of an MSF with landing site information as a sampling frame.

**When Collecting Data on Fisheries
Landing Site for Inclusion in the MSF**

- All APEC economies need to consider the use of a MSF and inclusion of fisheries landing sites for adoption of the multiple frame survey approach for their annual agricultural survey to estimate both freshwater and marine fish.
- Landing sites are the appropriate unit for surveying saltwater fishery production but the MSF can also serve a dual purpose of aquaculture estimation and incompleteness of both by sampling and screening other fishery-related units such as households, holdings, and enterprises.
- All APEC economies need to improve their website transparency documentation on fish production estimation.

4. Conclusions and Result Areas for APEC Economies

This study evaluated the application of the best practice principles by reviewing agricultural statistics available on economy websites. The most revealing finding of this study is the wide divergence in scope and depth of agricultural data coverage in member economies:

- 5 of APEC's 21 economies are fully compliant with FAO best practice principles in their agricultural statistics programs.²⁴
- 3 have strong application of the principles.
- 8 have moderate application.
- 4 have weak application.
- 1 has no application.

That only eight of the economies are fully compliant or have strong application of best practice principles supports the supposition of the RAP that programs have deteriorated. But APEC economies are diverse in the scope and complexity of their agriculture and best practice guidance provides flexibility for self-determination of core commodity items and associated data. For each core data item assessed, it was commonly found that the five economies with advanced agricultural statistics systems were likely to meet the best practices standards.

Recommendation: APEC economies that are less than fully compliant should review this analysis of the best practice for each core data item and consider steps to incorporate best practices into their domestic statistical collection programs. Economies not in compliance to any degree should change their survey questionnaires. Such changes can be made at minimal cost and possibly offset by dropping non-essential data items.

Our review assumed that each APEC economy has identified core commodities for best practice standards. Often these commodities have been surveyed over a number of years and historical data are often available. Nonetheless, the international community has recognized the need for better statistics and the *Global Strategy* provides guidance on standardizing and expanding the core dataset.

²⁴ That an economy is "fully compliant" does not mean that it follows all best practices, but that its agricultural statistics program is effectively in compliance compared with best practices.

This baseline study supports the Global Strategy best practices as soundly based statistical principles that are appropriate and recommends their immediate adaptation to the diverse scope of agriculture found in each of the APEC economies. The study's summary classification of application characteristics indicates there is an immediate need for APEC economies to take a more pro-active role to correct their best practices shortcomings. The aim of this report was not to judge individual economies but to identify, across 21 economies, where more attention to best practices is needed to produce more complete and comprehensive documentation and data.

This study considers the internet as the best practices standard for information distribution. The evaluation process required careful examination of all possible websites within each APEC economy to identify all that might publish agricultural statistics. It was found that the diverse nature of agriculture within each APEC economy very often was unique and utilized multiple institutions - each of which typically had an independent mandate to collect agricultural data to satisfy their specific program needs.

This agricultural statistics evaluation was somewhat limited because the review process was totally by internet and restricted to the published data made available on applicable institutional websites. The review process was made more difficult in that the primary websites were typically written in a language other than English. Also some website menus used awkward nomenclature and searching for specific best practices data was problematic. It is quite possible that additional agricultural statistics data are available in traditional paper published form, but it was not reviewed by this study as today's data users have expectations of meeting their data needs on the Internet.

Instances where the documentation was lacking required subjective use of the evaluator's knowledge of data collection methodology, probability sample surveys and census methodology in carrying out the evaluation. The study's review process found several instances where a survey or census report was advertised as available on the website but available only if purchased. Free Internet access to agricultural statistics is also considered by this study as consistent with the "spirit" and good "intent" of the best practices standard of data distribution.

Recommendation: Each economy should make agricultural statistics freely available in a timely fashion as a goodwill gesture to the goal of improving transparency and access to agricultural data. The economy will then benefit from the support of data users in making decisions on food security, trade, and production.

Statistical offices should use the study's assessment of Pillar 1 core data items to raise awareness of the need to include data on rural households, agricultural inputs, fisheries, and forestry in agricultural statistics. APEC agricultural statistic offices are encouraged to pursue correction of their Pillar 1 core data item shortfalls as these are more likely possible, especially in the near-term, as being under their own purview and budgetary control. It is always important to have feedback from agricultural statistic offices and those directly involved with issues related to program improvements.

This study concludes its review of Pillar 1 agricultural statistics with a summary of overall best practices on core data item compliance as presented in table 5-1. The purpose of this summary is to provide the reader with a better understanding of the relative difference in

percentage compliance between the classification groups. This summary includes all 43 individual Pillar 1 data items reviewed in Chapter 3²⁵. The overall average Pillar 1 compliance is 57.1 percent.

The APEC economies group classified as “Fully Compliant” possesses advanced agricultural statistics systems and obtained an estimated compliance rate of 80 percent. Weakness is mainly due to lack of published consumer prices of core data items which are still typically found on their commodity exchanges. This logic was used to deem these five economies fully compliant.

Table 4-1

Summary of Pillar 1 Compliance

	Fully Compliant	Strong Application	Moderate Application	Weak Application	No Apparent Application
Number/percent of economies	5 (24%)	3 (14%)	8 (38%)	4 (19%)	1 (5%)
Compliance with Pillar 1 core data	80.0%	39.5%	62.2%	45.9%	0%

The Compliance with Pillar 1 core data row above demonstrates a decline in the percentages from left to right, but the “Strong Application” group of three APEC economies defies this logic. The “Strong Application” group consists of three atypical APEC economies— one a relatively moderate size pastoral & forested island, one with urban modern industrialized cities and rural seasonal subsistence agriculture, and one a small modern city-state with minor agricultural land area. Their compliance percentage is low because they lack the following data items: EW data, aquaculture consumer prices, number of marine days fished, water or energy consumption, capital stock, and socioeconomic data (number of people working age, hired workers and employed household workers, and agricultural household and rural income).

The “Moderate Application” is the largest group with eight APEC that are most generally representative of the APEC membership as a whole. This group had a 62.2 percent compliance compared to the overall average of 57.1 percent. Their compliance percentage is lower than the “Fully Compliant” group because they lacked the following data items: core crop storage or utilization, EW information from satellite observations, number of marine days fished, forestry agricultural land price reporting, and socioeconomic (number of people working age, hired workers and employed household workers).

The “Weak Application” group comprised of four APEC economies: one city-state and three subsistence-based agricultural economies. Less than one-half of their core data items were in compliance (45.9 percent). They were lacking in the following data items: crop storage or utilization, all EW items, aquaculture net imports/exports, number of marine days fished and amount of fish processed, all forestry core data items, all agricultural input and socioeconomic core data items.

²⁵ An average percentage positive compliance for each APEC economy was calculated and subsequently averaged to estimate the degree of best practices application for each classification.

The lone remaining APEC economy falling under “No Apparent Application” does have a government statistical office, but the website searches found no apparent agricultural statistics data or system in compliance with Pillar 1 core data item best practices.

Recommendation: Statistical offices should improve coverage of Pillar 1 core data items and update questionnaires in line with best practices. This includes greater efficiency in sampling frame construction and maintenance, effective data collection methodology and, consistency in market coverage.

Pillar 2 core items of interest related to the integration of agriculture into domestic statistical systems. This was far less transparent. Issues related to the definition of a “domestic” or “national” based statistical system and the basis of its legal existence was needed. The sustainability of agricultural statistics by governance and statistical capacity building are the Third Pillar core items of focus by this study.

It was extremely difficult to evaluate Second and Third Pillar degrees of compliance because few organizational websites present governance and applicable legal information related to survey/census administration and data collection and distribution. Even when this information was found, it was often obscured. Often, the only governance transparency offered was the legislative law that authorizes a given survey or census. There were several instances during the review process where website documentation offered original announcements of statistical capacity building authorizations with contractual work funding start dates but nothing more on the progress or completion of the work. Each APEC economy’s NSO appears to assume its responsibilities independently of other organizations and bases its statistical reporting activities on its own pertinent administrative regulations and laws. On several occasions there was excellent documentation of the legislative cooperation between the NSO and MOA in the execution of census/survey data collection activities.

Recommendation: Improve underlying statistics and methodology by integrating agriculture into a “domestic” or “national” statistical system. This includes introducing an adequate degree of transparency and the elimination of overlapping data requirements.

A summary of overall best practices core item compliance for the Second and Third Pillars is presented in table 4-2. Eleven individual criteria were reviewed with averages calculated as per the methodology used in the First Pillar. The overall average compliance was 54.5 percent. The five APEC economies classified as the “Fully Compliant” have a compliance of 76.4 percent. Weakness was in the use (or lack thereof) of an area sampling frame as their MSF and in documentation that MSF includes fisheries landing sites. All five economies use a list MSF and the area sampling frame is a best practices requirement to determine incompleteness. The non-compliance is mainly due to one economy not having any documentation regarding use of a national statistics council or NSDS.

Table 4-2

Summary of Pillar 2 and 3 Compliance Based on Best Practice Application Classification Groups

	Level of Application					All Economies
	Full	Strong	Moderate	Weak	None Apparent	
Number of economies/percent	5 (24%)	3 (14%)	8 (38%)	4 (19%)	1 (5%)	21
Second and Third Pillar compliance	76.4%	75.8%	54.5%	20.5%	18.2%	54.5%

The “Strong Application” group above has an average compliance of 75.8 percent. The “Strong Application” is only slightly lower than the “Fully Compliant” group because one economy is a modern city-state and handles its agricultural statistics data collection using administrative licensing and reporting that is not consistent with best practices.

The “Moderate Application” group was the largest. These APEC economies are quite and generally most representative of the APEC membership as a whole. They were in compliance with 54.5 percent of core data items.

The “Weak Application” group average was in compliance with 20.5 percent of best practices. Three of the four economies did not have an MSF (the MSF counts for seven of the eleven core items used for calculation of the compliance percentage).

The one APEC economy composing the fifth group apparently has a government statistical office and conducts a population census, but no other information was available. This economy averages 18.2 percent compliance because its MSF is the basis of the population census and it is an area based sampling frame.

In practical terms, the study findings indicate that the priority for APEC economy data improvement should start with addressing the shortcoming associated with the Second and Third Pillars. These core items lay the foundation upon which Pillar 1 items are accurately obtained.

Recommended: Statistical offices should review compliance with Pillar 2 and 3 standards and take steps to supportive legislative action required for compliance. This will lay the foundation for solid efforts under Pillar 1.

None of the 21 APEC economies has adopted all of the best practices. It is entirely possible that an economy can achieve quality results by following a survey design that is within their financial capabilities. This can be achieved by diligently applying only selected best practice components that are particularly relevant to its situation and needs. Conclusions of the RAP and supported by this study’s results indicate that incorporation of agriculture as a component into a statistical system helps to facilitate and can better consolidate budgetary and personnel resources from multiple organizational sources if best practices are fully implemented.

Recommendation. Statistical offices should take the necessary steps required to implement the Pillar 2 core item concept of agricultural statistics integration. This is key to removing the duplication of effort between statistical organizations that may be so

straining on limited budgets. The study's review process should strengthen each APEC economy's desire to use its own NSDS.

This study could not accurately assess agricultural data distribution and management related to integrated systems. The appropriate assessment methodology is one conducted in-economy with a proper interview with an appropriate information technology (IT) official(s). This baseline study deferred website review of data management system aspects rather than attempt an inaccurate and totally subjective interpretative assessment.

The “sustainability” of agricultural statistics is extremely difficult to determine based on a website review. At the onset of this study, it was known that additional work is needed within APEC to improve agricultural data collection and dissemination to more effectively support policy decisions for areas such as agricultural planning, food security, and trade. Moreover, limited awareness and political commitment is found within many APEC economies that would be helpful in improving the quality, integration and transparency of agricultural statistical data systems. The RAP recognizes that sustainability of the agricultural statistics system will be achieved through adequate governance and capacity building. Without strong support of Second and Third Pillar core items, it is less likely that any Pillar 1 core data item shortfall will be corrected.

Recommendation: Seek technical assistance to:

- **Assess institutional and organizational structures supporting rural and agricultural statistics systems and the roles and responsibilities of organizations involved to determine whether a memorandum of understanding is needed between these organizations to formalize their roles.**
- **Promote statistics and statistical development outside the NSO in sectors that produce statistics related to agriculture and rural development.**
- **Enable statistical legislation.**

APEC agricultural statistic offices are equally encouraged to pursue correction of their Second and Third Pillar core item shortfalls. These are longer-term and much more complex; requiring legislation, coordination between ministries and designated funding. Someone might think that one ministry could offer its services to other ministries, namely in the area of utilizing a MSF. The conversion to its use by another ministry is lengthy in process and normally requires the assistance of experts to bridge the knowledge gaps for successful adoption. Difficulties in data measurements may also arise.

This study could not determine the capacity building aspects that might be underway in a given APEC economy to improve its agricultural statistics systems. Nonetheless, some general recommendations below will go a long way in improving the quality of agricultural statistics as a function of their accuracy, relevance, timeliness, comparability, availability, and accessibility.

Recommendation: Statistical offices should strengthen (1) national strategies for the development of statistics (NSDS) including the review and, if necessary, revision/creation to reflect the integration of agricultural data into the domestic statistical system. (2) the network of statisticians and supporting staff, including data collectors; (3) staff education on statistical methods for sampling, survey design, data

compilation, and data analysis; and (4) development and maintenance of the master sample frame, implementing the new survey framework and developing the data management/ distribution system.

It is hoped that the results of this baseline study provide the impetus for each APEC economy to embrace the agenda to improve their agricultural data program within the context of the Global Strategy. The study highlights common areas for improvement, where APEC economies can use their NSDS to create better governance and transparency for agricultural data, hopefully improving sustainability of the system. Implementation of best practices is a long-term effort, and will require a concentrated effort from all stakeholders.

This study provides a basis of discussion on how FAO's best practice guidance for data collection and dissemination supports the APEC objective of improving the quality of agricultural data to support food security, trade and production decision-making. In further support of this objective, APEC TATF has developed a handbook that supports member economies in implementing of the FAO Global Strategy agricultural survey best practices.

Recommendation: Statistical offices should reference the *Handbook to Guide Agricultural Statistics Best Practice Methodology Implementation in APEC Member Economies* for improving agricultural survey methodology in line with international best practices.

Appendix A. Checklists of Best Practices

Pillar 1

Core Data Items

Items	Census Y__ N__ (Year_____)	Survey: annual Y__ N__ (Yr_____)	Survey: seasonal Y__ N__
Core crop items. Wheat, maize, barley, sorghum, rice, sugar cane, soybeans, and cotton are core crop items.			
1. Area planted and harvested, yield, and production.			
2. Amounts in storage at the beginning of harvest			
3. Area of cropland that is irrigated			
4. Producer prices	N.A.	N.A.	
5. Consumer prices	N.A.	N.A.	
6. Amounts utilized for own consumption, food, feed, seed,			
7. Amounts utilized for fiber, oil for food, bio-energy, and net trade or imports and exports			
8.1 Early warning indications such as precipitation	N.A.	N.A.	
8.2 Early warning indications such as by windshield surveys of crop conditions	N.A.	N.A.	
8.3 Early warning indications such as provided by satellite observations	N.A.	N.A.	

Items	Census Y__ N__ (Year_____)	Survey: annual Y__ N__ (Yr_____)	Survey: seasonal Y__ N__
Core livestock items. These include cattle, sheep, pigs, goats, and poultry			
9. Inventory no. and animal births			
10.1 Production of products such as meat			
10.2 Production of products such as milk			
10.3 Production of products such as eggs			
10.4 Production of products such as wool			
11. Net trade or imports and exports			
12. Producer prices	N.A.	N.A.	
13. Consumer prices	N.A.	N.A.	

Items	Census Y__ N__ (Year_____)	Survey: annual Y__ N__ (Yr_____)	Survey: seasonal Y__ N__
Core aquaculture products			
14. Area cultured			
15. Production			
16. Net trade or imports and exports			
17. Producer prices	N.A.	N.A.	
18. Consumer prices	N.A.	N.A.	

Items	Census Y__ N__ (Year_____)	Survey: annual Y__ N__ (Yr_____)	Survey: seasonal Y__ N__
Core fisheries products			
19. Production - Quantity landed and discarded			
20. Number of days fished			
21. Amounts processed for food and nonfood uses			
22. Producer prices	N.A.	N.A.	
23. Consumer prices	N.A.	N.A.	
24. Imports and exports			

Items	Nat'l Inventory Y__ N__ (Yr_____)	Survey: annual Y__ N__ (Yr_____)	Survey: seasonal
Core forestry production			N.A.
25. Ag holdings area in woodland/forest	N.A.		N.A.
26. Ag holdings wood/pulp quantity removed	N.A.		N.A.

Items	Nat'l Inventory Y__ N__ (Yr____)	Survey: annual Y__ N__ (Yr____)	Survey: seasonal
27. Ag holdings price woodland/forest land	N.A.		N.A.
28. Non-ag holdings area in woodland/forest			N.A.
29. Non-ag holdings production in quantities removed			N.A.
30. Non-ag holdings prices for wood/pulp	N.A.		N.A.

Items	Census Y__ N__ (Year____)	Survey: annual Y__ N__ (Yr____)	Survey: seasonal Y__ N__
Core agricultural inputs			
31. Quantities of fertilizer and pesticides utilized			
32. Water and energy consumed			
33. Capital stocks such as machinery by purpose (i.e., tillage or harvesting)			
34. Number of people of working age by sex			
35. Number of workers hired by agricultural holders			
36. Employment of household members on the agricultural holding			

Items	Census Y__ N__ (Year____)	Survey: annual Y__ N__ (Yr____)	Survey: seasonal Y__ N__
Core socioeconomic data			
37. Agricultural households income by source			
38. Rural households income by source			

Pillars 2 and 3

Sustain Agricultural Statistics through National Integrated Statistical System, Governance, and Statistical Capacity Building

Item	Yes	No
39. Legally recognized statistical system		

Item	Internet Accessible		NSO	MOA	MOE	Other
	Yes	No				
40. Agricultural crop and livestock production data						
41. Consumer prices						
42. Weather						

Item	Yes	No
43. Has national statistical system		
44. Has a national statistical council to coordinate the integration of agriculture		
45. Country has designed a National Strategy for the Development of Statistics (NSDS)		
46. Has integrated ag into national statistical system		
47.1 If yes, has master sampling frame:		
47.2 If yes, basis of population census:		
47.3 If yes, basis of agricultural census:		
47.4 If yes, is constructed using <i>administrative data to construct registers of farms</i>		
47.5 If yes, is constructed using an area sample frame		
47.6 If yes, is ag survey based on master sampling frame		
47.7 If yes, does master sampling frame include fisheries landing sites		
47.8 If yes, does master sampling frame include fisheries used to monitor other fishery-related units such as households, holdings, and enterprises		

Appendix B. Global Minimum Core Data Items

Group of Variables	Key Variables	Core Data Items	Frequency
ECONOMIC			
Output	Production	Core crops (e.g., wheat, rice) Core livestock (e.g., cattle, sheep, pigs) Core forestry products Core fishery and aquaculture products	Annual
	Area harvested and planted	Core crops (e.g., wheat, rice)	Annual
	Yield / productivity	Core crops, livestock, forestry, fishery	Annual
Trade	Exports in quantity and value	Core crops, livestock, forestry, fishery	Annual
	Imports in quantity and value	Core crops, livestock, forestry, fishery	Annual
Stock of Resources	Land cover and use	Land area	
	Economically active population	Number of people in working age by sex	
	Livestock	Number of live animals	
	Machinery	Number of tractors, harvesters, seeders etc.	
Inputs	Water	Quantity of water withdrawn for agricultural irrigation	
	Fertilizers in quantity and value	Core fertilizers by core crops	
	Pesticides in quantity and value	Core pesticides (e.g. fungicides herbicides, insecticides, disinfectants) by core crops	
	Seeds in quantity and value	By core crops	
	Feed in quantity and value	By core crops	
Agro processing	Volume of core crops/ livestock/ fishery used in processing food	By industry	
	Value of output of processed food	By industry	
	Other uses (e.g., biofuels)		
Prices	Producer prices	Core crops, livestock, forestry, fishery	
	Consumer prices	Core crops, livestock, forestry, fishery	
Final expenditure	Government expenditure on agriculture and rural development	Public investments, subsidies, etc.	
	Private investments	Investment in machinery, in research and development, in infrastructure	
	Household consumption	Consumption of core crops/livestock/etc. in quantity and	

Group of Variables	Key Variables	Core Data Items	Frequency
		value	
Rural Infrastructure (capital stock)	Irrigation/roads/railways/communications	Area equipped for irrigation / roads in Km / railways in Km / communications	
International transfer	Official Development Assistance for agriculture and rural development		
SOCIAL			
Demographics of urban and rural population	Sex		
	Age in completed years	By sex	
	Country of birth	By sex	
	Highest level of education completed	1 digit ISCED by sex	
	Labor status	Employed, unemployed, inactive by sex	
	Status in employment	Self employment and employee by sex	
	Economic sector in employment	International Standard Industrial Classification by sex	
	Total income of the household		
	Household composition	By sex	
	Number of family/hired workers on the holding	By sex	
	Housing conditions	Type of building, building character, main material, etc.	
ENVIRONMENTAL			
Land	Soil degradation	Variables will be based on above core items on land cover and use, water use, and other inputs to production.	
Water	Pollution due to agriculture		
Air	Emissions due to agriculture		
Geographic location			
GIS coordinates	Location of the statistical unit	Parcel, province, region, country	
Degree of urbanization	Urban/rural area		

Note: Frequency of data collection for all variables other than output and trade will be established by the framework provided in the Global Strategy to determine the domestic priorities for content, scope, and frequency. The frequency requirement will also be considered in establishing the integrated survey framework that will define the data sources.

Appendix C. Agricultural Data Organizations and Websites

APEC Economy	Organization	Website
Australia	National Statistical Service (NSS)	www.nss.gov.au/nss/home.nsf
	Australia Bureau of Statistics Office (ABS)	www.abs.gov.au
	Dept. of Ag, Fisheries, and Forestry (DAFF)	www.daff.gov.au
	Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)	www.daff.gov.au/abares
Brunei Darussalam	Dept. of Agriculture (DOA), Ministry of Industry and Primary Resources	www.agriculture.gov.bn
	Agriculture and Agrifood Dept.	www.agriculture.gov.bn
Canada	Statistics Canada	http://www.statcan.gc.ca/start-debut-eng.html
	Agriculture and Agri-Food Canada (AAFC)	http://www.agr.gc.ca/index.html
China	National Bureau of Statistics of China (NBS)	www.stats.gov.cn/english
	Ministry of Agriculture of the People's Republic of China (MOA)	http://english.agri.gov.cn/sa/Statistics/
Chile	National Institute of Statistics (INE)	www.ine.cl
	Institution Ministry of Economy, Development and Tourism National Fisheries Service (SERNAPESCA)	www.sernapesca.cl
	Ministry of Agriculture	www.minagri.gob.cl
	Office of Agricultural Studies and Policies (ODEPA)	www.odepa.cl
Hong Kong, China	Agriculture, Fisheries and Conservation Dept. (AFCD)	www.afcd.gov.hk/english/agriculture/agr_hk/agr_hk
Indonesia	Central Bureau of Statistics (BPS)	www.bps.go.id
	Ministry of Agriculture	www.deptan.go.id
Japan	Statistics Bureau of Japan	www.stat.go.jp/english
	Agriculture, Forestry and Fisheries (MAFF)	www.maff.go.jp
Korea	Ministry of Agriculture, Food and Rural Affairs (MAFRA)	http://english.mafra.go.kr/main.jsp
	Korea National Statistical Office (KNSO)	kostat.go.kr/portal/english
	Korean Statistical Information Service (KOSIS)	kosis.kr/eng/database
Malaysia	Ministry of Agriculture and Agro-based Industry	www.doa.gov.my/web/guest/home
	Department of Statistics	www.statistics.gov.my
Mexico	Instituto Nacional De Estadística Y Geografía (INEGI)	www.inegi.gob.m
	Ministry of Agriculture, Livestock, Rural	www.sagarpa.gob.mx

APEC Economy	Organization	Website
	Development, Fisheries and Food (SAGARPA)	
	AgriFood and Fishery Information Service (SIAP)	www.siap.gob.mx
	Fishery (SAGARPA – CONAPESCA)	www.conapesca.sagarpa.gob.mx
New Zealand	Statistics New Zealand (SNZ)	www.stats.govt.nz
	Ministry for Primary Industries (MPI)	www.mpi.govt.nz
Papua New Guinea	Dept. of Agriculture and Livestock (DAL)	www.agriculture.org.pg
	National Statistical Office (NSO)	www.spc.int
Peru	Instituto Nacional de Estadística e Informática (INEI)	www.inei.gob.pe
	Ministerio de Agricultura (MINAG)	www.minag.gob.pe
Philippines	National Statistics Office (NSO)	www.census.gov.ph
	National Statistical Cooperation Board (NSCB)	www.nscb.gov.ph
	Bureau Agricultural Statistics (BAS) – Dept. of Agriculture	www.bas.gov.ph
Russia	Federal State Statistics Service (FSSS) or State Committee of the Russian Federation on Statistics (GKS Goskomstat) also referred to as Rosstat	www.gks.ru
	Ministry of Agriculture of the Russian Federation (Minselkhoz)	www.mcx.ru
Singapore	Agri-Food & Veterinary Authority of Singapore (AVA)	www.ava.gov.sg/Publications/Statistics
Chinese Taipei	National Statistics, Directorate General of Budget, Accounting and Statistics (DGBAS), Executive Yuan	http://eng.stat.gov.tw
Thailand	National Statistics Office (NSO)	http://web.nso.go.th/index.htm
	Ministry Of Agriculture and Cooperatives (MOAC)	http://eng.moac.go.th
	Office of Agricultural Economics (OAE), MOAC	www.oae.go.th
United States	National Agricultural Statistics Service (NASS), USDA	www.nass.usda.gov
	Economic Research Service (ERS), USDA	www.ers.usda.gov
	Foreign Agricultural Service (FAS), USDA	www.fas.usda.gov
Viet Nam	General Statistics Office (GSO)	www.gso.gov.vn
	Ministry of Agriculture and Rural Development (MARD)	www.agroviet.gov.vn