MEASURING RURAL WATER SUPPLY ACCESS:

Findings from a Comparative Analysis of Cambodian National Surveys

Project Report, June 2006

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Ministry of Rural Development

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Disclaimers

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The findings, interpretations and conclusions expressed in this report are entirely those of the authors and should not be attributed in any manner to the Ministry of Rural Development, the Ministry of Planning, the World Bank or the Water and Sanitation Program.

Abbreviations

CIPS	Cambodia Inter-censal Population Survey
CMDGs	Cambodian Millennium Development Goals
CSES	Cambodian Socio-Economic Survey (SES)
DHS	Demographic and Health Survey
lcd	Liters per capita per day
MIME	Ministry of Industry, Mines and Energy
MOP	Ministry of Planning
MRD	Ministry of Rural Development
NGO	Non-Governmental Organization
NIS	National Institute of Statistics (Ministry of Planning)
POU	Point of Use
RGC	Royal Government of Cambodia
RWS	Rural Water Supply
SES	Socio-Economic Survey
UN	United Nations
UNICEF	United Nations Children's Fund
WSP	Water and Sanitation Program (World Bank)

Executive Summary

The Cambodia Rural Water Supply Coverage Analysis Project was implemented at the request of the World Bank's Water and Sanitation Program (WSP) and the Ministry of Rural Development (MRD). The reason for the formulation of the project was the release of two national data sets, showing a marked discrepancy in rural water supply (RWS) coverage rates between them. Specifically, the Cambodia Inter-censal Population Survey (CIPS) showed that 39.6% of the rural population has access to safe water, while the Cambodia Socio-Economic Survey (CSES) showed that fully 60.1% of the rural population has access to safe water; a difference of more than 20 percentage points.

The National CMDG targets "access to a safe water source" aim for 50% rural and 80% urban coverage by 2015 (targets 7.10 and 7.11). Measuring progress towards those targets depends on the definitions of "access" and "safe". While a definition is in use internationally (based on having access to an "improved water supply" which provides at least 20 liters of water per person per day, and is not further than 1000 meters away) no formal definition exists in Cambodia. Projects have tended to use their own definitions of access, and different national surveys use different definitions of which water supply technologies are considered "safe".

The main national surveys considered in this report (the Census, the Cambodia Inter-Census Population Survey and Cambodia Socio-Economic Survey) all consider the following water sources to be safe:

- Piped water
- Tube well
- Protected dug well

Surface water (pond, river or stream) is considered unsafe by all surveys. Beyond that, interpretations differ. The Census and CIPS consider bought water safe, but rainwater unsafe. The CSES sees bought water as unsafe, but rainwater as safe. Looking at the approach followed by the national surveys, the following issues become obvious:

1. There is no clear definition of "access to a safe (or improved) water source";
2. The terminology in use in the CMDG targets and the surveys implies a level of assessment accuracy that does not exist. It is not known whether water sources are "safe" or "unsafe" because the water is not tested. It would be more accurate to speak of "improved source" vs. "unimproved source";
3. Related to the lack of definitions, there is no agreement on how to classify bought water and rain water;
4. Although survey data are reported as "access to safe water", what is actually measured is "use of an improved source". This leads to under reporting in the case where improved sources exist, but are not used, for example because of taste problems.

Examining the differences in coverage figures between CIPS and CSES in more detail reveals the following:

- The fact that CSES and CIPS both classify rainwater and bought water differently introduces a difference between them of more than 7 percentage points.
- Almost all the remaining difference is caused by the fact that both surveys appear to have different definitions of what is a "protected dug well". The absolute difference between surveys in the dug well category (protected and unprotected) is only slightly more than one point. But disaggregating the numbers into protected dug wells and unprotected dug wells shows a difference of more than 15 points between the "protected dug well" categories.

Neither CIPS nor CSES use a formal definition of what is considered a "protected dug well" although by the numbers it is clear that whatever approach the CIPS uses, its definition is stricter, since the reported numbers are much lower (CIPS reports 2.7% rural use of protected dug wells, while CSES reports 18.1%). Neither survey considers the full range of protective measures used internationally to lower the risk of contamination, i.e.:

- A headwall around the well with a properly fitting cover
- A concrete drainage platform around the well, with drainage channel
- A hand pump or bucket with windlass
- A fence around the well

Coverage trends were analyzed by taking data from the four CSES surveys conducted between 1996 and 2004, and separately considering the 1998 Census and the 2004 CIPS data. The 2000 Demographic and Health Survey data were also considered, although no trend analysis could be performed, since data from only one DHS are available. The analysis shows the following:

- The third CSES survey (from 1999) shows a dramatic rise in protected dug well coverage when compared with earlier surveys. No other survey shows a similar increase, and it appears possible that the definition of "protected dug well" used in the SES changed in 1999.

- The overall contribution of ground water (dug wells and tubewells) to the total has remained fairly constant since 1998, at around 60%. However, within the category we see the use of dug wells declined by about 10 points, while the use of tubewells increased by the same amount.

- Other sources (including rainwater) fluctuate around 30%. Rainwater by itself shows a sudden peak in 2003-2004, growing to 13% from 1% or less three years earlier. A possible explanation for this growth is the fact that part of the latest SES was carried out during the wet season (when rainwater use is higher).

- Data from 1997 seems anomalous in that piped water accounts for more than 13%, but for much less in the years before or after that peak, averaging some 2.9% over the period 1998-2004. The peak in piped water use also explains the "dip" seen in dug wells and other sources; the total has to add up to 100% after all, so growth in one category must be matched by a decrease in one or more others.

- The major trend feature is that the SES data continually indicate higher coverage figures, and show a faster growth than CIPS. An approximate 10 percentage point difference between surveys in 1996 had grown to a greater than 20 percentage point difference by 2004. The DHS figure of 2000 falls very close to the Census-CIPS trend line compared to the trend line for the SES. The DHS data coinciding with the CIPS trend line indicates that the definitions used by it more closely resemble the definitions used by CIPS.

A breakdown of available data by province unsurprisingly shows rural water supply access in the more urbanized areas (e.g. Phnom Penh, Preay Veng, Pursat, Svay Reing) to be much above the national average, while access in the more remote provinces (e.g. Mondul Kiri, Rattanak Kiri, Stueng Traeng) is much lower than the national average.

Addressing the issues raised in this report will take a concerted effort by sector agencies, government institutions and development partners. Some of the issues raised and recommendations given can be dealt with fairly efficiently. Others will need further debate before a consensus can be reached. Not all of the questions raised have a clear answer, but involve a judgement based on an understanding of the local situation. These are important issues the water sector is faced with and everyone involved must work together to come to a consensus for them to be resolved.

Summary of Recommendations

Please note that the recommendations are numbered according to the chapter in which they appear.

Recommendation 1.1

Government and sector agencies should formulate an official definition of access to rural water supply services. This definition should encompass the classification of improved and unimproved sources, as well as considerations of water quantity and source accessibility. It is recommended that the definition take into account (but does not necessarily copy) existing internationally accepted definitions.

Recommendation 1.2

The use of the terms "safe water source" and "unsafe water source" in official targets and definitions should be abandoned in favor of "improved source" and "unimproved source".

Recommendation 1.3

The classification of "bought" water as safe in the census and CIPS should be urgently reconsidered. Considering bought water as "unimproved" more accurately reflects the reality in Cambodia — where bought water mostly refers to untreated surface water—and at the same time mirrors international practice.

Recommendation 1.4

The classification of "rainwater" in the same category as surface water in the CSES should be urgently reconsidered. International and national data provide ample justification for classification of rainwater as an improved source.

Recommendation 1.5

Independent of the classification of rainwater as an improved or unimproved source, Census and CIPS surveys should list rainwater in a category by itself, distinct from surface water sources. This will allow

a more meaningful breakdown of water use, and make for better comparability with data collected through the Socio-Economic Surveys.

Recommendation 1.6

The agreed upon definitions and specifications for access to an improved water supply should be disseminated widely throughout the sector through the organisation of workshops as well as the release of written materials in English and Khmer. Particular care needs to be taken that the following institutions are fully briefed (not an exhaustive list):

- Interministerial Coordinating Committee on Water Supply and Sanitation
- Department of Rural Water Supply, Ministry of Rural Development
- Department of Potable Water, Ministry of Industry, Mines and Energy
- National Institute of Statistics, Ministry of Planning
- Infrastructure Technical Working Group, c/o. Ministry of Public Works and Transport
- Ministry of Health
- Ministry of Environment

Recommendation 2.1

The Ministry of Rural development, together with sector agencies should draw up a clear definition of what constitutes a "protected" dug well, considering issues such as lining, headwall, covers, water withdrawal etc. following internationally accepted guidelines. The classification of protected dug wells as an improved or unimproved water source should be considered separately, in line with recommendation 1.1

Recommendation 2.2

The National Institute of Statistics should be requested to officially adopt the definition and specifications for "access to an improved water source" for use in future surveys once these have been agreed upon by the relevant sector agencies (see also recommendation 1.1).

Recommendation 2.3

Training materials based on the agreed definitions and specifications need to be developed, and NIS staff need to be trained in properly classifying "improved" vs. "unimproved" water sources according to those definitions.

Recommendation 3.1

Future national surveys should stratify Rural and Urban data according to the latest Rural/Urban classification published by the Ministry of Planning. The use of this classification should be stated explicitly in the survey report.

Recommendation 3.2

Responsible sector agencies, in cooperation with the National Institute of Statistics, should recommend which regularly implemented national survey will serve as the primary source for reporting water supply coverage figures, and will be used for tracking progress towards indicators 7.10 and 7.11 of the CMDGs.

Recommendation 3.3

Responsible sector agencies should agree on which existing survey data will be used for reporting current water supply coverage in the interim period before the release of the next national survey (see also recommendation 3.2). Part of this agreement should be a consensus of which water supply sources in that survey will be considered as "improved" and "unimproved".

សង្ខេបប្រតិបត្តិ

ការរៀបរៀងវិភាគតំបន់គ្របដណ្តប់នៃការផ្គត់ផ្គង់ទឹកនៅជនបទនៅក្នុងប្រទេសកម្ពុជា ត្រូវបានអនុវត្តសំណើរបស់ កម្មវិធីទឹក និងអនាម័យរបស់ធនាគារពិភពលោក (WSP) និងក្រសួងអភិវឌ្ឍជនបទ (MRD) ។ ហេតុផលចំពោះ ការបង្កើតគំរោងនេះឡើង គឺជាការចេញផ្សាយនូវទិន្នន័យថ្នាក់ជាតិចំនួន ២ ដែលបង្ហាញពីភាពខុសប្លែកគ្នាគួរអោយកត់ សំគាល់ចំពោះអត្រានៃតំបន់គ្របដណ្តប់នៃការផ្គត់ផ្គង់ទឹក (RWS) រវាងពួកគេ ។ ពិសេស ការអង្កេតអំពីជំរឿនប្រជាជន នៅក្នុងប្រទេសកម្ពុជា (Cambodia Inter-censal Population Survey - CIPS) បានបង្ហាញថា ៣៩.៦% នៃប្រជាជននៅតាមតំបន់ជនបទអាចទទួលបានទឹកដែលមានសុវត្ថិភាព ចំណែកឯការអង្កេតអំពីសេដ្ឋកិច្ចសង្គមរបស់ប្រទេសកម្ពុជា (CSES) បង្ហាញថាប្រជាជនតាមតំបន់ជនបទចំនួន ៦០.១%អាចទទួលបានទឹកដែលមានសុវត្ថិភាព ។ នេះជាចំណុចខុសគ្នាមួយដែលមានចំនួនជាង ២០% ។

គោលដៅ CMDG ថ្នាក់ជាតិ "លទ្ធភាពទទួលបានប្រភពទឹកដែលមានសុវត្ថិភាព" មានគោលដៅគ្របដណ្តប់ ប្រជាជនតាមជនបទចំនួន ៥០% និងប្រជាជនក្នុងតំបន់ទីក្រុងចំនួន ៨០% ត្រឹមឆ្នាំ ២០១៥ គោលដៅ ៧.១០ និង ៧.១១) ។ ការវាស់វែងអំពីការរីកចំរើនឆ្ពោះទៅរកគោលដៅទាំងនោះពឹងផ្អែកទៅលើនិយមន័យនៃពាក្យ"លទ្ធភាពទទួល បាន" និង "សុវត្ថិភាព" ។ ក្នុងពេលដែលនិយមន័យមួយកំពុងត្រូវបានគេប្រើប្រាស់នៅទូទាំងពិភពលោក ដោយផ្អែកទៅលើលទ្ធភាពទទួលបាននូវ "ការផ្គត់ផ្គង់ទឹក ដែលមានភាពប្រសើរឡើង" ដែលផ្តល់ទឹកយ៉ាងហោចណាស់ក៏ ២០ លីត្រ ដែរសំរាប់មនុស្សម្នាក់ក្នុងមួយថ្ងៃ ហើយមិនមានចំងាយលើសពី ១.000 ម៉ែត្រឡើយ) ប្រទេសកម្ពុជាពុំមាននិយមន័យ ជាផ្លូវការទេ ។ គំរោងមានបំណងប្រើប្រាស់និយមន័យផ្ទាល់របស់ខ្លួននៃពាក្យលទ្ធភាពទទួលបាន ហើយការអង្កេតថ្នាក់ជាតិផ្សេងៗទៀតប្រើប្រាស់និយមន័យខុសៗគ្នា ដែលតាមនិយមន័យនោះបច្ចេកវិទ្យានៃការផ្គត់ផ្គង់ទឹកត្រូវបានគេ ចាត់ទុកថា"មានសុវត្ថិភាព" ។

ការអង្កេតថ្នាក់ជាតិសំខាន់ៗដែលត្រូវបានគេពិចារណានៅក្នុងរបាយការណ៍នេះ (ការធ្វើជំរឿន ការអង្កេតអំពីជំរឿនប្រជាជននៅក្នុងប្រទេសកម្ពុជា និងការអង្កេតអំពីសេដ្ឋកិច្ចសង្គមរបស់ប្រទេសកម្ពុជា) ទាំងអស់នេះចាត់ទុកប្រភព ទឹកនានាដូចខាងក្រោមនេះថា "មានសុវត្ថិភាព" :

- ទឹកម៉ាស៊ីន
- ទឹកអណ្តូងស្នប់
- អណ្តូងលូដែលមានការការពារ

ទឹកធម្មជាតិ (ត្រពាំង ទន្លេ ឬអូរ) ត្រូវបានគេចាត់ទុកថាពុំមានសុវត្ថិភាពទេ នៅគ្រប់ការអង្កេតទាំងអស់ ។ លើសពីនោះទៅទៀត ការបកស្រាយនានាមានលក្ខណៈខុសៗគ្នា ។ ការធ្វើជំរឿន និង CIPS ចាត់ទុកថាទឹកដែលទិញ មានសុវត្ថិភាព ប៉ុន្តែទឹកភ្លៀងបែជាពុំមានសុវត្ថិភាពទេ ។ CSES មើលឃើញថាទឹកដែលទិញពុំមានសុវត្ថិភាពទេ ប៉ុន្តែទឹកភ្លៀងមានសុវត្ថិភាពទៅវិញ ។ បើពិនិត្យមើលពីវិធីសាស្ត្រ ដែលការអង្កេតថ្នាក់ជាតិបានអនុវត្តតាមចំណុចបញ្ហានានាដូចខាងក្រោមនេះមានភាពច្បាស់លាស់ជាទីបំផុត :

១. ពុំមាននិយមន័យច្បាស់លាស់ពី "លទ្ធភាពទទួលបានប្រភពទឹកដែលមានសុវត្ថិភាព ឬដែលមានការកែលំអទេ)" ។
២. ពាក្យដែលកំពុងតែប្រើនៅក្នុងគោលដៅនានារបស់ CMDG និងការអង្កេតនានាបញ្ជាក់ពីភ័ិត នៃភាពត្រឹមត្រូវនៃការវាយតំលៃដែលពុំដែលមានសោះ ។ គេពុំបានដឹងថាតើប្រភពទឹក"មានសុវត្ថិភាព ឬ"ពុំមានសុវត្ថិភាព"នោះទេពីព្រោះទឹកពុំត្រូវបានគេធ្វើពិសោធន៍ឡើយ ។ វានឹងមានភាពត្រឹមត្រូវជាងក្នុងការនិយាយថា "ប្រភពទឹកដែលមាន ការកែលំអ" ធ្យើបជាមួយនឹង "ប្រភពទឹកដែលពុំមានការកែលំអ" ។
៣. ទាក់ទងនឹងការខ្វះនិយមន័យនានា ពុំមានការឯកភាពគ្នាទៅលើរបៀបចាត់ចំណាត់ថ្នាក់ទឹកដែលទិញ និងទឹកភ្លៀងទេ ។

៤. ទោះបីជាទិន្នន័យនៃការអង្កេតត្រូវបានគេរាយការណ៍ថា ជា"លទ្ធភាពទទួលបានទឹកដែលមានសុវត្ថិភាព" ក៏ដោយ ក៏អ្វីដែលត្រូវបានគេវាស់វែងយ៉ាងពិតប្រាកដគឺ "ការប្រើប្រាស់នូវប្រភព ដែលមានការកែលំអមួយ" ។ ចំណុចនេះនាំ ទៅរកការរាយការណ៍មិនបានដិតដល់នៅក្នុងករណីដែលមានប្រភពដែលមានការកែលំអប៉ុន្តែមិនត្រូវបានគេប្រើប្រាស់ទេ ឧទាហរណ៍ដោយសារបញ្ហានានានៃការពិសោធន៍ ។

ការពិនិត្យមើលលក្ខណៈខុសៗគ្នានៅក្នុងតួលេខនៃទំហំរវាង CIPS និង CSES អោយបានល្អិតល្អន់ថែមទៀត បង្ហាញអោយឃើញដូចខាងក្រោម :

- ការណ៍ដែលថា CSES និង CIPS ទាំងពីរចាត់ចំណាត់ថ្នាក់ទឹកភ្លៀង និងទឹកដែលទិញខុសគ្នាបង្ហាញពីលក្ខណៈខុសគ្នាមួយរវាងទឹកទាំងពីរប្រភេទនេះចំនួនជាង ៧% ។
- ចំណុចខុសគ្នាដែលនៅសល់ស្ទើរតែទាំងអស់គឺ បណ្តាលមកពីការពិតដែលថា ការអង្កេតទាំងពីរនេះទំនងជាមាននិយមន័យខុសៗគ្នាទៅលើអ្វីដែលហៅថា"អណ្តូងលូដែលមានការការពារ" ។ ភាពខុសគ្នាយ៉ាងច្បាស់លាស់រវាងការអង្កេតនៅ ក្នុងផ្នែកអណ្តូងលូ ដែលមានការការពារ និងមិនមានការការពារ) គឺមានចំនួនលើសពី ១% បន្តិចប៉ុណ្ណោះ ។ ប៉ុន្តែ ការញែកអោយដាច់ពីគ្នានូវចំនួនអោយទៅជាអណ្តូងលូដែលមានការការពារ និងអណ្តូងលូដែលពុំមានការពារបង្ហាញ នូវភាពខុសគ្នាមួយដែលមានចំនួនច្រើនជាង ១៥%រវាងផ្នែកនៃ"អណ្តូងលូដែលមានការការពារ" ។

ទាំង CIPS ឬ CSES ពុំប្រើប្រាស់និយមន័យជាផ្លូវការមួយចំពោះអ្វីដែលត្រូវបានគេចាត់ទុកថា ជា "អណ្តូងលូ ដែលមានការការពារ" នោះទេ ទោះបីជាតាមបរិមាណ វាមានភាពច្បាស់លាស់ថា តាមវិធីសាស្ត្រដែល CIPS ប្រើប្រាស់ និយមន័យរបស់គេមានមានលក្ខណៈហ្មត់ចត់ជាង ដោយសារចំនួនដែលគេបានរាយការណ៍មានចំនួនទាបជាងឆាយណាស់ (CIPS រាយការណ៍ថា ២.៧% នៃប្រជាជននៅតាមតំបន់ជនបទប្រើប្រាស់អណ្តូងលូដែលមានការការពារ ចំណែកឯ CSES រាយការណ៍ថាមានចំនួន ១៨.១%) ។ ពុំមានការអង្កេតណាមួយគិតគូរពិចារណាពីវិធានការនៃការការពារយ៉ាងច្រើនដែល គេប្រើប្រាស់ជាអន្តរជាតិដើម្បីកាត់បន្ថយហានិភ័យនៃការធ្វើអោយកខ្វក់ឡើយ បានន័យថា :

- មាត់អណ្តូងត្រូវនឹងគំរបអណ្តូង
- ខឿនបង្ហូរទឹកដែលចាក់បេតុងនៅជុំវិញអណ្តូង ដោយមានចង្អូរបង្ហូរទឹក
- អណ្តូងដៃ ឬធុងដែលមានដៃយួរ
- របងនៅជុំវិញអណ្តូង

និន្នាការនៃការគ្របដណ្តប់ត្រូវបានគេវិភាគដោយយកទិន្នន័យពីការអង្កេតរបស់ CSES ចំនួន ៤ ដែលគេបានធ្វើឡើងនៅរវាងឆ្នាំ ១៩៩៦ និង ២០០៤ និងការគិតគូរពិចារណាដាច់ដោយឡែកពីគ្នាទៅលើការធ្វើជំរឿនឆ្នាំ ១៩៩៨ និង ទិន្នន័យ CIPS ឆ្នាំ ២០០៤ ។ ទិន្នន័យនៃការអង្កេតពីប្រជាសាស្ត្រ និងសុខភាពឆ្នាំ ២០០០ ក៏ត្រូវបានគេពិចារណាដែរ ទោះបីជាពុំមានការវិភាគទៅលើនិន្នាការអាចត្រូវបានគេធ្វើឡើងក៏ដោយ ដោយសារតែមានទិន្នន័យដែលបានមកពីការ អង្កេតពីប្រជាសាស្ត្រ និងសុខភាពមួយប៉ុណ្ណោះ ។ ការវិភាគបង្ហាញនូវចំណុចដូចខាងក្រោម :

- ការអង្កេត CSES លើកទី ៣ (ពីឆ្នាំ ១៩៩៩) បង្ហាញថា ការកើនឡើងយ៉ាងខ្លាំងមួយចំពោះចំនួននៃអណ្តូងលូដែលមានការការពារនៅពេលគេធ្វើការប្រៀបធៀបជាមួយការអង្កេតលើកមុនៗ ។ ពុំមានការអង្កេតណាមួយផ្សេង ទៀតបង្ហាញពីការកើនឡើងស្រដៀងគ្នាមួយទេ ហើយវាទំនងជាអាចធ្វើទៅបានដែលនិយមន័យរបស់"អណ្តូងលូ ដែលមានការការពារ" ត្រូវបានគេប្រើប្រាស់នៅក្នុង SES ដែលបានផ្លាស់ប្តូរនៅក្នុងឆ្នាំ ១៩៩៩ ។

- ការរួមចំណែកជាទូទៅរបស់ទឹកក្រោមដី (អណ្តូងលូ និងអណ្តូងស្នប់)ចំពោះចំនួនសរុបនៅតែមានចំនួនដដែលចាប់ តាំងពីឆ្នាំ ១៩៩៨ មក ដោយមានចំនួនប្រមាណជា ៦០% ។ ទោះជាយ៉ាងណាដ៏ដោយ នៅក្នុងផ្នែកនេះ យើងឃើញថា ការប្រើប្រាស់អណ្តូងលូបានធ្លាក់ចុះមកត្រឹមចំនួនប្រមាណជា ១០% ខណៈពេលដែលការប្រើប្រាស់អណ្តូងស្នប់កើន ឡើងត្រឹមចំនួនដូចគ្នានេះដែរ ។

- ប្រភពផ្សេងៗទៀត (ដោយរាប់បញ្ចូលទាំងទឹកភ្លៀង)ប្រែប្រួលជុំវិញ ៣០% ។ ទឹកភ្លៀងខ្លួនឯង ផ្តល់បង្ហាញនូវ ចំណុចកំពូលយ៉ាងឆាប់រហ័ស នៅក្នុងឆ្នាំ២០០៣-២០០៤ ដោយឡើងពី ១% ដល់ ១៣% ឬតិចជាងចំនួនកាលពី ៣ ឆ្នាំកន្លងទៅ ។ ការពន្យល់មួយដែលអាចធ្វើទៅបាន សំរាប់ការកើនឡើងនេះគឺ ការណ៍ដែលថា ភាគខ្លះនៃ SES ចុងក្រោយបំផុតត្រូវបានគេធ្វើឡើងនៅរដូវភ្លៀង នៅពេលដែលការប្រើប្រាស់ទឹកភ្លៀងមានចំនួនខ្ពស់ជាង) ។

- ទិន្នន័យកាលពីឆ្នាំ ១៩៩៧ ហាក់ដូចជាខុសពីធម្មតាបន្តិច ដែលទឹកម៉ាស៊ីនមានចំនួនច្រើនជាង ១៣% ប៉ុន្តែមានចំនួនតិចជាងឆ្ងាយណាស់ សំរាប់រយៈពេលប៉ុន្មានឆ្នាំមុន និងក្រោយក៏រិតកំពូលនោះ ដោយមានមធ្យមភាគ ២.៩% សំរាប់ រយៈពេលពីឆ្នាំ ១៩៩៨-២០០៤ បន្តិច ។ ចំណុចកំពូលនៃការប្រើប្រាស់ទឹកម៉ាស៊ីនក៏ពន្យល់ពី "ការធ្លាក់ចុះ" ដែលគេ មើលឃើញចំពោះទឹកអណ្តូងលូ និងប្រភពទឹកផ្សេងៗទៀត ។ ដូច្នេះ ចំនួនសរុបត្រូវបន្ថែមរហូតដល់ទៅ ១០០% បន្ទាប់ ដូច្នេះការកើនឡើងនៅក្នុងប្រភេទមួយត្រូវតែស៊ីគ្នានឹងការធ្លាក់ចុះមួយនៅក្នុងប្រភេទមួយ ឬប្រភេទជាច្រើន ទៀត ។

- លក្ខណៈនៃនិន្នាការភាគច្រើនគឺថា ទិន្នន័យរបស់ SES បង្ហាញជាបន្តបន្ទាប់នូវតួលេខនៃការគ្របណ្តប់ដែលមាន ចំនួនកាន់តែខ្ពស់ហើយបង្ហាញនូវការកើនឡើងមួយល្បឿនជាង CIPS ។ លក្ខណៈខុសគ្នាមួយដែលមានចំណុចប្រមាណ ជា ១០% រវាងការអង្កេតនានានៅក្នុងឆ្នាំ ១៩៩៦ បានកើនឡើងច្រើនជាងចំណុចខុសគ្នាចំនួន ២០% ត្រឹមឆ្នាំ ២០០៤ ។ តួរលេខ DHS សំរាប់ឆ្នាំ ២០០២ ធ្លាក់ចុះក្បែកមែនទែនទៅនឹងបន្ទាត់នៃនិន្នាការដំរឿន - CIPS បើប្រៀបទៅនឹងបន្ទាត់នៃនិន្នាការសំរាប់ SES ។ ទិន្នន័យរបស់ DHS ដែលត្រូវគ្នាទៅនឹងបន្ទាត់នៃនិន្នាការរបស់ CIPS ចង្អុលបង្ហាញថា និយមន័យនានាដែលខ្លួនប្រើប្រាស់មានលក្ខណៈប្រហាក់ប្រហែលគ្នាខ្លាំងជាមួយនឹងនិយមន័យនានាដែល ប្រើប្រាស់ដោយ CIPS ។

ការលំអិតនូវទិន្នន័យដែលមានទៅតាមខេត្តបានបង្ហាញដោយគ្មានការភ្ញាក់ផ្អើលចំពោះលទ្ធភាពទទួលបាននូវការផ្គត់ផ្គង់ទឹកនៅតាមទីក្រុង ឧទាហរណ៍ ភ្នំពេញ ព្រៃវែង ពោធិ៍សាត់ ស្វាយរៀង) លើសពីមធ្យមភាគថ្នាក់ជាតិឆ្ងាយណាស់ ចំណែកឯលទ្ធភាពទទួលបាននៅក្នុងខេត្តដែលកាន់តែដាច់ស្រយាលមណ្ឌលគីរី រតនៈគីរី ស្ទឹងត្រែង) មានចំនួន តិចជាងការគ្របដណ្តប់នៅថ្នាក់ជាតិឆ្ងាយណាស់ ។

ការដោះស្រាយនូវចំណុចបញ្ហានានាដែលលើកឡើងនៅក្នុងរបាយការណ៍នេះ នឹងតំរូវអោយមានការខិតខំប្រឹងប្រែងអោយបានច្បាស់លាស់មួយពីសំណាក់ទីភ្នាក់ងារតាមវិស័យនានា ស្ថាប័នរដ្ឋាភិបាល និងដៃគូអភិវឌ្ឍន៍ ។ ចំណុចបញ្ហាមួយចំនួនក្នុងចំណោមចំណុចបញ្ហានានាដែលបានលើកឡើង និងអនុសាសន៍ផ្សេងៗដែលគេផ្តល់អោយ អាចត្រូវបាន គេដោះស្រាយប្រកបដោយប្រសិទ្ធភាពខ្លះដែរ ។ ចំណុចបញ្ហាផ្សេងៗទៀត នឹងត្រូវការពិភាក្សាដេញដោលបន្ថែមទៀត មុនពេលកិច្ចព្រមព្រៀងរួមមួយអាចត្រូវសំរេចបាន ។ មិនមែនគ្រប់សំណួរទាំងអស់ដែលបានលើកឡើងមានចម្លើយច្បាស់លាស់នោះទេ ប៉ុន្តែពាក់ព័ន្ធនឹងការវិនិច្ឆ័យមួយដែលផ្អែកលើការយល់ដឹងពីស្ថានភាពតាមមូលដ្ឋាន ។ ទាំងនេះគឺជា ចំណុចបញ្ហាដ៏សំខាន់ដែលផ្នែកទឹកត្រូវប្រឈមមុខជាមួយ ហើយម្នាក់ៗដែលពាក់ព័ន្ធត្រូវតែធ្វើការរួមគ្នា ដើម្បីសំរេច អោយបាននូវកិច្ចព្រមព្រៀងរួមមួយចំពោះចំណុចបញ្ហាទាំងនោះ ដើម្បីអោយគេដោះស្រាយ ។

សង្ខេបអំពីអនុសាសន៍នានា

សូមកត់សំគាល់ថា អនុសាសន៍នានាត្រូវបានគេបង់លេខ ដោយយោងទៅតាមវគ្គដែលវាកើតឡើង ។

អនុសាសន៍ទី ១.១

រដ្ឋាភិបាល និងទីភ្នាក់ងារតាមវិស័យនានាត្រូវបង្កើតនូវនិយមន័យជាផ្លូវការមួយចំពោះលទ្ធភាពក្នុងការទទួល សេវាផ្គត់ផ្គង់ទឹកនៅតាមជនបទ ។ និយមន័យនេះត្រូវរាប់បញ្ចូលការចាត់ចំណាត់ថ្នាក់នៃប្រភពទឹកដែលមានការកែលំអ និងដែលមិនមានការកែលំអ ក៏ដូចជាការគិតគូរពិចារណានានាស្តីពីគុណភាពទឹក និងលទ្ធភាពប្រើប្រាស់ប្រភពទឹក ។ គេផ្តល់អនុសាសន៍ថា និយមន័យត្រូវគិតគូរពិចារណា (ប៉ុន្តែមិនចាំបាច់ត្រូវចំលងតាម) និយមន័យដែលគេទទួលស្គាល់ជា អន្តរជាតិដែលមានស្រាប់ទេ ។

អនុសាសន៍ទី ១.២

ការប្រើប្រាស់ពាក្យ "ប្រភពទឹកដែលមានសុវត្ថិភាព" និង "ប្រភពទឹកដែលពុំមានសុវត្ថិភាព" នៅក្នុងគោលដៅជាផ្លូវការ ហើយនិយមន័យនានាគួរត្រូវបានគេបោះបង់ចោលដើម្បីស្របទៅនឹង"ប្រភពទឹកដែលមានការកែលំអ" និង "ប្រភពទឹកដែលពុំមានការកែលំអ" ។

អនុសាសន៍ទី ១.៣

គេត្រូវគិតគូរពិចារណាជាបន្ទាន់ចំពោះការចាត់ចំណាត់ថ្នាក់ថាទឹក "ដែលទិញ" ជាទឹកដែលមានសុវត្ថិភាពនៅក្នុង ការជំរឿន និង **CIPS** ។ ការចាត់ទុកថាទឹកទិញ"ពុំមានការកែលំអ" ឆ្លុះបញ្ចាំងកាន់តែត្រឹមត្រូវច្រើនថែមទៀតអំពី តថភាពនៅក្នុងប្រទេសកម្ពុជា - នៅពេលទឹកដែលទិញភាគច្រើនសំដៅទៅលើទឹកធម្មជាតិដែលពុំមានការសំលាប់មេរោគ - ហើយក្នុងពេលជាមួយគ្នានោះដែរឆ្លុះបញ្ចាំងពីការអនុវត្តជាអន្តរជាតិ ។

អនុសាសន៍ទី ១.៤

ការចាត់ចំណាត់ថ្នាក់ "ទឹកភ្លៀង" នៅក្នុងប្រភេទដូចគ្នាថាជាទឹកលើដីនៅក្នុង **CSES** ត្រូវតែគិតគូរពិចារណាឡើងវិញជាបន្ទាន់ ។ ទិន្នន័យអន្តរជាតិ និងជាតិផ្តល់នូវការគួសបញ្ជាក់យ៉ាងទូលំទូលាយចំពោះការចាត់ចំណាត់ថ្នាក់ទឹកភ្លៀងថាជា ប្រភពដែលមានការកែលំអមួយ ។

អនុសាសន៍ទី ១.៥

ក្រៅពីការចាត់ចំណាត់ថ្នាក់ទឹកភ្លៀងថាជាប្រភពដែលមានការកែលំអ ឬមិនមានការកែលំអការធ្វើជំរឿន និង ការអង្កេតរបស់ **CIPS** ត្រូវចុះបញ្ជីទឹកភ្លៀងនៅក្នុងប្រភេទមួយដោយខ្លួនឯង ដោយដាក់អោយនៅដាច់ដោយឡែកពី ប្រភពទឹកលើដី ។ ការនេះនឹងអនុញ្ញាតអោយមានការបែងចែក ប្រកបដោយអត្ថន័យខ្ជឹមសារច្រើនថែមទៀតមួយចំពោះការប្រើប្រាស់ទឹក ហើយធ្វើអោយមានការអាចប្រៀបធៀបគ្នាបានកាន់តែច្រើនថែមទៀតជាមួយនឹងទិន្នន័យដែលប្រមូលបានតាមរយៈការអង្កេតពីសេដ្ឋកិច្ច និងសង្គម ។

អនុសាសន៍ទី ១.៦

គេត្រូវកំណត់អោយបានទូលំទូលាយនូវនិយមន័យនានាដែលគេឯកភាព និងចំណុចជាក់លាក់ចំពោះលទ្ធភាពទទួលបានការ ផ្គត់ផ្គង់ទឹកដែលមានការកែលំអមួយនៅគ្រប់ផ្នែកទាំងអស់ តាមរយៈការរៀបចំនូវសិក្ខាសាលានានា ក៏ដូចជាការចេញ ផ្សាយឯកសារជាលាយលក្ខណ៍អក្សរនានាជាភាសាអង់គ្លេស និងភាសាខ្មែរ ។ គេគួរយកចិត្តទុកដាក់ជាពិសេសថា ស្ថាប័ន នានាខាងក្រោមនេះត្រូវបានគេពន្យល់ត្រួសៗ ពុំមែនជាបញ្ជីលំអិតទេ) :

- គណៈកម្មាធិការសំរបសំរួលអន្តរក្រសួងទទួលបន្ទុកផ្នែកការផ្គត់ផ្គង់ទឹក និងអនាម័យ
  - នាយកដ្ឋានផ្គត់ផ្គង់ទឹកជនបទ ក្រសួងអភិវឌ្ឍន៍ជនបទ
  - នាយកដ្ឋានទឹកស្អាត ក្រសួងឧស្សាហកម្ម រ៉ែ និងថាមពល
  - វិទ្យាស្ថានជាតិស្ថិតិ ក្រសួងផែនការ
  - ក្រុមការងារបច្ចេកទេសផ្នែកហេដ្ឋារចនាសម្ព័ន្ធតាមរយៈ ក្រសួងសាធារណៈការ និងដឹកជញ្ជូន
  - ក្រសួងសុខាភិបាល
  - ក្រសួងបរិស្ថាន

អនុសាសន៍ទី ២.១

ក្រសួងអភិវឌ្ឍន៍ជនបទ រួមជាមួយទីភ្នាក់ងារតាមវិស័យផ្សេងៗទៀត ត្រូវតែកំណត់និយមន័យអោយបានច្បាស់លាស់ អំពីអ្វីខ្លះដែលបង្កើតបានជាអណ្តូងល្អ "ដែលមានការការពារ" ដោយគិតគូរពីចំណុចបញ្ហានានាដូចជា ការដាក់ទ្រនាប់មាត់ អណ្តូង គំរប ការដងទឹក ។ល។ ទៅតាមគោលការណ៍ណែនាំនានាដែលគេទទួលស្គាល់ជាអន្តរជាតិ ។ ការចាត់ចំណាត់ ថ្នាក់ចំពោះអណ្តូងល្អដែលមានការការពារថាជាប្រភពទឹកមួយដែលមានការកែលំអ ឬមិនមានការកែលំអគួរត្រូវបានគេគិតគូរពិចារណាដាច់ដោយឡែក ស្របតាមអនុសាសន៍ទី ១.១ ។

អនុសាសន៍ទី ២.២

វិទ្យាស្ថានជាតិស្ថិតិគួរត្រូវបានគេស្នើសុំអោយអនុម័តជាផ្លូវការនូវនិយមន័យ និងចំណុចជាក់លាក់នានាសំរាប់ "លទ្ធភាពទទួលបានប្រភពទឹកដែលមានការកែលំអមួយ" សំរាប់ប្រើប្រាស់នៅក្នុងការអង្កេតនាពេលអនាគត នៅពេល ដែលចំណុចទាំងនេះត្រូវបានឯកភាពពីសំណាក់ទីភ្នាក់ងារតាមវិស័យដែលមានការពាក់ព័ន្ធ (សូមមើលអនុសាសន៍ទី ១.១ ផងដែរ) ។

អនុសាសន៍ទី ២.៣

ឯកសារបណ្តុះបណ្តាលនានាដែលមានមូលដ្ឋានលើនិយមន័យ និងចំណុចជាក់លាក់នានាដែលគេបានឯកភាព ចាំបាច់ត្រូវរៀបចំឡើង ហើយបុគ្គលិកវិទ្យាស្ថានជាតិស្ថិតិចាំបាច់ត្រូវទទួលការបណ្តុះបណ្តាលនៅក្នុងការចាត់ចំណាត់ថ្នាក់ អោយបានត្រឹមត្រូវលើប្រភពទឹក "ដែលមានការកែលំអ" និង "ដែលមិនមានការកែលំអ" ស្របទៅតាមនិយមន័យទាំងនេះ ។

អនុសាសន៍ទី ៣.១

ការអង្កេតថ្នាក់ជាតិនាពេលអនាគតត្រូវចាត់ថ្នាក់ទិន្នន័យតំបន់ជនបទ និងទីក្រុង ដោយស្របទៅតាមការចាត់ ចំណាត់ថ្នាក់នៅជនបទ/ទីក្រុង ដែលបោះពុម្ពផ្សាយដោយក្រសួងផែនការ ។ គេត្រូវបញ្ជាក់អោយបានច្បាស់លាស់នូវការប្រើប្រាស់ការចាត់ចំណាត់ថ្នាក់នេះនៅក្នុងរបាយការណ៍នៃការអង្កេត ។

អនុសាសន៍ទី ៣.២

ដោយរួមសហការណ៍ជាមួយវិទ្យាស្ថានជាតិស្ថិតិ ទីភ្នាក់ងារតាមវិស័យនានាដែលទទួលខុសត្រូវត្រូវផ្តល់អនុសាសន៍ថា តើការអង្កេតថ្នាក់ជាតិណាមួយដែលត្រូវបានគេអនុវត្តជាឡើងទាត់ នឹងធ្វើជាប្រភពដ៏សំខាន់សំរាប់ធ្វើការរាយការណ៍ពី តួលេខអំពីតំបន់គ្របដណ្តប់នៃការផ្គត់ផ្គង់ទឹក ហើយនឹងត្រូវបានគេប្រើប្រាស់សំរាប់ការធ្វើអោយមានការរីកចំរើនឆ្ពោះ ទៅរកសូចនាករនានានៅក្នុងចំណុច ៧.១០ និង ៧.១១ របស់ CMDG ។

អនុសាសន៍ទី ៣.៣

ទីភ្នាក់ងារតាមវិស័យដែលទទួលបន្ទុកត្រូវឯកភាពថា តើទិន្នន័យនៃការអង្កេតដែលមានស្រាប់មួយណា នឹងត្រូវបានគេប្រើប្រាស់សំរាប់ធ្វើរបាយការណ៍អំពីតំបន់គ្របដណ្តប់នៃការផ្គត់ផ្គង់ទឹកបច្ចុប្បន្ន នៅក្នុងរយៈពេលបណ្តោះអាសន្ន មុនពេលចេញផ្សាយនូវការអង្កេតថ្នាក់ជាតិលើកក្រោយ (សូមមើលអនុសាសន៍ទី ៣.២ ផងដែរ) ។ មួយផ្នែកនៃកិច្ចព្រម ព្រៀងនេះត្រូវមានលក្ខណៈជាកិច្ចព្រមព្រៀងរួម ដែលតាមរយៈនោះ ប្រភពនៃការផ្គត់ផ្គង់ទឹកនានានៅក្នុងការអង្កេតនោះនឹងត្រូវបានគេចាត់ទុកថា "មានការកែលំអ" និង"មិនមានការកែលំអ" ។

Chapter I

Introduction

1.1. The Project

The Cambodia Rural Water Supply Coverage Analysis Project was implemented at the requestof the World Bank's Water and Sanitation Program (WSP) and the Ministry of Rural Development (MRD). It was carried out in the period of September through December 2005. The reason for the formulation of the project was the release of two national data sets, showing a marked discrepancy in rural water supply (RWS) coverage rates between them. Specifically, the Cambodia Inter-censal Population Survey (CIPS) showed that 39.6% of the rural population has access to safe water, while the Cambodia Socio-Economic Survey (CSES) showed that fully 60.1% of the rural population has access to safe water; a difference of more than 20 percentage points.

These access rates as reported by official national surveys are used to monitor changes in the water supply situation over time. Changes are taken to indicate the degree of success in increasing the share of the population with access to safe water. The large difference between the official figures causes an equally large degree of uncertainty about the actual rural water supply situation in Cambodia, and for this reason it was felt useful to investigate the causes of the discrepancy and to make recommendations for improvement. This project was a collaborative effort between the staff of WSP and the staff of the Department of Rural Health Care within the Ministry of Rural Development.

The main objectives of the project were twofold: first to document any major gaps, inconsistencies or other quality issues in the official RWS coverage figures obtained from the Ministry of Planning for the period of 1996 - 2005. Second, to report coverage trends at the provincial and national levels based on official data and research using Socio-Economic Survey data. Finally, the project allowed the summary and presentation of a large amount of water supply data in one location, this report.

1.2. Cambodia Drinking Water Access Targets

In 2000, all 189 member states of the United Nations General Assembly adopted the Millennium Development Goals (MDGs). These provided a set of measurable and time- bound goals and targets for combating poverty, hunger, environmental degradation, illiteracy, etc. One target is to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation (goal 7, target 10).

The MDG targets were "localized" in Cambodia, and are known as the Cambodian Millennium Development Goals (CMDGs). The CMDGs dealing with water supply say that by 2015 50%of the rural population and 80% of the urban population will have access to a safewater source. The Royal Government of Cambodia (RGC) is committed to the MDG process,and intends to measure national development performance with respect to the CMDGs. CMDG 7 contains a number of indicators regarding water supply and sanitation as seen in Table 1.1.

Indicator	Benchmarks		Targets (%)		
	Value (%)	Year	2005	2010	2015
7.10: Proportion of rural population with access to a safe water source	24	1998	30	40	50
7.11: Proportion of urban population with access to a safe water source	60	1998	68	74	80
7.12: Proportion of rural population with access to improved sanitation	8.6	1998	12	20	30
7.13: Proportion of urban population with access to improved sanitation	49	1998	59	67	74

Table 1.1– Cambodian Millennium Goal 7, indicators 10-13.

Measuring progress towards these targets hinges on the definitions of "access" and "safe". Unfortunately, there is no further explanation of these terms in either the CMDG documents or Cambodia's National Policy on Water Supply and Sanitation. The following section will explore some international definitions, as well as some approaches adopted in Cambodia.

1.3. Defining Access to Improved Water Supplies

The range of options available for improving access to water (and sanitation) is wide, especially in low-income settings where large proportions of the population have access to only the most basic facilities (Hutton and Haller, 2004). For developing countries, options that are low cost, are feasible and do not require heavy maintenance are generally favored. Internationally, the Global Water Supply Assessment 2000 report established definitions that have become generally accepted for the purposes of monitoring coverage. Table 1.2 categorizes which type of services are considered "improved" and which are considered to be "unimproved".

Improved water supply technologies	Unimproved water supply technologies
Household connection	Unprotected well
Public standpipe	Unprotected spring
Borehole	Vendor-provided water
Protected dug well	Bottled water (quantity)
Protected spring	Water from tanker-trucks
Rainwater collection	

Table 1.2: Improved vs. unimproved water supply technologies
Source: http://www.wssinfo.org/en/122_definitions.html

Note that services can be defined as "unimproved" not only if they are unsafe, but also if obtaining a sufficient quantity of water would be unnecessarily costly, such as bottled water or water provided by tanker truck.

Basic, low technology improvements to water services generally involve better access and protected water sources (standpipes, borehole, protected dug well or spring, or collected rain water). Improvement does not necessarily mean that the water is safe, but it is more accessible, and some measures are taken to

protect the source from contamination. In the global definition used for monitoring water supply coverage, it is assumed that an improved source would provide at least 20 liters of water per capita per day (lcd) at a distance no further than 1,000 meters. Household connections are considered a high technology improvement providing water that is safe for drinking.

In addition, household level water treatment and storage (sometimes referred to as "Point of Use" treatment or POU) such as water filters or the use of chlorine can make water safer. Please note that POU treatment is not included in the table of technologies, even though its use is becoming widespread in certain countries, including Cambodia.

While the definitions listed in table 1.2 are used globally, they have not been officially adopted in Cambodia.

Box 1: Safe water vs. improved supplies

The definitions used internationally for monitoring water supply coverage use the descriptions "improved supply" and "unimproved supply". It is recognized that an improved supply does not necessarily provide safe water (except treated, piped supplies). The condition of the technology is critical to the quality of the water, and improved technologies can still be contaminated due to the way they are used.

Water quality and the quantity used are difficult to measure, so type of technology and distance to the source are used as proxy indicators. The assumption is that the chances of obtaining safe water from an improved supply are higher than from an unimproved supply, and that a source that is close enough will lead to increased quantities of water being used.

By specifying "access to a safe water source" in its indicators, Cambodia raises the bar. Access to a safe source has a stricter meaning than access to an improved supply. In practice however, national surveys in Cambodia do not identify "safe" sources; they distinguish between improved and unimproved supplies.

The following criteria are important in coming to a definition:

- Quantity of water;
- Quality of water; and
- Distance to the source.

The Rural Water Supply and Sanitation Sector Policy Framework prepared by MRD in 2001 proposes 20 liters per person per day as minimum quantity of water that has to be provided by an improved source. Although this figure was not made official, it is generally accepted (Ockelford, 2006).

Distance to the source has never been identified as part of the "access" definition, and projects have tended to make their own decisions about what is acceptable. For example, the EU PRASAC project set the maximum walking distance to a water point at 150 meters, based on the observation that people continue

to use their traditional unimproved sources if distances to improved sources are too far (ibid). It is clear that the global definition of less than 1 km. used for MDG monitoring is not appropriate for Cambodia; people will not walk that far to fetch safe water.

Quality of water can be taken to mean "meeting the national water quality standards". However, water meeting the quality standards may not be acceptable to users because of taste problems (in many cases caused by iron or manganese in the water). This means that a family or community may have access to what is considered a safe source, but may not use it. This may cause issues with the national surveys, since they provide data on water sources used as reported by households, they don't describe access.

Box 2: Access vs. Use

Many villages in Cambodia have one or more handpumps installed on a tubewell. They have **access** *to an improved source. However, because there are often taste issues with ground water from the wells, many people continue to* **use** *surface water or rain water.*

A survey that asks households what water they **use***, and then reports the figures as water supply* **access** *may come to the wrong conclusion. Actual access to improved sources may be much larger than that reported by such a survey.*

There are indications that such differences occur in all national surveys in Cambodia. However, since all surveys report use (not access) this would not explain the differences between the surveys.

1.4. Measuring Access to Drinking Water in Cambodia

Rural Water Supply coverage in Cambodia is measured in the Census and the Cambodia Inter-censal Population Survey (each carried out at 10 year intervals), the Socio-Economic Survey (SES, carried out regularly), and the Demographic and Health Survey (DHS, carried out periodically). All national surveys are carried out and their results are officially reported by the National Institute of Statistics (NIS) of the Ministry of Planning (MOP).

None of these surveys have been declared the "primary source" for water supply and sanitation data, but the Socio-Economic Survey data have been used as the *de facto* standard because it is the most regularly updated data set available. None of these surveys use the definition for "access to an improved water source" given above. Technically speaking, the surveys identify "improved" vs. "unimproved" supplies; they do not identify sources that can be considered "safe" because they meet the national drinking water quality standards. The lack of definitions makes it difficult to say who has a safe or an unsafe supply and is the primary contributor to discrepancies between the surveys.

In order for the RGC (or sector agencies) to measure their progress towards the CMDGs they rely on these national surveys. The accuracy of the national surveys will thus influence the confidence with which CMDG updates and projections can be approached.

The data used in the project were those of two national level surveys conducted by the NIS. The Cambodia Socio-Economic Survey (CSES) was conducted in 1996, 1997, 1999, and over 2003 – 2004 collecting data in both the wet season and the dry season. The second set of data is the Cambodia Inter-censal Population Survey (CIPS) carried out in 2004 in order to update the national Census of 1998. In most of the analysis, the CSES data of 2003-2004 are presented side-by-side with the CIPS data of 2004. Other data are summarized in the appendices.

The CIPS and CSES surveys of 2004 were of similar size and scope; CIPS surveyed around 21,000 households in 700 villages around Cambodia. The CSES surveyed approximately 15,000 households. The surveys were conducted using a standard questionnaire in which there is a question for each household surveyed regarding their source of drinking water. The household then selects from nine available categories what source of water they use. The information is self-reported; there is no observation or independent verification by the interviewer. Also, as noted earlier, respondents report water sources used. This means that strictly speaking the surveys do not measure access (for example, a respondent may have access to a dug well close by, but she may prefer using river water because she does not like the taste of the well water. In this case, access to the well will not be reported).

Which water sources are considered to be safe and which are unsafe differs for each survey. Tables 1.3 and 1.4 show the water source categories distinguished by the CIPS and the CSES surveys, as well as their classification as safe or unsafe.

Census and CIPS water source classification	
Safe water sources	*Unsafe water sources*
Piped water	Unprotected dug well
Tubewell	Pond, river, stream or **rainwater**
Protected dug well	Other
Bought	

Table 1.3: Safe and unsafe water sources according to the CIPS and the census (differences with CSES highlighted)

Socio-Economic Survey water source classification	
Safe water sources	*Unsafe water sources*
Piped in dwelling	Unprotected dug well
Public tap	Pond, river or stream
Tubewell	**Bought**
Protected dug well	Other
Rainwater	

Table 1.4: Safe and unsafe water sources according to the CSES (differences with CIPS highlighted)

1.5.Some Initial Observations and Recommendations

There are a number of important differences between "safe water" definitions used by the CIPS and CSES surveys. In the first place, the CIPS has a total of seven categories, four of which are considered safe, and three of which are considered unsafe. The CSES recognizes nine types of water supply, of which five are safe, and the remaining four are considered unsafe.

Bought water, as well as rain water are in different categories in both surveys. The census and CIPS consider bought water safe, and classify rainwater as unsafe in the same category as surface water. The CSES reverses this; it recognizes rainwater as a separate category, considered safe, while bought water is considered unsafe. These disparities alone would lead us to expect differences between the findings of both surveys, even before we saw the actual figures.

The classification of bought water and rainwater is important. Bought water in the rural Cambodian context mostly refers to private vendors, selling water obtained from a river or pond, and sold without treatment. It is clearly microbially unsafe, and should never be considered a "safe" or "improved" source. It should not be confused with "bottled" water. Rainwater is safe as it comes to us from the sky. Whether it remains so largely depends on the conditions of catchment and storage. Is the roof clean? Is there a first flush system? Is the tank closed, and is water withdrawn by tap or pump? These are some of the questions that influence microbial quality of rain water. Classifying rainwater as an "improved source" rather than trying to make the distinction "safe/unsafe" would resolve any uncertainty.

Finally, the language used in the surveys ("safe source" vs. "improved source") raises the bar, and leads to questions about some of the classifications (such as the example for rainwater given above). Practically speaking, measuring whether water is "safe" (i.e. meets the standards) is impossible in national population surveys, and should not even be attempted at such a scale. In reality, "improved" and "unimproved" should be substituted for "safe" and "unsafe" respectively.

Box 3: Bought water

Bought water can be further classified as either "bottled water" or bulk water delivered to the home by tanker truck, water cart etc. Bottled water would under most circumstances be considered safe to drink. The fact that it is not considered an "improved source" is because it would be prohibitively expensive to obtain enough bottled water even to satisfy drinking and cooking needs only.

Bulk water deliveries are less easily categorized. Water provided by tanker truck may be safe in some countries, and unsafe in others. The same goes for water carts. Water delivered straight from a surface water source, for example by a vendor with a "pump and a pipe" would always be unsafe. Bulk water is generally classified as "unimproved" because it is considered to be unnecessarily costly.

The Cambodian national surveys do not make a distinction between bottled water and water delivered in bulk. Both CSES and CIPS list "bought" only. CIPS and census consider bought water to be safe, while CSES does not. Arguably, the CSES interpretation is the correct one; bought water should not be considered safe (or improved). This is because in Cambodia "bought" water mostly refers not to treated or bottled water, but to water supplied by vendors who pump directly from a river or pond.

Recommendation 1.1

Government and sector agencies should formulate an official definition of access to rural water supply services. This definition should encompass the classification of improved and unimproved sources, as well as considerations of water quantity and source accessibility. It is recommended that the definition take into account (but does not necessarily copy) existing internationally accepted definitions.

Recommendation 1.2

The use of the terms "safe water source" and "unsafe water source" in official targets and definitions should be abandoned in favor of "improved source " and "unimproved source".

Recommendation 1.3

The classification of "bought" water as safe in the census and CIPS should be urgently reconsidered. Considering bought water as "unimproved" more accurately reflects the reality in Cambodia — where bought water mostly refers to untreated surface water — and at the same time mirrors international practice.

Recommendation 1.4

The classification of "rainwater" in the same category as surface water in the CSES should be urgently reconsidered. International and national data provide ample justification for classification of rainwater as an improved source.

Recommendation 1.5

Independent of the classification of rainwater as an improved or unimproved source, Census and CIPS surveys should list rainwater in a category by itself, distinct from surface water sources. This will allow a more meaningful breakdown of water use, and make for better comparability with data collected through the Socio-Economic Surveys.

Recommendation 1.6

The agreed upon definitions and specifications for access to an improved water supply should be disseminated widely throughout the sector through the organisation of workshops as well as the release of written materials in English and Khmer. Particular care needs to be taken that the following institutions are fully briefed (not an exhaustive list):

- **Interministerial Coordinating Committee on Water Supply and Sanitation**
- **Department of Rural Water Supply, Ministry of Rural Development**
- **Department of Potable Water, Ministry of Industry, Mines and Energy**
- **National Institute of Statistics, Ministry of Planning**
- **Infrastructure Technical Working Group, c/o. Ministry of Public Works and Transport**
- **Ministry of Health**
- **Ministry of Environment**

Chapter II

Comparative Analysis of CIPS and SES Data

2.1. Data Gap

Comparing Socio-Economic Survey and Cambodia Inter-censal Population Survey water supply data at national level reveals some interesting issues. The most obvious is the fact that the 2004 CIPS survey concludes that 44.2% of people in Cambodia have access to a safe water source, while the 2003/2004 CSES survey lists 63.5% access to safe water nationally.

Since Cambodia's population is predominantly rural, it is no surprise that a similar difference is found between the figures for access to safe water by the rural population (39.6% and 60.1% for CIPS and CSES[1] respectively). Table 2.1 summarizes the findings of both surveys, at national level as well as for rural data only. It is clear from the table that the CSES recognizes more water supply categories than the CIPS. Please note that if we remove bought water from the "safe" category, national coverage according to the CIPS would drop to 37.5%, while rural coverage would drop to 33.3%. The difference between the surveys would increase to more than 26 percentage points.

Improved water supply technologies	*Total (%)*		+/- (points)	*Rural (%)*		+/- (points)
	CIPS	*CSES*		*CIPS*	*CSES*	
Piped Water	8.2	9.9	-1.7	3.3	1.7	1.6
Piped in Dwelling		9.7			1.5	
Public tap		0.2			0.2	
Tube/Piped well	26.3	26.3	1.4	27.3	26.7	0.6
Dug Well	29.6	27.4	2.2	31.8	30.7	1.1
Protected Dug well	3.0	16.4	-13.4	2.7	18.1	-15.4
Unprotected Dug well	26.6	11.0	15.6	29.1	12.6	16.5
Pond, river, stream or rainwater	28.5	30.9	-2.4	30.5	34.6	-4.1
Pond, river or stream		18.6			21	
Rainwater		12.3	-12.3		13.6	-13.6
Bought	6.7	6.3	0.4	6.3	5.5	0.8
Other	0.7	0.6	0.1	0.7	0.8	-0.1
Safe Drinking Water	44.2	63.5	-19.3	39.6	60.1	-20.5
Excluding "bought"	37.5	63.5	-26.0	33.3	60.1	-26.8

Table 2.1 – Summary of findings of both surveys, highlighting the differences between them.
Note: In this table the figures used for the CSES are the average of the wet and dry season data. In 2003 and 2004 for the first time the CSES collected data in both the wet and the dry season. The main difference between the seasons is an increase in rain water use in the wet season, and an increase in well water use in the dry season.

[1] If rural access to safe water were indeed 60.1%, this would mean that the CMDG target indicator (7.10) had been met and significantly exceeded…10 years ahead of schedule. This is most unlikely.

The differences are quite large, and are due to differences in specific categories. The highlighted entries represent water sources considered "safe" in the respective survey (as decided by the NIS). The major differences between the two surveys are found in the categories of protected and unprotected dug wells. The total proportion of dug wells is very close in each survey, a difference of only 1.1 percentage points. However the difference between the protected dug well categories in each survey was 15.4 percentage points for the rural areas.

The second big difference occurs in the "Pond, river, stream and rainwater" category. The CIPS classified all of these sources in one big group, and labeled it unsafe in its entirety. CSES took a different approach and split this category into two pieces: pond, river and stream; and rainwater. The CSES then considered this rainwater category as a safe source leading to a further 13.6 percentage points difference in safe water access. In the CIPS, bought water is considered safe, while in the CSES it is considered unsafe. The different classifications of rainwater and bought water introduces a difference between surveys of more than seven points. The rest of the difference is explained by the different protected dug well counts.

2.2. Analysis

The contradictory definitions of what is a protected dug well forms the central issue of the divergence in reported coverage, accounting for more than half the difference. Compared to the CSES, the CIPS survey has a stricter definition of what is considered a protected dug well, leading to much lower numbers in protected dug wells, and a higher unprotected dug well count.

The National Institute of Statistics does not use a formal definition for what constitutes a "protected dug well". The person in charge of training the people who will conduct a particular survey out in the field sets the definition of what a protected dug well is. This definition is then used in all training materials related to that survey. In practice, this has led to the use of the definitions as set out in table 2.2 below.

To be considered protected, a dug well must have:	*CIPS*	*CSES*
An adequate cover	Yes	No
A headwall	Yes	Yes
A platform	Yes	Yes
A pump or windlass	No	No
Proper drainage	No	No
A fence	No	No

Table 2.2: Practical classification of protected dug wells for CSES and CIPS

Figures 2.1 through 2.3 below show some pictures of dug wells with various features. According to Mr. Tith Vong, who did training for the CSES, the wells shown in figures 2.2 would be considered protected. Mrs. Hang Lina, who conducted training for the CIPS Team, would classify them as unprotected due to their lack of a cover. Figure 2.3 show wells that would be considered protected in both CIPS and CSES.

While the CIPS definition may be more conservative, leading to a lower number of protected dug wells, it still is not a fully effective definition. Neither the SES northe CIPS definition includes all the elements mentioned in Box 4.

Figure 2.1: A dug well without any protection
CIPS: Unprotected
CSES: Unprotected

Figure 2.2: Two dug wells with platform and headwall
CIPS: Unprotected
CSES: Protected

Figure 2.3: Two dug wells with cover
CIPS: Protected
CSES: Protected

Recommendation 2.1

The Ministry of Rural development, together with sector agencies should draw up a clear definition of what constitutes a "protected" dug well, considering issues such as lining, headwall, covers, water withdrawal etc. following internationally accepted guidelines.

The classification of protected dug wells as an improved or unimproved water source should be considered separately, in line with recommendation 1.1

Box 4: Protected Water Sources

When talking of a "protected" water source, what do we mean? Explaining that we mean protection from sanitary risk only brings us a little closer, because what is sanitary risk? "Sanitary risk" expresses the likelihood of the water in the source becoming contaminated. There are three factors that contribute to sanitary risk:

Hazard factors: *these are factors from which contamination may come and are a measure of sources of faeces in the environment. Examples include pit latrines, solid waste dumps and animal husbandry.*

Pathway factors: *these are factors that allow microbiological contamination to enter the water supply, but do not provide the faecal matter directly. Pathways are often critical to whether contamination occurs, as the presence of a hazard may not result in contamination if no pathway exists for the contaminants to reach the water supply. Examples of pathway factors include cracked or missing well aprons, loose pump attachment and damaged protection works.*

Indirect factors: *these are hazards close to the source or factors that enhance the development of pathway factors. Indirect factors do not directly allow water into the source nor are they a source of faeces. Examples include lack of fencing or faulty surface water drainage.*

Applying these concepts to the dug well technology, we could say that protection consists of having all of the following:

- *A headwall around the well with a properly fitting cover*
- *A concrete drainage platform around the well, with drainage channel*
- *A hand pump or bucket with windlass*
- *A fence around the well*

Risk can be further reduced by proper siting, away from latrines or other sources of pollution. Assessing risk factors and facility status would normally be done in dedicated sanitary surveys performed by communities or external agencies. A survey like CSES or CIPS can only hope to note the major features of a well, such as drainage, headwall, cover, water withdrawal method and fencing.

We should note that a protected dug well can count as an improved water source, but it is not necessarily safe, as explained in chapter 1.

Guy Howard, 2002: *Water Quality Surveillance: A Practical Guide.* **WEDC, UK**

The remainder of the difference between CIPS and SES is accounted for by the different classifications of bought water and rainwater. This difference occurs simply because CIPS counts bought water as safe, but does not count rainwater as a safe source of drinking water. CIPS groups rainwater with pond, river, and stream water and considers this category unsafe. SES considers bought water unsafe, together with pond, river and stream water but then includes a separate category for rainwater, which is considered safe. Following the same definitions in both surveys will eliminate this component of the difference. The consideration whether to classify rainwater as an improved source or an unimproved source should be left to the relevant sector agencies, although the authors are in favor of considering rainwater an improved source, in line with international practice. As stated in chapter one, bought water should not be considered safe. If rainwater were to be considered an improved source, the question would need to be answered whether there should be a further distinction along the same lines as for dug wells: one category for "protected rain water storage" (considered improved) and one for "unprotected rainwater storage" (considered unimproved). Many different approaches to rainwater catchment and storage are practiced in Cambodia, arguably not all of them "improved". Just as with dug wells, following this route would bring up the question of how to classify safe storage versus unsafe storage.

Recommendation 2.2

The National Institute of Statistics should be requested to officially adopt the definition and specifications for "access to an improved water source" for use in future surveys once these have been agreed upon by the relevant sector agencies (see also recommendation 1.1).

Recommendation 2.3

Training materials based on the agreed definitions and specifications need to be developed, and NIS staff need to be trained in properly classifying "improved" vs. "unimproved" water sources according to those definitions.

National Trends

3.1. National Data

The national data that have been compiled come from both the Socio Economic Survey and the Inter-censal Population Survey. The SES contains data from 1996, 1997, 1999, and 2003/ 2004. CIPS only has data from 2004, but we can compare these data to the data from the Census of 1998. The CIPS and Census used the same data collection instruments and the same training, making the data sets comparable. Table 3.1 shows all of the rural water supply data available from the different surveys and different years. The highlighted boxes represent categories that are considered safe water sources in that particular survey. The years 2001 and 2002 are shown to highlight that no surveys took place in those years.

Improved water supply technologies									
	CSES 96	*CSES 97*	*Census 98*	*CSES 99*	*DHS 00*	*2001*	*2002*	*CSES 03-04*	*CIPS 04*
Piped in dwelling/public tap	5.2	13.4	2.5	6.2	1			1.7	3.3
Piped Water	3.9	10.8		4.9	0.7			1.5	
Public tap	1.3	2.6		1.3	0.3			0.2	
Tube/Piped well	15.8	17.1	15.1	18.8	22.3			26.7	27.3
Dug Well	38.6	32.6	43.4	37.9	37.8			30.7	31.8
Protected Dug Well	5.8	4.7		22.1	3.6			18.1	2.7
Unprotected Dug well	32.8	27.9		15.8	34.2			12.6	29.1
Pond, river, stream or rainwater	33.9	25.7	30.4	29.3	31.7			34.6	30.5
Pond, river or stream	31.3	25.2		28.6	30.7			21	
Rainwater	2.6	0.5		0.7	1			13.6	
Bought	4.7	8.3	6.1	6	3.6			5.5	6.3
Other	1.7	2.8	2.5	1.9	3.5			0.8	0.7
Total Rural Safe Drinking Water Access	29.4	35.7	23.7	47.8	27.9			60.1	39.6

Table 3.1: Summary of surveys of rural access to safe water supplies 1996-2004
Note: As in table 2.1, the 2003-2004 CSES data represent the average of dry- and wet season data.

Figure 3.1 shows selected data from the table in graphical form.

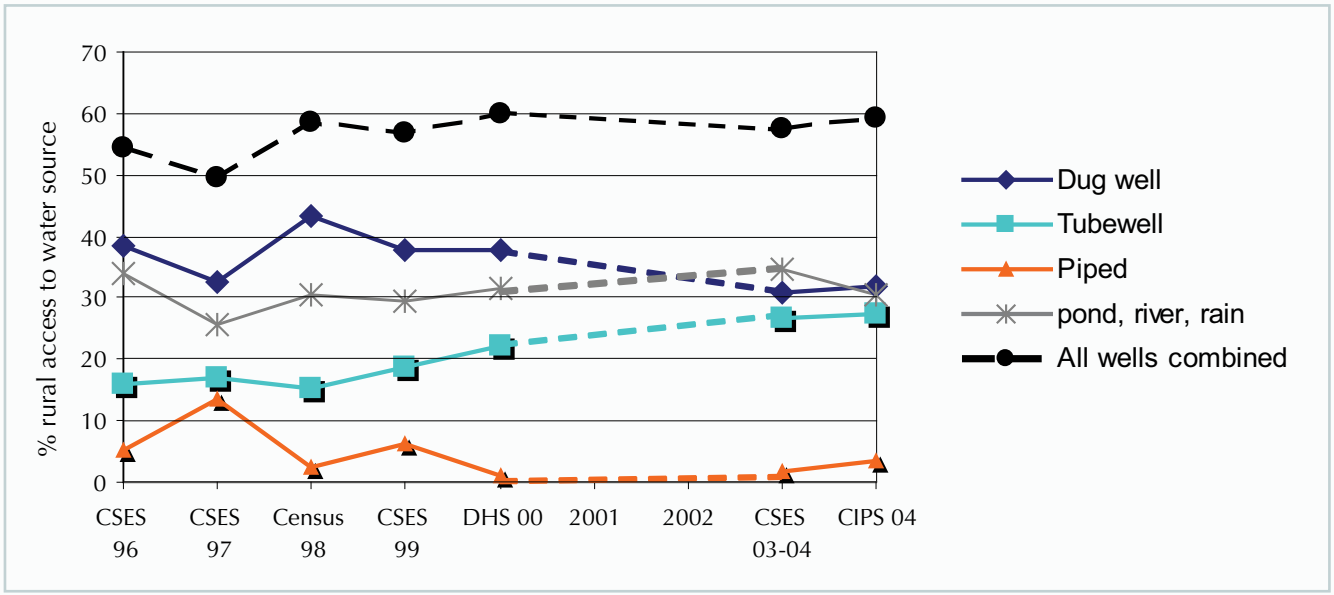

Figure 3.1: trends over time in rural water supply access

Looking at both table 3.1 and figure 3.1 leads us to the following observations:

- According to the SES, protected dug wells show a large increase between 1997 and 1999 (from 4.7% to 22.1%). The latest available SES data show protected dug well coverage remaining high, but DHS and CIPS show much lower numbers. As a matter of fact, DHS 2000 and CIPS 2004 data show much more consistency with the early SES data than with the later SES data. It appears possible that the definition of "protected dug well" used in the SES changed in 1999.

- The overall contribution of ground water (dug wells and tubewells) to the total has remained fairly constant since 1998, at around 60%. However, within the category we see the use of dug wells declined by about 10 points, while the use of tubewells increased by the same amount.

- Other sources (including rainwater) fluctuate around 30%. Rainwater by itself shows a sudden peak in 2003-2004, growing to 13% from 1% or less three years earlier. A possible explanation for this growth is the fact that part of the latest SES was carried out during the wet season. Rural rainwater use in the wet season is almost 26% while in the dry season it is 1.4%. The high wet season number influences the average significantly.

- Data from 1997 seem anomalous in that piped water accounts for more than 13%, but for much less in the years before or after that peak, averaging some 2.9% over the period 1998-2004. The peak in piped water use also explains the "dip" seen in dug wells and other sources; the total has to add up to 100% after all, so growth in one category must be matched by a decrease in one or more others.

Figure 3.2 shows the national trends based on the totals given in table 3.1.

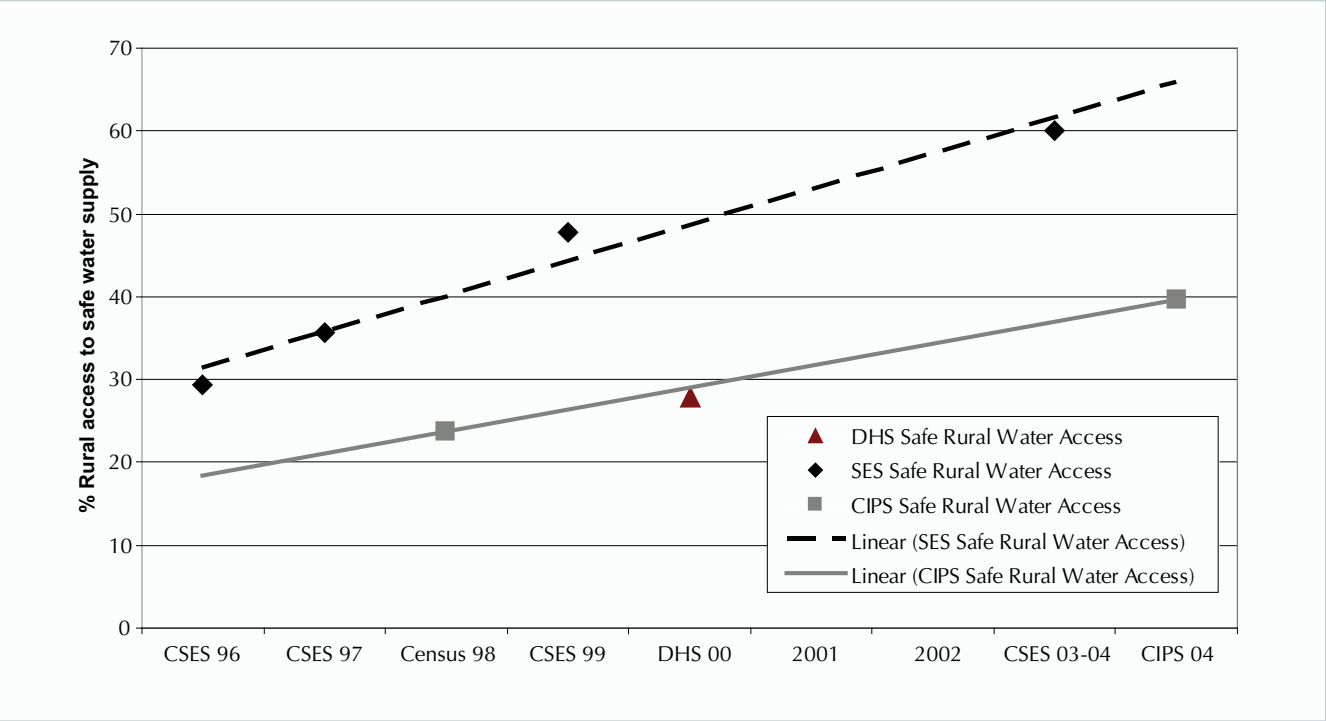

Figure 3.2: Trends in access to safe water supplies in rural areas according to different surveys

The trends that we have are not all that dissimilar, showing a definite improvement in rural water supply access over time. Please note that the inclusion of "bought water" as safe in the Census and CIPS inflates the coverage figures by about 6%. The absence of rainwater as a safe source on the other hand, decreases coverage somewhat in the early years and a lot in 2004.

The major feature of this graph is that the SES data continually indicate higher coverage figures, and show a faster growth than CIPS. Also note that an approximate 10 percentage point difference between surveys in 1996 has grown to a greater than 20 percentage point difference by 2004. The DHS figure of 2000 falls very close to the CIPS trend line as indicated by the triangle in figure 3.2 compared to the trend line for the SES. The differences between the SES and CIPS trends can be explained based on the different definitions used. The DHS data coinciding with the CIPS trend line indicates that the definitions used by it more closely resemble the definitions used by CIPS although details on the DHS were not available.

In a report by the Ministry of Planning released in October of 2005, *Achieving the Cambodia Millennium Development Goals 2005 Update,* an updated figure was released for the rural access to safe water. While the update did not make clear what data sources were used to arrive at the estimate, the figure closely resembles that of the CIPS data. The figure used by MOP is 41.6%, a small increase from the CIPS 2004 figure of 39.6% including bought water as a safe source (If CIPS had not counted "bought" water as safe –which is arguably the correct interpretation- the updated CMDG target would represent an increase of 8.3 percentage points over the 2004 CIPS data).

Box 5: Rural vs. Urban

In addition to the issue of needing to define "access to safe water" as mentioned before, stratifying data by "rural coverage" and "urban coverage" means that we need a clear definition of what is "urban" and what is "rural".

The Ministry of Planning carried out a reclassification of rural and urban areas in 2004. The Ministry of Industry, Mines and Energy (MIME) used this reclassification as the basis for assessing progress in expanding the water supply service coverage in urban areas in 2005.

While in the rural sector, the term "safe water" tends to be defined as having access to a particular type of source -rather than the quality of the water and the reliability of the supply- The MIME assessment defined safe water in the urban context as water meeting the National Drinking Water Quality Standards. Since no water quality data are available, MIME considered all water supplied through an operating water meter from a piped distribution system and a water treatment and disinfection facility to be safe water.

According to this definition of safe water for urban areas, in 2005, only about 37% of urban population had access to safe water. This result shows a large difference from the sector's key indicators for the CMDG, which determined that 68% of urban population should have access to safe water by 2005.

While the urban classification of "safe" water access has issues similar to that of the rural sector, the Ministry of Industry, Mines, and Energy is making some clear choices in order to improve the data being used towards the CMDGs.

Ministry of Industry, Mines, and Energy. *Urban Water Supply Sector Performance Review 2005*

3.2. Implications

Based on the analysis of all the data from the Socio-Economic Surveys, the 1998 Census, and the Cambodia Inter-censal Population Survey we can make some decisions as to which data sets give us a good picture of the water supply situation in Cambodia. Many ministries and sector agencies need to be able to look at water supply data and make decisions regarding funding, priority areas or project design and implementation. It is important to be clear on the data sources available, and their reliability and limitations.The current situation is one of incomparable datasets, and a resulting uncertainty over current status and progress.

As we compare the definitions used in each survey we observe the following:

CIPS uses a stricter, and arguably more "correct" definition of protected dug wells. Even so, the definition in use can probably be enhanced further. The better definition arguably provides a figure that is much more representative of which dug wells should be considered improved.

On the other hand, there are elements of the CIPS survey that make it less desirable to use than the SES. The inclusion of bought water as safe, and the exclusion of rainwater as safe are two important examples. Also, the CIPS survey breaks down water sources into fewer categories than the SES. The SES is a more detailed survey, containing nine individual categories (as opposed to the seven in CIPS) but these categories are not as strictly defined as those in CIPS.

The Socio-Economic Surveys provide a lot of historical data, but also show a number of unexplained swings in certain categories, including piped supplies, protected dug wells and rainwater. Without strong explanations for differences observed from year to year, it is difficult to weigh the reliability of the data.

Unfortunately the Demographic and Health Survey does not have any historic data to compare to the 2000 survey. This will change in 2006, as the DHS 2005 is currently in the field collecting data. That data should be processed and available by the end of 2006 according to the National Institute of Statistics.

When looking at the pros and cons of each data set it is apparent that each survey has its uses. The SES provides a good deal of historic data and a detailed breakdown of water supplies. For their work with the CMDGs the Ministry of Planning has used CIPS which seems to provide a more conservative view of water supply coverage in Cambodia. The authors would support the use of CIPS data for this purpose, while at the same time urging responsible ministries and sector agencies to implement the recommendations laid out in this report.

Recommendation 3.1

Future national surveys should stratify Rural and Urban data according to the latest Rural/Urban classification published by the Ministry of Planning. The use of this classification should be stated explicitly in the survey report.

Recommendation 3.2

Responsible sector agencies, in cooperation with the National Institute of Statistics, should recommend which regularly implemented national survey will serve as the primary source for reporting water supply coverage figures, and will be used for tracking progress towards indicators 7.10 and 7.11 of the CMDGs.

Recommendation 3.3

Responsible sector agencies should agree on which existing survey data will be used for reporting current water supply coverage in the interim period before the release of the next national survey (see also recommendation 3.2). Part of this agreement should be a consensus of which water supply sources in that survey will be considered as "improved" and "unimproved".

3.3. Provincial Breakdown

In order to use the data more effectively they have been broken down by province. Some provinces show progress in the rural water supply sector well above that of the national average, while other provinces lag behind the curve.

Table 3.3 summarizes data by province from the four Socio-Economic Surveys carried out between 1996 and 2004. The categories that compose the "safe" supplies in this table are: protected dug well, piped in dwelling, public tap, rainwater, and tube/piped well. By simply comparing the coverage percentage of each province to the national average of 63.5% it is immediately clear which provinces are doing well and which are not.

	Access to Safe Water Source (SES)			
	1996	*1997*	*1999*	*2004*
Banteay Mean Chey	17.61%	14.47%	57.69%	69.61%
Bat Dambang	13.16%	22.93%	24.72%	68.34%
Kampong Cham	26.38%	26.15%	56.04%	69.80%
Kampong Chhnang	34.29%	27.88%	78.24%	56.36%
Kampong Speu	34.62%	39.51%	20.00%	68.27%
Kampong Thom	9.77%	13.38%	44.40%	60.68%
Kampot	7.06%	14.17%	19.00%	60.55%
Kandal	22.22%	29.76%	34.10%	66.35%
Kaoh Kong	18.75%	13.33%	27.00%	60.00%
Kratie	38.18%	20.00%	51.90%	55.99%
Mondul Kiri	35.00%	N.A.	0.00%	33.33%
Phnom Penh	61.83%	65.11%	63.67%	90.24%
Preah Vihear	N.A.	N.A.	26.25%	57.86%
Prey Veaeng	53.75%	56.42%	83.75%	91.94%
Pursat	33.38%	18.18%	39.33%	80.63%
Rattanak Kiri	5.00%	20.00%	10.00%	33.64%
Siem Reap	13.38%	30.16%	57.24%	54.02%
Krong Preah Sihanouk	21.54%	19.29%	50.00%	79.23%
Stueng Traeng	17.69%	18.00%	26.67%	33.00%

Svay Rieng	31.10%	46.12%	85.88%	92.97%
Takeov	26.40%	18.72%	45.36%	74.37%
Oudor Mean Chey	N.A.	N.A.	8.00%	75.00%
Krong Kaeb	0.00%	20.00%	13.33%	20.00%
Krong Pailin	N.A.	N.A.	30.00%	77.50%

Table 3.3: Provincial breakdown of water supply coverage (N.A. = Not Available)

As could be expected, typically more urbanized areas (like Phnom Penh) have higher rates of access. Phnom Penh, Prey Veaeng, Pursat, Krong Preah Sihanouk, and Svay Rieng are the provinces that are 15 percentage points or more above the national average. Mondul Kiri, Rattanak Kiri, Stueng Traeng, and Krong Kaeb are the provinces that are 15 percentage points or more below the national average.

While there are some obvious issues with the different data sets from each province, in general the provincial data can be an excellent guide to which provinces are doing well, and which provinces still need a lot of work. Even if there are questions about the absolute accuracy of the different surveys, the data from one survey can still be used to judge relative performance among provinces. This also illustrates the importance of having accurate surveys. Basing surveys on nationally accepted, documented definitions leads to better data, which in turn allow better analysis of each province. Better analysis can help government decide what sort of projects should be located in which provinces. The more information gathered from each province the more useful these surveys will be and the better the quality of services that can be delivered to those provinces that need it. More detailed information and data for each province are located in Appendix B.

Chapter IV

Some Final Remarks

Two sets of national data, both supposed to be describing the proportion of access to safe rural water supplies, and two completely different numbers. In short, that describes the current situation in Cambodia's water supply sector. Before a survey goes into the field to collect data, officials of the Ministry of Planning train the surveyors for that survey. Because there is no agreed upon national definition for access to an improved water supply, training is done differently for each survey. To resolve the discrepancies between data sets, the definitions used for all national surveys regarding water supply (and sanitation) must be universal. Once a set of definitions is decided upon, these can be widely disseminated and training can be standardized for every national survey.

Making all of this happen will require a concerted effort by many organizations and institutions with an interest in the sector. The Ministry of Rural Development is clearly the agency mandated to take the lead in addressing the issues raised in this report, but strong cooperation from the National Institute of Statistics, the Ministry of Industry, Mines and Energy, UNICEF, WHO and others will also be required.

Applying a national definition of "access to an improved water supply" to future surveys will very likely lead to a correction of the water supply coverage figures quoted in the past. For example, it is likely that the next Socio-Economic Survey will report national access to an improved water supply source lower than the 63.5% reported by the last one. Such a correction would need to be explained in the survey report in order to increase the chances of it being accepted.

Some of the issues raised and recommendations given in this report can be dealt with fairly efficiently. Others will need further debate before a consensus can be reached. Not all of the questions raised have a clear answer, but involve a judgement based on an understanding of the local situation. Where does rainwater belong? Does improper storage lead to it becoming an unsafe source? Is the term "safe" an appropriate label for a water source? Should organizations that construct (or fund) water supplies be required to meet the standards specified for "improved supplies"? These questions and others are important issues the water sector is faced with and everyone involved, be it the ministries or sector agencies, must work together to come to a consensus for them to be resolved.

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Appendix A - National Data

	CSES 96	*CSES 97*	*Census 98*	*CSES 99*	*DHS 00*	*2001*	*2002*	*CSES 03-04*	*CIPS 04*
Piped in dwelling/public tap	5.2	13.4	2.5	6.2	1			3.3	3.3
Piped Water	3.9	10.8		4.9	0.7			1.5	
Public tap	1.3	2.6		1.3	0.3			0.2	
Tube/Piped well	15.8	17.1	15.1	18.8	22.3			26.7	27.3
Dug Well	38.6	32.6	43.4	37.9	37.8			30.7	31.8
Protected Dug well	5.8	4.7		22.1	3.6			18.1	2.7
Unprotected Dug well	32.8	27.9		15.8	34.2			12.6	29.1
Pond, river, stream or rainwater	33.9	25.7	30.4	29.3	31.7			34.6	30.5
Pond, river or stream	31.3	25.2		28.6	30.7			21	
Rainwater	2.6	0.5		0.7	1			13.6	
Bought	4.7	8.3	6.1	6	3.6			5.5	6.3
Other	1.7	2.8	2.5	1.9	3.5			0.8	0.7

Appendix B - Provincial Data

No	Provinces		Socio Economic Survey - Main source of drinking water in wet season									
			Piped in dweling	Public tap	Tube/ pipedwell or borehole	Protected dug well	dug well	Pond, river or stream	Rainwa-ter	Tanker truck, vendor	Other	Total
1	Bantey Meanchey 2004	Count	31	1	29	20	18	170	455	41	5	770
		% within Province	4.0%	0.1%	3.8%	2.6%	2.3%	22.1%	59.1%	5.3%	0.6%	100.0%
	Bantey Meanchey 1996	Count	4	0	76	27	161	316	11	1	74	670
		% within Province	0.6%	0.0%	11.3%	4.0%	24.0%	47.2%	1.6%	0.1%	11.0%	100.0%
	Bantey Meanchey 1997	Count	2	0	26	1	60	99	5	11	31	235
		% within Province	0.9%	0.0%	11.1%	0.4%	25.5%	42.1%	2.1%	4.7%	13.2%	100.0%
	Bantey Meanchey 1999	Count	3	1	95	50	6	100	1	4	0	260
		% within Province	1.2%	0.4%	36.5%	19.2%	2.3%	38.5%	0.4%	1.5%	0.0%	100.0%
2	Bat Dambang 2004	Count	70	0	112	42	5	242	461	72	3	1,017
		% within Province	6.9%	0.0%	12.0%	4.1%	0.5%	23.8%	45.3%	7.1%	0.3%	100.0%
	Bat Dambang 1996	Count	16	2	64	35	135	650	8	30	10	950
		% within Province	1.7%	0.2%	6.7%	3.7%	14.2%	68.4%	0.8%	3.2%	1.1%	100.0%
	Bat Dambang 1997	Count	25	3	30	11	27	220	17	41	1	375
		% within Province	6.7%	0.8%	8.0%	2.9%	7.2%	58.7%	4.5%	10.9%	0.3%	100.0%
	Bat Dambang 1999	Count	22	1	22	24	55	144	20	49	23	360
		% within Province	6.1%	0.3%	6.1%	6.7%	15.3%	40.0%	5.6%	13.6%	6.4%	100.0%
3	Kampong Cham 2004	Count	97	14	378	704	369	125	231	105	17	2,040
		% within Province	4.8%	0.7%	18.5%	34.5%	18.1%	6.1%	11.3%	5.1%	0.8%	100.0%
	Kampong Cham 1996	Count	13	1	69	39	230	99	2	17	0	470
		% within Province	2.8%	0.2%	14.7%	8.3%	48.9%	21.1%	0.4%	3.6%	0.0%	100.0%
	Kampong Cham 1997	Count	22	27	86	51	411	76	1	26	15	715
		% within Province	3.1%	3.8%	12.0%	7.1%	57.5%	10.6%	0.1%	3.6%	2.1%	100.0%
	Kampong Cham 1999	Count	15	19	44	189	100	59	2	43	9	480
		% within Province	3.1%	4.0%	9.2%	39.4%	20.8%	12.3%	0.4%	9.0%	1.9%	100.0%
4	Kampong Chhnang 2004	Count	3	2	111	154	33	202	40	5	0	550
		% within Province	0.5%	0.4%	20.2%	28.0%	6.0%	36.7%	7.3%	0.9%	0.0%	100.0%
	Kampong Chhnang 1996	Count	2	0	43	3	82	10	0	0	0	140
		% within Province	1.4%	0.0%	30.7%	2.1%	58.6%	7.1%	0.0%	0.0%	0.0%	100.0%
	Kampong Chhnang 1997	Count	0	0	35	11	56	43	0	0	20	165
		% within Province	0.0%	0.0%	21.2%	6.7%	33.9%	26.1%	0.0%	0.0%	12.1%	100.0%
	Kampong Chhnang 1999	Count	7	0	65	60	11	23	1	2	1	170
		% within Province	4.1%	0.0%	38.2%	35.3%	6.5%	13.5%	0.6%	1.2%	0.6%	100.0%

No	Provinces		Socio Economic Survey - Main source of drinking water in wet season									
			Piped in dweling	Public tap	Tube/ pipedwell or borehole	Protected dug well	dug well	Pond, river or stream	Rainwater	Tanker truck, vendor	Other	Total
	Kampong Chhnang 1996	Count	2	0	43	3	82	10	0	0	0	140
		% within Province	1.4%	0.0%	30.7%	2.1%	58.6%	7.1%	0.0%	0.0%	0.0%	100.0%
	Kampong Chhnang 1997	Count	0	0	35	11	56	43	0	0	20	165
		% within Province	0.0%	0.0%	21.2%	6.7%	33.9%	26.1%	0.0%	0.0%	12.1%	100.0%
	Bantey Meanchey 1997	Count	7	0	65	60	11	23	1	2	1	170
		% within Province	4.1%	0.0%	38.2%	35.3%	6.5%	13.5%	0.6%	1.2%	0.6%	100.0%
5	Kampong Speu 2004	Count	27	0	120	119	80	144	259	10	10	769
		% within Province	3.5%	0.0%	15.6%	15.5%	10.4%	18.7%	33.7%	1.3%	1.3%	100.0%
	Kampong Speu 1996	Count	0	0	37	8	1	79	0	5	0	130
		% within Province	0.0%	0.0%	28.5%	6.2%	0.8%	60.8%	0.0%	3.8%	0.0%	100.0%
	Kampong Speu1997	Count	0	0	66	15	19	102	0	0	3	205
		% within Province	0.0%	0.0%	32.2%	7.3%	9.3%	49.8%	0.0%	0.0%	1.5%	100.0%
	Kampong Speu1999	Count	3	4	27	20	27	220	17	41	1	375
		% within Province	1.1%	1.5%	10.0%	2.9%	7.2%	58.7%	4.5%	10.9%	0.3%	100.0%
6	Kampong Thum 2004	Count	1	0	71	352	187	100	25	3	1	740
		% within Province	0.1%	0.0%	9.6%	47.6%	25.3%	13.5%	3.4%	0.4%	0.1%	100.0%
	Kampong Thum 1996	Count	1	0	49	35	681	92	0	0	12	870
		% within Province	0.1%	0.0%	5.6%	4.0%	78.3%	10.6%	0.0%	0.0%	1.4%	100.0%
	Kampong Thum 1997	Count	12	0	10	14	178	38	0	0	17	269
		% within Province	4.5%	0.0%	3.7%	5.2%	66.2%	14.1%	0.0%	0.0%	6.3%	100.0%
	Kampong Thum 1999	Count	9	0	13	89	96	43	0	0	0	250
		% within Province	3.6%	0.0%	5.2%	35.6%	38.4%	17.2%	0.0%	0.0%	0.0%	100.0%
7	Kampot 2004	Count	33	1	25	23	94	178	340	3	0	697
		% within Province	4.7%	0.1%	3.6%	3.3%	13.5%	25.5%	48.8%	0.4%	0.0%	100.0%
	Kampot 1996	Count	3	1	5	1	34	111	2	13	0	170
		% within Province	1.8%	0.6%	2.9%	0.6%	20.0%	65.3%	1.2%	7.6%	0.0%	100.0%
	Kampot 1997	Count	4	16	3	11	117	72	0	4	13	240
		% within Province	1.7%	6.7%	1.3%	4.6%	48.8%	30.0%	0.0%	1.7%	5.4%	100.0%
	Kampot 1999	Count	20	5	20	30	117	182	1	23	2	400
		% within Province	5.0%	1.3%	5.0%	7.5%	29.3%	45.5%	0.3%	5.8%	0.5%	100.0%

No	Provinces		Socio Economic Survey - Main source of drinking water in wet season									
			Piped in dweling	Public tap	Tube/ pipedwell or borehole	Protected dug well	dug well	Pond, river or stream	Rainwater	Tanker truck, vendor	Other	Total
8	Kandal 2004	Count % within Province	88 6.5%	6 0.4%	217 16.1%	68 5.0%	10 0.7%	318 23.6%	516 38.3%	124 9.2%	2 0.1%	1,349 100.0%
	Kandal 1996	Count % within Province	5 1.4%	3 0.8%	63 17.5%	8 2.2%	13 3.6%	248 68.9%	1 0.3%	18 5.0%	1 0.3%	360 100.0%
	Kandal 1997	Count % within Province	17 3.4%	0 0.0%	119 23.6%	13 2.6%	56 11.1%	212 42.1%	1 0.2%	81 16.1%	5 1.0%	504 100.0%
	Kandal 1999	Count % within Province	20 5.1%	4 1.0%	65 16.7%	37 9.5%	2 0.5%	196 50.3%	7 1.8%	58 14.9%	1 0.3%	390 100.0%
9	Kaoh Kong 2004	Count % within Province	18 10.6%	0 0.0%	7 4.1%	22 12.9%	40 23.5%	1 0.6%	55 32.4%	25 14.7%	2 1.2%	170 100.0%
	Kaoh Kong 1996	Count % within Province	0 0.0%	0 0.0%	14 8.8%	15 9.4%	90 56.3%	4 2.5%	1 0.6%	36 22.5%	0 0.0%	160 100.0%
	Kaoh Kong 1997	Count % within Province	0 0.0%	1 1.7%	0 0.0%	4 6.7%	39 65.0%	1 1.7%	3 5.0%	11 18.3%	1 1.7%	60 100.0%
	Kaoh Kong 1999	Count % within Province	2 2.0%	2 2.0%	3 3.0%	20 20.0%	14 14.0%	11 11.0%	0 0.0%	39 39.0%	9 9.0%	100 100.0%
10	Kratie 2004	Count % within Province	32 8.9%	0 0.0%	77 21.4%	49 13.6%	29 8.1%	66 18.4%	43 12.0%	62 17.3%	1 0.3%	359 100.0%
	Kratie 1996	Count % within Province	0 0.0%	0 0.0%	41 37.3%	0 0.0%	12 10.9%	39 35.5%	1 0.9%	17 15.5%	0 0.0%	110 100.0%
	Kratie 1997	Count % within Province	1 0.7%	0 0.0%	21 14.5%	7 4.8%	40 27.6%	55 37.9%	0 0.0%	21 14.5%	0 0.0%	145 100.0%
	Kratie 1999	Count % within Province	8 3.8%	6 2.9%	61 29.0%	33 15.7%	34 16.2%	51 24.3%	1 0.5%	16 7.6%	0 0.0%	210 100.0%
11	Mondul Kiri 2004	Count % within Province	0 0.0%	0 0.0%	9 30.0%	1 3.3%	0 0.0%	20 66.7%	0 0.0%	0 0.0%	0 0.0%	30 100.0%

No	Provinces		Socio Economic Survey - Main source of drinking water in wet season									
			Piped in dweling	Public tap	Tube/ pipedwell or borehole	Protected dug well	dug well	Pond, river or stream	Rainwater	Tanker truck, vendor	Other	Total
	Mondol Kiri 1996	Count % within Province	0 0.0%	0 0.0%	0 0.0%	21 35.0%	19 31.7%	20 33.3%	0 0.0%	0 0.0%	0 0.0%	60 100.0%
	Mondol Kiri 1997	Count % within Province	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
	Mondol Kiri 1999	Count % within Province	0 0.0%	0 0.0%	0 0.0%	0 0.0%	13 43.3%	17 56.7%	0 0.0%	0 0.0%	0 0.0%	30 100.0%
12	Phnom Penh 2004	Count % within Province	1,156 82.9%	0 0.0%	56 4.0%	13 0.9%	7 0.5%	15 1.1%	33 2.4%	112 8.0%	2 0.1%	1,394 100.0%
	Phnom Penh 1996	Count % within Province	477 39.8%	111 9.3%	127 10.6%	24 2.0%	41 3.4%	210 17.5%	3 0.3%	207 17.3%	0 0.0%	1,200 100.0%
	Phnom Penh 1997	Count % within Province	584 48.7%	97 8.1%	85 7.1%	13 1.1%	24 2.0%	101 8.4%	1 0.1%	268 22.4%	25 2.1%	1,198 100.0%
	Phnom Penh 1999	Count % within Province	558 46.5%	34 2.8%	94 7.8%	78 6.5%	4 0.3%	65 5.4%	0 0.0%	361 30.1%	6 0.5%	1,200 100.0%
13	Preah Vihear 2004	Count % within Province	0 0.0%	0 0.0%	29 20.7%	4 2.9%	43 30.7%	15 10.7%	48 34.3%	1 0.7%	0 0.0%	140 100.0%
	Preah Vihear 1996	Count % within Province	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
	Preah Vihear 1997	Count % within Province	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
	Preah Vihear 1999	Count % within Province	0 0.0%	0 0.0%	10 12.5%	11 13.8%	32 40.0%	26 32.5%	0 0.0%	0 0.0%	1 1.3%	80 100.0%
14	Prey Veng 2004	Count % within Province	0 0.0%	2 0.2%	1,095 85.7%	66 5.2%	5 0.4%	77 6.0%	12 0.9%	21 1.6%	0 0.0%	1,278 100.0%
	Prey Veng 1996	Count % within Province	5 1.3%	7 1.8%	143 35.8%	60 15.0%	98 24.5%	67 16.8%	0 0.0%	0 0.0%	20 5.0%	400 100.0%
	Prey Veng 1997	Count % within Province	0 0.0%	4 0.7%	284 51.4%	24 4.3%	108 19.5%	119 21.5%	0 0.0%	1 0.2%	13 2.4%	553 100.0%
	Prey Veng 1999	Count % within Province	5 1.3%	7 1.8%	232 58.0%	91 22.8%	13 3.3%	52 13.0%	0 0.0%	0 0.0%	0 0.0%	400 100.0%

No	Provinces		Socio Economic Survey - Main source of drinking water in wet season									
			Piped in dweling	Public tap	Tube/ pipedwell or borehole	Protected dug well	dug well	Pond, river or stream	Rainwa-ter	Tanker truck, ven-dor	Other	Total
15	Pursat 2004	Count % within Province	28 4.0%	0 0.0%	30 6.3%	99 20.6%	45 9.4%	39 8.1%	230 47.9%	9 1.9%	0 0.0%	480 100.0%
	Pursat 1996	Count % within Province	7 1.1%	14 2.2%	71 10.9%	122 18.8%	192 29.5%	227 34.9%	3 0.5%	4 0.6%	10 1.5%	650 100.0%
	Pursat 1997	Count % within Province	4 2.4%	10 6.1%	4 2.4%	10 6.1%	49 29.7%	44 26.7%	2 1.2%	22 13.3%	20 12.1%	165 100.0%
	Pursat 1999	Count % within Province	3 2.0%	0 0.0%	1 0.7%	54 36.0%	6 4.0%	56 37.3%	1 0.7%	14 9.3%	15 10.0%	150 100.0%
16	Rattanak Kiri 2004	Count % within Province	0 0.0%	0 0.0%	15 13.6%	17 15.5%	42 38.2%	16 14.5%	5 4.5%	1 0.9%	14 12.7%	110 100.0%
	Rotanak Kiri 1996	Count % within Province	2 0.3%	1 0.2%	5 0.8%	23 3.7%	166 26.8%	421 67.9%	0 0.0%	2 0.3%	0 0.0%	620 100.0%
	Rotanak Kiri 1997	Count % within Province	0 0.0%	0 0.0%	0 0.0%	8 20.0%	17 42.5%	15 37.5%	0 0.0%	0 0.0%	0 0.0%	40 100.0%
	Rotanak Kiri 1999	Count % within Province	0 0.0%	1 1.7%	5 8.3%	0 0.0%	24 40.0%	20 33.3%	0 0.0%	0 0.0%	10 16.7%	60 100.0%
17	Siem Reab 2004	Count % within Province	7 0.8%	0 0.0%	246 28.3%	160 18.4%	301 34.6%	61 7.0%	57 6.6%	6 0.7%	32 3.7%	870 100.0%
	Siem Reab 1996	Count % within Province	5 0.7%	0 0.0%	60 8.8%	26 3.8%	539 79.3%	50 7.4%	0 0.0%	0 0.0%	0 0.0%	680 100.0%
	Siem Reab 1997	Count % within Province	1 0.3%	0 0.0%	83 27.2%	6 2.0%	143 46.9%	59 19.3%	2 0.7%	0 0.0%	11 3.6%	305 100.0%
	Siem Reab 1999	Count % within Province	1 0.3%	1 0.3%	90 31.0%	74 25.5%	99 34.1%	10 3.4%	0 0.0%	10 3.4%	5 1.7%	290 100.0%
18	Krong Preah Sihanouk 2004	Count % within Province	50 19.2%	0 0.0%	3 1.2%	95 36.5%	37 14.2%	5 1.9%	58 22.3%	12 4.6%	0 0.0%	260 100.0%
	Krong Preah Sihanouk 1996	Count % within Province	11 8.5%	0 0.0%	2 1.5%	15 11.5%	77 59.2%	13 10.0%	0 0.0%	12 9.2%	0 0.0%	130 100.0%
	Krong Preah Sihanouk 1997	Count % within Province	2 1.4%	0 0.0%	0 0.0%	25 17.9%	99 70.7%	4 2.9%	0 0.0%	10 7.1%	0 0.0%	140 100.0%
	Krong Preah Sihanouk 1999	Count % within Province	16 6.7%	4 1.7%	2 0.8%	95 39.6%	58 24.2%	29 12.1%	3 1.3%	31 12.9%	2 0.8%	240 100.0%

No	Provinces		Socio Economic Survey - Main source of drinking water in wet season									
			Piped in dweling	Public tap	Tube/ pipedwell or borehole	Protected dug well	dug well	Pond, river or stream	Rainwa-ter	Tanker truck, vendor	Other	Total
19	Stueng Traeng 2004	Count % within Province	18 18.0%	0 0.0%	7 7.0%	6 6.0%	17 17.0%	50 50.0%	2 2.0%	0 0.0%	0 0.0%	100 100.0%
	Stueng Traeng 1996	Count % within Province	0 0.0%	0 0.0%	21 16.2%	2 1.5%	9 6.9%	95 73.1%	0 0.0%	3 2.3%	0 0.0%	130 100.0%
	Stueng Traeng 1997	Count % within Province	9 18.0%	0 0.0%	0 0.0%	0 0.0%	1 2.0%	40 80.0%	0 0.0%	0 0.0%	0 0.0%	50 100.0%
	Stueng Traeng 1999	Count % within Province	4 6.7%	0 0.0%	2 3.3%	10 16.7%	5 8.3%	34 56.7%	0 0.0%	5 8.3%	0 0.0%	60 100.0%
20	Svay Rieng 2004	Count % within Province	2 0.3%	1 0.2%	486 75.9%	101 15.8%	24 3.8%	21 3.3%	5 0.8%	0 0.0%	0 0.0%	640 100.0%
	Svay Rieng 1996	Count % within Province	0 0.0%	0 0.0%	194 23.7%	61 7.4%	530 64.6%	14 1.7%	0 0.0%	3 0.4%	18 2.2%	820 100.0%
	Svay Rieng 1997	Count % within Province	1 0.4%	0 0.0%	78 31.8%	34 13.9%	129 52.7%	1 0.4%	0 0.0%	1 0.4%	1 0.4%	245 100.0%
	Svay Rieng 1999	Count % within Province	0 0.0%	1 1.6%	109 64.1%	36 21.2%	23 13.5%	0 0.0%	0 0.0%	0 0.0%	1 0.6%	170 100.0%
21	Takaev 2004	Count % within Province	38 3.7%	0 0.0%	163 15.8%	88 8.5%	53 5.1%	201 19.5%	477 46.3%	9 0.9%	1 0.1%	1,030 100.0%
	Takaev 1996	Count % within Province	0 0.0%	0 0.0%	42 16.8%	18 7.2%	79 31.6%	100 40.0%	6 2.4%	3 1.2%	2 0.8%	250 100.0%
	Takaev 1997	Count % within Province	0 0.0%	0 0.0%	48 12.8%	21 5.6%	90 24.1%	201 53.7%	1 0.3%	5 1.3%	8 2.1%	374 100.0%
	Takaev 1999	Count % within Province	2 0.7%	0 0.0%	55 19.6%	69 24.6%	21 7.5%	126 45.0%	1 0.4%	6 2.1%	0 0.0%	280 100.0%

No	Provinces		Socio Economic Survey - Main source of drinking water in wet season									
			Piped in dweling	Public tap	Tube/ pipedwell or borehole	Protected dug well	dug well	Pond, river or stream	Rainwater	Tanker truck, vendor	Other	Total
22	Oudor Mean Chey 2004	Count % within Province	0 0.0%	0 0.0%	21 21.0%	1 1.0%	3 3.0%	21 21.0%	53 53.0%	1 1.0%	0 0.0%	100 100.0%
	Oudor Mean Chey 1996	Count % within Province	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
	Oudor Mean Chey 1997	Count % within Province	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
	Oudor Mean Chey 1999	Count % within Province	0 0.0%	0 0.0%	0 0.0%	4 8.0%	7 14.0%	23 46.0%	0 0.0%	0 0.0%	16 32.0%	50 100.0%
23	Krong Kaeb 2004	Count % within Province	1 2.0%	1 2.0%	4 8.0%	3 6.0%	23 46.0%	17 34.0%	1 2.0%	0 0.0%	0 0.0%	50 100.0%
	Krong Kaeb 1996	Count % within Province	0 0.0%	0 0.0%	0 0.0%	0 0.0%	5 16.7%	25 83.3%	0 0.0%	0 0.0%	0 0.0%	30 100.0%
	Krong Kaeb 1997	Count % within Province	0 0.0%	0 0.0%	2 10.0%	2 10.0%	6 30.0%	10 50.0%	0 0.0%	0 0.0%	0 0.0%	20 100.0%
	Krong Kaeb 1999	Count % within Province	0 0.0%	0 0.0%	2 3.3%	5 8.3%	10 16.7%	42 70.0%	1 1.7%	0 0.0%	0 0.0%	60 100.0%
24	Krong Pailin 2004	Count % within Province	2 5.0%	1 2.5%	3 7.5%	0 0.0%	0 0.0%	6 15.0%	25 62.5%	3 7.5%	0 0.0%	40 100.0%
	Krong Pailin 1996	Count % within Province	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
	Krong Pailin 1997	Count % within Province	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
	Krong Pailin 1999	Count % within Province	0 0.0%	0 0.0%	0 0.0%	0 0.0%	7 17.5%	21 52.5%	12 30.0%	0 0.0%	0 0.0%	40 100.0%

N.D. means No Data

Provinces		2004 Cambodia Inter-censal Population Survey - Main Source of Drinking Water							Total
		Piped Water	Tube/Pipe Well	Protected Dug Well	Unprotected Dug Well	Stream, River, etc…	Bought	Other	
Banteay Meanchey	Count % within Province	1,882 1.41%	24,157 18.16%	2,359 1.77%	5,843 4.39%	92,740 69.71%	5,646 4.24%	403 0.30%	133,030 100.00%
Battambang	Count % within Province	7,633 4.11%	34,349 18.52%	2,547 1.37%	23,356 12.59%	96,032 51.77%	19,193 10.35%	2,396 1.29%	185,506 100.00%
Kampong Cham	Count % within Province	18,994 5.43%	70,327 20.10%	10,317 2.95%	164,061 46.89%	45,962 13.14%	37,778 10.80%	2,468 0.71%	349,907 100.00%
Kampong Chhnang	Count % within Province	2,099 1.92%	22,267 20.37%	2,717 2.49%	60,980 55.80%	19,880 18.19%	1,347 1.23%	0 0.00%	109,290 100.00%
Kampong Speu	Count % within Province	497 0.39%	34,525 27.09%	4,321 3.39%	26,028 20.42%	60,438 47.42%	1,633 1.28%	0 0.00%	127,442 100.00%
Kampong Thom	Count % within Province	4,594 3.87%	11,344 9.55%	4,689 3.95%	81,395 68.50%	14,895 12.53%	1,459 1.23%	452 0.38%	118,828 100.00%
Kampot	Count % within Province	3,367 2.78%	11,257 9.29%	5,078 4.19%	28,988 23.93%	69,227 57.14%	2,155 1.78%	1,084 0.89%	121,156 100.00%
Kandal	Count % within Province	7,618 3.29%	62,384 26.96%	5,203 2.25%	20,422 8.83%	95,118 41.11%	40,536 17.52%	118 0.05%	231,399 100.00%
Koh Kong	Count % within Province	1,471 6.48%	1,689 7.44%	800 3.52%	12,894 56.79%	2,331 10.27%	3,427 15.09%	94 0.41%	22,706 100.00%
Kratie	Count % within Province	0 0.0%	20,434 32.54%	1,238 1.97%	11,877 18.91%	22,770 36.25%	6,121 9.75%	366 0.58%	62,806 100.00%
Mondul Kiri	Count % within Province	121 1.65%	3,815 52.05%	2,667 36.38%	364 4.97%	242 3.30%	0 0.00%	121 1.65%	7,330 100.00%
Phnom Penh	Count % within Province	132,631 69.61%	7,482 3.93%	2,161 1.13%	4,906 2.57%	4,911 2.58%	35,651 18.71%	2,784 1.46%	190,526 100.00%
Preah Vihear	Count % within Province	0 0.00%	7,886 29.45%	362 1.35%	9,264 34.59%	8,728 32.59%	0 0.00%	542 2.02%	26,782 100.00%
Prey Veng	Count % within Province	1,765 0.81%	173,659 79.60%	718 0.33%	17,947 8.23%	19,466 8.92%	0 0.00%	4,612 2.11%	218,167 100.00%
Pursat	Count % within Province	865 0.98%	4,122 4.67%	1,662 1.88%	35,007 39.64%	43,083 48.78%	3,472 3.93%	111 0.13%	88,322 100.00%

Provinces		2004 Cambodia Inter-censal Population Survey - Main Source of Drinking Water							Total
		Piped Water	Tube/Pipe Well	Protected Dug Well	Unprotected Dug Well	Stream, River, etc…	Bought	Other	
Ratanak Kiri	Count % within Province	122 0.73%	0 0.00%	3,998 23.82%	328 1.95%	12,339 73.50%	0 0.00%	0 0.00%	16,787 100.00%
Siem Reap	Count % within Province	4,477 3.20%	31,993 22.90%	5,925 4.24%	85,789 61.40%	10,348 7.41%	454 0.32%	728 0.52%	139,714 100.00%
Sihanoukville	Count % within Province	8,157 22.75%	2,916 8.13%	4,881 13.61%	15,816 44.11%	1,271 3.54%	2,818 7.86%	0 0.00%	35,859 100.00%
Stung Treng	Count % within Province	1,188 7.83%	2,974 19.60%	796 5.25%	531 3.50%	9,427 62.12%	133 0.88%	126 0.83%	15,175 100.00%
Kampong Speu	Count % within Province	497 0.39%	34,525 27.09%	4,321 3.39%	26,028 20.42%	60,438 47.42%	1,633 1.28%	0 0.00%	127,442 100.00%
Svay Rieng	Count % within Province	3,275 3.00%	83,247 76.14%	3,410 3.12%	18,518 16.94%	776 0.71%	0 0.00%	115 0.11%	109,341 100.00%
Takeo	Count % within Province	4,853 2.76%	35,176 20.03%	8,032 4.57%	41,659 23.72%	79,990 45.54%	5,845 3.33%	77 0.04%	175,632 100.00%
Oddar Meanchey	Count % within Province	104 0.41%	16,882 66.62%	725 2.86%	5,196 20.51%	2,432 9.60%	0 0.00%	0 0.00%	25,339 100.00%
Kep	Count % within Province	0 0.00%	446 4.10%	669 6.15%	2,677 24.61%	7,087 65.14%	0 0.00%	0 0.00%	10,879 100.00%
Pailin	Count % within Province	815 9.78%	2,384 28.61%	0 0.00%	0 0.00%	2,436 29.23%	2,608 31.29%	91 1.09%	8,334 100.00%

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