Assessment of the Effectiveness and Efficiency of the Cadastral Survey Program of the Department of Environment and Natural Resources (DENR)

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List of Acronyms

A&D	Alienable and Disposable
AO	Administrative Order
ARMM	Autonomous Region in Muslim Mindanao
BAP	Boundary Agreement Process
BSP	Bangko Sentral ng Pilipinas
CALABARZON	Cavite, Laguna, Batangas, Rizal, and Quezon
CAR	Cordillera Administrative Region
CENRO	Community Environment and Natural Resources Office
DBM	Department of Budget and Management
DENR	Department of Environment and Natural Resources
DILG	Department of Internal and Local Government
FASPO	Foreign-Assisted and Special Projects Office
GAA	General Appropriations Act
GSD	Geodetic Surveys Division
GSS	Group Settlement Surveys
LAMS	Land Administration and Management System
LGU	Local Government Unit
LMB	Land Management Bureau
LMS	Land Management Services
LRA	Land Registration Authority
NAMRIA	National Mapping and Resource Information Authority
NCIP	National Commission on Indigenous Peoples
NCPCO	National Cadastral Project Coordinator Office
NOL	No Objection Letter
PENRO	Provincial Environment and Natural Resources Office
PIS	Parcel Information Sheet
PLS	Public Land Subdivision Survey
PPCS-PRS 92	Philippine Plane Coordinate System/Philippine Reference System of 1992
PPP	Public-Private Partnership
RCPCO	Regional Cadastral Project Coordinator Office
RED	Regional Executive Director
RTD	Regional Technical Director
WB	World Bank

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Executive Summary

Over the years since its resumption in 2007, the Cadastral Survey Program has proceeded at a slow pace. The slow progress of the program has been associated with implementation issues that have affected the effectiveness and efficiency of the cadastral surveys. In addition, there is a concern over the overlap of functions with regard to surveying and titling activities of government agencies namely, DENR (through the Land Management Bureau [LMB]), the Land Registration Authority (LRA) and the National Commission on Indigenous Peoples (NCIP).

This paper assessed the Cadastral Survey Program by: (1) reviewing processes and procedures involved in the conduct of cadastral surveys to determine the cause of implementation delays; (2) reviewing the existing institutional set-up to determine if there are overlaps in the surveys done by different government agencies; and (3) assessing the accomplishments of the cadastral survey program and estimating the number of year(s) and funding requirements needed for doing the remaining planned surveys. In the analysis, the paper used data and information provided by the DENR/LMB and other government agencies.

According to DENR-LMB, the whole land area of the Philippines will be covered by the Cadastral Survey Program. NAMRIA data indicated that the Philippines' total land area comprises 30 million hectares. However, DENR data reported 30,957,221 million hectares (excluding ARMM), which is bigger than the NAMRIA figure. One of the purposes of the cadastral survey is to ultimately determine the total land area of the Philippines.

Data on accomplishments as of 2010 suggested that: 780 municipalities and 104 cities have approved surveys; 294 municipalities and 12 cities that have yet to complete their cadastral surveys; 263 municipalities and 18 cities have yet to complete their field work, validation and verification, which are pre-requisites to the approval of surveys; and 45 municipalities have yet to undergo a cadastral survey. In terms of land area, 54.6 percent of the cadastral survey coverage constituted approved surveys. But this is not very far from the level of physical accomplishment of 54.1 percent in 2007. The data also indicated that within 3 years since 2007, cadastral surveys in only 10 additional municipalities/cities had been approved.

Cadastral survey projects can be classified into three categories: Category A – Full Cadastre; Category B – Political Boundary Survey; and Category C – Lot Survey. Category C projects have the most number of surveys approved (43% of total 2007-2011 Category C projects), followed by Category A (28%) and then Category B (13%). Most projects under office verification (involves LMB's desk and ground verification of survey results) are found in Category B, followed by Categories A, and C respectively. Data also indicated that many

projects that were launched in 2009, especially those under Categories A and B, are yet to be completed. They are also undergoing office verification or fieldwork.

Upon assessment of the program's accomplishments and review of the procedure and processes in the conduct of cadastral surveys, it was found that the causes of implementation delays include the following:

- tedious procurement process due to several factors, including some procurement guidelines;
- frequency of failed bidding arising from defects in procedure and documentation;
- unresolved dispute over boundaries especially when it is LGUs that are in disagreement;
- slow ground verification process due to lack of skilled manpower, e.g., geodetic engineers, and the backlog in the huge volume of projects currently under verification;
- the peace and order situation in the area subject to cadastral survey
- the lack of cooperation of some LGUs;
- inaccurate and dated database that prevents efficient planning and programming of resources for the surveys.

As for the overlap of surveying and titling functions (by DENR, LRA, NCIP), the different mandates of the concerned agencies indicates that the expected outputs of the three agencies are distinct and delineated. For as long as these functions are strictly followed in practice, their activities are properly coordinated and land information is shared, there would not be any overlap in discharging their respective functions.

The paper also presented estimates on the remaining area that still needed to be surveyed and the time and budget required to conduct the remaining surveys. The estimates were based on available crude data and information and some simplifying assumptions. Based on the status of the cadastral program as of 2010 and some assumptions, we estimated that the remaining area that still needed to be surveyed is approximately 10.902 million hectares.

Estimates of the time and cost of conducting the remaining cadastral surveys were presented in two scenarios. To complete the survey of the remaining areas in 5 years, the government needs about PHP14.757 billion based on current Bill of Quantity used by LMB, without adjustment to inflation; or about PHP14.941 billion under a one-time adjustment of 5%; or about PHP16.696 billion if adjusted yearly for 5% inflation.

On the other hand, completing the program in 10 years will entail cost amounting to around PHP15.335 billion if the current Bill of Quantity is adjusted for 5% inflation every 5 years; or about PHP18.983 billion if adjusted yearly for 5% inflation.

Given the findings, the following recommendations to improve the cadastral survey program are presented:

- Given the importance of accurate and shared data and information, DENR-LMB should allocate time and budget to improve, cleanse, monitor, and update its land database. In collaboration with other agencies such as NAMRIA and LRA, DENR-LMB should also install a modern project monitoring system that links information and data from the municipal, city, and provincial level to the regional office, which in turn is linked to a central database at the LMB, with data updated and validated in a regular and timely manner.
- DENR and the main donor, the World Bank, should revisit the procurement guidelines in order to speed up the issuance of the No Objection Letter (NOL).
- In view of the experiences of lack of cooperation by some LGUs, the DENR, DILG, the relevant leagues of local governments, and the specific LGU or LGUs concerned should sign a memorandum of understanding to expedite the survey of disputed areas in the LGU/LGUs concerned. The oversight agencies (DENR and DILG) should monitor compliance with the MOU.
- DENR should formulate and implement specific guidelines to finish the backlog and accelerate the completion of the survey of remaining areas. One mechanism that DENR, with DBM, could consider is public-private partnership (PPP).
- Better implementation and performance of the program would require cooperation and support by DENR and DBM. DBM in collaboration with DENR should provide both a hard budget constraint and indicate the time period to complete the planned cadastral survey projects with specific performance indicators to justify additional budgets. In addition, before approving the funding of proposed cadastral projects, DBM should require DENR-LMB to submit accurate data and information on accomplishments and on remaining areas to be surveyed, and expedite the conduct of the delayed but previously approved cadastral projects. DBM and DENR should also agree on a joint monitoring and field verification process to check on the progress of the cadastral survey program.
- Finally, DBM and DENR should jointly conduct field visits to collect more and better information and verify the findings of this paper.

Assessment of the Effectiveness and Efficiency of the Cadastral Survey Program of the Department of Environment and Natural Resources (DENR)

Gilberto M. Llanto and Maureen Ane D. Rosellon[1]

I. Introduction

A cadastral survey refers to a survey conducted to delineate political boundaries and to determine the metes and bounds of all parcels within an entire municipality or city for land registration, land titling, and other purposes. The main output of a cadastral survey is a line map, that is, a cadastral map, and the metes and bounds of each parcel surveyed and other data related to land ownership.

Cadastral surveys were introduced in the country to expedite public land distribution through the first cadastral survey project in the Philippines that was conducted in 1908 in Pilar, Bataan. In 1913 Act 2259 or the Cadastral Act formalized the cadastral survey program of the government and authorized the Director of Lands to conduct cadastral surveys. The Act provided the mechanism for compulsory registration of land covered by the cadastral survey and for judicial adjudication of public lands.[2]

Sometime in the 1980s, however, a suspension by the government of funding for cadastral surveys brought a halt to the program. The government used the funds for cadastral surveys for its main focus at that time, the agrarian reform program. After almost three decades, the cadastral survey program was revived in 2007.[3]

Over the years since its resumption, the cadastral survey program has proceeded at a slow pace.[4] The slow progress of the program has been associated with certain issues relating to the processes and procedures for conducting the survey and other possible causes of delay in the execution of survey activities. In essence, there could be implementation issues that have affected the effectiveness and efficiency of the cadastral surveys. In addition, there is a concern over the overlap of functions with regard to surveying

[1] We thank Marife Ballesteros for useful comments and suggestions. We are also grateful for the suggestions and inputs given by various staff members of DENR/LMB and DBM during the validation workshop held in October 9, 2012.
[2] Land Management Bureau website
[3] Information came from the interview with the DENR Land Management Bureau (LMB)
[4] From Terms of Reference for Assessment of the Effectiveness and Efficiency of the Cadastral Survey Program of the Department of Environment and Natural Resources (DENR)

and titling activities of government agencies other than the DENR.[5] Under DENR, the Land Management Bureau (LMB) and the DENR Regional Office Land Management Services (LMS) are mandated to supervise the survey and distribution of public lands and so are involved in cadastral surveys.[6] Other government agencies are also engaged in doing land surveys, namely, the Land Registration Authority (LRA) and the National Commission on Indigenous Peoples (NCIP). If such an overlap indeed exists, it could presumably affect the efficient performance of the DENR-LMB/LMS in cadastral survey operations and the other agencies mentioned. There is a budgetary issue as well because an overlap implies doing the same thing with a bigger budget than would be required had the agencies focused on their respective tasks.

In light of these issues pointed out by DBM, this paper has the following specific objectives:

1. To review processes and procedures involved in the conduct of cadastral surveys and determine the causes of implementation delays;
2. To review the existing institutional set-up relative to the conduct of cadastral surveys to determine if there are overlaps in the surveys done by different government agencies;
3. To validate the total national area coverage of public alienable and disposable (A&D) lands that are subject to cadastral survey and assess the accomplishments by areas where cadastral surveys have been conducted and to estimate the number of year(s) and funding requirements needed for doing the remaining planned surveys; and
4. To recommend measures that will help improve the conduct of cadastral surveys.

The paper is organized as follows: the next section discusses the methodology used and the data sources. Section III reviews the accomplishments of the cadastral survey program. Section IV discusses the cadastral survey activities and the factors affecting the conduct of a cadastral survey. Section V presents some estimates of the number of years and funding requirements of doing the remaining surveys. The final section provides concluding remarks and some recommendations.

[5] From Terms of Reference for Assessment of the Effectiveness and Efficiency of the Cadastral Survey Program of the Department of Environment and Natural Resources (DENR)
[6] The LMS in the DENR Regional offices serve as the LMB's field office.

II. Methodology and Data Sources

The paper applied a descriptive analysis of data and information provided by the DENR/LMB and other government agencies. The paper depended on secondary data that were made available by those agencies[7]. Limited primary information was gathered through interviews with relevant agencies. Time and budget constraints made the authors rely on available secondary data and limited primary information. During the examination of available data on the cadastral surveys, we noted note that the database on those surveys has to be thoroughly reviewed, cleansed, updated and meticulously monitored. This observation is reflected below in the course of our analysis of the program.

We reviewed the processes and procedures involved in cadastral survey operations, interviewed the Director of LMB, staff of the Geodetic Surveys Division-LMB, and the Chief of Surveys Division of DENR-CALABARZON; reviewed the institutional framework for the conduct of surveying and titling activities; and assessed the physical accomplishments of the program.

The review of processes, procedures, delineation of functions, and duration of activities in the cadastral survey operations required gathering of data and information from the Land Management Bureau (LMB) and the Land Management Services (LMS) in the Regional Office.

Data from NAMRIA and LMB were important sources of information to validate the national coverage of the cadastral survey and balance of un-surveyed lands.

We used data on physical accomplishments on a regional level and other relevant documents from LMB to determine the status of the program and to identify issues concerning the problem of completing the cadastral survey program. We relied on whatever data we could gather and whatever was made available by the LMB and the DENR Regional Office and other agencies. A limitation of the database that we used in this paper is our inability to verify the accuracy or validity of such data provided to us given budget and time constraints. We assumed that the data and information given to us for analysis are accurate. We note that LMB monitors the status of and compiles information on cadastral

[7] We thank them for their cooperation with the data and information on conducting cadastral surveys.

surveys. Data and reports[8] at the DENR head office level are simple summation or aggregation of data and reports submitted by the regional offices. More disaggregated data, e.g., municipal or barangay level would have yielded rich information and insights but it seems that these are not compiled at the head office level. The regional offices have more detailed information because they either supervise or conduct the cadastral surveys. Unfortunately, there is no systematic way of uploading those important detailed data to the head office.

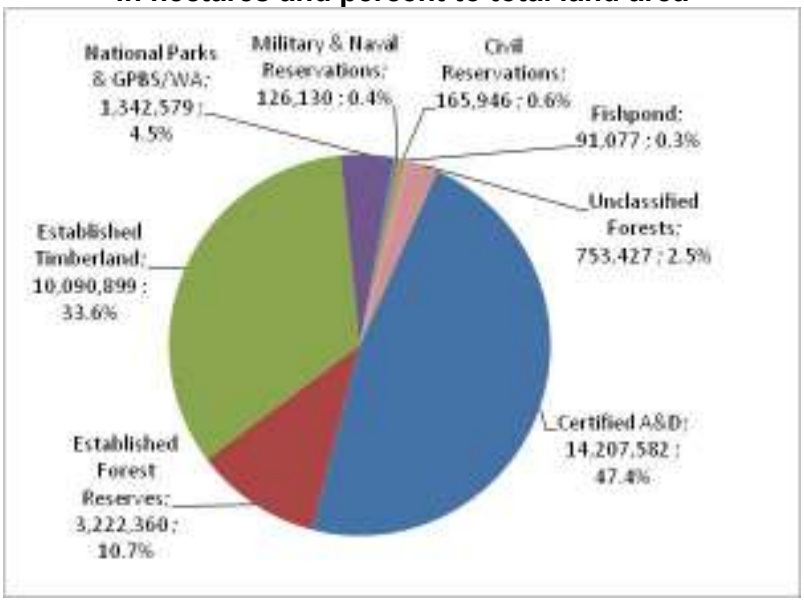
III. Review of Accomplishments of the Cadastral Survey Program

A. Coverage of the Cadastral Survey

The starting or reference point for the resumption of the cadastral survey program was the 2004 land classification data from NAMRIA, which categorize land into 47.4 percent alienable and disposable (A&D) lands and 52.6 percent total forestland (**Figure 1**). The NAMRIA data indicate that the whole Philippine land area comprises 30 million hectares, which according to LMB are all under coverage of the cadastral survey program. The objective of the resumed cadastral survey program is to conduct a full cadastral survey, i.e. up to lot survey, of all A&D lands and forestlands, comprising about 30 million hectares. The cadastral survey of forestlands is for the purposes of determining the metes and bounds of such lands within certain municipalities.[9]

[8] According to a staff of the monitoring group at LMB, the data/reports submitted are also validated in the field. A focal person from LMB visits the regional offices (one region every month) to make sure that the projects are indeed undertaken and accomplished.
[9] Information came from Interview with LMB.

Figure 1. Land Classification, Philippines as of 2004/2005. In hectares and percent to total land area



Source of data: NAMRIA

B. Physical Accomplishments of the Cadastral Survey Program

DENR-LMB data in **Table 1** show that as of December 2007 there were approved surveys covering 16.8 million hectares of land (A&D and forestlands) in 773 municipalities and 101 cities or 54.1 percent of the total land area of the country. Partially surveyed areas in municipalities or cities that were covered by Public Land Subdivision Survey (PLS) and Group Settlement Surveys (GSS) can be found in 258 municipalities and 10 cities, or 19.7 percent of total land coverage. About 3.7 percent are categorized as “un-surveyed areas” while 22.6 percent represent areas where cadastral surveys have been reported to be “in-progress”. Cadastral projects “in-progress” refer to projects under fieldwork or office verification. Those areas that are yet to be surveyed are categorized as the “un-surveyed areas.” It is noted that the partially surveyed and un-surveyed categories have maintained their respective status because of lack of funds. The curious fact revealed by our examination of the data is that both the 2007 and 2010 database of the DENR-LMB excludes lands in the ARMM.

Table 1. Status of Cadastral Survey Program, CY2007 and CY2010

	2007				2010			
	Municipalities	Cities	Total	Land Area (ha)	Municipalities	Cities	Total	Land Area (ha)
Approved Survey	773	101	874	16,752,436	780	104	884	16,898,210
Partially surveyed	258	10	268	6,094,943	294	12	306	6,718,043
In-Progress	303	18	321	6,989,237	263	18	281	6,312,932
Un-surveyed	53	-	53	1,140,445	45	-	45	1,028,036
Total	1,387	129	1,516	30,977,061	1,382	134	1,516	30,957,221

Source: DENR-LMB

Comparing the accomplishments as of December 2010, data indicate an increase in the number of municipalities and cities with approved surveys from 874 in 2007 to 884 in 2010. In terms of land area, 54.6 percent of the reported accomplishment constituted approved surveys as of 2010, not very far from the level of physical accomplishment in 2007 (54.1%). The data indicate that in 3 years since the 2007 reporting data, cadastral surveys in only 10 additional municipalities/cities had been approved.

There was no change in the number of cities (18) under “in-progress” category between 2007 and 2010. On the other hand, the number of municipalities under the same category had decreased. There was also a decline in the number of municipalities under the “un-surveyed” category in the same period. There was a substantial increase in the number of municipalities under the category “partially surveyed” between 2007 and 2010. This seems to suggest that while since 2007 the government has provided funding to cover on-going projects (“in-progress”) and un-surveyed lands, it seems that most of the surveys conducted were partial cadastral surveys.

The reported 2010 accomplishments suggest that:

- 294 municipalities and 12 cities have yet to complete their cadastral surveys;
- 263 municipalities and 18 cities have yet to complete their field work, validation and verification, which are pre-requisites to the approval of surveys; and
- 45 municipalities have yet to undergo a cadastral survey;

The corresponding number of hectares of lands waiting for a full cadastral survey is staggering: some 14 million hectares[10] of partially surveyed, in-progress, and un-surveyed lands.

It should be noted that the 2007 and 2010 data reported in **Table 1** do not include land data from the ARMM. Inclusion of ARMM lands will bloat the reported total land area of the country to more than 30 million hectares, an impossibility! The corresponding task of conducting cadastral surveys in the ARMM lands will add to the already huge burden of surveying the remaining 14 million hectares (as of 2010). The inaccurate land data base of the government has serious implications on cadastral survey program, specifically on the corresponding budgetary support for such an activity and the time and staff to be involved.

One can notice that the total land area reported by DENR as of 2010 is 30,957,221 million hectares, which is bigger than the NAMRIA figure of 30 million hectares. LMB claims that the NAMRIA figures resulted from an aerial survey and that the figure of 30 million hectares reported by NAMRIA may not be completely accurate.[11] One of the purposes of the cadastral survey is to ultimately determine the total land area of the Philippines.

We asked DENR-LMB what is meant by the term "approved surveys" to find out if this is synonymous to surveys done and finished, that is, lands that had been subjected to a full cadastral survey. The DENR-LMB Geodetic Surveys Division (GSD) said that "approved surveys" are indeed cadastral surveys already done and finished, including the "pre-war surveys."[12] They, however, put caution on the interpretation of the figures under "approved surveys", especially the pre-war surveys, because of the possibility of a need to resurvey some areas, for instance, to establish political boundaries. However, it also appears to us that the caution about pre-war surveys refer to doubts about the accuracy or completeness of those surveys. We concluded that there is a great need for DENR-LMB-GSD to cleanse the database of "approved surveys" to eliminate possible overlaps, inaccuracies in the data reported, or double counting of surveys that had previously been done or finished.

The DENR-LMB-GSD further explained that some areas reported as having undergone a cadastral survey have completely missing land records due to losses or damages incurred during the Second World War, inefficient record keeping, and other reasons. It is also possible that information on pre-war surveys is inaccurate or unreliable.

[10] Taking into consideration LMB's coverage of the cadastral survey program, this may include forestlands. Forestlands in a municipality will also be covered in the cadastral survey for purposes of determining boundaries.
[11] Survey conducted on the ground may bring more accuracy according to our interviews at LMB.
[12] That is, surveys approved before the Second World War.

Indeed some of the approved surveys are pre-war surveys that have been recorded as approved but some of those documents have either been missing or destroyed. Instead of having to re-survey, a reconstruction or re-plotting may be a least-cost option. It is a welcome development that the reconstruction of pre-war surveys has started in the regions. For this task to be properly accomplished, available land records relevant to such areas should be obtained and thoroughly examined. This will involve sharing with the DENR Regional Offices records from other government agencies that are also a repository of land records (NAMRIA, LRA, NCIP).

The LMB indicated that there is a need to (i) re-survey some areas reported as falling under "approved surveys" or (ii) re-construct or re-plot the concerned areas based on available lot data and documents in order to have a more accurate and reliable database. However, re-surveys have large budgetary and personnel implications but weighed against the social benefits of having more accurate, more reliable, and updated data it may be worth the expense to do resurveys.

The bottom line here is that the DENR-LMB land database needs to be reviewed, thoroughly cleansed, monitored, and continuously updated. This conclusion is further supported by the information derived from data on the status of cadastral projects reported below.

According to the DENR it has installed the Land Administration and Management System (LAMS) in the regions, including PENROs and CENROs. This "enhanced land record management facility ensures integrity and access to land information such as cadastral programs, isolated survey plans, public land applications, patent and titles etc." The system is "supported by a cadastral database that provides a spatial reference." Meanwhile, additional financing for some important elements of the system such as Inventory, scanning and grooming of all records are still being worked out with the World Bank.

Given these developments, it becomes all the more important to exert greater effort to cleanse old and past records, strictly monitor current projects in the cadastral survey program, and closely coordinate with other land agencies. Cadastral surveys are just one of the various land surveys conducted by the DENR, and so the department should be prepared and equipped to handle the volume of records that would be inputted to the LAMS facility, especially given the current state of land archives.

A project monitoring system, through the National Cadastral Project Coordinator Office (NCPCO) at LMB, was established in 2011 to monitor the implementation of cadastral projects throughout the country. Regional Cadastral Project Coordinators (RCPCO) at the LMS monitor at the regional level. DENR says it has taken this action to address the backlog. Monitoring enables the detection of erring contractors and has led to the issuance of guidelines on the blacklisting and ineligibility of such contractors for future projects. Monitoring done by the LMB is just one step. What happens after monitoring is as important.

C. Status of Cadastral Projects undertaken in 2007-2012

Overall, the number of cadastral projects has increased immensely from 2007 to 2012 and this can be explained by the additional funding coming from a loan from the World Bank,[13] which was provided in 2011 and 2012. As of August 2012, data indicate that out of 602 cadastral projects launched from 2007 to 2012, 59 projects (around 10%) were completed and approved (**Table 2**). For projects in 2011, 50 out of 79 cadastral survey projects (63%) are still undergoing fieldwork. Meanwhile, 17 projects are under office verification. Fieldwork here refers to the actual conduct of the cadastral survey. Office verification is the status given to the project whose survey returns are being inspected and verified by the Regional Office. Office verification involves both desk verifications and field inspections.

Table 2. Status of 2007-2012 Cadastral Projects

Year	Est. area (ha.)	No. of proj	For Re-bidding	Bidding/ evaluation	Awarded	Ongoing: Fieldwork	Ongoing: Office Verif	Approved Survey	No report	No fund released
2007	202,510	25	-	-	-	1	11	13	-	-
2008	125,307	25	-	-	-	1	9	15	-	-
2009	815,708	64	-	-	-	13	27	22	2	-
2010	943,691	55	-	-	-	15	34	6	-	-
2011	1,189,417	79	4	4	1	50	17	3	-	-
2012	6,714,562	354	59	54	6	228	0	0	0	7
Total	*9,991,195*	*602*	*63*	*58*	*7*	*308*	*98*	*59*	*2*	*7*

Source: LMB
Note: Data as of August 2012

[13] Under the WB's National Program Support for Environment and Natural Resources Management Project

Considering that 2012 projects are mostly undergoing fieldwork, we look at the accomplishments of 2007 to 2011 projects. There were only 59 approved surveys out of a total of 248 cadastral surveys, a very low level of accomplishment (23.7%) over a five year period (2007-2011) or less than 5% on a yearly basis. Many projects from 2007-2011 are still under office verification or fieldwork. Of the 2007 projects, 44 percent are still being verified (procedure before approval), and almost the same situation has prevailed in projects that started in 2008-2010. It looks like the office verification and field work stages are the bottleneck stages in the implementation of cadastral surveys. The difficulties encountered in these stages such as those related to lack of manpower in the Regional LMS, lack of cooperation from some local government units, and peace and order situation have prevented DENR from expediting the surveys. These issues are discussed more thoroughly in the next section.

We then look at the accomplishments of the program in terms of cadastral survey categories. Cadastral projects may be categorized into 3: Category A – Full Cadastre; Category B – Political Boundary Survey; and Category C – Lot Survey. Category A, as a full cadastre survey, involves the establishment of main and subsidiary controls over the entire area of a cadastral project; followed by establishment of monuments to define boundaries of the entire municipality and their component Barangays; and then the determination of individual lot boundaries. Category B, which is a political boundary survey, is conducted in municipalities or cities that have been previously subject to lot survey (for instance, areas that have been subject to the Public Land Subdivision projects) in order to resolve boundary issues. Category C, covering only lot survey, is for areas where main controls and political boundaries have already been established.

Table 3 presents the status of projects by category. The data suggest that most projects (59%) have been under Category B (establishment of political boundaries), followed by Category A (29%), then Category C (12%).

In terms of accomplishments per category, Category C (lot survey) projects have the most number of surveys approved (43% of total 2007-2011 Category C projects), followed by Category A (28%) and then Category B (13%). Meanwhile, looking at projects under office verification (which many projects are undergoing), most projects are found in Category B (political boundary survey), followed by Categories A, and C respectively. In addition, the figures indicate that many projects that were launched 3 years ago, that is, in 2009, especially those under Categories A and B, are yet to be completed. They are also undergoing office verification or fieldwork.

Table 3. Status of 2007-2012 Cadastral Projects by Category
In number of projects

	2007	2008	2009	2010	2011	2012	Total
Category A							
Approved Survey	4	5	8	1	1	-	19
Ongoing: Office Verification	-	3	12	12	-	-	27
Ongoing: Fieldwork	1	-	4	3	12	63	83
Awarded	-	-	-	-	-	-	-
Bidding/ evaluation	-	-	-	-	-	24	24
For Re-bidding	-	-	-	-	-	14	14
No report	-	-	2	-	-	-	2
No fund released	-	-	-	-	-	7	7
Subtotal	*5*	*8*	*26*	*16*	*13*	*108*	*176*
Category B							
Approved Survey	3	1	8	3	2	-	17
Ongoing: Office Verification	1	4	14	14	17	-	50
Ongoing: Fieldwork	-	1	9	11	30	151	202
Awarded	-	-	-	-	1	6	7
Bidding/ evaluation	-	-	-	-	4	29	33
For Re-bidding	-	-	-	-	4	39	43
Subtotal	*4*	*6*	*31*	*28*	*58*	*225*	*352*
Category C							
Approved Survey	6	9	6	2	-	-	23
Ongoing: Office Verification	10	2	1	8	-	-	21
Ongoing: Fieldwork	-	-	-	1	8	14	23
Bidding/ evaluation	-	-	-	-	-	1	1
For Re-bidding	-	-	-	-	-	6	6
Subtotal	*16*	*11*	*7*	*11*	*8*	*21*	*74*
Grand Total	*25*	*25*	*64*	*55*	*79*	*354*	*602*

Source: LMB
Note: Data as of August 2012; in 2012, WB-funded projects were all under Category B (214 projects).

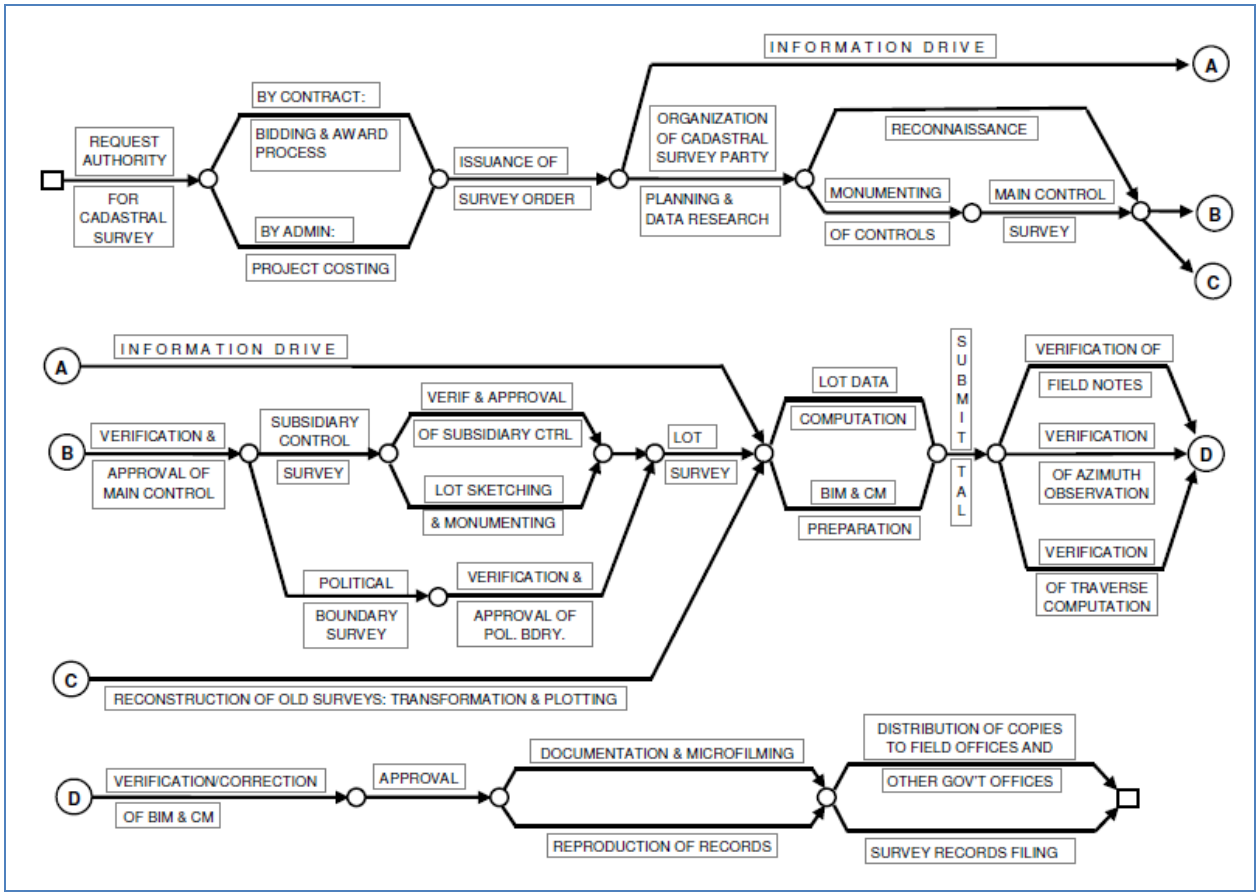
The information coming from the data somehow gives us an indication of what is behind the slow progress of the cadastral survey program, e.g., process and procedures prior to the actual survey, etc. In the next section, we attempt to further explore this point by looking at the cadastral survey operations and issues on the ground.

IV. Cadastral Survey Activities and Implications

A. Activities in the Cadastral Survey Operations

Figure 2 shows a flow chart of activities done in a cadastral survey. The flowchart presents operations for a full cadastre (Category A), i.e. from the establishment of main controls, of political boundaries, and lot survey. For Categories B and C, some activities are skipped because they are unnecessary. It follows that Categories B and C are simpler surveys than Category A.

Figure 2. Cadastral Survey Flow Chart for Survey Operation



Source: DENR Memorandum Circular No. 2010-13 (Adoption of the Manual of Land Survey Procedures), page161.

A cadastral project starts with the DENR Regional Office submitting a listing of cadastral projects to the DENR Central Office for approval. Once approved, the cadastral survey project proceeds with the bidding and awards process in the DENR Regional Office if

bid out to private contractors, or with project costing if the survey is to be conducted by administration[14]. A survey order is issued by the DENR Regional Executive Director for the conduct of the cadastral project.[15] For projects bid out to private contractors, the survey order is issued after a successful bidding. Failed biddings undergo re-bidding until a successful bidder is identified. The survey operations commence only after the accomplishment of either of these alternative administrative procedures.

The preliminary activities of the survey operations include: organization of the Cadastral Survey Party, preparation and submission of the Cadastral Survey Management Plan, and conduct of the data and information drive. As indicated in the flowchart, the information drive extends up to the lot survey operations. This is to enable the survey team to collect as much detailed information as they can, especially from lot claimants/owners. The legal and technical documents that the claimants present are important in lot sketching and monument markings that are done by the survey team.

Main activities of the survey team start with a preliminary survey of the area which involves constructing and locating standard concrete references and corner monuments, reconnaissance, and establishing location of the main and subsidiary control lines. The progress and project control maps are then prepared, the boundary of the project is sketched, and afterwards the project control surveys are conducted. The Project Control Survey returns (main and subsidiary controls) are prepared and submitted to the Regional Technical Director/LMS for verification and approval.

The next main activities are the setting of monuments of the political boundary (barangay and city/municipality) and the preparations for the lot survey, which can be conducted simultaneously as indicated in the flowchart. Upon approval of the project control survey returns, the conduct of political boundary survey will follow. Areas in dispute within barangays, municipalities or province, if any, are plotted and located in the approved project control and progress map. Another activity during this stage is the distribution of individual notices to the lot claimants/owners, informing them to appear on the scheduled date of monument setting and sketching of their lots to present their document, both the legal and technical, in support of their claims (called the Boundary Agreement Process or BAP). The claimants/owners confirm their respective boundaries which will be marked on the ground by

[14] "By administration" means that the cadastral survey operations are conducted by the staff/geodetic engineers of the DENR Regional Offices' Land Management Services (LMS).
[15] Discussion of the flowchart draws from *"A to Z of a Cadastral Survey Project*", prepared by LMB

the survey team using standard monuments. Moreover, the survey team reconstructs/plots old surveys in order to prepare a sketch map.

After the political boundary survey, the survey returns are prepared and submitted to the Regional Office for verification and approval. Upon expiration of the "30-day notice" for individuals who did not participate in the Boundary Agreement Process (BAP), the lot survey operation will begin. During the lot survey, other data/information such as those needed for land use inventory, physiographic features for lots with natural boundaries and man-made features for the road network are determined. Also at this stage, corner monuments are plotted on the cadastral map based on their location from the control station, and are connected in accordance with the sketch of the survey. Work at this stage also involves transforming previously approved surveys to the PPCS/Grid-PRS 92[16] system currently used in the Philippine geographic reference system. Old surveys are also adjusted after the verification and approval of the lot survey documents.

After the lot survey, lot corners in the cadastral maps are assigned numbers according to the field notes, and lot data computations are prepared and submitted by the survey team to the Regional Office for verification. The submitted cadastral map is traced and validated in the field. Discrepancies in the map, if any, are forwarded to the survey team for correction. Thereafter, preliminary cadastral maps with the corrections and the list of claimants and indicated lot numbers are posted in the Barangay Hall. This enables the claimants to comment on the result of the survey affecting their respective lots. Final checking is done to verify discrepancies.[17]

After verification and correction come the completion and inking of the progress map and the cadastral maps. The following are prepared: the Barangay/Case Boundary Index Map, Municipal/Project Boundary and Index Map. All these maps, including the completed survey returns of the project are submitted for final approval by the Regional Technical Director (RTD) for Lands.[18] Following approval comes the final stage: documentation, scanning, reproduction (blueprinting), distribution of copies to field/government offices (CENROs, LGUs), and survey records filing.

[16] The Philippine Plane Coordinate System/Philippine Reference System of 1992 (PPCS/PRS92) is a national network of geodetic control points currently used as the standard coordinate reference system for all surveying and mapping activities in the Philippines (www.namria.gov.ph).

[17] For localities that are difficult to access, this work will be conducted during favourable weather conditions.

[18] The RTD/Director for Lands reports to the Regional Executive Director (RED). The RED is the overall Director of the DENR Regional Office. The RTD/Director for Lands approves the completed cadastral surveys. The RED is mostly involved in the beginning stages, prior to conduct of the cadastral survey e.g. survey orders, contracts; also issues orders in selected cadastral activities as in Table 4.

Cadastral survey operations comprising recommendation of cadastral projects to be undertaken, bidding and awards of project to contractors, inspection, verification and approval of survey returns (maps and lot data), and distribution of cadastral maps and data to the CENROs and LGU are administered by the Land Management Services (LMS) and DENR regional directors. **Table 4** lists the roles of DENR regional officers who are involved in the cadastral survey program.

Table 4. Roles of DENR Regional Officials Involved in the Cadastral Survey Program

Regional Executive Director (RED) • Issues Survey Order for the conduct of Cadastral Survey Projects • Approves the bidding of Cadastral Survey Projects • Issues Orders for final inspection of Cadastral Survey Projects • Issues Orders of payments to contractors relative to Cadastral Survey Projects • Issues Survey Orders for delineation of Political Boundaries if there is no Inter Regional boundary disputes	**Regional Technical Director (RTD) for Lands**[19] • Issues Certificate of Acceptance on Subdivision, PLS, Cadastral Lots, and Original Isolated Surveys • Issues Authority to Inspect • Issues Survey Order for Political Survey if the Barangay/s of the same City/Municipality are involved • Issues Certificate of Acceptability over Cadastral Survey Returns of main and subsidiary Project Controls and Political Boundary Controls • Assigns Project Engineers to all Cadastral Projects to oversee the technical implementation of the project • Monitors and evaluates all Cadastral Survey Projects through the Regional Cadastral Project Coordinator
Provincial Environment and Natural Resources Officer (PENRO) • Issues Certificate of Completion regarding sketching, monument settings and lot surveys phases of work of cadastral survey contract	**Community Environment and Natural Resources Officer (CENRO)** • Assigns Land Management Officer as adjudicator, together with the Chief of Party of the Cadastral Project and Barangay representative who stand as witness to the agreement and affix the signature on the Parcel Information Sheet (PIS) form • Monitors the establishment of a project office in the Municipality by the contractor • Facilitates and renders assistance in the conduct of Political Boundary Survey

Source: LMB

As mentioned earlier, the cadastral survey operations may also be implemented by the LMS by administration, especially if the regional office has enough manpower to undertake the projects. For instance, in DENR-CALABARZON, past cadastral surveys have been mainly done by administration. However, because of the increase in number of cadastral projects, survey work is now tendered or bid out to private contractors. In general, projects are tendered to private contractors but those projects will be done by administration

[19] RTD for Lands is the Director of the LMS. There are separate RTD/RD for forest management, protected areas, environmental management, etc., under the regional office.

either when there are no bidders or biddings/re-biddings have been unsuccessful. In the latter case, the regional office should have enough manpower to do the survey.

The Provincial Environment and Natural Resources Office (PENRO) and Community Environment and Natural Resources Office (CENRO) are also involved in the survey operations. The PENROs and CENROs are highly involved the information drive, ground verification activities, and in helping resolve cases of land boundary disputes.

A crucial part of the survey operations is the information drive where the municipal government, barangay officials as well as the townspeople are informed about the conduct of a cadastral survey. This part of the survey operations is crucial especially when political boundaries are involved. For example, for this type of survey, the original lot titles held by residents may have to be presented as input to the information base and analysis to be done by the private contractors (survey team). The information drive is primarily done by the private contractors with CENRO staff providing assistance given their familiarity with the area (barangay or municipality. The Regional Office/LMS, on the other hand, renders assistance to the private contractors, for instance, in setting up meetings with the local government officials of the area where the survey will be conducted. Typically, a pre-survey conference to discuss the purpose and mechanics of the survey is done. During the conduct of the survey itself, a Project Engineer is assigned by the Regional Office/LMS to monitor the implementation of the project. The resident Project Engineers are trained and are also assigned to the different projects to ensure that the survey contractors comply with the requirements and specifications contained in the DENR Manual on Land Surveys.

Inspection and verification are also a critical part of the survey operations in relation to timely approval or completion of the cadastral projects. These two activities involve ground work/field work that is done by the Field Network Survey Party composed of staff, especially Geodetic Engineers, from the DENR Regional Office.

As for the duration of major activities, we gathered from an interview at the DENR-CALABARZON that the process of tendering bids to awarding of a project takes about one month. When a bidding fails a subsequent re-bidding would likewise take another month. However, once there is a successful bid and an award is given to the private contractor, it is possible to issue a Survey Order in one day.

The duration of the survey itself depends on the extensiveness of the survey area, e.g., how many hectares, and other factors but on the average, Category A or a full cadastral

survey could take 1 to 2 years to finish; Category B or political boundary survey would take 6 months to 1 year, especially if the affected LGU or LGUs cooperate in the conduct of the survey. Otherwise, non-cooperation by affected LGUs will unnecessarily delay the survey. It takes 6 months to 1 year to do a Category C or lot survey.

Using LMB data on duration of projects (**Table 5**), we find that Category A survey done by private contractors indeed takes over a year. A survey of Category B usually exceeds 6 months while Category C will need more than 8 months to complete. The figures in **Table 5** also indicate that a private contractor is able to accomplish an average of 44.2 hectares per day for a Category A survey, 122.6 hectares per day for Category B, and 21.7 hectares per day for Category C survey. These findings show that Category B has the shortest project duration of the three survey categories; at the same time, it shows the highest accomplishment (surveyed area) per day.

Table 5. Project duration surveys done by private contractors, 2007-2010

	Category A		Category B		Category C	
Est. area (ha)	Ave. no. of days	Ave. area (ha)	Ave. no. of days	Ave. area (ha)	Ave. no. of days	Ave. area (ha)
1,000 or less	143.5	704.9			115.5	523.6
1,001-2,000	245.0	1,371.0			185.7	1,363.2
2,001-4,000	303.4	3,051.8			307.9	2,741.0
4,001-6,000	297.5	5,284.4			155.5	5,488.2
6,001-10,000	356.5	7,000.1	196.0	8,567.4		
10,001-20,000	404.0	14,980.7	238.1	15,150.6	176.0	10,741.0
20,001-50,000	400.0	34,294.5	239.2	28,038.5		
over 50,000	429.0	119,320.0	140.0	66,578.4	330.0	92,060.0
All (weighted ave.)	312.0	13,798.7	212.2	26,025.5	199.0	4,325.4

Source: Authors' calculations based on LMB data as of March 2012

Inspection, verification and approval of certain phases of work in the project (e.g. main and subsidiary controls, political boundary), which are done by the Regional Office, would take 2 to 3 weeks, on average. But the final Inspection, verification and approval for one cadastral lot (generally, one municipality) would take 2 months, on average.

A cadastral survey done by administration will take a shorter period of time to conduct because this excludes the time-consuming process of bidding, ground inspection, and evaluation. However, successful undertaking of cadastral projects by the Regional Office under a 'by administration' approach would depend on the quantity and quality of

personnel available in the DENR Regional Office including the availability of sufficient funds for field expenses. We do not have information on the number of geodetic engineers and support staff each DENR regional office has. DBM has this information, which is necessary and useful in evaluating the feasibility of DENR requests for approval and funding of proposed cadastral projects to be done 'by administration'.

Having reviewed the process and procedures of a typical cadastral survey, the accomplishments, and status of the cadastral survey program, we then look at issues that affect the implementation and completion of cadastral projects.

B. Implementation Issues: Causes of Delay

The immediate concern regarding the cadastral survey program is its slow progress or the delay in the completion of cadastral projects. We discuss the causes of delay in implementation.

(i) Failed Bidding and Slow Procurement

Available data suggest that there is slow procurement for cadastral projects launched in 2011 and 2012. **Table 6** indicates that only 68 percent of WB-funded projects and 60 percent of government funded (GAA) projects in 2012 have been given the notice to proceed. It also shows that 11 percent of WB-funded and 19 percent of GAA-funded projects listed in 2011 were not given the notice to proceed. On another note, a few projects (2% to 4%) in 2009 and 2010 did not make it to the bidding stage and were not subject to re-bidding.

Table 6 also shows the proportion of WB-funded projects that had to be re-bid: 6 percent of 2011 projects and 17 percent of 2012 projects. On the other hand, for GAA-funded projects, 14 percent of 2012 projects need rebidding, and none for 2011 projects. Furthermore, the data suggest that for both GAA and WB funded projects, about 19 percent of 2012 projects have failed to reach the pre-bid conference stage.

Table 6. Status of Procurement Process (% of projects)

Activity	2007	2008	2009	2010	2011 (GAA)	2011 (WB)	2012 Cat A&C (GAA)	2012 Cat B (WB)
Pre-bid Conferenced	100%	100%	98%	96%	100%	94%	81%	82%
Bid-Opened	100%	100%	98%	96%	100%	94%	81%	82%
Bid Evaluation	100%	100%	98%	96%	100%	94%	81%	82%
Awarded	100%	100%	98%	96%	100%	89%	60%	71%
Contract Signing	100%	100%	98%	96%	100%	89%	60%	71%
Re-bidding	0%	0%	0%	0%	0%	6%	14%	17%
Notice to Proceed	100%	100%	98%	96%	81%	89%	60%	68%

Source: LMB
Note: Data as of August 2012.

Interviews with LMB and DENR-CALABARZON revealed that certain requirements in bidding/procurement make it difficult for the Regional Offices to attract bidders. We were informed that there have been many instances wherein there were no private contractors submitting bids. The officials interviewed maintain that it has been difficult to attract bidders in local areas because of the requirement for contractors to have at least 5 years of survey experience or work equivalent to it in terms of level and complexity.. It is noted that the cadastral survey program was suspended for a long time and only recommenced in 2007. Because of this many potential private contractors may not have accumulated enough survey experience as required by the DENR-LMB procurement rules.

The limit on the number of projects that can be undertaken by a private contractor at a time (a maximum of 3 projects) has also discouraged some contractors to bid, especially for projects with small budgets. This, however, has been addressed recently through a DENR Administrative Order (issued in May 2012) that allows for an unlimited number of projects per contractor on condition of ability to fulfil specific technical and financial capability. This AO may help in increasing the number of bids, but not necessarily the number of bidders who can submit competitive bids. It may help in having more cadastral survey projects to be undertaken in a given period of time.

The lifting of the limitation on the number of projects per contractor is a welcome improvement. This directive will help prevent cases of failed biddings and will allow undertaking of more projects, especially if the government would like to fast track the cadastral survey program. It is noted that the qualifications required of contractors, e.g., the

minimum number of years of survey experience or equivalent level of work required of the contractor should be maintained to ensure quality outputs.

One reason for the slow procurement in WB-funded projects is a guideline requiring the DENR Regional Office to submit bid documents to the World Bank (WB) resident mission in Manila for evaluation and application for a No Objection Letter (NOL). Under this requirement, bid documents are first submitted to the Foreign-Assisted and Special Projects Office of the DENR (FASPO) for an initial evaluation, which are then forwarded to the WB for a final evaluation and approval. A cadastral survey project can only proceed upon receipt of the NOL from the WB by the DENR Regional Office. It was pointed out during the interview that acquiring the NOL from the WB adds as much as a month's delay to the procurement process. Considering the numerous proposals to do a cadastral survey, the tedious two-step process constrains the efficiency of project implementation. The NOL is a requirement of the donor to ensure that the borrowed funds will be used for the intended purpose and that the winning bidder is qualified to do the job.

There is a need to review and streamline the process of securing approval for the winning bidder to proceed without sacrificing transparency and good governance. The DENR and WB should coordinate and agree on how improvements in guidelines and procedures may be done.

(ii) Dispute Over Boundaries

Based on interviews with the LMB and DENR-CALABARZON, conflicts in boundaries – political or not – do not necessarily lead to a suspension of the conduct of the cadastral survey. If a dispute among LGUs concerning political boundary issues is not settled, or a dispute between residents cannot be resolved even with the assistance of the CENRO, the commonly claimed or disputed area is reflected in the cadastral map. The cadastral survey of the whole area including the disputed portions will continue, meaning that the DENR will not wait for the dispute to be settled before conducting or proceeding with the cadastral survey.

A significant delay in the cadastral survey happens in the establishment of political boundaries when a LGU concerned disallows the conduct of the cadastral survey because of disagreement with an adjacent municipality. According to the interviews, this was one major factor behind the delay in the implementation of projects, especially the conduct of surveys

by the private contractors under Category B (political boundary survey).[20] The political boundary survey normally will take 6 months to 1 year to finish but because of the delay arising from a dispute among the affected LGUs the survey may take a year or more.

The cooperation of the LGUs that are subject to cadastral survey is crucial in completing the cadastral projects, especially in establishing political boundaries. A memorandum of understanding among the Secretaries of the DILG, DENR, and DBM respectively and the different leagues of local governments will be useful in addressing various local issues impeding the efficient conduct of cadastral surveys. At present, a memorandum of agreement between DENR and DILG is said to have been drafted but is yet to be signed.

(iii) Peace and Order Situation

Another cause of delay in the conduct of a survey is the peace and order condition in a locality. In this case, it is possible that the interruption of survey operations may even be indefinite especially in areas that have high security risks. There may not even be private contractors willing to bid for survey projects in such conflicted areas.

(iv) Volume of Projects Currently under Office Verification

In the earlier discussion on status of cadastral projects, it was found that many projects from 2007-2011 are still under office verification, i.e. survey returns submitted by private contractors are for inspection and verification by the DENR Regional Office. The lack of manpower in the DENR Regional Office (CALABARZON) is constraining the efficiency of the ground verification process. The Chief of the Survey Division of DENR-CALABARZON pointed out that given the limited number of technical personnel there could be more significant delays especially now with the increase in number of cadastral survey projects. This situation may be generally true across DENR Regional Offices but we were not able to obtain this information from the DENR Head Office. It will be important to find out the ratio of technical personnel, say geodetic engineers to the magnitude of the survey work to be done per Regional Office. The DENR Head Office can easily compute this ratio.

Data on status of the 2007-2011 cadastral projects by region in **Table 7** indicate that as of August 2012, about half of the projects launched in 2009 and 2010 are still undergoing

[20] Source: Chief of Surveys Division in DENR-CALABARZON.

office verification. These are years when the number of cadastral projects doubled that of 2007 and 2008.

The data also suggest that regions with 10 projects or less in 2007-2011 seem to have better accomplishments. They also have a lesser number of projects under verification and have more approved surveys. The problem is that having fewer projects would prolong and delay overall the completion of cadastral surveys in those regions.

On the other hand, in regions with more than 10 projects in 2007-2011 such as CAR with 21 projects, Region VI with 20 projects and Region X with 22 projects, accomplishment has been low. Region I with 12 projects is an exception because it has relatively good accomplishments. These regions have the most number of projects under office verification and the least number of approved surveys.

The absorptive capacity of the regions to manage cadastral survey projects is an issue, especially taking into consideration that the number of projects has significantly increased from 79 projects in 2011 to 354 projects in 2012. It will be important for DENR and DBM to determine the optimal distribution of geodetic engineers and support staff among the regions because lack of skilled manpower appears as a significant reason behind the delays and other problems encountered during implementation of the cadastral surveys. An attempt to remedy the situation is through the hiring of contractual staff. For 2011-2012, a total of 54 Geodetic Engineers and 18 Mathematician Aides were hired under contractual service to supplement the workforce of the cadastral survey projects in the regions.[21] An assessment should be done in order to determine whether the additional personnel expedited the completion of delayed cadastral projects and addressed other implementation issues in the regions where they have been assigned.

It is noted that the lack of cooperation of some LGUs is also part of the problem. Fieldwork done in the survey areas, such as the actual conduct of the survey and ground verification, requires official permission from the LGU officials. An uncooperative or inefficient LGU can impose a tremendous delay in the ground verification process.

Before a cadastral project is launched, the Regional LMS writes a letter to the LGU/Mayor of the municipality informing them that a cadastral survey will be conducted in their area. It is the private contractor that brings this letter to the LGU. The consent of the

[21] From DENR, "Comments on the Draft Report Submitted by PIDS Consultants on the ZBB Study Entitled Assessment of Efficiency and Effectiveness of the Cadastral Survey Program of DENR", September 20, 2012.

LGU signals the start of coordination for the launching of the cadastral project. The Regional LMS sets a meeting with the LGU to formally discuss the cadastral project and its launch and asks for cooperation and assistance as may be needed during the conduct of the survey.

Our review of accomplishments showed that the backlog of projects to be verified and validated is a serious problem. DENR instinctively will reach out for the obvious solution: for the inspections and verifications to be completed, additional personnel e.g. Geodetic Engineers may be needed. However, this does not necessarily mean hiring additional government personnel. There is scope for public-private partnership (PPP) as a mechanism to address the backlog and to expedite the conduct of future cadastral projects. The private sector has the incentive to secure the right number of personnel needed and the logistics required, etc, and to finish the job on time if not ahead of time. The participation of the private sector can also mean hiring them as technical advisors. However, it remains LMB's responsibility to supervise and manage those technical advisors.

Adopting a PPP approach does not necessarily mean that cadastral surveys should not be done "by administration" at all as there may be cases where such an approach is more applicable and justified. For instance, there may be instances where there is difficulty in attracting bids from private contractors due perhaps to problems with the peace and order condition or extreme difficulties in the planned survey areas. It may be advantageous to have some flexibility in this regard.

Table 7. Status of 2007-2011 Cadastral Projects by Region, as of August 2012

		2007				2008				2009				2010				2011			
REGN	Total no. of projects 2007-2011)	No. of proj	Ongoing: Fieldwork	Ongoing: Office Verif	Approved Survey	No. of proj	Ongoing: Fieldwork	Ongoing: Office Verif	Approved Survey	No. of proj	Ongoing: Fieldwork	Ongoing: Office Verif	Approved Survey	No. of proj	Ongoing: Fieldwork	Ongoing: Office Verif	Approved Survey	No. of proj	Ongoing: Fieldwork	Ongoing: Office Verif	Approved Survey
CAR	*21*	*9*		8	1	*1*	1			*5*	1	1	3	*3*	2	1		*3*	1	2	
NCR	*8*									*5*	1	4		*1*	1			*2*	1		
Region I	*12*					*4*			4	*4*		1	3	*3*		3		*1*	1		
Region II	*15*	*1*			1	*1*			1	*4*			4	*3*		3	2	*6*	4		1
Region III	*15*	*6*			6	*2*			2	*1*			1	*2*				*4*	4		
Region 4-A	*22*	*3*		1	2	*1*			1	*3*		1		*2*	1	1		*13*	4	9	
Region 4-B	*6*					*1*		1		*1*		1						*4*	1		
Region V	*10*	*1*	1			*1*			1	*5*	4	1						*3*	3		
Region VI	*20*					*3*		2	1	*7*		6	1	*7*	2	5	1	*3*	2		
Region VII	*24*	*3*		1	2	*5*		2	3	*1*			1	*6*	1	4		*9*	9		
Region VIII	*14*	*1*			1	*1*			1	*3*		2	1	*6*		6		*3*	3		
Region IX	*12*					*1*		1		*2*		2		*3*	1	2		*6*	3	3	
Region X	*22*									*11*	5	6		*5*		5		*6*	5		
Region XI	*12*									*5*	2		3	*4*	3	1		*3*	2		
Region XII	*17*	*1*		1		*3*		3		*5*		2	3	*3*	2	1		*5*	2		2
Region XIII	*18*					*1*			1	*2*			2	*7*	2	2	3	*8*	5	3	
Total	*248*	*25*	1	11	13	*25*	1	9	15	*64*	13	27	22	*55*	15	34	6	*79*	50	17	3

Source: LMB data as of August 2012

C. Overlap of Survey and Titling Activities with other Government Agencies

Given that two other government agencies conduct survey and titling activities aside from DENR-LMB/LMS, namely, the Land Registration Authority (LRA) and the National Commission for Indigenous Peoples (NCIP), the issue of whether or not there is an overlap in the conduct of such activities arises.

An appreciation of the different mandates of the concerned agencies indicates that the surveying and titling functions and the expected outputs of the 3 agencies are distinct and delineated, implying that there is no apparent functional overlap as shown in **Table 8**. It seems that for as long as these functions are strictly followed in practice, there would not be any overlap in discharging their respective functions. This also highlights the importance of research and sharing of information as far as land records are concerned. Awareness of the status, classification of an area, and the purpose of the survey lessens the probability of an overlap happening during actual surveying or titling activities.

Table 8. Surveying and Titling Activities of Selected Agencies

Agency	Surveying and Titling Functions	Output
DENR-LMB/LMS	Cadastral survey of public/A&D lands – for purposes of titling, taxation, land use planning; patent titling; Cadastral survey also covers forestlands	Cadastral map and lot data, free patent
LRA	Issue subsequent or transfer certificates of title (judicial or admin)	Subsequent or transfer certificates of title (judicial, decreed or admin)
NCIP	Issue certificate/title for ancestral land/domain	Titles for ancestral domain/land

It is noted that the three agencies (LMB, LRA, and NCIP) all operate in the identified alienable and disposable (A&D) lands. DENR-LMB is concerned with cadastral survey, which includes patent titling. LMB's patent titling function may be a source of overlap with LRA in as much as the latter is (mainly) concerned with land titling although clearly LRA deals with transfer certificates of title, not patent titles. In the case of NCIP it is concerned with issuing titles over ancestral domain lands, which lands may also have been or are also currently subject to petitions for patent titling by long-time residents, not necessarily belonging to minority groups, e.g., tribes. The upshot of this observation is that these three agencies will have to properly coordinate their activities, share land information, properly

train their staff members, and install/use modern technologies, e.g., computerization of land information, use of satellite information and others, to avoid any overlap.

V. An Estimate of the Number of Years and Costs for Completion of the Cadastral Survey Program

This section attempts to estimate the number of years needed to finish and complete the cadastral survey program and the project cost required. The LMB has data on the status of the cadastral survey program. However, there is no exact figure as to how many areas still remains to be surveyed. **Table 9** presents the status of the cadastral survey program: (a) areas not yet surveyed, (b) partially surveyed areas, (c) surveys in-progress and (d) approved surveys. These are estimated figures. The table also presents the remaining areas that need to be surveyed based on the status of the program as of CY2010. For the estimation of the cost for the completion of the survey of remaining areas, we made a few simple assumptions because some information that would be important in doing our estimations are not available. For instance, interviews at the Geodetic Surveys Division of LMB indicated that the partially surveyed projects may need a Category B survey (political boundary). However, information as to the number or proportion of projects that need Category B is not available. The interviews also indicated that some of the in-progress projects may be partial and not full cadastral surveys, and so may require additional surveys later on. There is likewise no information on the number or the proportion of such projects. Given that some important pieces of information are not available, we made the following assumptions in estimating the remaining area:

(1) Un-surveyed areas will undergo a full cadastre survey (Category A).
(2) Partially-surveyed areas that are covered by Public Land Subdivision Surveys (Pls) and Group Settlement Surveys (Gss) will undergo a Category B (political boundary survey). We found from our interview at LMB that partially surveyed areas may require a political boundary survey.
(3) Some of the projects under “In-progress” may be partial surveys, that is, not covering the whole municipality according to our interviews at LMB. Thus, we assume that half of those projects may require Category A survey.
(4) Areas with approved surveys will not be re-surveyed.
(5) Category A projects will take at most 2 years to finish from start (bidding) to finish (verification process and then approval), while Category B will take about 1 year to finish.

These assumptions are based on LMB data and interview with CALABARZON Regional Office/LMS.

(6) Project costs are as follows, based on LMB's bills of quantity as of March 2012: PHP 3,003.05 per hectare for Category A; PHP 326.05 for Category B; PHP 2,677 for Category C.[22] In computing the budget for the survey, we also present estimates adjusted for inflation of 5% (average inflation in the last 10 years, using BSP data).

(7) The cadastral survey projects will be done by private contractors.

Using LMB data made available to us, we estimated that the remaining area that still needs to be covered by the cadastral survey is around 10,902,545 hectares (**Table 9**). In particular, there are approximately 1.028 million hectares of land that have not been subjected to the cadastral survey. We estimated about 3.156 million hectares of in-progress cadastral projects and about 6.718 million hectares of partially-surveyed areas that need to be surveyed based on the assumptions given above.

Table 9. Summary of Cadastral Status for CY2010

	Municipalities	Cities	Total	Program Status as of CY2010: Land Area (ha)	Estimated Balance as of CY2010: Land Area (ha)
Approved Survey	780	104	884	16,898,210	----
Partially surveyed	294	12	306	6,718,043	6,718,043
In-Progress	263	18	281	6,312,932	3,156,466
Un-surveyed	45	-	45	1,028,036	1,028,036
Total	1,382	134	1,516	30,957,221	10,902,545

Source: Geodetic Surveys Division, LMB and authors' calculations

Notes: Excluding ARMM; "Program Status as of CY2010" refers to the accomplishment of the cadastral survey program by project status; "Estimated Balance as of 2010" refers to the land area that still needs to be subjected to cadastral survey, as calculated by the authors based on the assumptions mentioned above.

Given the assumptions above and the data available in LMB, we present estimates of the target project coverage and project cost under two scenarios: completion of the cadastral survey program within either a five-year or ten-year time frame.

(1) Completion of cadastral survey projects in 5 years

Given the status of the cadastral program as of 2010, the estimated area that remains to be covered by cadastral survey is approximately 10.902 million hectares. If the

[22] This 'Bills of Quantity' has been used by LMB since 2009 and needs updating.

program is to be finished in 5 years, the program should target an annual average of 2,725,636.25 hectares of cadastral projects within a four year period, assuming that there is a year of delay before the survey is actually completed.

The cost entailed by such targets is an annual average of PHP3.689 billion in a span of 5 years inclusive of a year of delay. Hence, we estimate a total cost of PHP14.757 billion. This estimate used the project costing that has been implemented by LMB since 2009, i.e. PHP 3,003.05 per hectare for Category A; PHP326.05 for Category B; PHP 2,677 for Category C. Adjusting for a 5% yearly inflation, total project cost will be around PHP16.696 billion. The project costs per year under different project cost assumptions are indicated in **Table 10.**

Table 10. Cost of Completion of Cadastral Survey Program in 5 years

	Balance as of 2010 (ha.)	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Coverage in hectares	10,902,545	2,725,636	2,725,636	2,725,636	2,725,636	(spill-over)	10,902,545
Project Cost 1	---	3,689,168,304	3,689,168,304	3,689,168,304	3,689,168,304	---	14,756,673,215
Project Cost 2	---	3,689,168,304	3,689,168,304	3,689,168,304	3,873,626,719	---	14,941,131,630
Project Cost 3	---	3,873,626,719	4,067,308,055	4,270,673,458	4,484,207,131	---	16,695,815,362

Source: Authors' calculations using data and information from LMB
Note: Project Cost 1 uses current Bill of Quantity (project costing) used by LMB since 2009; Project Cost 2 shows a one-time adjustment for inflation of 5%; Project Cost 3 adjusts for yearly inflation of 5%. The inflation rate of 5% was used as this was the average rate in the last ten years-BSP data. All costs in pesos.

(2) Completion of cadastral survey projects in 10 years

Using the same 10.902 million hectares remaining to be surveyed as of 2010, to finish the program in 10 years inclusive of a year's delay, the government should target an annual average of 1,211,394 hectares of cadastral projects in 9 years. This gives the projects launched in the 9th year some allowance of time to complete in case they will not be finished during that year, considering also that Category A surveys take up to 2 years to complete.

This set up will entail an annual average project cost of about PHP1.640 billion and a total of around PHP14.757 billion, using the current project costing (Bill of Quantity) of the LMB. As in the previous scenario, if we adjust for inflation of 5% every 5 years, total budget will then be about PHP15.335 billion (**Table 11**); while, a yearly 5% inflation will give a total budget of around PHP18.983 billion.

Table 11. Cost of Completion of Cadastral Survey Program in 10 years

	Balance as of 2010	Year 1	Year 2	Year 3	Year 4	Year 5	
Coverage in hectares	10,902,545	1,211,394	1,211,394	1,211,394	1,211,394	1,211,394	
Project Cost 1	---	1,639,630,357	1,639,630,357	1,639,630,357	1,639,630,357	1,639,630,357	
Project Cost 2	---	1,639,630,357	1,639,630,357	1,639,630,357	1,721,611,875	1,721,611,875	
Project Cost 3	---	1,721,611,875	1,807,692,469	1,898,077,092	1,992,980,947	2,092,629,994	
(cont'd)		Year 6	Year 7	Year 8	Year 9	Year 10	Total
Coverage in hectares	---	1,211,394	1,211,394	1,211,394	1,211,394	spill-over	10,902,545
Project Cost 1	---	1,639,630,357	1,639,630,357	1,639,630,357	1,639,630,357	---	14,756,673,215
Project Cost 2	---	1,721,611,875	1,721,611,875	1,721,611,875	1,807,692,469	---	15,334,642,916
Project Cost 3	---	2,197,261,494	2,307,124,569	2,422,480,797	2,543,604,837	---	18,983,464,074

Source: Authors' calculations using data and information from LMB
Note: Project Cost 1 uses current Bill of Quantity (project costing) used by LMB since 2009; Project Cost 2 adjusts for inflation of 5% in 2014 and another 5% in 2019; Project 3 adjusts for yearly inflation of 5%. Inflation rate of 5% was used as this was the average rate in the last ten years-BSP data. All costs in pesos.

The two scenarios presented also assume timely accomplishment of all survey activities by the surveyor, and also timely verification and approval by the Regional Office/LMS. The bottleneck of the program since 2007 has largely been the office and field verification processes. To address this constraint, there should be adequate and well-trained manpower in the Regional Office/LMS to verify and approve surveys without delay. This need is felt most especially in regions that have low physical accomplishments.

VI. Summary and Recommendations

This paper reviewed the accomplishments of the cadastral survey projects undertaken in the government's cadastral survey program. It also determined the causes of the slow progress of the program implementation based on information and data made available by the DENR. It was found that the causes of implementation delays include the following:

(a) tedious procurement process due to several factors, including some procurement guidelines;

(b) frequency of failed bidding arising from defects in procedure and documentation;

(c) unresolved dispute over boundaries especially when it is LGUs that are in disagreement;

(d) slow ground verification process due to lack of skilled manpower, e.g., geodetic engineers, and the backlog in the huge volume of projects currently under verification;

(e) the peace and order situation in the area subject to cadastral survey, and
(f) the lack of cooperation of some LGUs;
(g) inaccurate and dated database that prevents efficient planning and programming of resources for the surveys.

Based on the status of the cadastral program as of CY2010 and some assumptions, we estimated that the remaining area that still needed to be surveyed is approximately 10.902 million hectares.

Estimates of the time and cost of conducting the remaining cadastral surveys were presented in two scenarios. To complete the survey of the remaining areas in 5 years, the government needs about PHP14.757 billion based on current Bill of Quantity used by LMB, without adjustment to inflation; or about PHP14.941 billion under a one-time adjustment of 5%; or about PHP16.696 billion if adjusted yearly for 5% inflation.

On the other hand, completing the program in 10 years will entail cost amounting to about PHP14.757 billion, using the current Bill of Quantity; or around PHP15.335 billion if adjusted for 5% inflation every 5 years; or about PHP18.983 billion if adjusted yearly for 5% inflation.[23]

Given these findings, the following recommendations to improve the program are presented:

- **LMB should allocate time and budget to improve, cleanse, monitor, and update its land database.** This should be done in coordination with NAMRIA, LRA, and NCIP, which are the associated land agencies of the government. The DENR-LMB should also check and organize available records for sharing information with its Regional Offices.
- **Before approving the funding of proposed cadastral projects, DBM should require DENR-LMB to (a) submit accurate data and information on accomplishments of the previous year's cadastral survey projects, and on remaining areas to be surveyed, and (b) expedite the conduct of the delayed but previously approved cadastral projects.** There is a serious back log in cadastral surveys and this has to be resolved prior to accepting any request for

[23] These estimates were based on available crude data and information and some simplifying assumptions. More refined or accurate data would have provided better estimates. When such more accurate or better data become available, the method used in the estimation here may be one option to estimate the remaining cost and time to complete the cadastral survey program.

funding of new cadastral projects. Addressing the back log in a resolute manner will also give LMB the necessary information and experience on how to manage and implement future requests for funding cadastral projects.

- **DBM in collaboration with DENR should provide both a hard budget constraint and indicate the time period to complete the planned cadastral survey projects with specific performance indicators to justify additional budgets.**

- **DENR in collaboration with other agencies such as NAMRIA, LRA should install a modern project monitoring system that links information and data from the municipal, city, and provincial level to the regional office, which in turn is linked to a central database at the LMB, with data updated and validated in a regular and timely manner.**

- **DENR should formulate and implement specific guidelines to finish the backlog and accelerate the completion** of the survey of remaining areas.

- **DBM and DENR should agree on a joint monitoring and field verification process to check on the progress of the cadastral survey program. DBM can perform random and unannounced checks in this regard. This would be one way of motivating the DENR regional offices to efficiently implement the program**.

- **DENR and DBM could consider public-private partnership (PPP) as a mechanism to address the backlog in cadastral surveys and to expedite the conduct of future cadastral projects.**

- **DENR and the main donor, the World Bank, should revisit the procurement guidelines in order to speed up the issuance of the NOL.**

- **DENR, DILG, the relevant leagues of local governments, and the specific LGU or LGUs concerned should sign a memorandum of understanding to expedite the survey of disputed areas in the LGU/LGUs concerned. DENR Regional Offices should give a feedback to the Head Office on instances of non-cooperative behaviour so that appropriate intervention to address problematic**

LGUs may be done at level of the DILG and DENR secretaries. The oversight agencies (DENR and DILG) should monitor compliance with the MOU.

- **DBM and DENR should jointly conduct field visits to collect more and better information and verify the findings of this paper**. Because of budget and time constraints it was not possible for the study team to collect a sufficient quantity of data on the subject.

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