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Research Article

Legal and Technical Analysis of Overlapping Titles in Baguio City

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ABSTRACT

This study aims to analyze the legal and technical problems involving overlapping land titles in Baguio City. The study was conducted at different households, firms and the DENR Regional Office located at Baguio City with a total of 19 participants consisting of landowners, geodetic engineers and DENR employees. The study employed qualitative research design with the use of one on one interview as the primary instrument in gathering data. All gathered data were summarized, analyzed, coded, themed and interpreted with the use of thematic analysis. Based on the data, these are the following findings: the causes of overlapping are contradiction of reference system, precision and accuracy of old and new practices, lack of inter-agency coordination, inaccessibility of old records, and human error; landowners, geodetic engineers and DENR employees have contributions to overlapping; the possible approach to overlapping are unification of reference system, improvement of inter-agency coordination and Joint Relocation survey. The conclusions are the following: the evolution of survey is one of the main factor of overlapping, from the instrument, practices, methods and systems used; every stakeholders holds a responsibility in having overlapping land titles whether that be intentional or unintentional; having one system is the ideal solution to overlapping and its proper implementation should be strictly overlooked.

Keywords: Reference system, Instruments, Geodetic engineers, Boundaries, Point, Cadastral, Survey plan

Introduction

Overlapping land ownership certificates is a condition in which there are two or more certificates issued for the same land object, either

in part or in whole. In other words, there is an overlap of legal data and physical data on the land plot (Faruq and Hariri, 2023). The overlapping of land properties mostly occurs when

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a structure, fence, wall, or any physical improvement intrudes into an area that belongs to another property owner. Such unauthorized intrusions violate the owner's right to exclusive possession and can diminish the full enjoyment of the property. This can cause serious conflicts, including damages and physical altercations between the owners. Other owners even go through litigation to solve this problem.

In Indonesia, there are overlapping, double certifications, and even awarded land certificates, but then a Land Ownership Statement was released by the local administration, specifically the Head of Village and the neighborhood association. Numerous things might cause it, such as the inability to put the provisions of the Basic Agrarian Law and the rules that implement it in a consistent, logical, and appropriately, as well as the reality that some people continue to act for their own benefit notwithstanding other people's rights. Therefore, it is impossible to prevent land disputes. Additionally, if the property is situated in a desirable location, such a government center site, where the cost rises in tandem with development, increasing the demand for land (Karianga & Yunus, 2022).

With the development of the Philippines overlapping cases are occurring. Such instances wherein two certificate titles are overlapping due to some errors that were not overlooked in the past such as, erroneous survey plan and defective surveys (Spouses Yu Hwa Ping & Mary Gaw v. Ayala Land, Inc., 2019). Overlapping of properties in Baguio are mainly caused by the conversion of Baguio City into a town site reservation. This led to a conflict between the indigenous people and those who have migrated. In consideration with the IP's right, the government have granted Certificate of Land Ancestral Titles however the given titles had overlapped to other private properties. One case even said that the reference point of ancestral titles issued which were erroneously plotted resulted to overlapping with other areas (Republic of the Philippines vs. National Commission on Indigenous People, 2023).

The land is regarded as a valuable resource due to a variety of factors, such as its function in supplying people with food, shelter, and natural resources, its support of economic and

cultural activities, its importance for biodiversity and the health of ecosystems, and its limited availability (Wijayanti & Handayani, 2023). Given its crucial role, ownership and use of land must be carefully and equally governed to avoid conflicts and disagreements and guarantee legal certainty. Land ownership in the Philippines is a matter of both legal entitlement and precise technical documentation. Two of the most critical instruments in asserting and protecting property rights are the land title and the survey plan. However, despite the comprehensive legal and technical framework in place, instances of overlapping titles and conflicting survey plans continue to pose significant challenges in land administration and property rights enforcement.

Ownership in the Philippine legal system is primarily governed by the Civil Code of the Philippines (Republic Act No. 386). Ownership confers upon the lawful owner the right to enjoy and dispose of a thing, including the right to use, possess, and exclude others from the property. These bundle of rights are strongly protected by law, subject only to certain limitations such as police power and eminent domain. A land title serves as legal proof of ownership, defining the extent of one's rights over a parcel of land. Presidential Decree No. 1529 (the Property Registration Decree) sets forth the framework for obtaining and maintaining Torrens titles. Under this system, once a title is registered, it becomes indefeasible and incontrovertible after the lapse of the prescribed period. This conclusive nature of Torrens titles simplifies the resolution of boundary disputes and facilitates the identification of the legitimate owner in cases of encroachment. Alongside the Civil Code and land registration laws, local government units (LGUs) play a crucial role in regulating land use and enforcing zoning ordinances.

Complementing the land title is the survey plan, a technical document prepared typically by a licensed Geodetic Engineer, which defines the metes and bounds of the property. According to the Department of Environment and Natural Resources (DENR), a survey plan is a two-dimensional representation that includes boundaries, coordinates, and control points,

which serve as geodetic references to determine the accurate position and area of a land parcel (DAO No. 2025-11). The survey plan is expected to reflect the physical reality on the ground and align with the legal boundaries stated in the title. The occurrence of overlapping titles and inconsistent survey plans can often be traced to errors in Isolated Surveys, inaccurate or outdated control points, or the absence of harmonized geodetic data. Isolated Surveys, which refer to surveys of parcels for various land uses whether agricultural, residential, commercial, or resettlement can be prone to inconsistencies, especially when not integrated into a unified national geodetic network (DAO No. 2007-29). The role of the Geodetic Engineer is thus crucial in ensuring the accuracy and integrity of survey data. As mandated under Republic Act No. 8560, only licensed Geodetic Engineers are authorized to conduct land surveys, establish control points, and prepare survey returns (RA 8560, 1998). However, when surveys are not anchored properly to established geodetic control points or when there is duplication in the registration of titles, conflicts inevitably arise. Furthermore, this study offers significant benefits in improving land dispute resolution, strengthening the land registration system, and guiding landowners and developers. It also highlights the need for more efficient coordination between geodetic surveys and land titling, which can lead to improvements in the accuracy, integrity, and reliability of the country's land registration system. Also serves as a valuable guide for landowners and real estate developers, raising awareness of the risks associated with conflicting titles and survey errors, and encouraging due diligence such as verifying geodetic data and consulting professionals before engaging in land transactions. Legal analysis has traditionally focused on the validity, registration, and transfer of land titles, emphasizing the Torrens system and judicial remedies in cases of fraudulent claims. These studies often explore legal doctrines and jurisprudence governing ownership but seldom examine how technical inconsistencies in survey plans contribute to legal disputes. On the other hand, technical research in geodetic engineering has largely concentrated on improving survey

methodologies, accuracy of measurements, and the use of geospatial technologies, with minimal discussion of the legal consequences arising from inaccurate or conflicting surveys.

As a result, there is limited research that connects how errors or variations in survey plans such as misaligned control points, outdated isolated surveys, or improperly referenced boundaries can directly lead to the issuance of overlapping land titles and land surveys. This lack of integration between the legal and geodetic perspectives creates a blind spot in understanding the root causes of land conflicts. A comprehensive analysis that considers both the legal instruments (titles) and technical documentation (survey plans) as interdependent factors is therefore necessary to address the persistent issue of land overlaps in the Philippines. This research aims to identify the root causes, legal implications, and potential resolutions of conflicting claims to the same parcel of land. By analyzing relevant statutes, and administrative practices, the research seeks to clarify the legal principles governing land ownership and title registration. This research should also come up with specific suggestions and ways to make sure that people who own land rights have legal security which can help prevent future disputes, enhance land governance, and protect the rights of legitimate landowners.

Assumption of the Study

This study aims to understand and analyze the possible factors of overlapping land titles and survey plans.

Specifically, it sought answers to the following questions:

1. What are the causes of overlapping of land titles?
2. What are the contributions of landowners, DENR and Geodetic Engineers to overlapping boundaries?
3. What are the legal approaches to lessen possibilities of overlapping?

Research Design

The qualitative and descriptive method of research was utilized in this study. Qualitative research focuses on gathering and analysing non-numerical data to gain a deeper

understanding of human behavior, experiences, and perspectives (Simply Psychology, 2024). It embraces openness and at the same time uses the means such as open-minded questions, in-depth and focus interviews and participant observation, exploring “what”, “when”, “where”, “why”, “who”, and “how” of a social phenomenon to gain deeper contextual understanding (Lim, 2024). This method aims to anticipate furthering the information needed in this research. According to Hassan (2024), in this approach, the researcher designs interview questions that align with the research objectives to ensure relevant and meaningful data collection. The interviews are conducted in person to capture comprehensive responses, which are then organized and analyzed using thematic or content analysis to identify patterns, themes, and insights related to the study.

When it comes to the theoretical aspects of the possible factors of overlapping land titles and survey plans, several concepts and frameworks can be applied to understand and analyze their relationships. Here are some relevant theories:

Two Loops Theory of Change: as explained by (Wilson, 2025) how old systems decline while new ones emerge. Change happens in two overlapping cycles: the first loop represents the legacy system that has matured and is beginning to lose relevance, while the second loop represents the emergence of an innovative system that gradually replaces it. This theory emphasizes the importance of managing the transition between these loops, where decline and innovation coexist. With the work of geodetic engineers, it is expected that outdated reference systems are needed to face to convert or update them as they foundational frameworks in land surveying.

Hegel's Personality Theory of Property: views property as an external expression of an individual's will and identity. According to Hegel, ownership allows a person to give physical form to their freedom by marking and possessing a portion of the external world. When a landowner establishes boundaries, they are not merely drawing lines on the ground but are symbolically projecting their personality and autonomy onto that space. Boundaries,

therefore, represent the material extension of oneself in society. (Kumar, 2025)

Bounded Rationality: introduced by (Simon, 1955) in his seminal paper A Behavioral Model of Rational Choice, provides a foundational lens for understanding decision-making within technical professions such as geodetic engineering. Simon challenged the classical assumption of full rationality in decision-making, arguing that individuals rarely make perfectly optimal choices because they face limitations in information, cognitive capacity, and time. Rather than seeking the best possible outcome, decision-makers tend to satisfice—that is, they choose an option that is good enough given the constraints and context (Simon, 1955). This theory helps in analyzing how decision-making among geodetic engineers, surveyors, and land administrators contributes to mitigate the problem of overlapping land titles and survey plans. It assumes that such overlaps are not merely technical errors but are outcomes of decisions made within bounded informational, cognitive, institutional, and resource constraints. By applying this theory, this study aims to understand how the limitations of current cadastral systems and organizational processes shape the quality of survey decisions. Recognizing these bounds allows for a more realistic assessment of how overlaps arise and how they may be reduced.

Legal Realism: a theory that emphasizes that the law should be understood not as a fixed set of abstract moral principles, but as a prediction of how courts and legal officials act in real situations. Holmes, O.W.Jr. (1897) belief that understanding law requires examining how it functions in action, influenced by the decisions and judgments of those who enforce it. Survey Plan is vital in determining the precise measurement of a large property. The practice encompasses multiple procedures that require coordination with various government agencies to attain the highest level of accuracy and precision in the survey plan, in accordance with relevant laws, rules, and regulations. However, these procedures are often accompanied by challenges. In some cases, inefficiencies practices within government agencies greatly affects the accuracy and precision of the survey plan. These practices are often influenced by

personal interest, leading to the neglect of proper procedures and the negligence of official responsibilities. This has become a prevalent norm in the country, wherein approvals, regardless of the issue’s magnitude, can often be obtained through undue favors or exchanges.

In one case decided by the Supreme Court, the OIC-Regional Executive Director of the DENR demanded Two Million Five Hundred Thousand Pesos for the grant of the application for the issuance of Free Patent title which the applicant acceded. Various news reports have highlighted comparable incidents, including alleged corruption within the DENR concerning the approval of cadastral survey. Reports indicate that survey approvals were deliberately denied or delayed until a 30% commission was given to the DENR, after which the necessary signatures and approvals were granted. Utilitarianism on Property: as explained by (Menell, 1999) in Intellectual Property: General Theories, views property rights as tools created by society to promote the greatest overall good. Unlike natural rights theories, which see ownership as an inherent moral entitlement, utilitarianism argues that property laws exist because they produce positive social outcomes—such as economic efficiency, fairness, and stability. Property rights, in this view, are designed to encourage people to use land productively, avoid conflicts, and invest in improvements that benefit both individuals and society as a whole. This theory serves as the guiding framework for examining the issue of overlapping land titles and survey plans. It provides a philosophical and practical basis for evaluating how current land policies and surveying practices affect the well-being of individuals and communities. The study assumes that the main goal of property law and land administration should be to maximize social benefit—by en-

sureing fairness, reducing disputes, and supporting efficient land use. Understanding these concepts, it provides the basis for analyzing how factors such as control points, involved agencies and individuals, contribute to the possibilities of overlapping of land titles and survey plans.

Result and Discussion

This chapter presents the result and discussion gathered from the Participants regarding overlapping land titles in Baguio City.

Causes of Overlapping Land Titles

According to the Participants the following are the causes of overlapping land titles in Baguio City.

Contradiction of Reference System Used

The results show that the cause of overlapping land titles is the inconsistent reference system used by surveyors. Some surveyors use grid coordinate, PRS92, or plane coordinates, others rely on outdated tie points or localized systems. As a result, it shows a discrepancy in survey plan and technical description when plotting the land boundaries. Hence, confusion further increased by the fact that the reference points mentioned in titles frequently differ from their actual ground positions.

Additionally, the Participant also pointed out that overlapping also caused due to the conversion techniques and angle of rotation. Another cause of overlapping is the unsynchronized projection of DENR. Some surveyors rotate transformations clockwise, while others rotate them counter-clockwise. Therefore, this led to coordinate mismatched and surveys that “do not match” despite being technically correct with the standards at the time they were created. Another cause of overlapping is the unsynchronized projection of DENR.

Table 1. Causes of Overlapping Land Titles

Themes	Summary Of Key Points
1. Contradiction of reference system used	Different use of reference system like Philippine Reference System of 1992 (PRS92), Philippine Plane Coordinate System (PPCS), and Philippine Transverse Mercator (PTM)
2. Precision and Accuracy of Old and New Practices	Technical practices and survey instruments between old and new methods

Themes	Summary Of Key Points
3. Lack of Inter-Agency Coordination	Each Agency has their own data and projection
4. Inaccessibility of Old Records	Loss of data and unreadable records from record keeping
5. Human Error	Typographical error is one of the causes of overlapping

Participant 1: The surveyors used different reference systems. Either the surveyors used a localized reference system or from a tie point (the established reference system).

Participant 2: The reference used was wrong. That's the number one issue when you conduct a survey. The previous surveyors used a different reference system. Then another surveyor on the other side also used a different reference, and that became the cause of the overlapping.

Participant 3: One of the causes is related to the conversion. Not everything is the same, there is an angle of rotation. Some surveyors applied the angle of rotation from the right, while others applied it from the left. Others even consider everything as 'to the right,' which is not how it should be.

Participant 4: Then the projection of Baguio City is not synchronized

Participant 5: If the transformation I applied to your data is 1 degree clockwise, and I made all of us use 1 degree clockwise, that's not actually its original history. Yours was supposed to be counterclockwise. So, there will still be overlapping—that's one of the reasons.

Participant 6: The majority of cases in Baguio City required a Joint Survey. The issue is that different references were used, which results in overlapping on the ground, but the lots appear to adjoin when it comes to the plotting on the title.

Participant 7: The cause of that is the reference and control point that were used.

Participant 8: The references become inconsistent due to the various coordinate systems—some employ grid, others assume coordinates, and still others use different settings during relocation. Because of this, the reference ends up far from its

intended location. Typically, the reference point in your title seems distant, but it's actually just the same point.

Participant 10: the reference system isn't properly organized. There are so many overlapping reference systems, and a lot of them are really floating.

Participant 11: As for observations, there are still some issues because some systems—especially our tie-points—are not just 'true' but also assumed. The difficulty is that we can't recover those tie-points anymore; they have been buried, improved, or concreted, so we can't find their actual location

Participant 13: There are so many different projections because many surveys were localized. Now we are also adapting the PRS92 system, and then we have what we call the grid. Sometimes, this especially causes issues for those surveys that were already localized

Practical instances of how inconsistent reference systems result in overlapping titles can be found in legal and administrative documents from Philippine courts. Supreme Court rulings in cases involving overlapping titles frequently show that conflicting interpretations of boundary locations arise from unclear or out-of-date tie points that are not directly connected to a recognized geodetic control. The representation of territorial extents may change and result in overlaps with nearby parcels when cadastral plans lack accurate, contemporary reference ties (Supreme Court of the Philippines, 2017). Cadastral surveys and land titling depend on precise and reliable geodetic reference systems. Surveyors can precisely determine the location of points on Earth using a geodetic reference system, which consists of a datum and related coordinate frames. The resulting spatial data may not align when cadastral surveys are carried out using different or mismatched

reference systems, which could result in discrepancies in parcel boundaries and ultimately contribute to overlapping land titles. National land administration studies have documented this tendency, noting that a recurrent technical problem in cadastral integrity is the inconsistent usage or modification of reference systems (Jurist Legal Summary, n.d.).

Precision and Accuracy of Old and New Practices

The results on the precision and accuracy of old and new surveying practices in Baguio City shows a significant difference in older surveying methods and modern approaches. Historically, Participants highlighted that surveys were performed manually, such as transit and compass instruments often subject to human judgement and environmental influences. Additionally, bearings were handwritten, distances were measured using tapes, and plotting was done using drafting tools. As a result, the margin of error was significantly higher. These caused by magnetic interference, weather conditions, and different terrain-which affected the overall accuracy and precision of the survey.

In contrast, modern practices employ automated and technologically advanced instruments such RTK (Real Time Kinematic) and total station. This instrument provides higher precision and reduced human-induced errors. Modern technology also makes it easier to detect the discrepancies between surveys, making overlaps and boundary conflicts easier to identify.

Participant 2: Many of the old ones were done manually. The Leroy surveys also were done manually, and they sometimes would switch the directions. The direction could be measured, but there could be typical errors.

Participant 3: Usually the old practices

Participant 5: Some of them used magnetic because they relied on transit back then. You only used a compass, so if you didn't observe the sun or stars and just used your compass, then your survey would be magnetic or assumed.

Participant 11: Well, there are also lapses within the office. Some approved

plans from before were not properly checked to see how the projections were done manually. Back then, it was only possible to notice overlaps if they were large. Small overlaps were often overlooked because they were not easily visible, depending on the scaling. Now, with automated systems, it is easier to detect overlaps, even the smaller ones.

Participant 5: We should also consider that even before, overlapping was already prevalent in Baguio City. This is because of the history and uniqueness of Baguio, where the original surveys were done individually. According to our law, the City Charter of Baguio was established back in 1909. Uniquely, it stated that titling would be done through sale—specifically, TSA townsite sale. So, if you were an applicant applying for a townsite, your land or lot application would be surveyed individually. This resulted in different surveys, done at different times, by different surveyors, using different tie points, and so on.

Participant 5: Another reason in Baguio why we have magnetic surveys is because of the weather. The solar observation is between 8 to 10, 2 to 4. Back in the old days, if it rained here, it could rain for three weeks straight. If you had a project, you wouldn't be able to finish it until the sun finally came out. So the practitioner would carry on with the work even without sunlight and claim it was 'true,' but in reality, it was magnetic.

Participant 7: Originally, the instrument used was the transit that was manually operated. Back then, when they conducted surveys... for example, the tie point used was done with the transit, because originally it was meant to measure the alignment of the rods

Participant 8: The instrument alone since then was transit and now RTK came out.

Participant 9: Back then, the instrument used was the tape. We had to apply sag correction because of the sloping areas and terrain. We computed the sag error of closure using the transit. Now, with

the latest RTK, we're better off. If you compare it to back then, the tape would accumulate errors at every station.

Participant 12: Another factor is the equipment we used in the past. Some of our older surveys relied on outdated tools, while others only used a compass. As technology improved, we switched to the total station, then to RTK, and now we even use drones. The instruments changed over time, which affected our surveys. Because each tool had different levels of precision, some surveys ended up overlapping

Participant 16: The main cause of this discrepancy is probably the instruments that were used back then. They were just the basic tools used for simple measurements

Participant 16: If you look at it, the surveys back then were different from each other.

Digital mapping creates and analyzes data using computer technology and software, whereas conventional mapping is done by hand. In traditional mapping, geographical objects are manually measured and plotted on paper using tools like a compass, tape measure, and bow. This procedure requires a significant amount of time and work, and if it is carried out conventionally, the findings could not be correct (Aulia, N., 2024). Many new geodetic technologies and devices have been developed that are essentially different from traditional ones. In the past, theodolites were used for angular measurements, levels were used for high-altitude measurements, and tape measures and rangefinders were used for linear measurements. Every device has unique accuracy qualities based on its intended use. As research advances and technologies advance, engineering and geodetic equipment develop better over time. The result of new technology is a contemporary geodetic instrument (Wilson, J. D., 2025)

Lack of Inter-Agency Coordination

Another recurring problem highlighted by our Participants is that other government agencies involved in land titling lack coordination. Several agencies, such as DENR and NCIP, issue

land titles in Baguio City, which is designated as a townsite reservation. As mentioned by our Participant, certain subdivision or titling plans approved by LRA do not appear in DENR records, because each agency keeps its own databases and approval systems. As a result, overlaps were not discovered until after subdivision plans or titles had been issued. Because of this lack of synchronized data management, there was a conflict in survey records and titles of the same parcel of land.

Participant 6: There are other agency issues titles. Baguio City is a townsite reservation. DENR, DAR, and NCIP issue a title, and then later on will be registered to the LRA.

Participant 11: First and foremost, the technical descriptions of these lands do not tally because there were lapses among different agencies that initiated the titling process, such as the NCIP, DAR, DENR, and other agencies. Each agency had its own procedures when issuing titles. Once a land has been titled, the existing title becomes the document that must be followed technically.

According to Onyebuchi, O., (2022), land conflicts arise from multiple allocations, in which a single parcel of land has two certificates of occupancy issued to different owners. Therefore, the court typically favors the first defendant whose title is properly registered and documented. Due to insufficient evidence against the second defendant, the case has been dismissed. Additionally, as Pahrazi (2024) stated, one cause of overlapping land ownership in Indonesia, especially in Kalimantan, is multiple titles. Lower courts, such as municipal and regional trial courts, and higher courts, such as the Court of Appeals, the Court of Tax Appeals, the Sandiganbayan, and the Supreme Court, constitute the Philippine legal system. The court system serves as a means of acquiring original land titles, changing land titles (apart from ownership transfers), and settling property disputes. On the ground, however, there are overlaps due to the similarities between administrative and judicial jurisdiction in the issuing of titles. In many instances,

parcels have been granted patents by the DENR to one owner and by a court ruling to another, with both titles being recorded with the Registry of Deeds (Integra LLC. 2017).

Inaccessibility of Old Records

Loss and poor condition of old records is also a factor contributing to overlapping land titles, as one of the problems identified by our participants. Some survey data have already been lost or were never properly recorded, resulting in incomplete information. Surveyors attempt to validate older records. Additionally, many old documents are no longer readable or are difficult to recover, which prevents the surveyors from interpreting accurately past measurement, survey plan, and reference points accurately. Just as important, these documents are significant for the surveyors to verify a parcel of land. Hence, this gap between historical and current data leads to the mismatches in technical description and can cause overlapping of boundaries.

Participant 10: Based on my observation of the reason is the loss of our data. Some data will be lost that is not recorded, and then it's gone. So, meaning that they are going through the titling process. Whereas previously it was titled since it's not encoded on our system-then the assumption of DENR does not exist, so it was repeated.

Participant 11: One major issue involves old records that can no longer be read or are very difficult to recover. Sometimes, the records we have do not match how the land was actually planned or laid out on the ground.

As stated by UNECE (2020), older cadastral surveys were recorded using handwritten field notes, analogue maps, and paper-based plans kept in centralized archives, according to several studies. Natural calamities, improper archival procedures, misfiling, and physical deterioration all made these records prone to damage over time. Geodetic engineers must rely on secondary references or assumptions to re-establish borders when original survey documentation is unavailable or unreadable, which

increases the risk of positioning mistakes and overlaps with adjacent parcels. In the Philippine context, recent diagnostics of land governance systems highlight that overlapping land titles are frequently linked to missing or unreadable historical survey documents. A land administration assessment supported by the World Bank noted that many cadastral plans and survey records held by government agencies remain undigitized or fragmented across institutions, limiting their availability to practicing geodetic engineers (World Bank, 2021)

Typographical Error

Another cause of overlapping land titles in Baguio City arises when the reference title is misprinted or contains typographical errors. In Presidential Decree No. 1529 (1978) it states that no alteration should be made to a title without a court order if it affects the integrity of the certificate. A simple typographical error in bearing and distance can change the legal boundaries of the property, not just the text on the page. This then violates the integrity of the certificate. For example, consider two adjoining land titles that are subjected to a relocation survey. On record, both titles identify the same point as "corner 1," which gives the impression that they share the same tie line. However, when the survey data is plotted, the parcels do not appear side by side as they should. Instead, one parcel ends up overlapping the other. Upon closer examination, it becomes evident that the discrepancy is due to the two lots having different directional bearings in their tie lines. Although the written descriptions seem to match, the actual bearings or degrees indicated in each title differ, causing the lots to shift in direction during plotting and ultimately resulting in an overlap. Participant 6: Sometimes land titles contain typographical error which leads to overlapping land titles. Participant 9: There is what we say is wrong tie line subject to verification survey, there is no overlapping on ground but present on the title.

Contributions of Landowners, DENR and Geodetic Engineers to Overlapping Land Titles

From the gathered information the following are the contributions of Landowners, DENR

and Geodetic Engineers to overlapping land titles.

Contributions of DENR to Overlapping Land Titles

The Department of Environmental and Natural Resources (DENR) plays a crucial role in the acquiring of land titles. They are suppos-

edly the ones to check and verify survey returns to avoid overlapping. However there were actions and processes within the agency that contributed to overlapping land titles. The issue highlighted by the participants is how these land titles were acquired even when they overlap with other land surveys.

Table 2. Contributions of DENR, Geodetic Engineers and Landowners to Overlapping Land Titles

Theme	Summary of Key Points
1. Contributions of landowners to overlapping land titles	There are contributions of landowners that are intentional and unintentional.
2. Contributions of DENR to overlapping land titles	A common contribution of DENR in overlapping is through processing of survey plans.
3. Contributions of Geodetic Engineers to overlapping land titles	Unethical conduct of private practitioners can cause overlapping

Many Participants agree that during the process of approving land titles improper inspection is done. Said by Participant 2 "The side of DENR is when they inspect the ground. Original surveys go to DENR, they should inspect and show to them all the mohon/ monuments of landowners if it is really correct." Participant 8 "Of course they still approve even though there's no verification with their own instrument or personnel. Of course they trust the engineer but they should also check it on their own." Responses are questioning the DENR's credibility on how they process the approval of survey plans, on how they rely solely on existing documents. Without proper inspection they cannot assure that what is on the ground is in sync with the survey returns. As an example by Participant 2 there are similar cases of improper inspection in Camp 7 where in the Kennon Road, a national road, was written as an alley in the survey plan and those surveys were approved by the agency.

An agreement between the Participants would be the inconsistent projection of DENR. Participant 5 says "The problem of the DENR is their projection map. Ideally all projections coming in before the PRS92 was in true. Correct? However, there are those that are not true". The DENR projection consists of a different coordinate system. Each system should have separate projections but that would disregard other systems as they are acknowledged by the law.

The discrepancy between these systems accumulate creating the inconsistent projection.

There are also causes not by the agency but within their responsibility, this is due to passing of time. Discussed by Participant 11 "Record keeping is one. The old surveys are not that complete or pencil was used in writing then destroyed by the storm or whatever happened to that record, now it is unreadable." Time can degrade papers and ink as they lose their quality and fade. Old surveys are done manually so they need to be written and drawn using ink, pencil and paper and usually only one copy is passed to the agency. If these documents are faded or lost due to natural calamities the data is lost in the system. This can make it harder for the adjoining survey to verify their data.

In their response to keep safe data and to improve accuracy as said by Participant 11 "The projection from manual to automated is one reason.". Older titles created manually often do not align with the digital projections resulting in mismatches between the old and new datasets. Participant 11 explained that in the manual projection small errors cannot be detected while in the digital projection even the tiniest error can be detected. Tiny errors not detected before are now accumulated into an erroneous one.

Contributions of Geodetic Engineers to overlapping land titles Overlapping land titles can begin with the work of a Geodetic Engineer.

According to some participants the issue is not only technical but also rooted in the conduct and decisions of the surveyors involved. Geodetic Engineers from different firms admitted that other practitioners do unethical practices that lead to overlapping land titles. Participant 8: "If they concentrate only on their survey. They prefer that they are perfect, they are correct so they do not research the case of the adjoining lot where its reference came from.", Participant 14: "In order to preserve the client and you cannot avail other surveying services because they are the only ones who know where the monuments are placed on ground and they are the only ones to know that the monuments they placed on ground are erroneous... Actually it's an ethical problem and it is an economic problem because you are trying to preserve your clientele." Participant 5: There are many misrepresentation. Of course the private practitioner, not all but a few, hasten just to finish the work." In speeding up the land surveys, preserving clients, and creating unethical practices, surveyors tend to rely on what data they have without verifying it to the DENR. This data can cause a domino effect to the surveys of the adjoining lots which can lead to a chain of errors. On the technical side, Participant 13 says "Did you know that sometimes the cause is technology. Those surveys before use tape which you did not reach. The tape does not have measurements. They assume that until here is half a meter. Right now it is Real Time Kinematic (RTK)." As technology improves, from chain measurements to total stations and now Real Time Kinematics (RTK), surveys have become more accurate. But this accuracy also exposed the errors of old surveys. This is a challenge surveyor's face especially when relocating old surveys, as the same data will provide different results using the old tools and the tools today. Contributions of Land Owners to Overlapping Land Titles Interviews with stakeholders reveal a complex interplay of tradition, personal perception, and intentional decision making that contributes to the issue of overlapping land titles. As they recall their experience, boundaries in actual ground do not match the technical description written in released land titles. Others say that land owners rely on inherited knowledge rather than formal surveys.

As said by Participant 11 "Of course the priority of the owner is what he/she knows or what his ancestors or grandparents pointed out", Participant 4 "Even in the time of their ancestors, their land was until there." & Participant 6 "In the past, the survey from before- boundaries are natural features." With these statements it reflects the deep trust of owners to ancestral land marks, which conflicts with the precise boundaries written in land titles. Land marks like pine trees, old riprap walls, and boulders are more reliable and familiar to the landowners, especially if inherited, because these were present in the old times without much movement until now. These boundaries are also derived from verbal agreements way back just as said by Participant 3 "If both neighbors agreed that that will be the boundary, it will stay as is". As a result, unintentional boundary extensions occur naturally, caused by memory and tradition. However, not all boundary extensions are unintentional. Several Participants acknowledge that landowners extend their boundaries intentionally. Remarkd by Participant 12 "The tendency of our claims, even if that is not his/her boundary he/she extends it." and Participant 1 "Others move their mohon/monuments." The experience of the Participants says that personal desires of land owners to gain more land area for whatever reasons, like business, push owners to extend their boundaries. The interview suggests that greed, though expressed indirectly, is a factor in overlapping land titles. Another consistent insight throughout the interview is the limited involvement of professionals in boundary determination. The response of Participant 8 "If they bought a land and they fenced it right away without knowing their boundaries." and Participant 9 "Others, introduced fences without consulting Geodetic Engineers." Owners tend to rely on their own memory, just as said a while ago, to determine their boundaries. However, the accuracy of the boundaries established by them are not reliable and can incur technical errors. The reliance on informal sources combined with lack of seeking experts' verification can cause errors that can accumulate over time. The DENR, Geodetic Engineers and landowners share a common contribution to overlapping land titles, it is their own human behavior.

Tenbrunsel et al. (2015) explains that people's choices are shaped by situation and hidden influences, whether by good or not. In letting unethical behavior be a part of decision-making, unpleasant consequences arise which affect your neighbors and even the whole community. Especially to overlapping, one wrong decision from any stakeholders disturbs anyone from its environment. Also the DENR and Geodetic engineers has an additional contribution, this is related to technological evolution. As Kuhn explains in *The Structure of Scientific Revolutions*, "when paradigms change, the world itself changes with them." A paradigm shift happens when an old way of thinking is replaced by a completely new one because the new idea explains things better. Transitioning to digital has made surveys more easy and accessible. The change in manual surveys to digital surveys has exposed the errors from the manual surveys. The errors are now more visible and detectable. So as to overlapping land titles those errors that were checked now were produced using manual practices. Legal and Technical Approaches to Lessen Possibilities of Overlapping Land Titles. The following are the legal and technical approaches to overlapping based on the statements of the Participants. Systematic Solution through Unification into one Reference System Table 3 Legal & Technical Approaches to Lessen the Possibilities of Overlapping Land Titles Themes Summary of Key Points 1. Systematic Solution through Unification into One Reference System Having one system is an ideal solution to overlapping. 2. Improvement of Inter-Agency Coordination and Strict Implementation Coordination of different agencies, who approves plans and issues title, can lessen the possibilities of overlapping land titles. 3. Legal Solution to Occurring Overlapping Land Title Cases Coordination of stakeholders to resolve occurring overlapping. overlapping of land titles in Baguio City. A comprehensive cadastral survey is the logical first step for unifying reference points in Baguio City. Given that a proposed cadastral survey is initiated by the DENR, the proposed project should then re-establish and densify geodetic control points using modern survey techniques (like dual-frequency GNSS static sessions) and produce a reconciled control network that ties

every parcel to the chosen unified reference. By these, all existing control points old and newly established are observed and verified. With this unified reference system, survey returns of original surveys, isolated surveys and incoming surveys submitted to the DENR must comply with this reference system. It is widely recognized in both local and international land administration literature as one of the most effective long-term solutions for resolving and preventing overlapping land titles. In the Philippine context, the adoption of the Philippine Reference System of 1992 (PRS92) was intended to address inconsistencies arising from multiple local datums and assumed coordinate systems by providing a single, homogeneous geodetic reference for all surveys and mapping activities (Department of Environment and Natural Resources [DENR], 2005). Internationally, the International Federation of Surveyors (FIG) emphasizes that cadastral systems anchored to a unified geodetic reference significantly improve boundary consistency, legal certainty, and interoperability of spatial data, particularly in urban areas with dense and historically fragmented surveys (FIG, 2014; Williamson et al., 2010). These findings support the view that a unified reference system is fundamental to improving tenure security in complex land markets such as Baguio City. Once a unified reference is adopted, routine monitoring of both legacy and newly established control points is essential to detect coordinate shifts from monument instability, ground settlement, or tectonic motion. Where legacy surveys used assumed local coordinates (e.g., arbitrary origins like 20,000; 20,000) or older local datums, a systematic adjustment and transformation program is necessary. This quality assurance preserves the integrity of the reference and provides defensible evidence if title boundaries are contested. Participant 5: We need to do a cadastral survey in Baguio so that we'll establish just one system. Participant 8: Observe all existing monuments and new control points and replace them. Participant 10: So to fix the reference system, the DENR proposed a cadastral survey Participant 3: A one unified control point to address the incoming overlapping cases but we have to correct first the existing control points/monuments. Participant 5: The

adjustment of old surveys. So the old surveys will be adjusted to the new PRS system. Improvement of inter-agency coordination and strict implementation. Improving inter-agency coordination is crucial because the land administration system typically involves multiple offices such as the Department of Environment and Natural Resources (DENR), Land Registration Authority (LRA), local government units, and various surveying and mapping agencies. When these agencies operate in isolation or without updated communication, duplication of tasks and inconsistencies in land data become inevitable. Effective coordination ensures that proposed land surveys, approved plans, and issued titles are communicated across all concerned institutions, preventing the use of outdated or conflicting information. For instance, the issuance of land titles wherein a newly released land title by the DENR with their own projection, approves the newly released title's survey plan, from which overlaps the certificate of ancestral land title lately released by NCIP. International studies similarly observe that weak coordination among registration, and mapping agencies is a primary cause of overlapping titles and conflicting land rights, especially in developing countries with legacy survey systems (Williamson et al., 2010). Additionally, given that the Department of Environment and Natural Resources (DENR) Regional Office is responsible for providing essential data for research and reconnaissance such as reference lot data computation sheets, and coordinate information to geodetic engineers conducting isolated surveys, it is imperative that the DENR strictly enforce its established procedures for the inspection, verification, and approval of survey plans. To ensure the integrity of these procedures, the personnel assigned to carry out these tasks should be licensed geodetic engineers or, at minimum, graduates of a geodetic engineering program who possess sufficient technical knowledge and competency in surveying and geospatial data management. By consistently implementing these processes, the DENR can ensure that all reference lots and coordinates issued to private geodetic engineers are accurate, precise, and reliable. This level of data integrity is crucial, as these reference points form the basis

for a wide range of surveys and technical assessments carried out by geodetic professionals. Ultimately, stringent quality control and inspection safeguards the credibility of survey outputs. Furthermore, strict implementation of existing land management laws, guidelines, and protocols is necessary for ensuring uniformity in procedures. This includes enforcing accurate survey requirements, verifying map consistency before title issuance, and implementing sanctions for negligence or fraudulent practices. Research in land governance consistently finds that even well-designed land policies fail when enforcement mechanisms are weak or inconsistently applied (Williamson et al., 2010). With improved coordination and strict policy enforcement, the system becomes more transparent and accountable, reducing administrative lapses and protecting landowners from future disputes. Hence, consolidating all land-related records such as projection maps, approved survey returns and other survey documents from the respective agencies responsible for maintaining them with the purpose to facilitate a thorough cross-checking and validation of these documents, ensuring that the information they contain is accurate, consistent, and free from discrepancies. This process also serves as a preparatory step toward the full digitalization of these records. By organizing and verifying the documents beforehand, agencies can ensure that only accurate, authenticated, and properly classified information is digitized, ultimately supporting the long-term preservation, accessibility, and reliability of the nation's land records. These initiatives, however, can only be successfully implemented if they are formally proposed, supported, and adequately funded by the government. Participant 2: When inspecting, they should check the right orientation. Upon inspection, they should already be plotted on the google map for initial checking of the location of the lot. Google map is not accurate but it can show you its initial location. Participant 2: Their verifier should be a geodetic engineer or a geodetic Graduate Participant 10: They recommend it to NAMRIA to know what to change and to follow. Then the DENR will decide considering our suggestion. Participant 15: DENR must check their records and survey plans since before titling, they are

the ones processing the papers. Participant 11: One goal of LAMS is once the digitalization of all land records of DENR is done, comes the unification of all records (DENR, LRA, DAR, NCIP).

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References

- Aulia, N., & Hernawan, D. (2024). *The Legal Certainty for Land Rights Holders Due to the Issuance Certificates Overlap of Certificates (Overlapping) on property Rights Certificate No. 60 Certificate Issued in 1956 and Certificate of Ownership No. 01729 Published in 2019 is Linked to Government Regulation No. 24 of 1997 on Land Registration. Journal of Law, Politic and Humanities*, 5(2), 963-973.
- Bounded Rationality-- Simon, H. A. (1955). *A Behavioral Model of Rational Choice*. Quarterly Journal of Economics, 69(1), 99-118. <https://link.springer.com/article/10.1007/s10203-024-00436-2>
- Byrne, D. (2022). *A Worked Example of Braun and Clarke's Approach to Reflexive Thematic Analysis*. Quality & Quantity, 56, 1391-1412. <https://doi.org/10.1007/s11135-021-01182-y>
- Department of Environment and Natural Resources Memorandum Circular no. 2010-13.
- Department of Environment and Natural Resources. (2005). *DENR Administrative Order No. 2005-13: Revised Guidelines for the Implementation of the Philippine Reference System of 1992 (PRS92)*. DENR.
- DENR Administrative Order No. 2007-29
- DENR Administrative Order No. 2025-11
- Derr, A. (2024, August 16). *What is the Two Loops Model? Leveraging Community Networks for Transformative Change - Visible Network Labs*. Visible Network Labs. <https://visiblenetwork-labs.com/2024/08/16/what-is-the-two-loops-model/>
- Enemark, S., McLaren, R., & Lemmen, C. (2016). *Fit-For-Purpose Land Administration: Guiding Principles for Country Implementation*. United Nations Human Settlements Programme (UN-Habitat).
- Faruq, F. U. and Hariri, A. (2023) 'Legal Certainty Certificate of Land Rights Under National Law', Progressive Law Review, 5(02), pp. 169- 180.
- Hassan, M. (2024, November 14). *Research Design - Types, Methods and Examples*. Research Method. <https://researchmethod.net/research-design/>
- Holmes, O. W. Jr. (1897). *The Path of The Law*. Harvard Law Review, 10, 457-478.
- Integra LLC. (2017). *AgCLIR Philippines: Agribusiness Commercial Legal and Institutional Reform Assessment - Agenda for Action*. Millennium Challenge Corporation. Retrieved from <https://www.integralc.com>
- International Federation of Surveyors. (2014). *Fit-For-Purpose Land Administration*. FIG Publication No. 60.
- Jurist Legal Summary. (n.d.). *Manual of Procedures on the Transformation and Integration of Cadastral Data into the Philippine Reference System of 1992 (PRS92)*. Jur.ph. <https://jur.ph/law/summary/manual-of-procedures-on-the-transformation-and-integration-of-cadastral-data-into-the-philippine-reference-system-of-1992-prs92>

- Karianga, H., & Yunus, A. (2022). *Overlapping for Land Ownership Rights: Alternative Dispute Resolution by Ombudsman* RUSSIAN LAW JOURNAL, Volume X(1).
- Kuhn, T. S. (2012). *The Structure of Scientific Revolutions* (4th ed.). University of Chicago Press.
- Kumar, P. (2025, April 25). *The Evolution of Property Rights: From Natural Law to Psychological Theories* • Law Notes by. The Law Institute. <https://thelaw.institute/general-introductions-to-ip-rights/evolution-property-rights-natural-law-psychological-theories/>
- Lim, W. M. (2024b). *What is Qualitative Research? An Overview and Guidelines*. *Australasian Marketing Journal (AMJ)*, 33(2), 199–229. <https://doi.org/10.1177/14413582241264619>
- Menell, P. S. (1999). *Intellectual Property: General Theories*. In B. Bouckaert & G. De Geest (Eds.), *Encyclopedia of Law and Economics* (Vol. II). Edward Elgar Publishing. <chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://reference.findlaw.com/lawandconomics/1600-intellectual-property-general-theories.pdf>
- Onyebuchi, O., & Kakulu, I. I. (2022). *Land Title Conflicts and Real Estate Investment and Development in Rivers State*. *Am J Humanities Soc Sci Res*, 6(4), 62-68.
- Pahrazi, R., & Rahayu, M. I. F. (2024). *Juridical Study of Problematic Overlapping Land Ownership Status in Indonesia*. *Journal of Law, Politic and Humanities*, 4(4), 820-828.
- Presidential Decree No. 1529 (1978)
- Republic Act No. 8560, "Philippine Geodetic Engineering Act of 1998."
- Republic of the Philippines vs. National Commission on Indigenous Peoples, Register of Deeds- Baguio City, Land Registration Authority, heirs of Lauro Carantes, Dimson Manila, Inc., J.L. Gorio, & certain Jane Does and John Does, G.R. No. 209449, En Banc (Supreme Court of the Philippines, July 11, 2023).
- Respicio, H. (2024, December 11). *Understanding Property Rights and Legal Remedies for Encroachment Under Philippine Law* — Respicio & Co. Respicio & Co. <https://trumpet-pelicansky.squarespace.com/articles/understanding-property-rights-and-legal-remedies-for-encroachment-under-philippine-law>
- Respicio, H. (2025, August 8). *Resolving Overlapping Land Titles from Different Origins in Philippines*. RESPICIO & CO. <https://www.respicio.ph/commentaries/resolving-overlapping-land-titles-from-different-origins-in-philippines>
- Simply Psychology. (2024b, January 8). *Qualitative Research: Characteristics, Design, Methods & Examples*. <https://www.simplypsychology.org/qualitative-research-characteristics-design-methods-examples.html>
- Supreme Court of the Philippines. (2017). *G.R. No. 208494* [Court decision on overlapping titles]. Supreme Court E-Library. <https://elibrary.judiciary.gov.ph/the-bookshelf/showdocs/1/67888>
- Tenbrunsel, A. E., Rees, M. R., & Diekmann, K. A. (2015). *Sexual Harassment in Academia: Ethical Climates and Bounded Ethicality*. *Annual Review of Psychology*, 70(1), 245–270. <https://doi.org/10.1146/annurev-psych-010418-102945>
- United Nations Economic Commission for Europe. (2020). *Guidelines on Land Administration and Digital Cadastral Systems*. UNECE. <https://unece.org/housing-and-land-management/land-administration>
- Wijayanti, P., & Handayani, S. W. (2023). *Settlement of Land Disputes Indicated Overlapping Through Alternative Dispute Resolution*.
- Williamson, Ian & Enemark, Stig & Rajabifard, Abbas. (2010). *Land Administration for Sustainable Development*.
- Wilson, A. J. (2025, January 15). *The Two Loops Theory of Change: Navigating the Decline of Old Systems and the Rise of New Ones*. <https://www.linkedin.com/pulse/two->

- loops-theory-change-navigating-decline-old-rise-new-wilson-frsa-vgcje/
Wilson, J. D. (2025). *Analyzing The Role of Coordinates and Error Estimates in the Rules of Construction in Relation to Boundary Evidence Collection and Land Survey Planning* (Doctoral dissertation, University of Maine).
- World Bank. (2021). *Land Administration and Management Diagnostics: Philippines*. <https://documents.worldbank.org>