

COORDINATED ADOPTION OF LADM_COL IN COLOMBIA: INTERSECTORAL GOVERNANCE FOR THE MULTIPURPOSE CADASTRE

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NATIONAL POLITICAL FRAMEWORK

- **Historically**, cadastre and land registry operated separately under IGAC and SNR, with the cadastre limited **mainly to fiscal purposes**.
- The Multipurpose Cadastre policy (CONPES 3859/2016) established the guidelines for a cadastre integrated with territorial planning and information systems, shifting its focus beyond fiscal use toward comprehensive land management.
- CONPES 3958 (2019) operationalized the multipurpose cadastre policy by defining institutional roles, implementation mechanisms, and a standardized, interoperable data model aligned with LADM principles.
- Law 1955/2019 decentralized cadastral management, creating the “cadastral manager” and allowing public or mixed entities to assume cadastral functions.
- Decree 148/2020 regulated their authorization, supervision, and control, completing the decentralization framework.
- To ensure interoperability, IGAC and SNR issued Joint Resolution 642–5731/2018, adopting the Extended Cadastre-Registry Model (MECR)—the first LADM_COL implementation aligning cadastre and registry semantics.
- These instruments established the policy and regulatory foundation for a unified, standardized, and interoperable land administration system in Colombia.

GOVERNANCE OF LADM_COL – ROLE OF THE ICDE

- The **Colombian Spatial Data Infrastructure (ICDE)** acts as the **national coordination mechanism** for the governance and evolution of the **LADM_COL standard**.
- **Decree 2404 of 2019** reorganized the ICDE as the **intersectoral mechanism** for managing geospatial and land information. It functions as the **institutional hub** that articulates multiple State entities — **DNP, IGAC, DANE, MinTIC, MinAmbiente, SNR**, among others — enabling **intersectoral coordination** of geospatial and land information.
- **Resolution IGAC 899 of 2023** defined the governance structure through two bodies:
 - **CIIG (Intersectoral Geographic Informatio Commission)**: strategic coordination and policy alignment.
 - **CTO (Technical Operational Committee)**: technical supervision and version management of the models.
- **Agreement ICDE 002 of 2023** assigned ICDE the responsibility to govern the **core, extended, and application models** of LADM_COL (National profile and Core model).
- The ICDE acts as **custodian** of Colombia's land information architecture, overseeing updates, interoperability standards, and institutional adoption processes



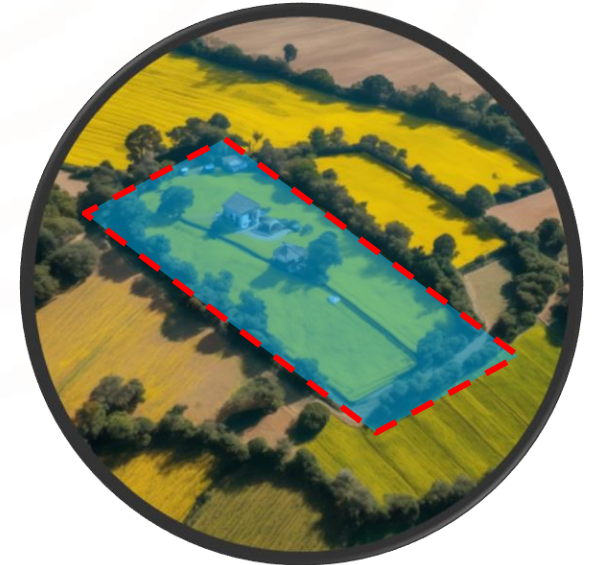
Established in 2000, the ICDE evolved from a technical network into the national platform for LADM_COL governance.



LADM_COL is the name of Colombia's national profile — it refers to the core model and the broader standard that extends beyond it.

LEGAL TERRITORIAL OBJECT (LTO)

- The LTO refers to the **Basic Administrative Unit** described in ISO19152, adapted to Colombian context.
- LTO is the **central concept of LADM_COL**, representing any spatial unit that holds a **legal or administrative meaning** in the Colombian territory.
- It acts as the semantic bridge between the physical reality of land and the legal domain of rights, restrictions, and responsibilities (RRRs).
- The LTO transcends the traditional concept of a parcel, encompassing a wider range of legal-spatial entities such as planning units, environmental or zoning areas, ethnic territories, protected zones, and any spatial object that gives rise to specific RRRs — including parcels themselves.



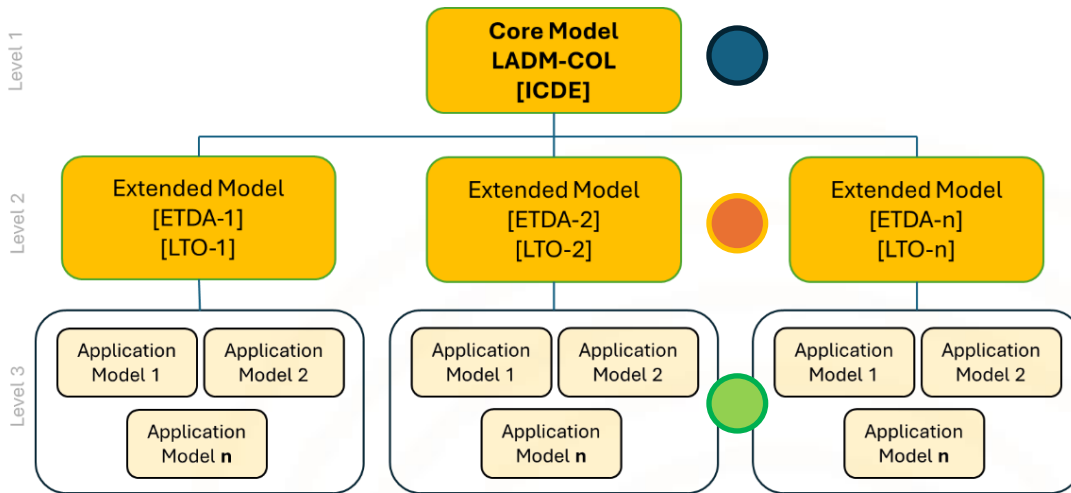
It is relevant to note that different LTOs may coexist in the same portion of the territory.

For instance, two different LTOs — a land parcel and an environmental protection area — may overlap in the same area, each governed by its own legal framework and managed by a distinct institution. While each entity maintains its data within its own mandate (Legal Independence), the information can be integrated and made interoperable for decision-making through the use of the LADM_COL standard.

Model-Driven Architecture (MDA)

LADM_COL adopts a model-driven approach, where governance, standardization, and implementation are organized through models that derive from one another within a clear hierarchy defined by the ICDE on three levels.

This structure ensures the coherent evolution of land administration concepts across institutions, maintaining a shared semantic foundation.



LTO: Legal Territorial Object

ETDA: Entity that Administers Territorial Data

This architecture ensures that the standard can be adapted to any LTO and to any specific need, including local particularities, and constitutes the three levels of conformity of LADM_COL.

CORE MODEL ●

The core model contains the minimum necessary elements to represent the reality of the territory, common to all dimensions land administration, capturing the shared characteristics of every LTO — making the LTO the backbone of Colombia's land administration standard.

Its design is based on ISO 19152:2012, and its governance lies with the ICDE.

EXTENDED MODELS ●

From the core model, a set of “extended models” is derived — by adding classes and attributes — to represent specific types of Legal Territorial Objects (LTOs).

Each extended model corresponds to a specific LTO, defining the elements required to describe its thematic scope while preserving

APPLICATION MODELS ●

From the extended models, application models are designed for practical applications or specific tasks, such as information exchange between entities, support for specific processes, or the implementation of services.

EXTENDED MODELS

•Cadastral–Registry Extended Model (MECR)

LTO: PARCEL.

- Jointly developed by **IGAC** and **SNR**.
- Version **4.1** adopted by **Joint Resolution IGAC 1456 / SNR 9844 (2024)**.
- Defines the **minimum variables** to describe all parcels — physical, legal (RRR), and economic components — ensuring **interoperability** between cadastre and registry.

•Land-Use Planning Extended Model (LADM_COL–POT)

- **LTO of Territorial Land-Use Plans**— *it's a composed LTO*.
- Developed and governed by *decreto*. Ministry of Housing, City and Territory **MVCT**.
- Version **2.0** adopted by **Resolution 0058 (2025)**.
- Standardizes information for land-use planning, integrating environmental, risk, and zoning components within an **interoperable territorial vision**.

•Collective Property Territories Model (LADM_COL–TPC)

LTO: Indigenous and Afro-descendant Collective Territories.

- Developed by **ANT**.
- Version **1.0** adopted by **Resolution 202510001528976 (2025)**.
- Standardizes spatial and legal data on **collective rights and holders**, enabling their integration into the national **Land Administration System (LAS)**.

Other extended models under development — such as the **Hydrocarbon Areas Model (ANH)**, **Protected Areas Model (National Natural Parks)**, and **Agricultural Frontier Model (UPRA)** — aim to strengthen **conceptual coherence** and **semantic interoperability** across Colombia's land data ecosystem.

APPLICATION MODELS

All existing application models have been developed under the Cadastral–Registry Extended Model (MECR), reflecting its maturity and institutional consolidation.

- **Cadastral Survey Model** standardized cadastral formation and updating processes; initially mandatory for all managers, now optional but still available as an official reference in the ICDE repository.
- **Cadastral Management Transfer Model (TGC)** — adopted by **IGAC Resolution 746/2024**; regulates the transfer of cadastral data and technical records between managers, ensuring continuity and consistency.
- **Model for Parcels within Indigenous Territories** — adopted by **IGAC Resolution 807/2025**; ensures intercultural participation of Indigenous communities in identifying parcels that constitute their territories.
- **National Cadastral Information System (SINIC)** — adopted by **IGAC Resolution 301/2025**; defines standardized reporting and validation for integrating all cadastral data into a single national database.

These models operationalize the MECR, linking standardized concepts to real cadastral workflows and ensuring semantic and institutional coherence nationwide.

Lessons and Future Directions

Challenges

- **Institutional adoption gaps** across sectors, requiring sustained inter-agency coordination and capacity building.
- **Semantic transition resistance** — shifting to model-based management under LADM_COL still faces cultural and technical inertia.
- **Dependence between model levels**, where updates in the core demand corresponding adjustments in extended and application models.
- **Uneven institutional capacities**, limiting the pace of implementation and interoperability.

Perspectives

- **Consolidation of LADM_COL as a national digital policy**, guiding institutional integration and governance of land information.
- **Advancement of interoperability**, enabling an effective and coordinated data exchange and joint management among cadastral, planning, and environmental institutions.
- **Expansion to new territorial domains** — environmental, hydrocarbon, agricultural frontier — through new extended models.

Conclusions

- **LADM_COL** has evolved from a **technical specification into a governance instrument** for intersectoral coordination in Colombia's land administration.
- The **model-driven architecture** ensures semantic coherence across sectors while allowing adaptability to institutional and local contexts.
- **Strengthened ICDE governance** provides the foundation for transparent version management and national alignment.
- Colombia's experience **demonstrates the viability of a national standard built through institutional consensus**, establishing a reference for coordinated land information governance in Latin America.

ACKNOWLEDGEMENTS



execução



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