

# Application of Land Administration Domain Model to Recognition of Indigenous Community Rights in Indian Forests

*Indian Forest Rights Act, 2006, examined with its Spatial Dimension*

Tarun GHAWANA, India; João HESPANHA, Portugal; Jaap ZEVENBERGEN, The Netherlands

**Key words:** Indigenous Property Rights, Land Administration Domain Modelling, Forested Communities

## SUMMARY

Recognizing the importance of protecting indigenous property rights, as acknowledged by worldwide organizations such as the United Nations, and specifically the poor and badly governed forested communities, this paper elected as its Use Case the implementation of the Indian Forest Rights Act from 2006.

Historically, India has a large number of forest dwelling tribes or which are largely dependent on forest products for their livelihood. However, after gaining independence, Indian forests become property of the state and thus the right of residing or traditional collection of forest produces become illegal in a number of forest areas designated as reserved or protected forest areas by the government. This denied the forest dwelling tribes and other related tribes their historical rights to earn their livelihoods based upon forest produces. Finally, in 2006 through an extraordinary gazette, Indian government declared Indian Forest Rights Act for recognizing the traditional rights of such tribes to reside in and earn their livelihoods through forests.

The background and current situation regarding the forest rights on ancestral lands and their habitat is first examined by literature review, followed by a modelling approach supported on the Land Administration Domain Model. The existing legislation is examined for its land administration aspects and related spatial dimensions with the aim to derive a specialized model applicable to the Indian Forest: IFR\_LADM.

From an initial set of definitions extracted from the Act, a functional, aspect-driven approach is followed. Each different aspect is first considered on its own iteration, before producing a comprehensive model where relationships and constraints are identified.

To finalize the modelling, a number of Instance Level diagrams is depicted and described, in order to demonstrate how the IFR\_LADM model can answer to specific, expected situations on the ground.

The resulting IFR\_LADM shows that the underlying Domain Model (LADM) is flexible enough to translate the relation of people to land through rights for specific land use related categories. It can thus facilitate the design of a Land Administration System supporting poor and marginalized groups, like the forest dwellers in India here reported.

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## **1. BACKGROUND**

Under Article 17 of the Universal Declaration on Human Rights every person has the fundamental right to own property, and no one shall be arbitrarily deprived of property. The United Nations Declaration on the Rights of Indigenous Peoples reaffirmed the importance of the protection of indigenous property rights in Articles 25-29. This is important to international scale projects such as REDD+ and VCM [1, 2] as many PES programmes are implemented on customary or indigenous lands over which the land tenure and rights to resources are complex and informal. The Rights and Resources Initiative, 2008 [3] noted the inadequate recognition of human rights, and stated “Many forested communities, particularly in developing countries, are chronically poor and badly governed. They suffer disproportionately from conflicts, humanitarian crises and corruption, which often then spread nationally and internationally”.

Clarity of tenure implies a strong understanding of all existing claims to land. However, in most settings these claims exist in a system of legal pluralism and include a mix of formal de jure rights recognised by the legal framework, and informal (but socially legitimate) de facto rights to land recognised by the local communities and based on complex cultural norms. Ignoring either the de jure or de facto rights is one of the main reasons for conflict over land and resources [4].

The Extraordinary Gazette of India, 2007 clearly states the reason for the declaration of a Forest Rights Act in India as the forest rights on ancestral lands and their habitat were not adequately recognized in the consolidation of state forests during the colonial period as well as in independent India resulting in historical injustice to the forest dwelling Scheduled Tribes<sup>1</sup> and other traditional forest dwellers who are integral to the very survival and sustainability of the forest ecosystem. It has become necessary to address the long standing

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<sup>1</sup> The framers of the Indian Constitution took note of the fact that certain communities in the country were suffering from extreme social, educational and economic backwardness arising out of age-old practice of untouchability and certain others on account of this primitive agricultural practices, lack of infrastructure facilities and geographical isolation, and who need special consideration for safeguarding their interests and for their accelerated socio-economic development. These communities were notified as Scheduled Castes and Scheduled Tribes as per provisions contained in Clause 1 of Articles 341 and 342 of the Constitution respectively [6].

insecurity of tenure and access rights of forest dwelling Scheduled Tribes and other traditional forest dwellers including those who were forced to relocate their dwelling due to state interventions [5].

This paper aims to capture the land administration aspects and the spatial dimensions of Indian Forest Rights Act, 2006 as a case study under the framework of Land Administration Domain Model (LADM).

## **2. INDIAN FOREST RIGHTS ACT, 2006**

It is an act to recognize and vest the forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded; to provide for a framework for recording the forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forest land [5].

### **2.1 Definitions under Forest Rights Act, 2006 [5]:**

**Forest Land (LA\_SpatialUnitGroup):** Land of any description falling within any forest area and includes unclassified forests, undemarcated forests, existing or deemed forests, protected forests, reserved forests, sanctuaries and national park

**Habitat and Villages (LA\_SpatialUnitGroup; LA\_SpatialUnit):** It includes the customary habitat area in reserved forests and protected forests of primitive tribal groups and pre-agricultural communities and other forest dwelling Scheduled Tribes. Villages are the settlements which have been established inside the forests by the forest department of any state government for forestry operations or which were converted into forest villages through the forest reservation process.

**Gram Sabha (LA\_GroupParty):** A village assembly which shall consist of all adult members of a village and in case of states having no Panchayats, Padas, Tolas (a form of traditionally elected / recognised local councils) and other traditional village institutions and elected village committees, with full and unrestricted participation of women.

**Nodal Agency (LA\_Party):** The ministry of the central government dealing with Tribal Affairs or any officer or authority authorised by the central government in this behalf shall be the nodal agency for the implementation of the provisions of this act.

**Forest Dwelling Scheduled Tribes and Other Traditional Forest Dwellers (LA\_GroupParty, LA\_Party):** Members or community of the Scheduled Tribes who primarily reside in (at least three generations prior to the 13th day of December, 2005) and who depend on the forests or forest lands for bona fide livelihood needs and includes the Scheduled Tribe Pastoralist Communities.

**Rights (LA\_Rights):** Some important Rights which secure individual or community tenure or both, shall be the forest rights of forest dwelling Scheduled Tribes and other traditional forest dwellers on all forest lands are

- a) Right to hold and live in the forest land under the individual or common occupation for habitation or for self-cultivation for livelihood by a member or members of a forest dwelling Scheduled Tribe and other traditional forest dwellers;
- b) Right of ownership, access to collect, use and dispose of minor forest produce which has been traditionally collected within or outside village boundaries;

- c) Rights for conversion of leases or grants issued by any local authority or any state government on forest lands to titles;
- d) Right to in situ rehabilitation including alternative land in cases where the Scheduled Tribes and other traditional forest dwellers have been illegally evicted or displaced from forest land of any description without receiving their legal entitlement to rehabilitation prior to the 13th day of December 2005.

**Responsibilities (LA\_Responsibilities):** Recognized Rights of forest dwelling Scheduled Tribes and other traditional forest dwellers include the responsibilities and authority for sustainable use, conservation of biodiversity and maintenance of ecological balance and thereby strengthening the conservation regime of the forests while ensuring livelihood and food security of the forest dwelling Scheduled Tribes and other traditional forest dwellers.

**Restrictions (LA\_Restrictions, AdministrativeServitude):** It includes “Critical Wildlife Habitat”, which means such areas of National Parks and Sanctuaries where it has been specifically and clearly established, case by case, on the basis of scientific and objective criteria, that such areas are required to be kept as inviolate for the purposes of wildlife conservation as may be determined and notified by the central government. Restrictions also include the ban on right of hunting or trapping or extracting a part of the body of any species of wild animal.

**Source (LA\_SpatialSource, LA\_AdministrativeSource):** LADM describes source as a document providing facts. A spatial source is thus a source with the spatial representation of one (part of) or more spatial units. For example, a field survey sketch, an orthophoto or a satellite image with evidence on the location of boundaries collected from the field. Under Chapter IV on the “Authorities and Procedure for Vesting of Forest Rights”, the Gram Sabha shall be the authority to initiate the process for determining the nature and extent of individual or community forest rights or both that may be given to the forest dwelling Scheduled Tribes and other traditional forest dwellers within the local limits of its jurisdiction under this Act by receiving claims, consolidating and verifying them and preparing a map delineating the area of each recommended claim in such manner as may be prescribed for exercise of such rights and the Gram Sabha shall, then, pass a resolution to that effect and thereafter forward a copy of the same to the Sub-Divisional Level Committee. This committee on behalf of state government shall examine the resolution passed by the Gram Sabha and prepare the record of forest rights. Finally it forwards the record through the sub-divisional office to the District Level Committee for a final decision.

### 3. DERIVATION OF A LAND ADMINISTRATION SPECIALIZED MODEL FOR THE INDIAN FOREST

#### 3.1 Derivation methodology

No Model Driven Architecture (MDA) methods and tools were applied at this first modelling stage in deriving a specialized model for the Land Administration of Indian Forest, abbreviated to IFR\_LADM. The modelling tools offered by the Eclipse Modelling framework (EMF) [7] were used to manually derive specialized classes from their respective LADM super-classes [8], by considering, in a first iteration, a total of four packages and functional groupings. These were:

- Party package;

- Administrative package (includes Rights and Restrictions from the Legal Profile);
- LADM Source classes (functional group);
- Spatial Unit package.

For each of the packages, the main source document to define the required specialized classes was the Indian Forest Rights Act from 2006, which was examined thus in a total of four sub-iterations [9]. So, each time the document was examined under a different focus, e.g., to identify the Parties involved in the administration of Indian Forest Rights, where different types and roles were identified, and so on for the other packages.

To get a comprehensive model as the base Domain Model, which establishes a number of different associations among the different packages, a second iteration is needed in order to (re) establish the relationships at the specialized classes level.

The country level specifics must be carefully examined at this time, in order to define (possibly) constraints at the class or association level, and also to define the spatial relationships between the different specializations in the Spatial Unit package.

At the end of these final iterations, one should obtain a completely integrated and overall class diagram for the proposed IFR\_LADM, this being the objective of this section of the research. In the following headings, the separate, package centric class diagrams with the generalization links to the source LADM super-classes are presented and discussed.

### 3.2 Party package specialization

Each of this section starts to present a (partial) class diagram for IFR\_LADM, centred on the referred package and showing the composite types and source classes used in LADM and their links to the specialized IFR classes and enumerations. All the diagrams follow the UML2 standard [10] as implemented in Eclipse EMF.

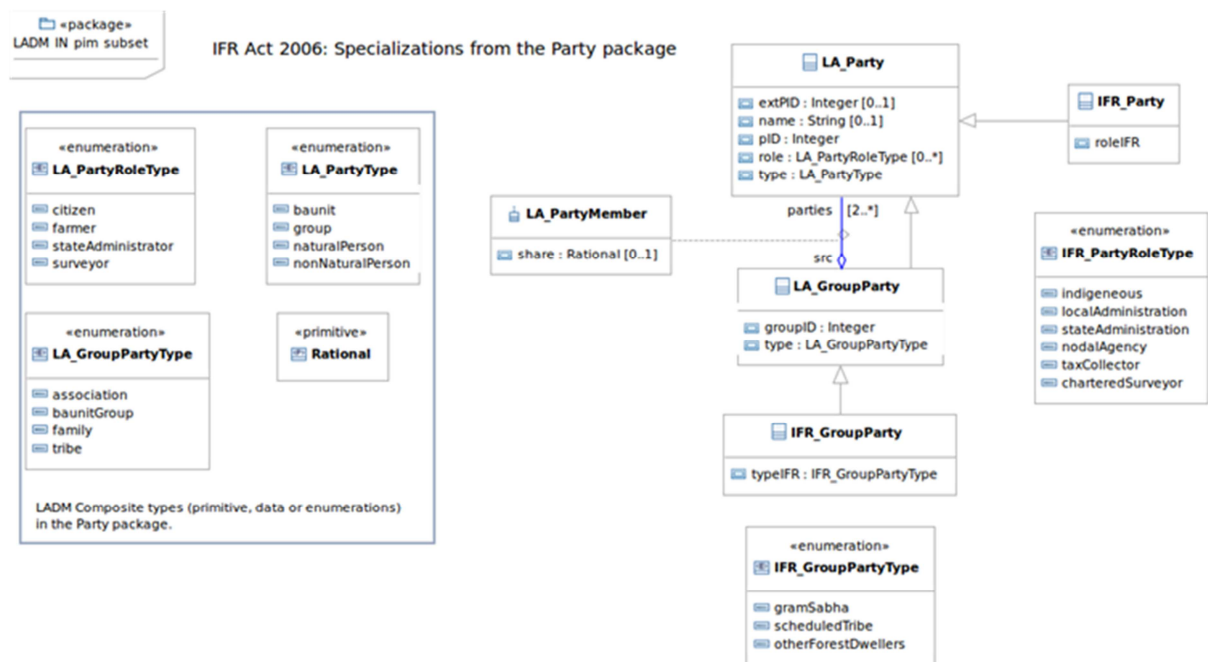


Figure 1- IFR Specializations; Party Package

The study of the Act concerning the identification of the participating Actors and their roles in the administration of Indian Forest Land, has led to the creation of two specialized classes, one for Group Parties, and other for individual Party elements, having each a dedicated enumeration type, respectively “typeIFR” and “roleIFR”. Each one is examined in turn.

- IFR Group Parties: All the identified types should have the role of (individual) indigenous as their members. But it could be impractical to consider for very large groups, like a Scheduled Tribe, except if some sort of hierarchical grouping is considered, given that is typically formed of many Gram Sabha communities;
- IFR Parties: A number of LADM roles are not directly or explicitly considered in the Act, so the choice was to create a specialized enumeration where only the roles expressed or implied in the Act were included. Note that a number of roles do not imply that the Party is a holder of rights, like the administration (except for certain cases), the tax collector or the chartered surveyor.

It must call our attention the fact that there is no mention at all to the role of a chartered surveyor in the procedure for vesting of Forest Rights (Chapter IV of the Act), although there is indeed a branch of the RICS<sup>2</sup> in India [11].

### **3.3 IFR Administrative package**

For the Administrative package of LADM, and within this first iteration, only the classes from the core class representing Rights, Restrictions and Responsibilities (LA\_RRR) were considered for examination. Contrary to the other packages, and except for the enumeration regarding types of Administrative Servitudes, no specialized “IFR” classes were created. Instead, the range of Rights, Restrictions and Responsibilities previously considered are modelled with the classes contained in the DIS 19152 LADM Annex F: the Legal Profile.

Within this Legal Profile, which intends to cover (mainly) private property, the individual indigenous rights covered in item a) on page 4 are presented with a major distinction in the abstract classes of Basic Ownership (basic property rights) and Appurtenance, which represents a number of derived rights [12]. In this way, the individual hold of forest land is represented by the Property rights, while the shared use for habitation and self-cultivation is represented by the remaining rights of Use & Habitation, Superficies or Usufruct. Those derived rights, however, do not have to be shared and can be hold by a single member.

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<sup>2</sup> Royal Institute of Chartered Surveyors

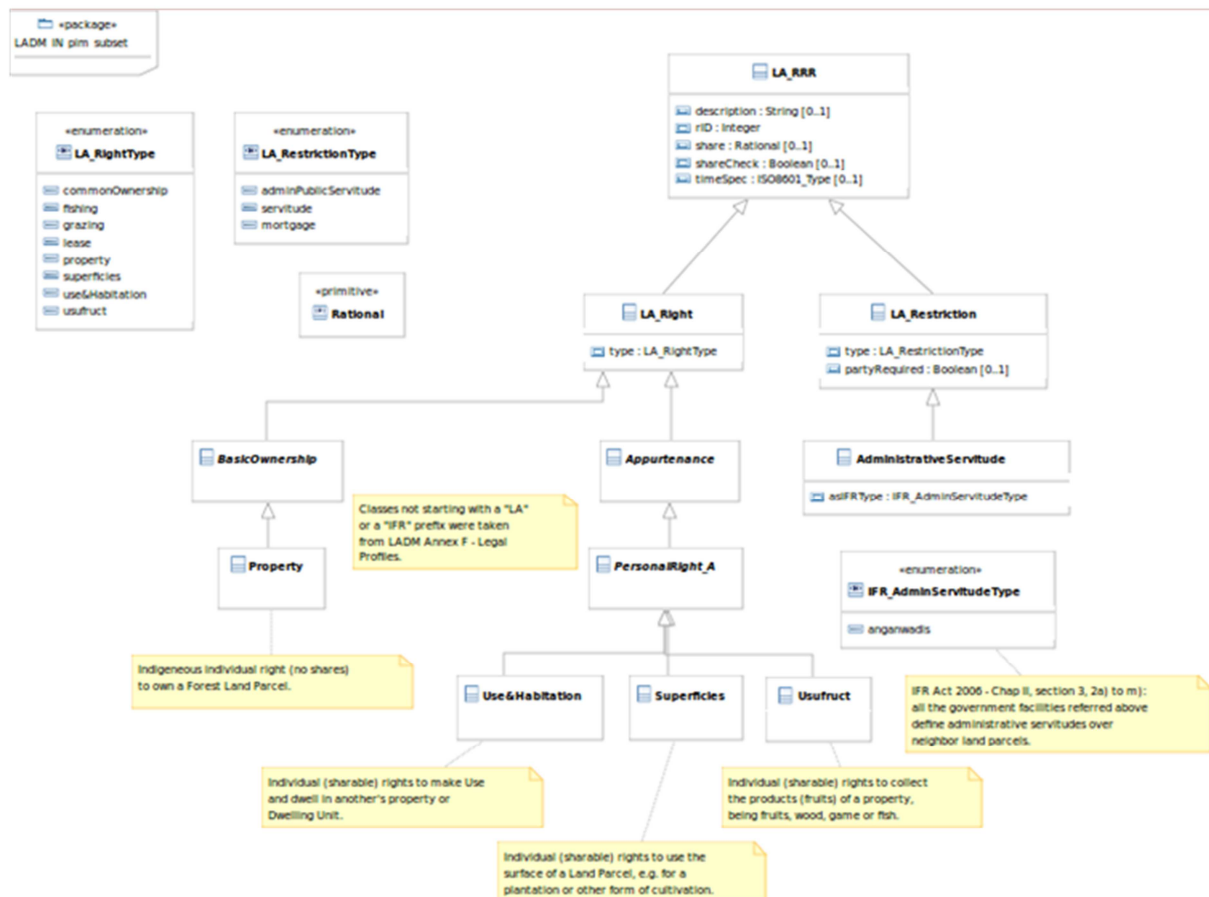


Figure 2 - IFR Specializations; Administrative Package

Specific Use rights and also Usufruct cover the rights considered in item c), specially this last one when referring to “dispose of minor forest product”.

Regarding community rights as referred in items b) and d), they can be treated under a separate legal regime of Commons, and thus considering a Commons Ownership which exists in the Legal Profile but is not shown in Figure 2.

If a special arrangement of Basic Administrative Units, Rights and Spatial Units is considered, there is also the possibility to create so-called Serving Parcels [see 6, Fig. C.3], under a Private Property regime, where a number of parcels are entitled to the (shared) use of another parcel, for instance, for grazing or fishing uses, as declared in item d).

Regarding item e) [5, Chap.2, 3e] on Use & Habitation rights for primitive tribal groups, they can be considered individually as above, or the Right can be hold by a Group Party, which can represent the Tribe with different individual shares, if needed.

Concerning Restrictions, every area of Habitat or Conservation of Wildlife that is not under a Public Domain regime (which excludes Private Property rights within), shall be considered as a Restriction over Forest Land Parcels or Villages.

All the “diversion of forest land for... facilities managed by the Government” [5, Chap. 2, 3.2] shall be considered as imposing Administrative Servitudes on Forest Land Parcels or even over Commons Land, and for some cases, this can be even creating new Public Domain, if some sort of Expropriating is to be considered.

Not all the Rights are considered in this first analysis (including those in [5, Chap. 2, 3f to 3m]), however it must be stressed that this is a proposal which is using a profile abstracted from the Land Law in Europe, with a strong tradition based on Roman Law and (more modern) Civil Law. The reason for this choice being that it is the sole legal profile available in [8].

It also assumes that there are three different legal regimes which have to be integrated and taken care of in this model: Private Property (Individual or shared Indigenous Rights), Commons (all the Land held by the Community at large) and Public Domain (under State ownership and administration).

### **3.4 IFR Source classes**

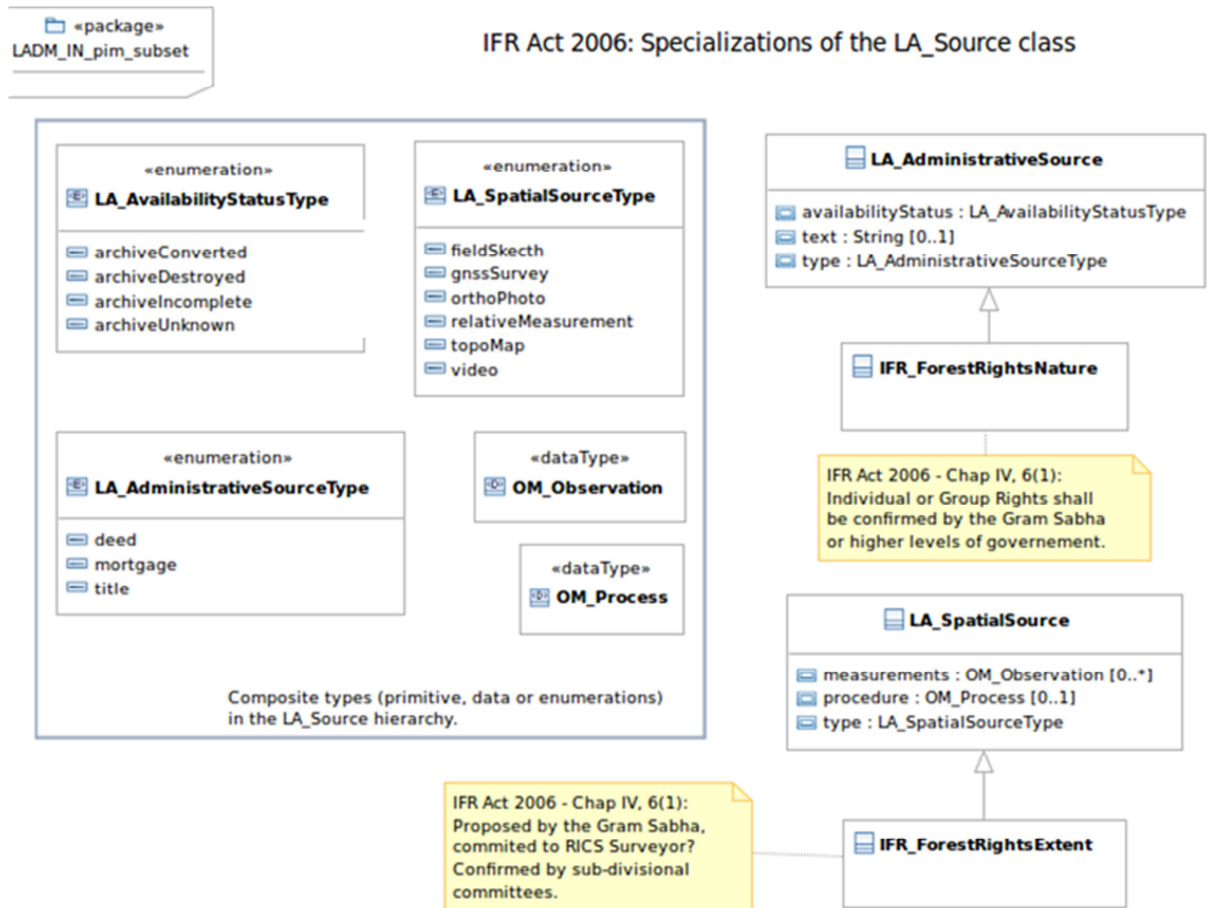
The “Source” herein refers to the LADM specializations from the base LA\_Source class, representing any legal or technical documents which support the definition of other model objects, such as Rights, Basic Administration Units or any Surveying documents.

In the IFR Act, these sources are implicit in Chapter IV on the “Authorities and Procedure for Vesting of Forest Rights”.

According to LADM, one should differentiate between any sources confirming the Nature of the Rights, from those confirming the corresponding Extent where those Rights (or Restrictions or Responsibilities) apply.

The section 6, item 1 of the Act is clear about which types of Land Parcels should be defined by the Gram Sabha (and confirmed by the local government): those are the Private Property Rights and those held in Common.





**Figure 3 - IFR Specializations; Source functional group**

Also according to LADM, the Extent or Spatial Source (in IFR\_LADM is represented by IFR Forest Rights Extent) belongs to the Surveying sub-package from the Spatial Unit, and is a technical document to be prepared with the participation of Land Surveyors. Although this is not explicit in the Act, it is proposed to include in this procedure the participation of some method of surveying to be validated by credited surveyors, but which can be sufficiently fast and affordable for such communities. Of course, the required regulation is still to be written, but it must take in consideration the specifics of the terrain to be covered, regarding human resources, surveying methods and quality versus costs balance. In the limit, it could be considered the survey of centroids as representing small parcels, using inexpensive GPS equipment.

Regarding the Administrative Source document, represented in IFR\_LADM by the class IFR Forest Rights Nature, should be adapted to the specifics of the Indian Forest and respective Parties, according the flexibility granted by LADM (as a Domain Model). As for the Extent source document, a specific regulation must be prepared, taking into account the specifics of the Forest Land, and with the participation of members designated by the Gram Sabha.

### 3.5 IFR Spatial Unit package

Due to its larger dimension, this class diagram was rotated and is inserted in the following page. It shows the same kind of elements as in the previous diagrams, however, it does not show the associations which are allowed between the units and the groups.

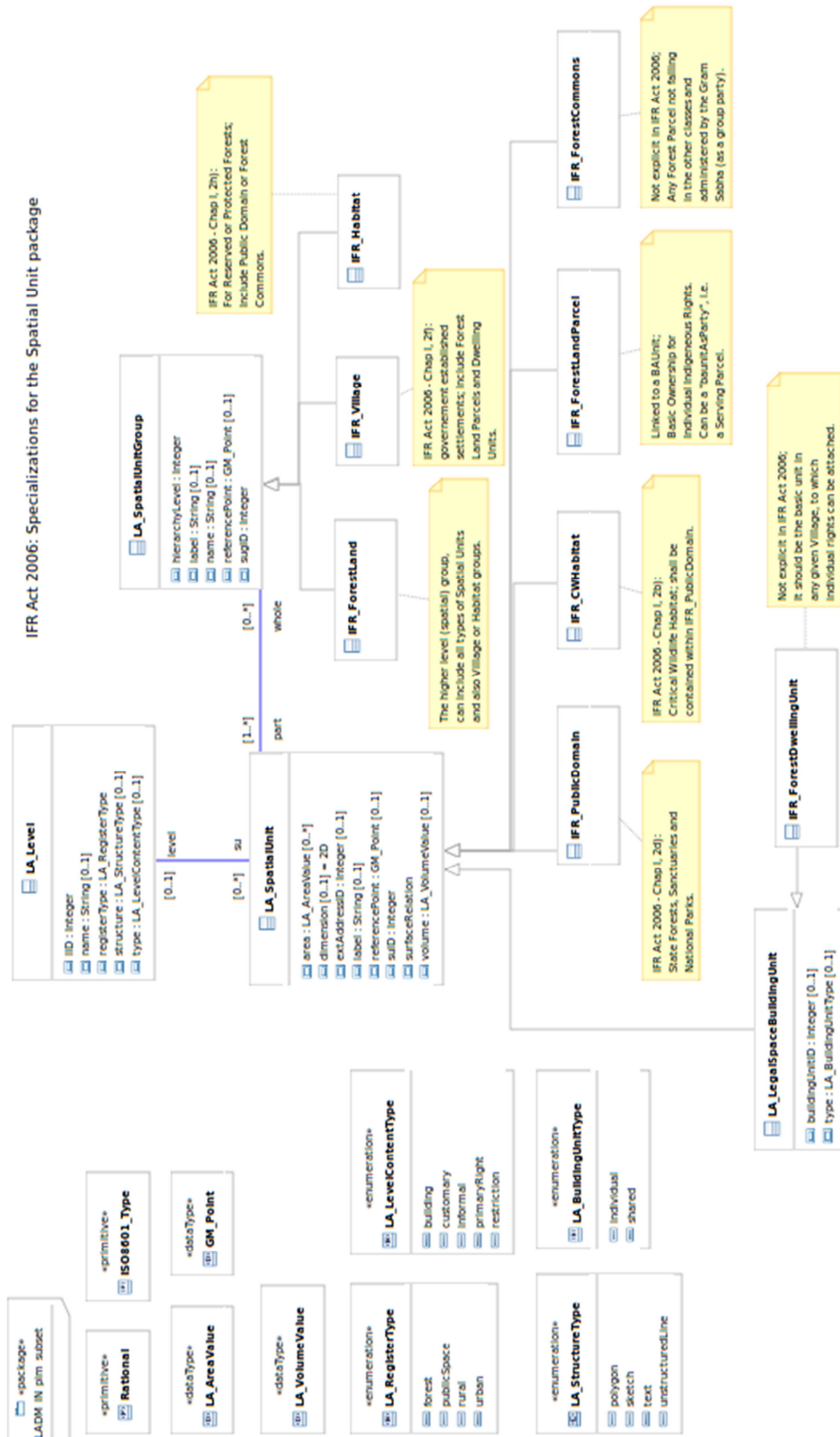
In relation to the arrangement of Spatial Units that can be deducted from the IFR Act, and disregarding for the moment any grouping into different levels (represented in LADM by the LA\_Level class), a total of three hierarchical groups can be identified. Firstly, at a basic, individual level, there are a number of different types of individual Spatial Units. It is considered that the following classes should share a Planar Partition, that is, there should be no overlaps between them (IFR prefix is omitted):

- Public Domain, Forest Land Parcel and Forest Commons.

In a sub-Parcel level and to be contained within Forest Land Parcels, there exists Forest Dwelling Units. All these should be considered as specializations from the LA\_SpatialUnit class. The Critical Wildlife Habitats not considered being Public Domain can overlap any of the different types in the Planar Partition.

From here, several Grouping Levels can be considered, and in the case of the IFR Act, a first hierarchical level should comprise the following classes:

- Habitat, which can comprise more than one Critical Wildlife Habitat, together with elected Forest Commons, and a Village, comprised from Forest Land Parcels and Forest Dwelling Units (eventually some Commons parcels can be considered here).
- A second level groups these first group level objects into a single object of the Forest Land type (as a Spatial Unit Group), which can group more than one Habitat and Village, plus individual Forest Commons, Forest Land Parcels and even Public Domain in a single Forest Land. This can be considered thus an administrative unit managed by the lower level of local government, like a Cadastral Section in many Continental Europe jurisdictions.



### 3.6 IFR Overview diagram

To conclude the presentation of the IFR\_LADM specialized model, an overview class diagram was producing, depicting all the classes having the “IFR\_” prefix, to which a number of classes from the source LADM and the Legal Profile were added (these last ones are used without modification at this time).

To produce such diagram, all the supporting types, namely Data Types, Enumerations and LADM parent classes, as well as abstract classes from the Legal Profile, were all omitted for clarity. The Use Cases use just classes within this overview diagram.

In terms of the object-oriented software development methodology, this procedure corresponds to a “flattening” of the preceding diagrams, where just the more specialized classes in the specialization chain are preserved.

## 4. LADM USE CASES

Next three Instance Level diagrams depict an individual indigenous right among the overall group party rights hold by the Gram Shaba; A Forest Land and Village administered by a Gram Shaba Group Party, and finally a Critical Wildlife Habitat with the State as a Party.

In the first Use Case, the individual holds a derived right of Superficies over a Forest Land Parcel owned by the Gram Sabha, while it holds another type of derived right over a dwelling unit. Both rights are shared among members of the family or tribe. The holder of the Property right is in both cases the local community formed by the Gram Sabha.

The second Use Case shows the different hierarchy levels amongst the Spatial Units which belong to a Gram Sabha. The higher hierarchy corresponds to the Forest Land, which can include one or more Villages.

The third Use Case shows how a State imposed Administrative Servitude can determine the extent of a Critical Wildlife Habitat which can extend over individual or local communal parcels of land.

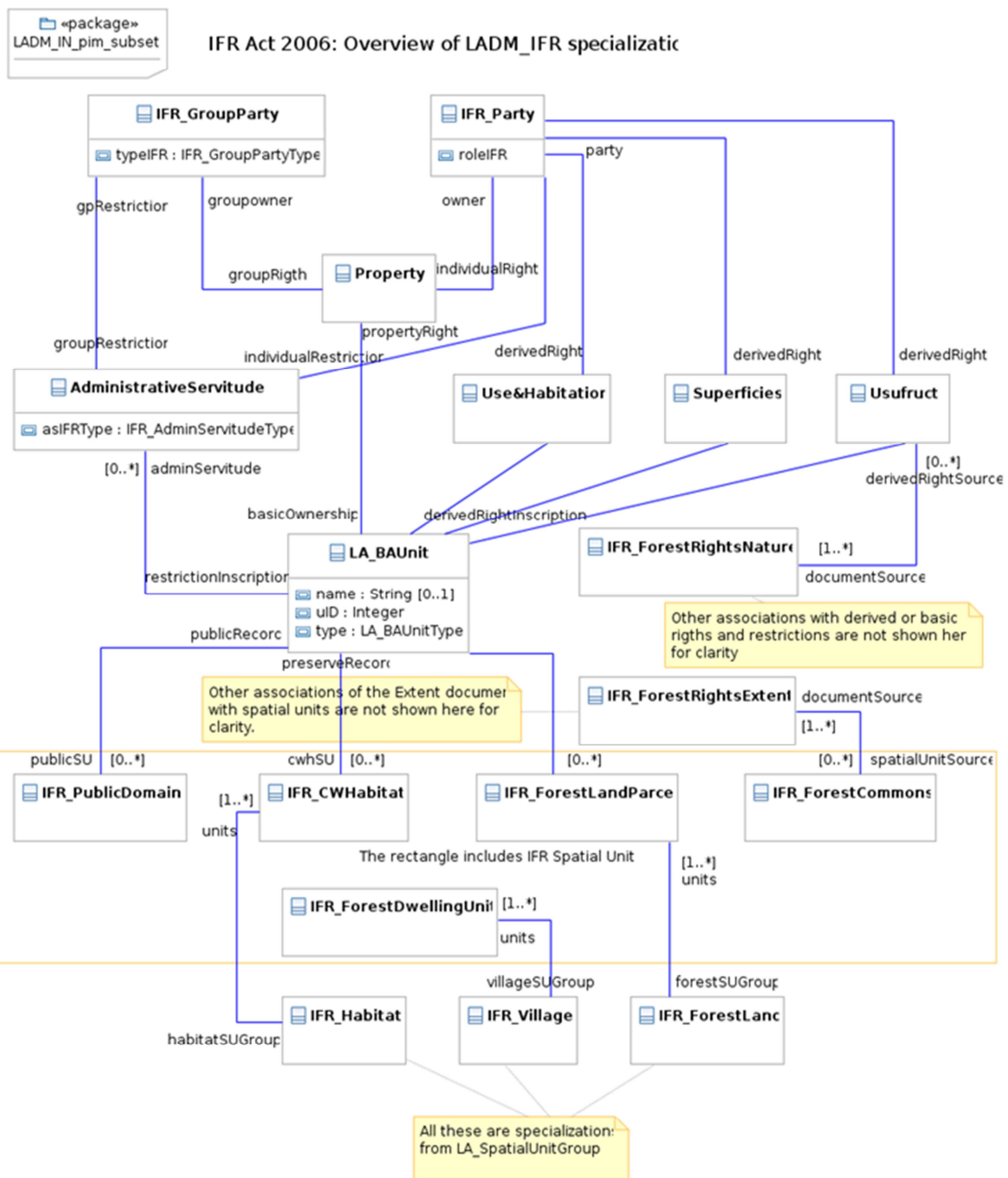


Figure 5 - Overview of IFR\_LADM Specializations<sup>3</sup>

<sup>3</sup> Property class in this diagram refers to the Maximum Real Right in a jurisdiction, according Civil Law. The spatial UnitSource association role refers to a Source document specifying the geometry of the Spatial Unit.

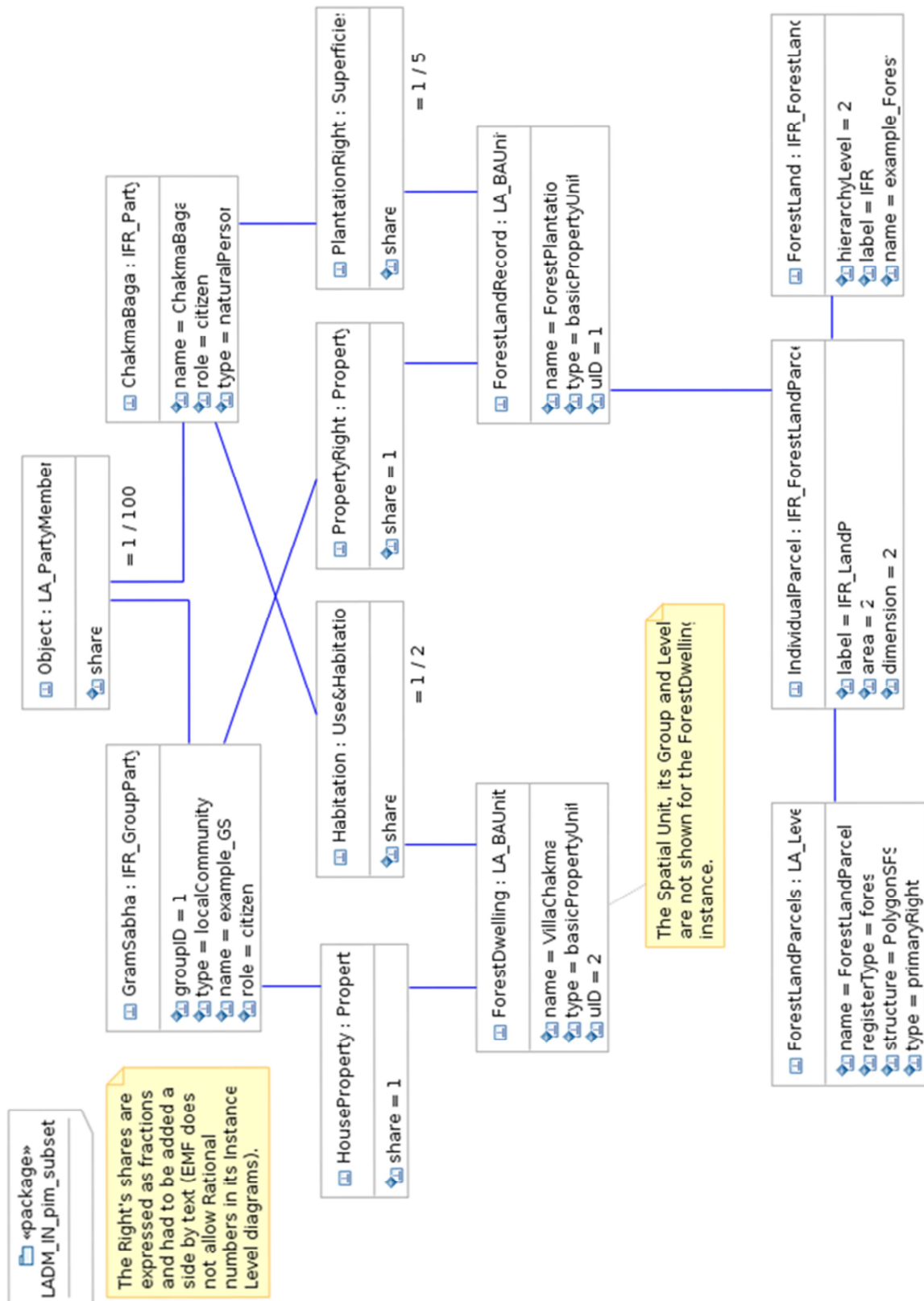
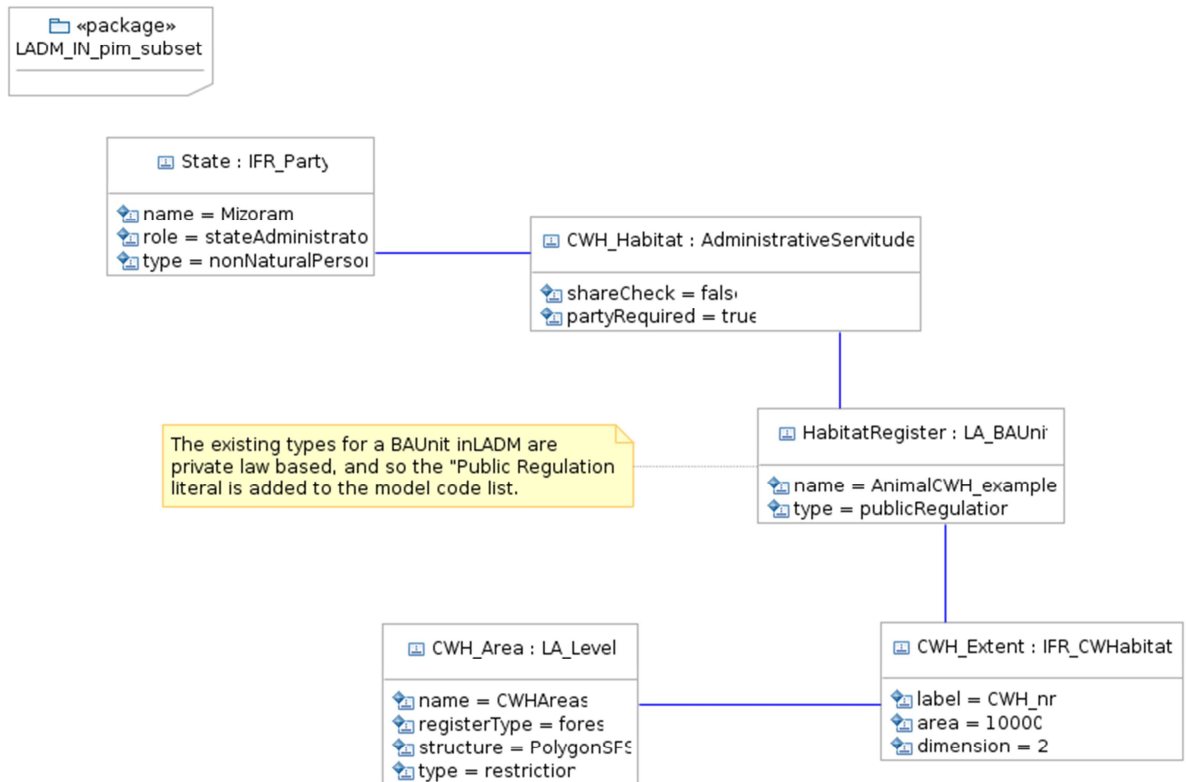
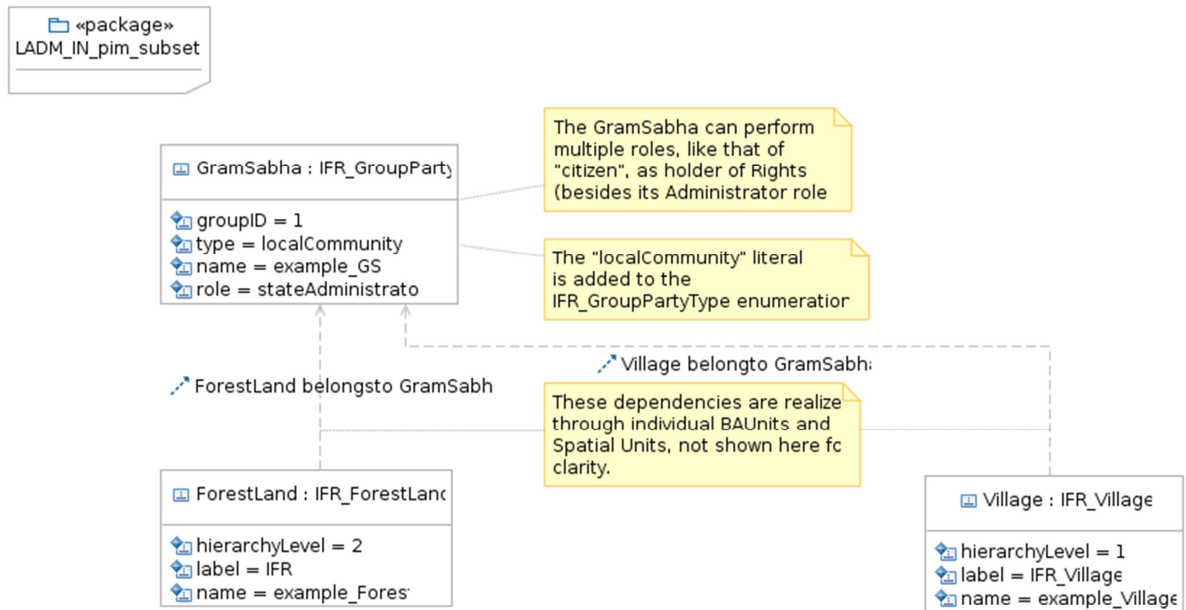


Figure 6 - Use Case: Individual Indigenous Rights





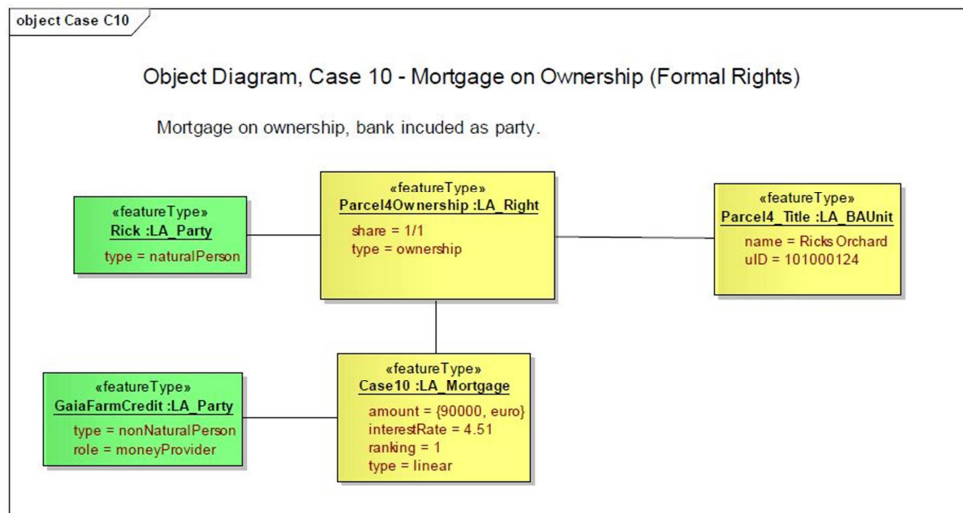
## 5. SPATIO-TEMPORAL DIMENSIONS OF FOREST RIGHTS ACT, 2006

The act does not explicitly mention about the spatial dimensions of the Rights and other aspects. However, some aspects are worth of mentioning under this section:

1. Rights for conversion of leases or grants issued by any local authority or any state government on forest lands to titles. This means land titles to a defined spatial unit. However it does not state the extension of rights in the third dimension i.e. underground.
2. Gram Sabha shall be the authority to initiate the process for determining the nature and extent of individual or community forest rights by preparing a map delineating the area of each recommended claim.
3. Right of ownership, access to collect, use and dispose of minor forest produce which has been traditionally collected within or outside village boundaries. This describes the spatial limits of rights related to minor forest produce. It also has a vague time-spec element by referring to traditional collection.
4. Other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities. This refers to temporal element in resource access by nomadic or pastoralist communities during particular seasons.
5. The act empowers the holders of any forest right, Gram Sabha and village level institutions to ensure that adjoining catchments area, water sources and other ecological sensitive areas are adequately protected. This empowerment clearly gives a spatial (2D and 3D) extension to the forest rights of the holders beyond their village or habitat limits.
6. The recognition and vesting of forest rights under this act shall be subject to the condition that mentioned tribes or dwellers had occupied forest land before the 13th day of December, 2005.

These spatial dimensions can be extended further in LADM framework. It is not clear and seems to be most unlikely that Forest Rights Act, 2006 allows the holders to raise credit against the entitled individual / community land holdings. This rule out the possibility of working with Case C27 of LADM i.e. Spatial Unit with Micro Credit. However, the formal rights granted to the holders of ownership, access to collect, use and dispose of minor forest produce within or outside village spatial demarcation; community rights or entitlements such as fish and other products of water bodies, grazing etc. can be considered as a basis for raising credit. Slight modification of Case C10 of LADM i.e. Mortgage on ownership (Formal Rights), considering above mentioned formal rights equivalent to Parcel Ownership rights, will enable credit rising for the right holders.





Case C10. Mortgage on ownership, bank included as party

## 6. CONCLUSION AND RECOMMENDATIONS

This paper shows that LADM does have the base flexibility to be tailored to the specific needs of special contexts, be it national or land use category related. It also has the possibility to be used in other settings that of Land Law in Europe, with a strong tradition based on Roman Law and (more modern) Civil Law. In this way it looks that it can underpin and facilitate the design of a land administration system that supports all segments of society, including poor and marginalized groups (in this case indigenous forest peoples). It looks it can ease the design of an appropriate land information system to help implement innovative legislation like the Indian Forest Rights Act, 2006 (our work did not make the next step of actually designing the system).

The flexibility in each of the packages and between the packages, especially the structure with abstract classes that allow for specialized classes below them without changing the relationships with the diagrams, contributes to this. Similarly the possibility to group classes to combine related (societal, legal or physical) concepts for different levels of societal application contribute to this.

The fact that a complex matter like forest rights can be handled without extensive reworking of the model, goes to show this flexibility once again. The approach of using the rights, restrictions, actors according to the appropriate law as main input, and the fact that no MDA tools were needed, just a UML tool, show that application at this level also does not require advanced technological skills and experiences.

We recommend conducting new Case Studies for other developing countries (such as Brazil or China) for future research. The temporal aspects deserve further research, as well as cost effective survey methods and administrative procedures. A more detailed modelling phase should be applied in order to identify Case specific properties and constraints, both alphanumeric and topologic, on the specialized classes. The results obtained for the Indian Forest Rights, at this detailed level, should then be compared to the new Case Studies, which can lead to the identification of widely applicable modelling patterns.

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## BIOGRAPHICAL NOTES

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