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Exploring and assessing STDM and LADM for gender equitable land administration

Christiaan LEMMEN, Eva-Maria UNGER and Monica LENGOIBONI (The Netherlands), Marisa BALAS (Mozambique), Kholoud SAAD (Egypt), Rohan BENNETT (Australia), Peter VAN OOSTEROM, Jaap ZEVENBERGEN and Martinus VRANKEN (The Netherlands)

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SUMMARY

International laws and frameworks such as the 2030 Agenda for Sustainable Development with its defined Sustainable Development Goals (SDGs), together with the Voluntary guidelines on the responsible governance of tenure of land, fisheries and forests in the context of national food security (VGGTs) are key global cornerstones in the protection of women's land rights and enabler for women to get land rights. Land rights for women is an issue that is linked to broader issues across geographical regions and cultural and religious differences. The SDGs specifically target women's land and property rights in ending poverty (target 1.4), achieving food security (target 2.3) and ensuring gender equality (target 5a). To achieve these goals and to act according to these global policies, namely, to have equal land rights for women and men, land ownership and land use records need to include both genders. Though, in many countries, such records are non-existent or not up to date or do not show the reality on the ground. As a result, women are often passed over by the government during tenure recordation processes.

Further overlapping or secondary land rights have been lost through formal land registration systems (women are often these 'secondary land right holders', where men are mostly the primary right holder). Consequently, the livelihoods of those relying on the secondary land rights, which are often overlapping use rights to property rights, have been negatively affected. Issues such as: polygamy, monogamy, divorce, inheritance, primary and secondary rights, shares in property and use rights, legal systems (statutory, customary) are directly related to women's land rights.

More specifically, the required supportive data models, forms and databases that could support women's land rights are either not designed or used in a way that is gender equitable. Aimed at overcoming these issues, supporting and enhancing the protection of the land rights of women and underrepresented, fit-for-purpose land administration promotes alternative approaches to improve land tenure security.

The Land Administration Domain Model (LADM) and the related Social Tenure Domain Model (STDM) functionalities can be used for documenting primary and secondary land

rights of women. The STDM concept promotes the recordation of a range of land rights including de-facto tenure rights, as well as capturing a variety or multiplicity of tenures that often overlap. In this paper, the contemporary and available options for modelling women's land rights and use rights in land recording systems will be unpacked, opportunities identified, along with limitations, and work to overcome these suggested. Concepts of land administration are neutral to politics, and can accommodate any number of classifications.

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1. INTRODUCTION

International laws and frameworks such as the 2030 Agenda for Sustainable Development with its defined Sustainable Development Goals (SDGs), together with the Voluntary Guidelines (VGGTs) are key global cornerstones in the protection of women's land rights. This can be seen as specific translation of women's rights in general¹ towards land tenure issues. Land rights for women is an issue that is linked to broader issues across geographical regions and cultural and religious differences. The SDGs specifically target women's land and property rights in ending poverty (target 1.4), achieving food security (target 2.3) and ensuring gender equality (target 5a). To achieve these goals and to act according to these global policies, namely, to have equal rights to land for women and men, land ownership and land use records need to include both genders. Though, in many countries, such records are non-existent or not up to date or do not show the reality on the ground. As a result, women are often passed over during tenure recordation processes due to social practices.

This paper evaluates gender equitable land administration within a more technical context such as the LADM in order to support and strengthen the recording of women's land rights in the proposed standardization process. The gender equality issue on land rights is mainly about policy frameworks that including human rights, international, regional and national legal instruments, laws and practices. Those legal instruments, laws and practises should be enforced by proper organisation of data models, processes and databases.

This suggested addition in the LADM would be helpful in collecting the statistical data on the gender monitoring parameters to feed into the Global Land Indicators' Initiative that aims in monitoring the progress on the land and women related SDGs.

In edition I of LADM (ISO/TC211, 2012b) there was attention to the rights of the poor and vulnerable by the related Social Tenure Domain Model – STDM (Lemmen, 2010) in the informative Annex I of the standard. The STDM is an initiative of UN-HABITAT GLTN to support pro-poor land administration. The focus of STDM is on the relationships between people and land, independently from the level of formalization or legality of those relationships. It is a search for a model that will support all forms of land rights, social tenure

¹ e.g. the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) (UN, 1979), an international treaty adopted in 1979 by the United Nations General Assembly and instituted on 3 September 1981. The 1993 United Nations World Conference on Human Rights to formally declare that women's rights are human rights

relations, and overlapping claims to land (Augustinus et al., 2006). This includes primary and secondary land rights. Secondary rights are often use rights overlapping to primary property rights. In case those secondary rights are not recognised they will not be included in the land administration systems and may be lost to the secondary land use rights holders.

Both STDM and LADM are descriptive and not prescriptive. The purpose is that LADM and STDM will contribute to a better understanding of the many aspects of social tenure – in this paper more specifically focussed on the gender issue.

LADM and STDM functionalities can be used for documenting primary and secondary land rights of men and women. This should be made more explicit in order to make the LADM and STDM functionalities accessible to a wider audience. In the opinion of the authors this will support and enhance women's land rights and use rights with LADM or STDM. This is strongly related to implementation conditions for gender friendly policies and laws. A condition for enforcement is gender friendly processes, transactions, forms and databases where both, all possible people to people, and people to land relations can be included.

People to people relationships (marriage or other constellations) can be represented in LADM as groups, groups of groups (etc., this is recursive) and as associations between LA_Party, LAGroupParty and LA_PartyMember. It is important to observe that in this paper people to people relationships are presented without opinions or viewpoints from whatever perspective – except be it the perspective of gender-friendly modelling people to land relations. This is a context sensitive issue – implementations depend on culture and context. In any case: databases, forms, processes must be ready to implement gender related land policies in countries all over the world. Such policies bring benefits to women - and to children.

The concepts of land administration are neutral to politics. Any number of classifications can be modelled using various data types, the choices of which classifications to include, however, is very much a socio-political process, and tend to benefit the economically stronger groups more than the others (incl. women).

It is not possible to present an overview of all kinds of women's rights in relation to this paper. The contents of this paper are expected be enhanced and updated according to new insights based on reviews and discussions. New and improved versions will be provided at global events as the World Bank Conference on Land and Poverty or FIG Conferences.

In this paper, the contemporary and available options for modelling women's land rights and use rights in land recording systems will be unpacked, opportunities identified, along with limitations, and suggested work to overcome these. Women's rights to land requires inclusion of the gender issue in the design of processes, forms, databases, products, services and certificates. That is the focus of this paper: to bring options for a gender-friendly design of processes for initial data acquisition and maintenance and gender-friendly database schema design.

A gender friendly design of land administration may look different at different locations with different culture and religion.

Section 2 of this paper provides a (historical) overview of LADM and Gender. ISO/IEC 5218 is introduced. This standard specifies a uniform representation of human sexes for the interchange of information which can be re-used in LADM. Section 3 discusses the need for a gender attribute in LADM: LA_GenderType. Some examples of (amongst experts already known) flexibilities of LADM (with LA_GenderType included) are discussed in Section 4. The conclusions are in Section 5.

2. LADM AND GENDER

The Land Administration Domain Model does not include an attribute in the LA_Party class related to gender – there is no LA_GenderType attribute. Such an attribute was proposed in early versions of the Social Tenure Domain Model STDM (Augustinus et al., 2006; Lemmen et al. 2007; Lemmen, 2010) but was not included in the different versions during the development of Edition I of LADM (ISO/TC211, 2008, 2009, 2011, 2012a and 2012b).

For the STDM the requirements were published in Augustinus et al. (2006). In that paper requirements were formulated as questions – such as ‘*Can formal and informal tenure systems be merged in one environment? How should a participatory approach be optimally supported? Which types of spatial units and parcel/spatial unit identifiers should be supported; how to support flexible (changing over time) boundaries, fuzzy boundaries? etc.*’.

In this list of requirements there was one related to gender (requirement 9 in Augustinus et al. (2006)): *How could a Social Tenure Domain Model support in full and equal access to land?* In the related analyses it was stated that shared rights (relationships) are supported; this functionality could be re-used from the earlier developed Core Cadastral Domain Model CCDM, in Van Oosterom et al. (2006). In this analysis it was further stated that (UML) methods should be developed to calculate shares based on legal or otherwise accepted principles. Certificates should be provided to male and female in the case of shared rights.

It should be noted here that the CCDM publication included already an “attempt to list classes or packages of classes that are related to, but outside, the CCDM”. This list included, amongst other, the “natural person registration” and the “non-natural person (company, institution) registration”. The idea is that data duplications should be avoided and that gender related issues need to be documented in a population (or similar) register with source data on natural persons. This will also allow changes in countries that are accepting non-binary gender types.

In principle a LA_GenderType attribute is not mandatory in a land administration system. Persons or parties can hold a right and/or a share in a right and/or can be member of a group holding a right, see Lemmen et al. (2010) for an overview of modelling group rights. The person can be identified with a name and/or ID (which can be an id in an external registration) and that should conceptually be sufficient.

LADM, STDM and CCDM contain person ID's. Those ID's can be used to access data from the source in external databases – duplications should be avoided because those external databases can contain a gender attribute. The construction of external databases with party data, address data, taxation data, land use data, land cover data, valuation data, physical utility network data, and archive data, is outside the scope of the LADM. However, the LADM provides stereotype classes for these data sets (if available), see Annex K of the LADM in (ISO/TC211, 2012b). During the design of the LADM it was even discussed that the inclusion of this attribute may result in support to discrimination purposes.

The gender can be included in a (country) profile model, based on STDM and LADM. This means that one attribute of sex can be added to manage data that can be used for inclusion of gender related (UML) methods or generation of statistics, etc. UML methods can be modelled gender friendly or can be modelled in support discrimination: i.e. unequal shares in inheritance processes. Shares can be equal for men and women or not - this depends on context: culture and customs. In any case it is proposed here to include LA_GenderType in the second Edition of LADM as optional [0...1] attribute.

There is an existing standard on gender. That is: ISO/IEC 5218 Information technology — Codes for the representation of human sexes. It is an international standard that defines a representation of human sexes through a language-neutral single-digit code. It can be used in information systems such as database applications (ISO/IEC 5218:2004).

ISO/IEC 5218 specifies a uniform representation of human sexes for the interchange of information. The standard specifies that it is intended to:

- reduce the time required to record and/or format the representation of sexes and transmit the corresponding data;
- improve clarity and accuracy of interchange;
- minimize the amount of human intervention required for communicating the representation of sexes; and
- reduce costs.

The four codes specified in ISO/IEC 5218 are:

0 = not known,
1 = male,
2 = female,
9 = not applicable.

The standard specifies that its use may be referred to by the designator "SEX".

ISO/IEC 5218 does not supplant national standards for coding sexes that are designed based upon codes derived from names of sexes in the various languages (for example “M” for “male” and “F” for “female” in the English language).

It provides a numeric code that is independent of language-derived codes and as such is intended to provide a common basis for the international exchange of information containing human sex data elements. It is recognized that the terms in this standard, i.e. “male” and “female”, are adjectives. As such, in many natural languages they are subject to concords, namely their gender and plurals.

The standard explicitly states that no significance is to be placed on the encoding of male as 1 and female as 2; the encoding merely reflects existing practice in the countries that initiated this standard. The standard also explains that it "meets the requirements of most applications that need to code human sexes. It does not provide codes for sexes that may be required in specific medical and scientific applications or in applications that need to code sex information other than for human beings." Extensions may be required as in a number of countries 'X' is legally recognised as non-binary gender².

3. GENDER ATTRIBUTE IN LADM

The SDGs specifically target women’s land and property rights in ending poverty (target 1.4), achieving food security (target 2.3), ensuring gender equality (target 5a) and reduced inequalities (target 10.2). The goals and related indicators are presented at the website ‘Indicators and a Monitoring Framework’ of the Sustainable Development Solutions Network.³

Ending poverty (SDG target 1.4):

- ‘by 2030 ensure that all men and women, particularly the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership, and control over land and other forms of property, inheritance, natural resources, appropriate new technology, and financial services including microfinance’.

Achieving food security (SDG target 2.3):

- ‘by 2030 double the agricultural productivity and the incomes of small-scale food producers, particularly women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment’.

Ensuring gender equality (SDG target 5a):

- ‘undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance, and natural resources in accordance with national laws’.

² See also https://en.wikipedia.org/wiki/Legal_recognition_of_non-binary_gender.

³ <https://indicators.report/targets/>

Reduced inequalities (SDG target 10.2):

- ‘by 2030 empower and promote the social, economic and political inclusion of all irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status’.

The related indicator is: ‘the percentage of women, men, indigenous peoples, and local communities with secure rights to land, property, and natural resources, measured by (i) percentage with documented or recognized evidence of tenure, and (ii) percentage who perceive their rights are recognized and protected’.

There is a remark: ‘as stated in the headline of the indicator, gender, indigenous peoples, and local communities are priority groups for disaggregation. Further disaggregation by urban/rural, region and other areas is desirable.’

In order to meet those requirements there is a need for LA_GenderType with a related code list based on ISO 5218. Indigenous people and local communities can be included in the code list LA_PartyType, see Annex J of LADM. The disaggregation urban/rural can be modeled via LA_SpatialUnitGroup with label urban or rural. An alternative may be via LA_Level – especially if there are differences between urban and rural land administrations from contents perspective. This is specifically important while monitoring women’s land rights in rural areas. It is well noted that in the rural areas the social norm of land being registered only to male members of the family is more dominant; hence the rural areas are more challenging for recording women land rights.

To achieve these goals and to act according to these global policies, namely, to have equal access to land for women and men, land ownership and land use records need to include both genders. Though, in many countries, such records are non-existent or not up to date or do not show the reality on the ground. As a result, women are often passed over during tenure recordation processes due to social practices.

The UN publication on ”Realizing women’s rights to land and other productive resources” (UN, 2013) provides detailed guidance for lawmakers and policymakers, as well as civil society organizations and other stakeholders, to support the adoption and effective implementation of laws, policies and programmes to respect, protect and fulfil women’s rights to land and other productive resources. The publication recommends to ‘recognize legal security of tenure within rural, urban and peri-urban areas across the “continuum of land rights” (e.g., customary, group, collective, leasehold, freehold) and ensure that legal security of tenure is recognized and enforced for women on an individual basis irrespective of marital or other status’. The publication further recommends that ‘laws, policies and programmes should: ensure that the full range of land tools (e.g., plans, guidelines, operational manuals, training modules, land tenure instruments, *land records databases*, monitoring and evaluation instruments) have an integrated gender perspective, and promote women’s effective, secure and equal enjoyment of their land rights’. It is further stated that ‘Laws, policies and

programmes should: recognize the equal rights of spouses regardless of whether a marriage, union or partnership is civil, religious or customary (including polygamous marriages, regardless of whether polygamy is legal or not)'. The LADM supports the implementation of the continuum of land rights (UN-Habitat, 2008) Polygamous marriage can be modelled in different ways; with equal or different shares in rights for the man and the wives – or even with distinction between 1st, 2nd, 3rd wife. This may be discrimination in the eyes of some people. It can also be considered as a foundation for a transaction from one level of shares in a right to another level. The issue is that systems should be designed to accommodate such issues.

The FAO publication 'Governing land for women and men A technical guide to support the achievement of responsible gender-equitable governance of land tenure' (FAO, 2013) publication is asking for design of the land information system and databases with inclusion of steps that ensure the law and regulations regarding gender equity to be implemented. For LADM this means code list management and the inclusion of LA_GenderType as already mentioned above. Also the (FAO, 2013) addresses the issue how adequately land administration activities are designed to take into account and address women's needs, interests and concerns. Tenure security can be safeguarded under various forms that make clear the rights of land users and owners: formal titles; clear, long-term rental contracts; reliable lease agreements; or formal recognition of customary and legitimate informal rights, with accessible and effective dispute mechanisms. It is further stated that the design of any land information system must fit into the relevant policy and legal framework, including for gender issues. For instance, if joint titling is mandated by law, the system should be designed to support this. In LADM joint titling is possible – with shares in rights. In (FAO, 2013) again the continuum of land rights is mentioned as being relevant in relation to gender and land rights.

In LADM this can be implemented via the LADM code list LA_AdministrativeSourceType, see Annex J of (ISO, 2012b). In Edition II of LADM an integrated source document is proposed – here the type of source document is organised via the new attribute maintype. One more demand from FAO (2013) is to promote joint titling and the registration of women as the exclusive owners of their land. This is possible in LADM but requires proper code list setup.

The FIG Publication No 24 (2001) of the International Federation of Surveyors (FIG) is a set of Guidelines from the Federation on women's land rights and access to land. The document provides background information to surveyors and assists development project managers, surveyors, land administration agencies, and others in ensuring that land administration enhances and protects the rights of all stakeholders, including women. Contents from this publication and from (FAO, 2002) as quoted below is relevant for LADM implementations.

First of all, it is about documenting or registering customary rights in land as part of the development of national land policies. This provides greater security of tenure on customary land, it provides a document that can be used as collateral for credit and it provides more information for planning and land management. Related to this it is said that this could have

significant impact on women's access to land because such documentation effectively freezes customary rules (which are sometimes in favor of women) that are in place at the time. No account is made, for example, of such future rights as the right of a woman to return home and receive a parcel of family land after a divorce. In LADM this would require the inclusion of defined membership in a LA_GroupParty per family and a code list where this right is related to a right holder – holder of first rights (ownership, shelter etc), secondary rights such as the right to return after divorce, right to shares in inheritance on the death of a family member; rights to shares in land and improvements after the death or departure of a partner in an informal marriage; rights of access to financing and financial inputs; rights to the profits from the use or sale of the resource; etc. LA_PartyRoleType could be used for issues as social status in the community based on access to land and role in decision-making (e.g., management and control). Decision making would provide opportunities for women's land rights to be explicitly recognized. If a land titling, cadastral surveying, land registration, or information system project is going to document rights to land, then decisions need to be made as to: what rights will be included? Names of which persons will be documented and based on what evidence? How will these names be kept up to date? In addition, there is a need for the choices made on these issues to be acceptable to the recipient community in order to ensure the sustainability of the systems introduced. This is especially complex when parts of the community accept women's land rights, and others stick to non-equal traditions.

Then it is mentioned (FIG, 2001; FAO, 2002) that limited rights – important for women – such as the right to access water and fish, to pick fruit or gather wood on another's property may be eliminated by the documentation. If it would be included in the documentation, then this can be managed in LADM. This may require new types of spatial units – with fuzzy boundaries (but still point, line or polygon based).

And then (in the same publications) there is the question of whose name(s) the certificates or registers will record. For example, will the name be the de facto head of household, who may be a woman whose husband works away from home, or the de jure head of household according to customary law. There are limitations with both of these approaches, including the problem of whether the documents have priority over customary law in cases of inheritance when both names are recorded. All those options are possible with LADM. In LADM it is possible, as the FIG Publication suggests to *add the spouse's or partner's name to all legal documents concerning land rights, including any official register of land rights*. For transactions involving family holdings, consent should be given by the spouse or partner. This helps to prevent fraud, adds security for the woman beyond family or legislative recognition (e.g., matrimonial laws), and helps to ensure that both partners understand what their rights are.

The FIG publication further proposes alternative ownership models. There are instances where combining individual, common, public or group ownership may provide a better solution for women or groups of women to secure or extend their existing rights. Under customary regimes women have use rights on their male relatives' land. During privatization programmes they can easily lose these rights if the land is titled under the name of the male relative without giving consideration to women's overlapping use rights. Identify joint

ownership interests during registration where applicable. For LADM this would mean extensions of the rights as included in code list LA_RightType, see Annex J of ISO (2012b). This code list may even include a right type violation in order to be able to document violations of women's rights to land.

The quoted FIG publication as followed by a call for action from Karin Haldrup, Denmark during the FIG XXII International Congress in Washington DC in 2002. Action was suggested in the areas 1. gender disaggregated land data and gender sensitive indicators 2. Gender in plural legal regimes 3. Socio-economic impact studies and monitoring 4. Simple, local models of land administration 5. Gender balance at all levels of organisations, and 6. Participation of women in implementation (Haldrup, 2002).

Lengoiboni et al., (2018) highlight that in many contexts, overlapping or secondary land rights have been lost through formal land registration systems (women are often these 'secondary land right holders', men are mostly men the primary right holder). Consequently, the livelihoods of those relying on the overlapping and secondary land rights have been negatively affected as formal registration confirms the primary ownership rights within land parcels. Suggested alternative approaches are based on the philosophy and approach of the Social Tenure Domain Model (STDM) (Lemmen, 2010), which aims at recording land rights of all, also the underrepresented. The STDM philosophy promotes recording of a range of land rights including de-facto ones, as well as capturing a variety or multiplicity of tenures that often overlap, which the formal registration systems have been unable to accommodate. Also the Gender Evaluation Criteria (UN-Habitat, 2016) ask for the possibility for Registry/cadaster to accommodate rights based on use rights tenure. This is possible in LADM by coding those rights in LA_RightType and allocating them to spatial units – as said: this may require new types of spatial units.

The UN-Habitat/GLTN publication Women and Land in the Muslim World Pathways to increase access to land for the realization of development, peace and human rights (UN-Habitat/GLTN, 2018) discusses (again) the importance of land monitoring and its function of providing decision makers and land professionals with an accurate picture of the level of enjoyment of land rights by women and gender-disaggregated land use patterns. It is stated that the collection, analysis and dissemination of gender-disaggregated data in all land administration institutions and projects, including on personnel, needs to be pursued by every country, and is also in line with the recently established SDGs and their monitoring framework. This means in fact more support to the LA_GenderType attribute inclusion in LADM. And, as earlier mentioned from other publications, it is said that 'various sources seem to agree that women are losing out on their access to land when individual ownership - and formal land administration systems - are introduced into customary settings and the transition of customary held land into formal land administration occurs. Changes in family bonds and balances within communities transitioning from traditional systems to more modern economies have distorted and increased inequalities in access to land, and women have disproportionately lost out in this process'.

The Islamic inheritance system is discussed frequently in UN-Habitat/GLTN (2018) as it remained unsurpassed for long time – at least on paper - in terms of protection of women’s access to land. This may be modeled as a process or transaction and may be included in LADM II – as well as similar processes from other environments. One more cited issue is on joint ownership: joint ownership ‘can also benefit women in polygamous marriages, and the option of allocating different shares of a property to different individuals can also be considered’.

Gender disaggregated data are also a criterium in the Gender Evaluation Criteria: 3 – does the tool rely on and provide sex- disaggregated data; and 11 – does the tool promote the principle of a bundle of rights; 12 – does the tool provide different tenure options, recognizing a continuum of rights? The importance of use rights tenure is mentioned. LADM can facilitate all this – if the LA_GenderType is explicitly included.

In Woldbank (2010), Deininger et al. (2011), UN-Habitat (2012), FIG and Worldbank (2014), UN-Habitat (2016) – and many other – similar requirements as discussed above can be detected.

In conclusion: relevant issues when it is about modelling women’s access to land, are polygamy, monogamy, divorce, inheritance, primary and secondary rights, shares in property and use rights (in spatial units with fuzzy boundaries), and legal systems (statutory, customary). Impact of divorce and inheritance is related to transaction processes that update a land administration system from one state into another.

4. INSTANCE LEVEL DIAGRAMS

This Section illustrates some of the options or example cases of people to land relationships from a gender perspective.

It should be noticed here that data modelling is useful for simplistic visualisation, but, is not going to address all the challenges associated with gender. Data models are introduced here to illustrate current settings (and later to envisage future settings), but those data models can only provide a simple representation of people-to-land realities.

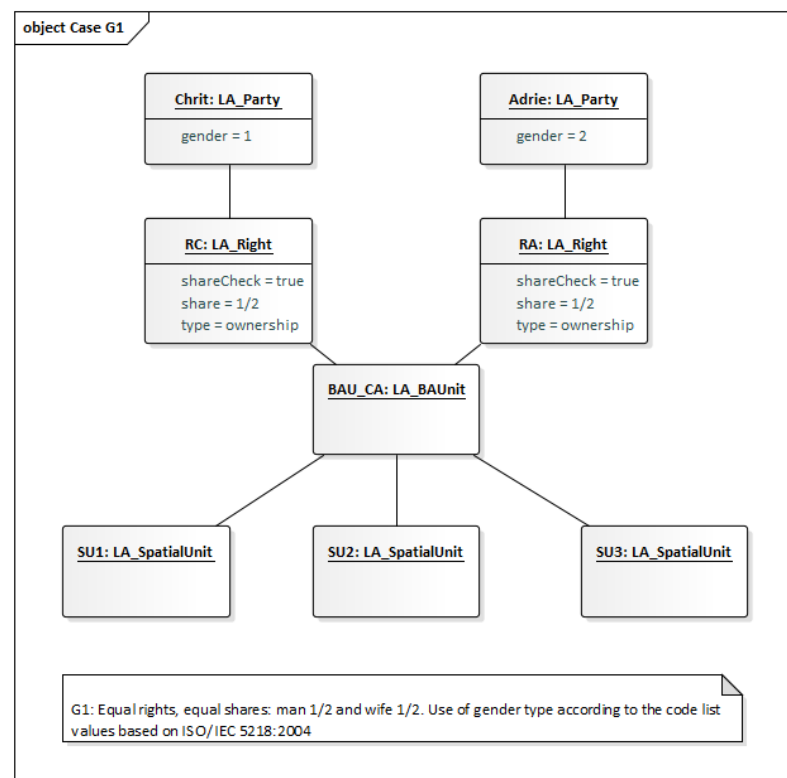
People-to-people relationships are complex, involving local norms, histories, shared stories, marriage and divorce, inheritance, dynamism. These impact on the nature of people-to-land relationships and whether they are recorded into a land administration system. So many laws and policies, but are they changing behaviour? One could argue, that a land administration system would therefore need to record more of the life circumstances and details of people to effectively record a tenure. This would be a relevant academic exercise – but it is expected that such systems can not be maintained because of many reasons – starting with privacy. The attribute set in a land administration system should be minimal. This means inclusion of men and women and primary and secondary rights.

It is explicitly intended that these gender-focused modelling options of people-to-land relationships are simplistic, and this is what is aimed at.

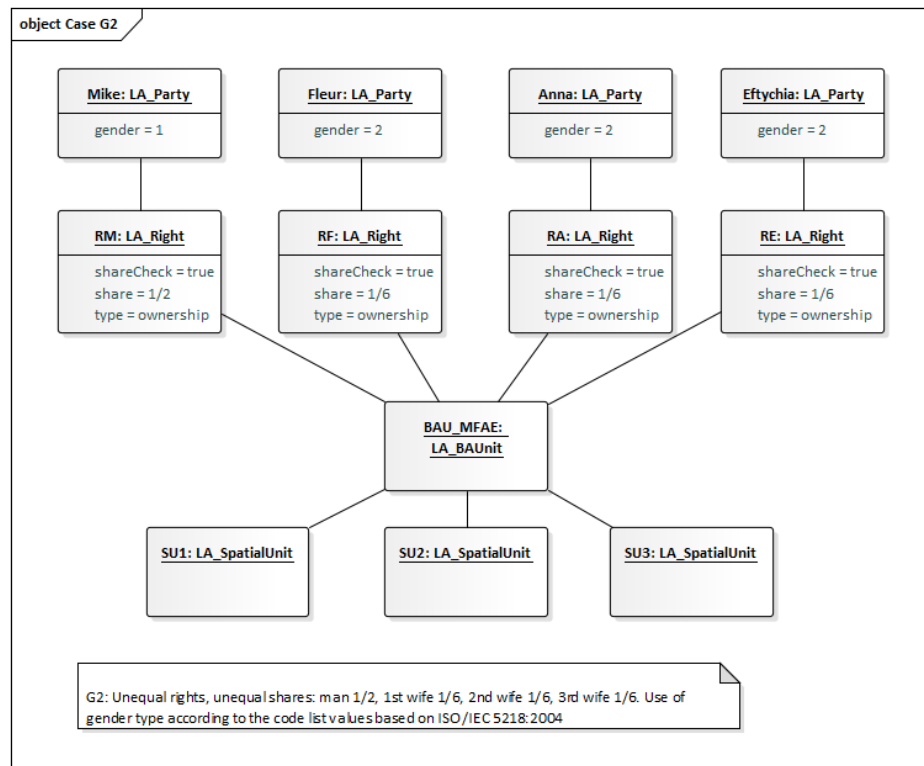
Six UML instance level diagrams are visualised below. Many other combinations are possible. The instance level diagrams demonstrate LADMs flexibility. Note 1: the attribute LA_ShareCheck can be used to set a method to enforce that sum of shares is equal to 1. Note 2: in LADM secondary use rights may be related to holders where the underlying ownership right is overlapped. Note 3: the question who defines the % of share in a right need to be discussed in awareness meetings. Experience is that (mostly in rural areas), men will decide the %. This will not solve the women's insecurity of tenure. Men, if obliged to will mostly decide for the secondary right as far as women's rights are concerned.

Note: the codes as from ISO/IEC 5218 (see above) are re-used in the instance level diagrams here below.

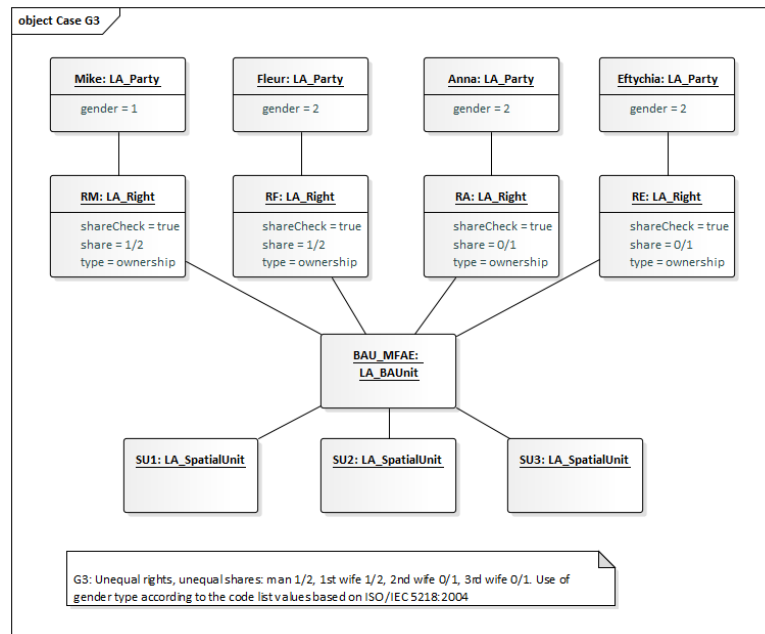
1. *Marriage between one male and one female.* In this example there are equal rights associated to one basic administrative unit with 3 spatial units. In this example parties of gender type '1' or '2' based on the code list from ISO/IEC 5218 as presented in Section 2. Both parties hold a share in one right (of right type ownership): Chrit a share equal to 1/2 and Adrie the sme. The attribute LA_Sharecheck is set to 'true'. This means UML method is applied where it is forced that the sum of all shares in the ownership right on the basic administrative unit is equal to 1 (the right as a whole).



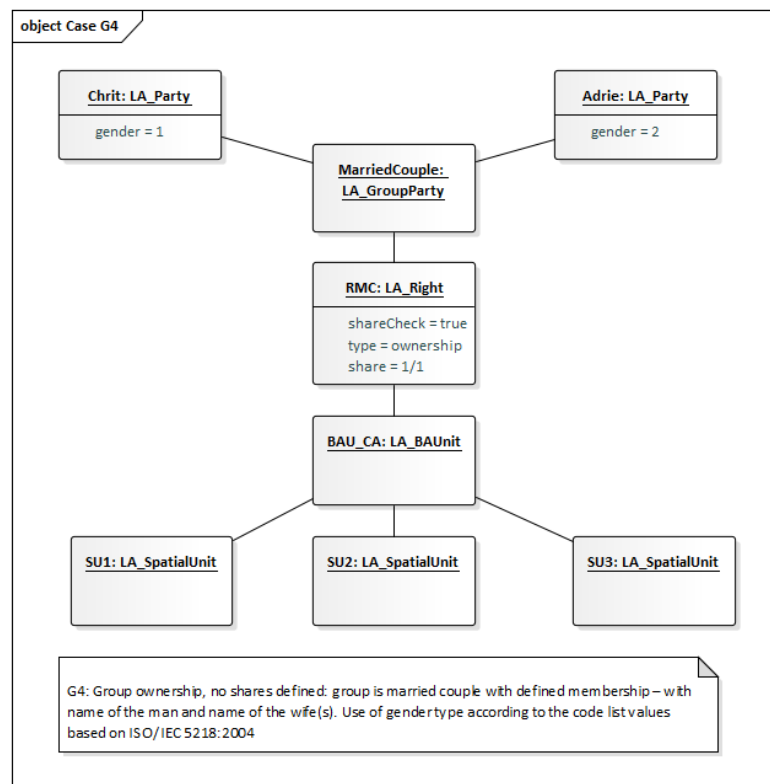
2. *Polygamous marriage between one male and three female.* In this example there are unequal rights associated to one basic administrative unit with 3 spatial units. The principle is followed that male gets a share equal to $\frac{1}{2}$ and all female together also a share equal to $\frac{1}{2}$: this means man $\frac{1}{2}$, 1st wife $\frac{1}{6}$, 2nd wife $\frac{1}{6}$, 3rd wife $\frac{1}{6}$. Use of gender type according to the attached code list. With the attribute LA_ShareCheck it is forced that the sum of shares should be equal to 1 (the right as a whole). Note: another division of shares is possible, as in case 3 below.



3. *Again a polygamous marriage between one male and three female.* This example illustrates the case where polygamous marriage is not allowed de jure but does exist de facto. Only the first – legal – wife can have land rights according to the law. This means that in this example there are unequal rights associated to one basic administrative unit with 3 spatial units: the man holds a share equal to $\frac{1}{2}$, the first wife also a share equal to $\frac{1}{2}$, the second wife a share 0/1 as well as the third wife (0/1). Sum of shares should be equal to 1. Even though the 2nd and 3rd wife have a zero share in the right as a whole inclusion of their names is likely to have some impact – because it is a representation of the situation “as is” and a basis for later transactions to improve the situation. Note: another division of shares is possible, for example equal shares for all persons involved.

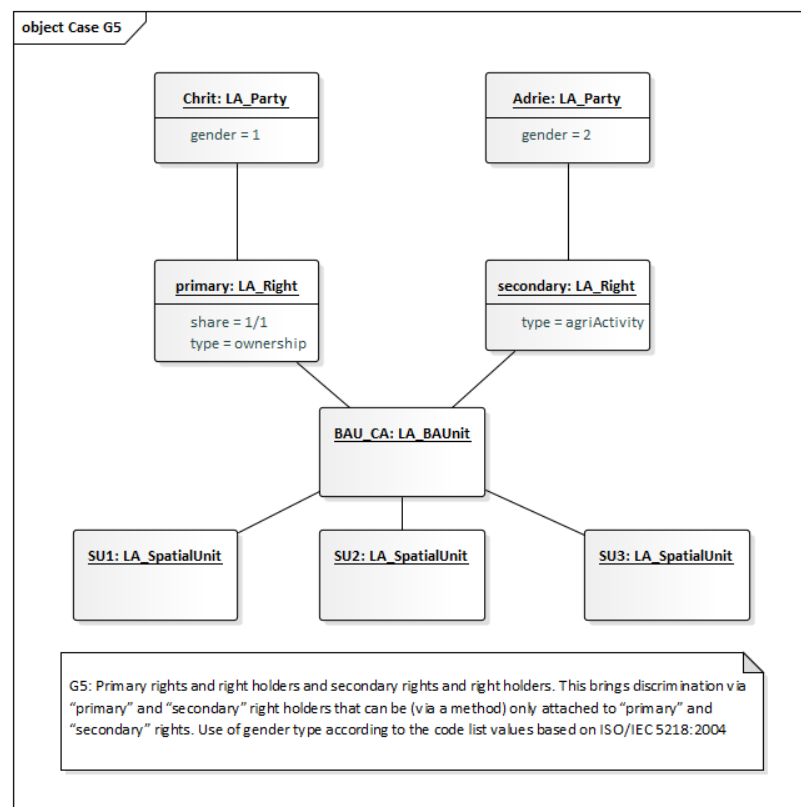


4. Group ownership in a land rights related to one basic administrative unit with 3 spatial units, no shares defined. The group in this example is a married couple with defined membership – with name of the man and name of the wife(s). See instance level diagram c.5 in ISO 19152.



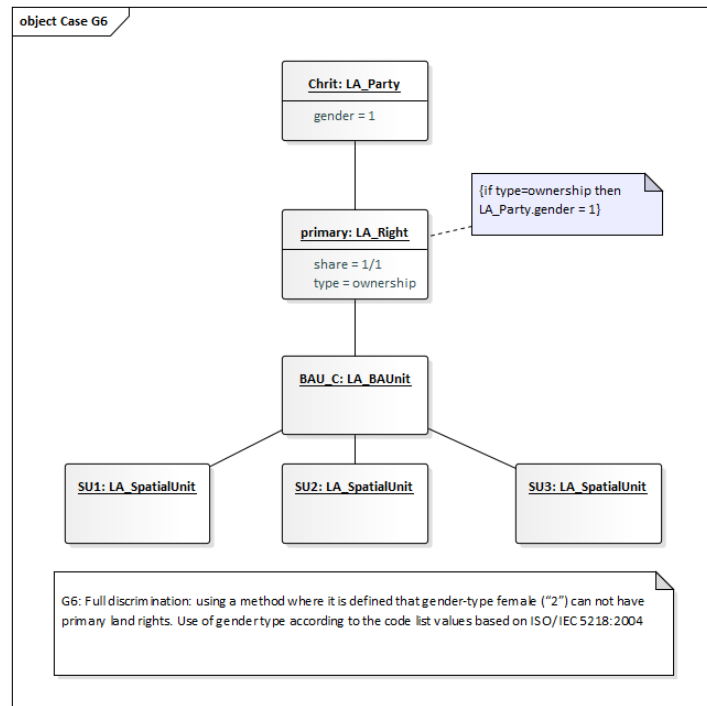
5. *'Partial' Discrimination.* The adjective 'partial' is added just to make a distinction with the next case. In this case primary rights and right holders and secondary rights and right holders with land rights are related to one basic administrative unit with 3 spatial units. This brings discrimination via "primary" and "secondary" right holders that can be (via a UML method) only attached to "primary" and "secondary" rights - female can only have secondary rights and can not have primary rights. But the important issue here is that (overlapping) secondary rights are recognised and included in the land administration. If spatial units with fuzzy boundaries are required to represent this situation it can be managed. LADM allows the inclusion of this type of cases. It can be named recordation instead of registration. There are no titles, but certificates may be. Also for the property rights.

This case is of course not at all a gender friendly implementation – it should be seen as a demonstration of how a possible common situation on the ground can also be modelled...



6. *'Full' discrimination.* Note: this is example is provocative - but for illustration purposes only – to demonstrate that this can be modelled. The adjective 'full' is added just to make a distinction with the previous case. Using a UML method where it is forced that gender-type female ('2' according to the attached) can not have primary land rights. This is of course not a gender friendly implementation.

This case is of course not at all a gender friendly implementation – it should be seen as a demonstration of how a possible common situation on the ground can also be modelled...



5. DISCUSSION

LADM contains a lot of functionalities in support to proper model women's land rights. Those functionalities are presented first of all in the ISO 19152 standard itself. UML diagrams are widely used but difficult to understand for many scientists and professionals from outside the Information and Communication Technology (ICT). The normative part of this standard is written in a formal language – again not easy to understand. Up to a certain level this is also valid for the various publications on LADM⁴. Even the instance level diagrams as presented in this publications may be not understood by many.

Land administration experts from many places are convinced that LADM has a potential as foundation for the development of future land administration systems and for the design of interoperability between existing systems in one country. Those experts (as all experts in all disciplines) speak a language that is not commonly understood.

The LADM gets more and more attention at global level. The Expert Group on Land Administration and Management of the United Nations Committee of Experts on Global

⁴ <https://wiki.tudelft.nl/bin/view/Research/ISO19152/LadmPublications>

Geospatial Information Management (UN-GGIM) developed a ‘Framework for Effective Land Administration’ (UN-GGIM, 2019). This is a reference for developing, reforming, renewing, strengthening or modernizing land administration and management systems where LADM is mentioned as an endorsed ISO standard, with links to OGC (Open Geospatial Consortium) and the International Hydrographic Organization (IHO) to inform about the principles of data and information management.

As soon as the new edition is available it has to be communicated at national and regional level. It should be communicated that LADM is gender inclusive, that overlapping land use rights can be included and should be recognised, that rightholders can hold shares, that impact on land rights in polygamous (or more complex) situations can be included, that customary and informal rights can be included. Or that modelling of co-titling may include children. Even if there are children from different marriages or relationships.

This kind of examples should be worked out in follow up papers – with illustrations that can be communicated.



In a set of illustrations that is under development in Mozambique together with DINAT, the national organisation for cadastre, there was serious attention to the gender issue. The illustration as below presents a female village leader (exceptional in Mozambique, but presented as normal case), a female surveyor (normal in Mozambique) and female participation in adjudication. Such illustrations can be used to explain shares and overlapping spatial units. That is a way of expression (apart from instance level diagrams and special developed communication) that is better understood.

6. CONCLUSIONS

The concepts of land administrations are neutral to politics, and any number of classifications, can be modelled using various data types. The LADM can be used to implement politics, legislation and regulations in land administration systems.

Linking people to polygons should happen in a fair way and in the benefit of all. It is the ambition of the world to provide women, men, indigenous people and local communities with secure rights to land, property and natural resources. This may be with documented or recognised evidence of tenure. Those who perceive their rights are recognised and protected. The (roughly) estimated 70% undocumented land rights concern billions of people to land relationships.

Using instance level diagrams, it is illustrated that several options are available in modelling women's land rights and use rights: as in the existing situation in many countries and alternatives to this. Country profiles and regional profiles are needed.

A LA_GenderType attribute is proposed to be included in Edition II of LADM. This helps to get disaggregated data and measure indicators for SDG targets 1.4, 2.3, 5a. and 10.2. It also pushes the issue more clearly to policy debates, including when preparing initial data acquisition, where in many countries there currently is no attention to gender at all. Forms are not designed for this purpose – the issue is ignored. This means the database and outputs from the database are not prepared for this too.

Many of the available functionalities of LADM are in support to gender sensitive approaches in land administration. This should be better communicated. Many academic and professional disciplines can not read those functionalities from the UML in LADM. This paper is a first effort to recognise this communication gap and to bridge it. Many organisations should be aware of those functionalities.

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