

Land Registration using aerial photography in Namibia: Costs and lessons

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1 Summary

Since 2003 the Ministry of Lands and Resettlement (MLR), together with the Communal Land Boards (CLB), have administered land in the communal areas of Namibia. In this context new methods based on the use of aerial photos have been devised to fast track the process of land registration. By these means the registration process is now proceeding eight times faster than when undertaken with hand held GPS units. The method is also more accurate, less prone to mistakes and more cost effective.

The Namibian Communal Land Administration System (NCLAS) has been concurrently developed to provide an improved means of storing digital data on communal land rights. It is not only more secure and accessible, but also reduces the time that is required to process the data by half.

By the end of 2007, less than 1% of the estimated total number of land rights in communal areas had been registered. In 2008 a further 5% of the estimated number of land rights was registered. With the information gained from this improved performance, a roadmap has been developed and plans are being prepared to register all existing communal land rights by the end of 2012.

2 Introduction

Access to land is one of the most pressing social and economical issues in Namibia (Legal Assistance Centre, NNFU (2003)). It is of concern not only because of the unequal distribution of freehold or 'commercial' land between its people, but also because of growing pressures on the communal areas. The uncertainties surrounding land holdings in communal areas have arisen due to the inability of legally recognized authorities to act in terms of their mandates. There is a need to recognize that everyone is equal before the law in matters of access to communal land. The National Land Policy (1998) states that clear steps need to be taken to remove uncertainties about legitimate access and rights to communal land. The directives given in it have been enacted in the Communal Land Reform Act (2002), which is the legislation underpinning access to land in communal areas for all people who are dependent on this land for their livelihoods. If the Act was to provide practical support to communal land users, recording their land rights was recognized as a key outcome. Since 2003 the Ministry of Lands and Resettlement (MLR), together with the Communal Land Boards (CLB), have been given the task to register land rights in communal areas. By the beginning of 2008 it was concluded that, although progress had been made, there was a need to hasten the land registration program. In 2008 MLR together with its supporting organizations, the European Commission (EC) and the German Government through the German Development Service (DED), German Technical Cooperation (GTZ) and German Development Bank (KfW) commenced activities that are aiming to register all communal land rights before the end of 2012. This paper describes the new methods applied to hasten land registration and presents the way forward envisioned by the Ministry.

2.1 Land in Namibia

In Namibia, land is classified for administrative purposes as **state land, communal land or commercial land** (Guide to the Communal Land Reform Act, Legal Assistance Center, NNFU (2003)). Each of these categories bestows certain rights and responsibilities on the people who are using the land. Both urban and rural land may fall within any of these categories. Figure 1 below shows the distribution of the different categories.

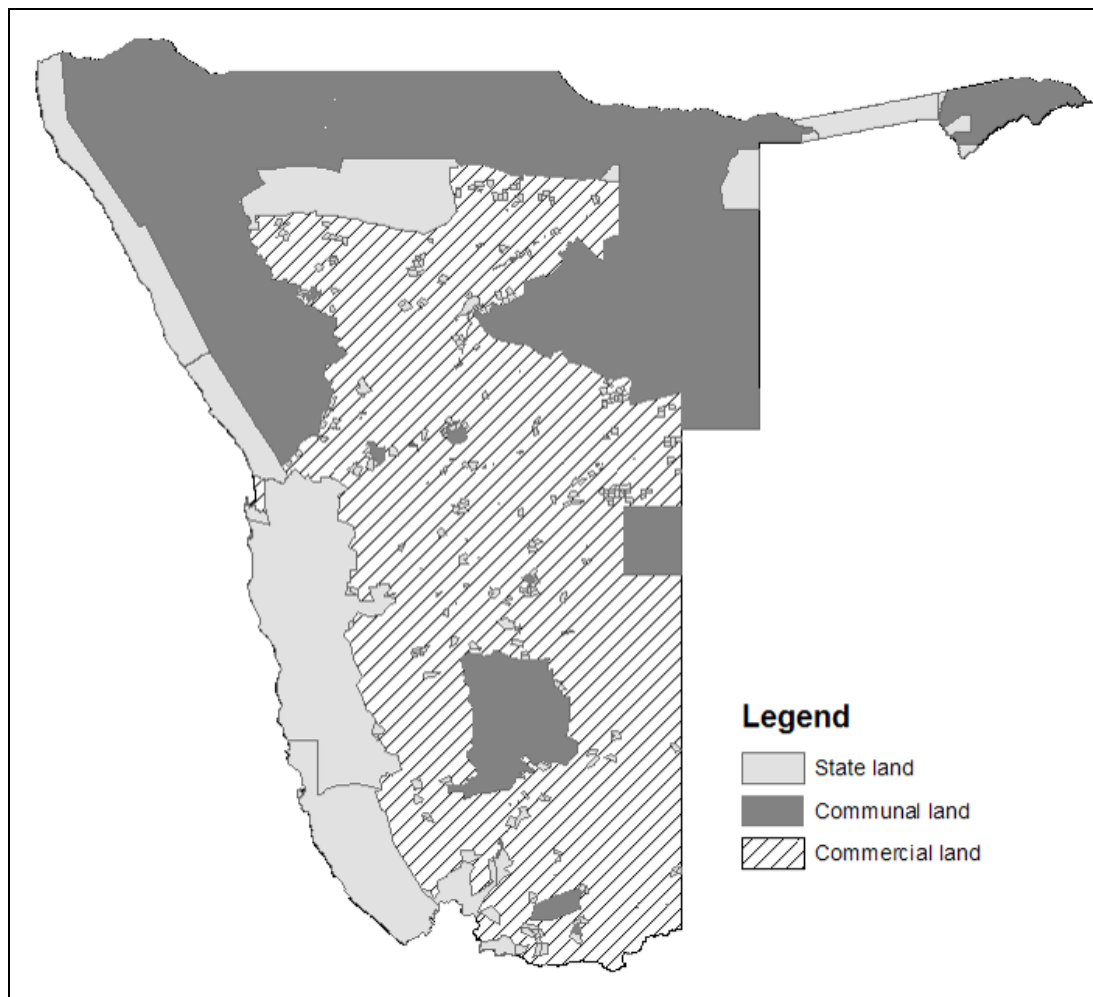


Figure 1: Map of State, Communal and Commercial Areas in Namibia. Source: MLR, M. Meijs (2008)

State land is land that belongs to the State. Under the Constitution, all land, water and natural resources belong to the State, unless lawfully owned by individuals. As the owner of the land, the State can decide what to do with the land – whether to add the land to existing communal areas or to sell it so that it becomes commercial land. The State can decide to allow people to reside on a particular piece of land, or permit them to rent it out, whilst still remaining the owner of the land. Much state land is classified as Protected Areas and named as National Parks, Game Parks, Recreation Areas, etc.

Communal land is vested in the State by the Constitution. The State has a duty to administer communal lands in trust for the benefit of the communities residing on these lands and for the purpose of promoting the economic and social development of the Namibian people. Communal land cannot be bought or sold, but can be leased out by the State.

Legal instruments and policies such as the Communal Land Reform Act No 5 of 2002 (CLRA), Traditional Authority Act of 2000 and the National Land Policy empower statutory bodies to administer and allocate land rights in communal areas.

Commercial land is freehold land that can be bought by private individuals, who then become the owners of the land. All transactions for commercial land are registered within the National Deeds Registry and Cadastral systems. Under the colonial government, commercial land allocations were made on racial lines, with the result that there are long-standing grievances with regard to these lands. The Agricultural (Commercial) Land Reform Act of 1995 was enacted to address some of these issues. In particular, this Act gives the State the first option to buy land when an owner wants to sell commercial farm land. The State must decide whether it wants to buy the land (or farm) before the land can be sold to another buyer. The Act also allows the State to acquire commercial land where one owner owns a disproportionately large amount, or it has been abandoned or under-utilized. While protecting the right of every person to own property in Namibia, the Constitution allows the State to expropriate property according to lawful procedures, if it is in the public interest and if just compensation is paid to the person whose property is expropriated. The State has only rarely exercised its right to expropriate commercial farmland.

2.2 Communal Land in Namibia

The Communal Land Reform Act (2002) (CLRA) underlines the facts that all communal land areas vest in (belong to) the State, and that the land is kept in trust for the benefit of the traditional communities living in those areas (Guide to the Communal Land Reform Act, Legal Assistance Center, NNFU (2003)). Therefore the State must put systems in place to ensure that communal lands are correctly administered and managed. The CLRA legislates for this by incorporating the Traditional Authorities in the administrative structure, and by creating Communal Land Boards in each region containing communal land. Communal land does not have freehold status and cannot be bought and sold like commercial farmland.

As the trustee of communal land, the State has the following obligations:

- It takes responsibility for communal land and administers it in the best interests of its citizens.
- The State acts in a way that will benefit the communities living in communal areas and not other people.
- The reason why the State holds the land in trust is so that it will be used to promote the economic and social development of the people of Namibia, particularly those who do not have other income and who rely on the land for their livelihoods.

Before the enactment of the CLRA, Traditional Authorities used to allocate land rights in accordance with their customary tenure systems (National Land Policy, 1998). These allocations were not documented and were considered biased by some residents of communal areas. Results included that some people were allocated large land parcels whereas others received less; some people were allowed to fence around their land parcels, whereas others were not; and there were cases of double allocation of land rights. This biased land tenure system was characterized by many land related disputes, including boundary disputes, self-extensions and illegal fencing, and was operated in the absence of regulatory legislation.

The CLRA was passed with the aim of facilitating a proper and uniform land administration system, with a secure land tenure for all, which will result in the minimization of land disputes in communal areas (Adams, 2000). This is the key reason why communal land registration is being carried out in Namibia. It is an answer to critics who say that land registration is an expensive and pointless exercise, and administration of communal lands would be better retained under customary legislation. As a result, the registration of existing communal land rights became necessary, serving as a base for proper land administration. The objective is that, by having all land rights registered, the Ministry of Lands and Resettlement as well as the Traditional Authorities will be able to improve their means of communal land administration and ensure that all people have equal access to land.

Two broad categories of land rights in communal land are stipulated in the CLRA, namely: customary land rights and rights of leasehold. The rights that are allocated under customary land rights are rights to residential units and rights to crop farming units. Customary land rights are primary for small scale and subsistence activities. The second category, the leaseholds covers all the rights that can be allocated for specific commercial purposes. The rest of the land is referred to as commonage and can be used for grazing by the local community. Grazing rights can also be allocated to outsiders by the Traditional Authorities.

The passing of the Act gave birth to the Communal Land Boards (CLBs) countrywide wherever communal land is found. The Act empowers Communal Land Boards and Traditional Authorities to administer and allocate land rights in communal areas. Traditional Authorities allocate customary land rights, with Communal Land Boards verifying the allocations before they become legally effective. The allocation of leasehold rights is undertaken by the Communal Land Boards.

The CLRA required that any person, who held a right to communal land for subsistence farming and /or for a residential plot before the commencement of the CLRA, should apply for recognition and registration of his or her customary land right before 1 March 2006. The registration will have to be done according to a set procedure. The applicant will have to get a letter of consent for his land right from his village headman. He then fills out an application form and submits it with the letter of consent and N\$25 to the Traditional Authority (TA). After the approval of the TA, the letter is forwarded to the CLB for verification and ratification. It is estimated that on 1 March 2006, less than 15 percent of the land users had applied for registration and still fewer of the land parcels had been mapped and registered. Hence, the deadline was extended by three years to 1 March 2009.

Communal land boards have been established as from 2003 for all the regions of Namibia where there is Communal Land. The tasks of the Communal Land Boards as stipulated by the CLRA are to:

- Control the allocation and cancellation of customary land rights by Chiefs and Traditional Authorities;
- Decide on applications for rights of leaseholds;
- Create and maintain registers for the allocation, transfer and cancellation of customary land rights and rights of leasehold;
- Advise the minister on regulations to be made to meet the objectives of the CLRA; and
- Give effect to the provisions of the CLRA.

The Land Boards are comprised of representatives of all the parties involved in communal land administration. Communal Land Boards meet every two months and can form committees to investigate certain issues. This results in their holding six regular meetings a year, which is insufficient for effective land administration in most instances. The CLBs can also request the

Minister to give permission to hold an extraordinary meeting, if there are matters that need urgent attention.

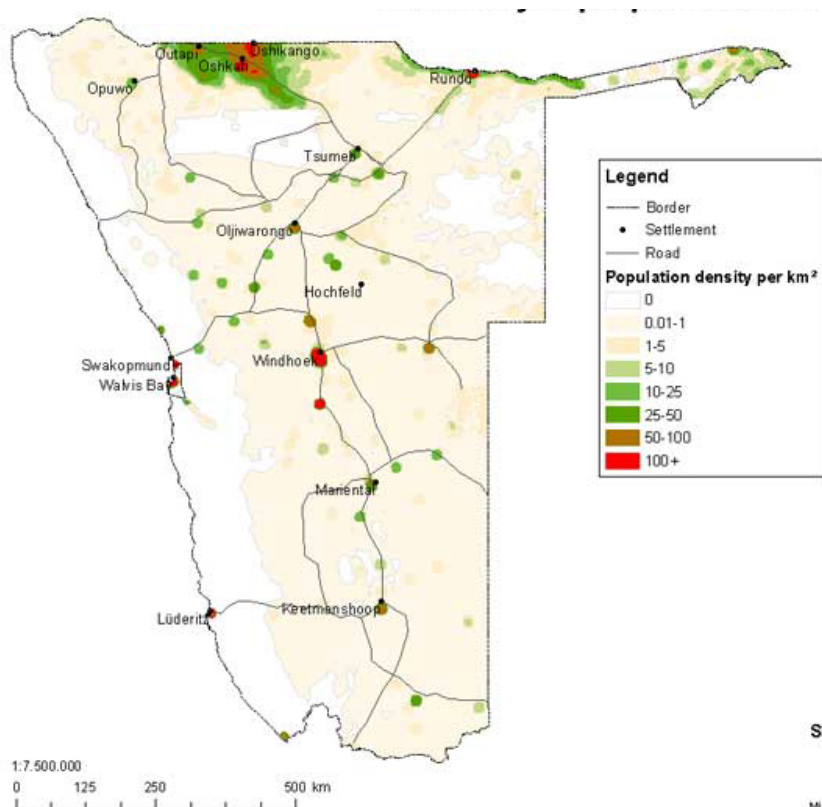
The Land Boards make decisions on land related administrative issues in communal land. Public servants of the Ministry of Lands and Resettlement are appointed to perform specific tasks such as verifying, mapping and administering the land rights.

In accordance with Section 5 of the CLRA, each Land Board has the following members.

- One representative from each Traditional Authority (TA) within the area of the board
- One person representing the organized farming community within the area of the board
- The Regional Officer of the particular regions affected by the Communal Land Board
- Four women, two farming in the Board's area of operation and two having experience relevant to the functions of the Land Board.
- One person from a conservancy or conservancies in the area of the Board.
- Four staff members from the public service nominated by
 - Minister of Lands and Resettlement (MLR)
 - Minister of Environment and Tourism (MET)
 - Minister of Agriculture, Water and Forestry (MAWF)
 - Minister of Regional and Local Government, Housing and Rural Development (MRLGHRD).

2.3 Areas in the south versus areas in the north, Population density

General population density is low in Namibia, with a countrywide population density of 2.5 persons per km². As can be seen in the population map as Figure 2 below, this is not equally distributed. The density of rural population is much higher in the north due to a favourable agricultural climate and to past colonial and apartheid interference. It is estimated that 50% of Namibia's population lives in the rural parts of the communal areas in the north.



Map produced by
SFB 389 'ACACIA', subproject E1
University of Cologne

Data source:
Atlas of Namibia Project, 2002, Directorate of Environmental Affairs,
Ministry of Environment and Tourism. <http://www.dea.met.gov.na> (2003)

Figure 2: Map of Population density in Namibia

As shown in Table 1, 24% of the total number of rural communal land rights will be allocated in the Central and Southern regions, whereas 76% will be allocated to the Northern Regions.

Table1: Estimation of Communal Land Rights Allocation per region. Source: Roadmap Registration Communal Areas 2009-2013

<i>Northern Regions</i>	<i>Estimated number of Communal Land Rights</i>	<i>Central and Southern Regions</i>	<i>Estimated number of Communal Land Rights</i>
Kunene	14.373	Erongo	1.875
Omusati	45.000	Otjozondjupa	21.875
Oshana	37.500	Omahake	43.750
Ohangwena	31.250	Khomas	0
Oshikoto	21.875	Hardap	1.125
Kavango	50.000	Karas	1.375
Caprivi	25.000		
Total	224.998	Total	70.000
		Overall Total	294.998 ≈ 300.000

3 Status of registration of communal land rights in January 2008

3.1 Methods used to measure parcels

After a hesitant start in 2003, it was decided by MLR that communal land had to be measured by some means in order for Land Board to approve its registration. The only legal reason why parcels were to be surveyed was because it is a requirement of the CLRA that Communal Land Boards can only approve customary land rights up to 20 ha and right of leaseholds up to 50 ha in size. Therefore the extent of each parcel must be known by means of mapping the parcels.

However, MLR also saw other benefits of surveying all communal land, amongst which were that it:

- provides a record of occupants in the communal areas;
- enhances security of tenure over the land for these occupants;
- enables land more readily to be managed sustainably and equitably;
- reveals areas that are legally and illegally fenced;
- supports the upgrading of communal land towards a freehold status, as may happen in the future.

It was then decided that communal land parcels would be surveyed with the use of hand held GPS (Garmin V) units, which was the fastest and most economical method available at that time.

From 2003 until January 2008 a total of 1389 parcels were registered, which is less than 1% of the estimated number of parcels that need to be registered in communal areas.

From the experiences in the first five years of land registration the following main lessons were learned:

- A maximum of 10 parcels could be mapped by one team a day using hand held GPS units. A country wide average is more likely to be around five parcels per team per day.
- A faster way to register parcels needed to be found and more people had to be employed to be able to finish the work in a realistic time scale.

- Preferably a new method should not only be faster but also easier because GPS survey is hard work whilst the parcel is being traversed and waypoints collected. Village headmen, who allocate the land and should be present, are often elderly people who cannot be expected to walk around fields all day.
- A new method should also ensure that fewer mistakes will be made. Mapping using hand held GPS units has a number of weaknesses, including the following.
 - Waypoints can be taken before a 3D position fix is acquired by the GPS hand held unit, which decreases the absolute accuracy of the record.
 - Too few waypoints are often taken for an accurate outline of the parcel, such as when a boundary deviates from a straight line that is not visible through vegetation.
 - Incorrect notes are taken in the field, resulting in confusion in the office. A common mistake is to take a waypoint for a house or other feature in the parcel. Later, if not properly recorded, this point mistakenly is used as one of the boundary turning points of the plot.

3.2 Methods used to register data

Data on parcels, owners and land rights were not registered in an organized manner. A parcel's boundaries were digitized in ArcView 3.2, using a separate shape file for each parcel. A map showing only the boundaries of the parcel was then produced also in ArcView 3.2, saved under the applicant's name and printed on the reverse of a certificate paper. The front of the certificate was made in MS Word and printed on the obverse of the paper. In this way an average of 10 land right certificates could be produced a day.

Approved certificates were given a number and were recorded in a land register. This provided two means of finding a certificate; first by searching for the name of the applicant in the computer (names are not unique and can be mistyped) and secondly by searching for the certificate number. Errors could be made and some valuable information from the application forms was not copied in the registry book or onto the certificates

All Communal Land Boards used slightly different systems for registration, making it difficult to incorporate the regional databases prepared by each into one national database.

After evaluating the way the land and the land user's data were registered, the following lessons were learned.

- Any land registration system should enable information to be found on a specific land right (including the owner, the right and the parcel) by as many means of entry into the system as possible. These would include by identification number, name of applicant, parcel identifier, village name, certificate number, and date.
- Parcels must be checked for mapped overlaps before they are sent for approval, as otherwise conflicts will arise in the doubly allocated areas of parcels.
- A Unique Parcel Identifier (UPI) system should be used to make sure that each parcel is uniquely numbered.
- The digital system of communal land registration should be as similar as possible to the national Deeds Registry system.
- All Communal Land Boards should use the same system for registering communal land parcels. This will enable future integration of all regional databases into one National Database of land parcels

- The system should be easy to use, at least for the people who enter the data.
- A digital system should have a secure backup. There should also be a backup paper based system that can be searched by a person's name (or company's name), by UPI, village name or by certificate number.

In summary, there were two big challenges being faced as the communal land registration programme was being facilitated. The first was the need to hasten the process and complete the registration of existing land rights within a reasonable time frame. The second challenge was to safeguard the collected information in an organized and easily administered manner.

4 Methods used to speed up the process of registration

4.1 Methods used to speed up the processes of field verification

The process of field verification of land rights required improvements, to enable the Ministry to finish the registration of existing land rights in communal areas within a limited amount of time. Increasing the number of personnel by outsourcing the work to contractors would improve the rate of progress, as would making the mapping process easier and faster. In Namibia a combination of both options has been used, by means of initiating outsourcing and by using aerial photography to hasten the rate of field verification.

4.2 Mapping/verification of Customary Land Rights with Aerial Photos

Aerial photos have been used in various countries for mapping as well as for the registration of land rights. The main reasons to use aerial photos for the registration of land rights are because the method is relatively inexpensive and efficient. This is particularly the case in Namibia, where good quality aerial photography is available for a large part of the country. We also believe that the accuracy that can be achieved with aerial photos is at least as good as with hand held GPS. In order to test and to compare the method using aerial photos with the regular method of land registration (by using hand held GPS units) under Namibian circumstances and conditions, the Olukonda Project (in Oshikoto region) was undertaken. This Project provided much needed experience of using air photos for land registration, and gave scope for improving methods and techniques. The project was followed by three further projects that tested the speed and the costs of the new methods. Two of these projects were carried out in the north central regions; namely Oshikuku in Omusati Region, Oshikango in Ohangwena Region, and one in the far North East in Caprivi region. In the following sections, first the methods of mapping and registration will be described, followed by supporting figures.

4.2.1 Aerial photos of the North of Namibia

The aerial photos were acquired of 275,000 km², covering all of Namibia north of 20° south latitude (see figure 3 below). The financing of the photography was made available through the EC-funded Rural Poverty Reduction Programme (RPRP), which is supporting land reform measures across the country. The air photo coverage is of 75 per cent of all communal land in the country. The photographs were acquired between September 2007 and April 2008, and were taken from 8900 m by a Beechcraft King Air B200 aircraft flying a digital Vexcel Ultracam X aerial survey camera with 14,330x9,420 CCD. The quality of the digital air photos, in terms of visibility and geometric accuracy, was extremely good, due to the favorable climatic conditions with low humidity and minimal air pollution. The nominal pixel size of the photographs was 85 cm. The photos were rectified using

precise ground control point data obtained every 50 km across the entire survey area, which was then covered with seamless digital orthophotographs (orthophotos), true color and near infra red (see a sample in figure 3 below) .

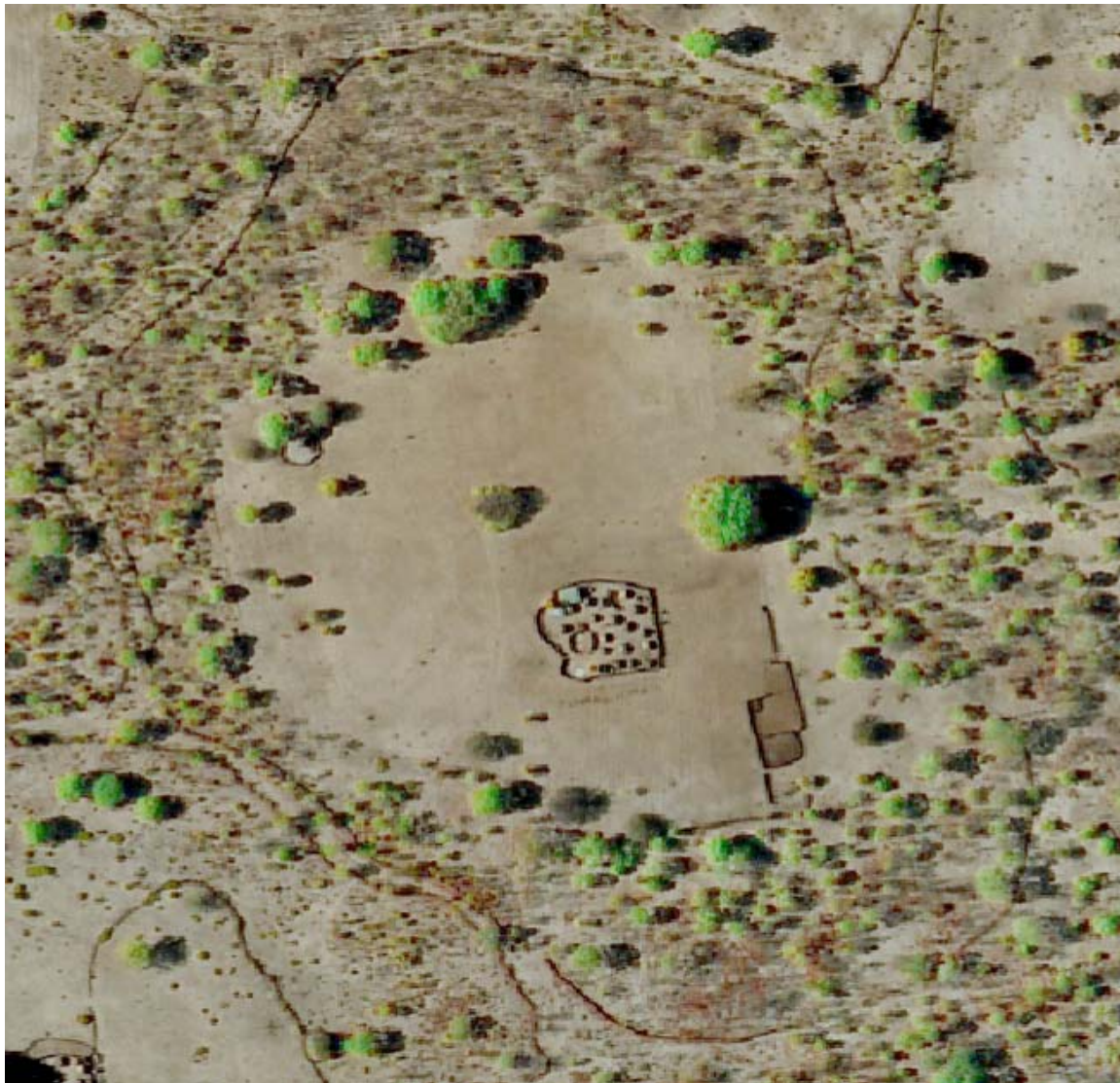


Figure 3: Sample of an orthophoto enhanced with the near infrared band.

The primary use for these aerial photos was to update the cartographical maps for the north of the country but their high quality and digital format has ensured their worth for many other development purposes. This included the registration of land rights in the communal areas. What was provided from the original air photos for the land registration project were digital orthophotos as tiles, each covering a ground area of 10x10 km with a nominal 1 m ground resolution.

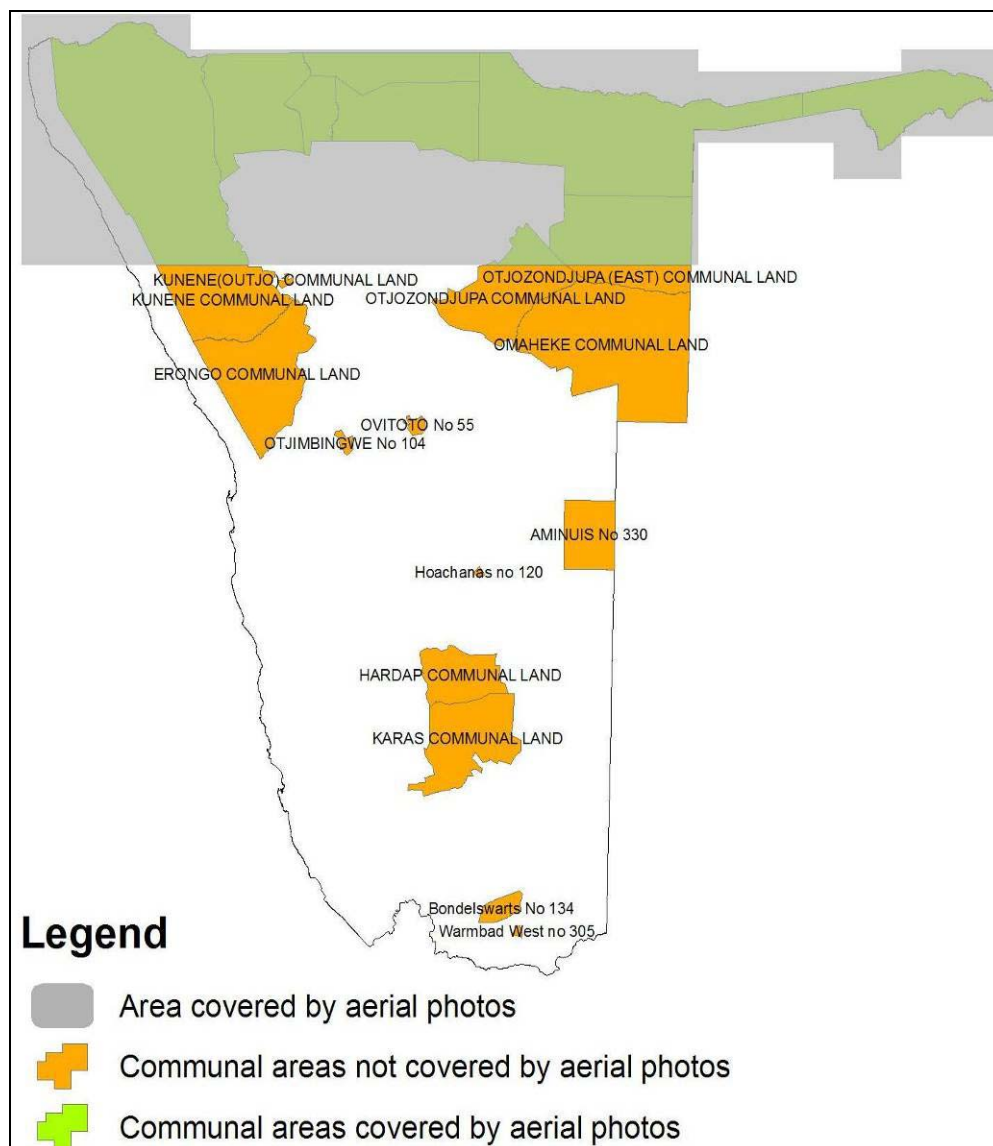


Figure 4: Area covered with aerial photos (shaded) in Namibia and areas still to be covered by aerial photos. Source: MLR, M. Meijs (2008)

The digital orthophotos were then printed on A1 sized photo paper at a scale of 1:5000 and used as such in the field. At the end of 2008 a tool within ArcGIS mapping software was written to export all tiles automatically to PDF and to facilitate their printing.

4.2.2. Field work procedures with orthophotos

In the field the following activities were undertaken by individual teams of survey staff members:

Communication with the stakeholders

The most important part of the project, and a critical factor and key to the success, was communication, organization and planning. The key player in this respect is the team leader. All contacts between different actors and stakeholders in the project went through the Team Leader. This was necessary to ensure good coordination, progress and good results.

The communication consisted of 4 steps:

1. Workshop village headmen/headwomen and stakeholders

2. Radio messages before and during field work
3. Visit to the headman/headwoman
4. Visit to the homestead with key informant

In step 1, the goal of the registration and the way forward were explained to the village headmen and other stakeholders (Communal Land Board, Regional Councilor, representatives of Traditional Authority). This was supported by radio messages in step 2 to ask the people for their participation, to apply for their customary land rights and to cooperate during field work. The radio messages were always broadcasted in local language and in good cooperation with the TA. In step 3, the village headman was visited before the start of the field work in his village. The course of the project and the planning of his village were explained to the village headman, and he was asked for his cooperation and to appoint key informants. Once he agreed, the people of the village were informed on the start of the project and asked again for their cooperation. Again this was done by radio messages which were coordinated with the TA. The last step was to visit every homestead with the key informant. The purpose of the registration was explained before the boundaries of the parcel were mapped.

The pilot projects were well covered by the media. There were seven articles in four different newspapers published. The Stakeholder meeting on 23 July was covered in the 8 o'clock NBC News on Thursday 24th July.

RPRP created an information Folder and an article was written for the internal magazines of GTZ and Dutch Cadastre. GTZ financed a film on the Registration of Communal Land in Namibia (DVD is available). This film will be used in the upcoming registration campaign and is planned to be broadcasted on national television.

The verification of land rights

After the procedures and activities were explained and understood by the land users, the team started with the mapping of the individual plots using the orthophotos, commencing with the village headman's parcel and progressing outwards until all land rights in the village are verified. A field team consists of minimal two MLR employees. At least one should have experience in the mapping of land rights with orthophotos and one should speak the local language. A field team will be joined by the village headman or someone appointed to represent him.

Each parcel was mapped on the orthophotos following three steps:

1. First, the team wrote the names of the land right holders onto the orthophotos in such a way that they can be sure that this will not disturb the mapping of the boundary. These names were cross-checked with the names on the application forms when available.
2. Then, with the help of the village headman or his representative, and the landowners, the team systematically mapped all parcels for which the boundaries could be recognized on the orthophotos (by using features such as fences, roads, footpaths, individual trees, and natural depressions). Mapping was most easily undertaken of completely fenced parcels.
3. Finally, the team visited land parcels containing boundaries that were not clearly recognizable on the orthophotos. Frequently, by careful interpretation of the orthophotos, it was possible to identify indistinct features that were key waypoints around parcel boundaries, and to use them to complete the boundary maps.

Team members were instructed to pay special attention as they mapped boundaries on the orthophotos. The act of putting pen to paper was the moment of recording the boundaries of a land parcel, and was done with great care and the agreement of all concerned stakeholders.

Disputes

Land related disputes that could not be resolved by the field team were documented and reported to the team leader whenever they were encountered. They mostly involved conflicts over the exact boundaries of two neighbouring parcels. The disputes were then investigated by the team leader, who tried to solve them in the field. The team leader reported disputes that could not be resolved to the relevant traditional authority for further action.



Figure 5: Field work in action, putting the pen on the photo. Photo: R. Witmer (2008)

4.2.2 Advantages and disadvantages of using orthophotos

Systematic Survey

Large scale orthophotos proved to be particularly suitable for the systematic survey and registration of customary land rights. This approach was different from the sporadic approach to survey and registration that was applied until 2008 in Namibia. In that earlier approach only the parcels of people who had applied for customary land rights were verified and registered. The remaining parcels were left unmapped until applications for their registration were received. Compared to the sporadic survey method, the advantages of the systematic survey method include it being:

1. More efficient and cost effective, because transport and logistical requirements are lower through the area only being traversed once.
2. More productive, because all parcels are verified at the same time, permitted boundary issues to be resolved in the field.
3. able to provide a better overview of a whole project area, and so facilitating thorough analysis.

WYSIWYG

One of the biggest advantages of using orthophotos is that they supported the **What You See Is What You Get** principle. The lines demarcating parcel boundaries that were drawn on the orthophotos could be seen and agreed to by everyone present. This resulted in:

- The land registration applicants being able to check that their certificates really indicated the land parcels that they were entitled to use. The orthophotos were available to serve as a background to the survey diagram printed on the back of the registration certificate. This gave the land holders good overviews of their parcels, relative to those of their neighbors and the features visible in the field.
- The village headman being able to check that no one was claiming more than their entitlements.
- The village headman being able to draft a village land use plan, indicating where new parcels could be demarcated but also ensuring that there was space for movement of cattle and people where needed.
- The whole community being able to check that important communal resources, and areas used communally, such as water ponds and trees, were not claimed by individuals and were kept outside registered parcels.
- Disputes being more readily resolved. People could identify the location of the disputed area on an orthophoto. It was also easier to determine the owners of different fields and where fences and features were located. In many cases, the disputing parties, village headman and MLR employees could resolve the dispute with the help of the orthophotos on the spot.
- Field team members from MLR making fewer mistakes in mapping the boundaries.
- Ready checking of the size of a parcel, while in the field, with the aid of a transparent grid overlay marked with squares representing 1 ha at 1:5000 scale.. The number of squares covering a parcel was counted and, if the area equated to more than the maximum 20 ha permitted, the applicant could be advised on what to do. Either the size should be reduced to below 20 ha, a motivation letter sent to the minister requesting permission to retain more than 20 ha, or part of the land could be allocated to a relative.

Accuracy

The aerial photos were delivered with an accuracy report and were all reported to be within an absolute accuracy of two meters. When digitizing parcels they were all as accurately mapped as the locations of the features used to identify the parcel boundaries. In cases where fences were used, the accuracy was high, but when the middle of a pond was, for instance, indicated, or a similar vaguely defined area, then the accuracy was lower. Assuming a ground resolution of 1 m, then a final accuracy of the land register of better than 10 m could be easily manageable. Presently the orthophotos are being used to update the parcels digitized with hand held GPS units, as it is being shown that the points surveyed with these units are sometimes not as accurately as expected. There is a study going on to compare a (professional) survey with kinematic DGPS with the survey using the orthophotos, unfortunately no results are available yet.

Speed

A hand held GPS survey can map and register up to an average of 10 land rights a day, where parcels are not exceeding 20 ha each. By using orthophotos a survey of up to an average of 40 parcels a day can be completed (see table below). The Olukonda project has a low number of parcels mapped a day since this was the first project in which we had some startup problems. The Sibinda project has a

low average value because the area is less populated and the land tenure system is different which includes shifting cultivation and parcels being far from the homesteads.

Table2: Number of parcels mapped a day during the four pilot projects

Project	Nr of parcels	Nr of field days (approximation)	Parcels per day
Olukonda project	2137	60x2 teams 120	18
Oshikuku project	2352	30x2 teams 60	39
Oshikango project	3422	40x2 teams 80	43
Sibinda project	951	30x2 teams 60	16
<i>Total</i>	<i>8862</i>	<i>360</i>	<i>28</i>

The high rate of progress will only be achieved in the more densely populated areas where parcels are smaller and more closely spaced, this is estimated to be true for 60% the estimated number of land rights.

It can be concluded that working with orthophotos is not only faster but also easier and quicker. This is because most parcels can be mapped whilst standing at their centers, from where identifying features around their boundaries can be recognized both on the ground and on the orthophotos.

Costs

A number of variables was used to calculate the likely costs of the whole land registration program in Namibia using orthophotos.

- 300.000 land rights are estimated as awaiting registration.
- Approximately 40,000 A1 tiles are required to be printed for the communal area, at an average cost of €10 each. Forty tiles can be printed a day if the work is carried out in-house in MLR.
- Assume that six teams each of two persons are employed by the programme, and the salary on average is €50/day. Assume also that €50/day is required for transport for each team. The total cost of each team is then €150/day.
- We assume that for GPS survey, 5 and for orthophoto survey, 25 parcels per day per team are realistic figures for the entire country.
- All other costs are assumed to be the same for both survey methods and will according to the roadmap add up to €220.000

Table 3: Variables used for the calculation of the costs, in euros, of mapping and registering all communal land parcels, using the two survey methods

GPS survey			
Activity	Direct cost	Nr. Of days (team of 2)	Total cost in €
Doing the actual survey	0	300.000/5 = 60.000	9.000.000
Total			9.000.000

Aerial photo survey			
Activity	Direct cost	Nr. Of days (team of 2)	Total cost in €
Printing of orthophotos	400.000	40.000/40 = 1000	550.000
Doing the actual survey		300.000/25 = 12.000	1.800.000
Total			2.350.00

From this table it is apparent that the cost of mapping a plot with orthophotos is a bit more than a quarter of the cost of mapping a plot with hand held GPS units. The difference between the two methods makes buying the aerial photos solely for the purpose of the survey possible. The complete cost for the orthophotos for the North was €1.696.000 (which includes the aerial photographing of National Parks including Etosha and the Skeleton Coast, and also significant commercial farming areas in the south). This figure includes the acquisition of the original 32,000 digital aerial photographs, the ground survey that fixed and pre-marked 126 control points and 100 check points every 50 km across the survey area, and the production of orthophotos.

The communal areas not covered by the orthophotos are around 120.000 km². Quickbird images cost US\$ 23,- per km², thus it will cost €2.1 million to cover these communal areas. If the cost for the orthophotos and the Quickbird images is added to the figure above, then the aerial photo survey is still €3 million cheaper than surveying with GPS.

4.3 Methods used to improve the registration process

In the beginning of 2008 it was concluded that there was a need for a comprehensive recording system for communal land rights. Such a system had to be easy to use but also able to accommodate future developments in technology and the opportunity for integration of the commercial and communal land registration systems. The system that was developed was tested during the Olukonda and Oshikuku projects and was implemented in the remaining communal areas of Namibia in November-December 2008. It was termed the Namibia Communal Land Administration System (NCLAS).

As shown in Figure 5, the NCLAS consists of two parts, termed the Communal Deeds and the Communal Cadastre. The Communal Deeds part was developed to resemble the structure of the Deeds Registry system covering commercial areas. It was based on Microsoft Access, since this software is readily available on most computers and since it is also the software for which expertise is the easiest to find in Namibia. The Communal Cadastre part of the system was based on ArcGIS, as this software was made available by a donor, GTZ, to all MLR offices that support CLB activities. This was also the software on which MLR staff members have received training in recent years.

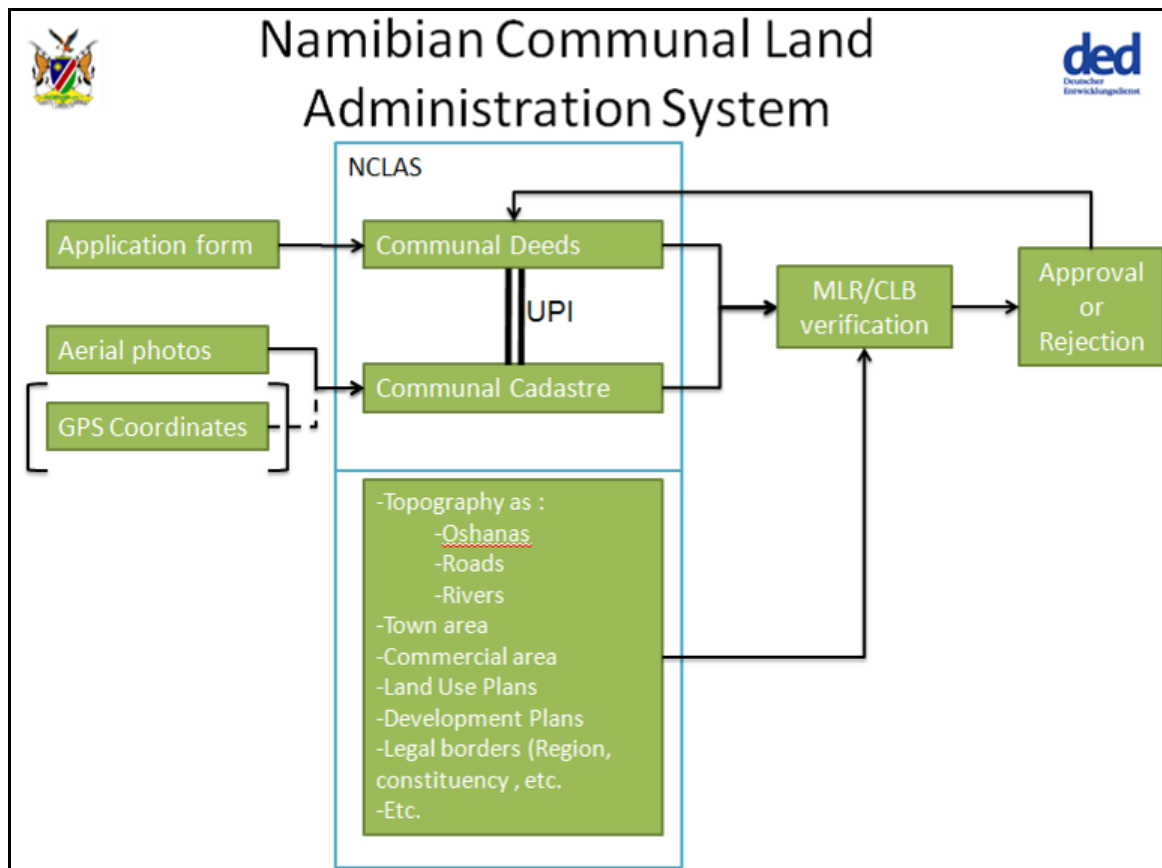


Figure 6: NCLAS position in the Land Registration process. Source: M. Meijs (2008)

The two separate Deeds and Cadastre parts of the NCLAS are linked by a Unique Parcel Identifier (UPI) system. The UPI is a coding system that is being finalized to ensure that every land parcel in the country will have a unique number. This will enable the exchange of information, not only within the NCLAS but also between the NCLAS and the commercial Deeds Registry system.

Four different types of output are created out of the NCLAS. These are Certificates, Village maps, Registers and Index Cards. The certificate (see figure below for an example) describes the land right in full detail with on the front the official description and on the back a diagram of the parcel.

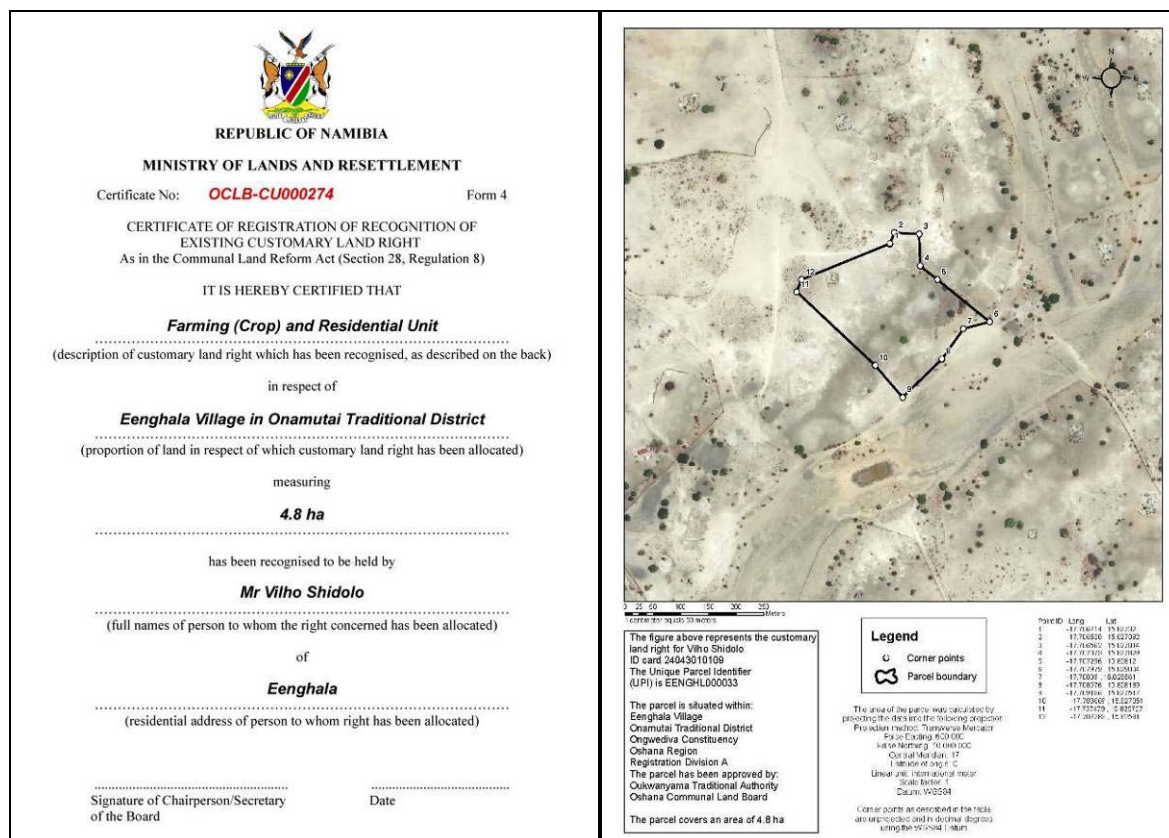


Figure 7: Example of a certificate (front and back). Source: MLR, M. Meijs (2008)

The village map(s) are maps at a scale of 1:10.000 and display all parcels for a particular village with the aerial photo on the background. A village map is used in the paper based backup system to provide a spatial entry into the data. The village map is also a useful tool for land management since it is easy to see which areas are occupied and which areas are still unoccupied.

Registers are printed to provide easy access to the paper based system by UPI and village. Index cards provide access through the individual owner names.

Accuracy

The NCLAS has features that enable the checking of the quality of the data. The most important are the checks for overlapping parcels and the check that ensures that the right person is allocated the right parcel.

Speed

Entering the data into the Communal Deeds part of the NCLAS is the slowest part in the registration process. Data from about a hundred parcels can be entered on one computer in a day, provided that personnel are rotated to counteract the tedium of the task. Checking and correcting data are also time consuming, depending on the quality of the original data entry. The process of creating certificates in the Communal Cadastre part of the NCLAS is automated through ArcGIS by the use of VBA programming language. Experience showed that it takes approximately the same amount of time to survey the data as it takes to enter, check and print the data. This is still a big improvement on the speed of work, as before an average of about 20 certificates were prepared in a day, whereas now this rate of progress has been doubled.

5 Status of registration in January 2009

5.1 Output in 2008

Table 4 gives the number of communal land parcels registered in 2008 using both methods of mapping.

Table 4: Number of Communal Land Rights registered per region in 2008

With Orthophotos	Number of parcels registered
Oshikoto (Olukonda project)	2137
Omusati (Oshikuku project)	2352
Ohangwena (Oshikango project)	3422
Caprivi (Sibinda project)	951
<i>Total</i>	<i>8862</i>
With hand held GPS units	Number of parcels registered
Omaheke	739
Erongo	694
Hardap	441
Karas	574
Oshana	223
<i>Total</i>	<i>2671</i>
Overall Total 2008 11533 (4.9% of the total of 236.000)	
Total Until end 2007 1389 (0.6% of the total of 236.000)	
Total until end 2008 12922 (5.5% of the total of 236.000)	

5.2 The roadmap

A draft plan for the communal land registration work has been prepared with the assistance of RPRP for the period 2009-2013. Currently arrangements are being put in place to implement the processes described in this roadmap. In summary the roadmap makes the following points.

- Orthophotos will be used to complete the registration of existing parcels with communal land rights in all communal areas by the end of 2012. Where areas are not covered by digital air photos, satellite images from Quick Bird or Ikonos will be purchased.
- The Ministry of Lands and Resettlement does not have human resources to manage this substantial work. Private companies will therefore be contracted to execute the activities as Executing Organisations. A competent Project Organisation with sufficient authority and responsibilities has first to be convened within the Ministry to direct the programme.
- Its success depends very much on the quality of an intensive publicity campaign explaining to all stakeholders the value to them of communal land registration.
- In the next four years, all land related spatial data will be stored in a central database of the MLR. The plan is that it will then be possible to view the rights of communal as well as the commercial areas in one integrated system.
- For this to be realised it is necessary first to agree on a series of IT measures regarding the standardisation of data, the form of the IT infrastructure and the security of IT management.
- As soon as a land parcel is registered its records are open to being changed. Parcels can be amalgamated or divided, and in both cases updating of the registry records are required as new UPI numbers and owners are recorded. The registry also has to be maintained in good order, with its records readily accessible to enquirers. Additional MLR staff members,

termed Land Officers, are required to be placed in each region with communal land. They will have the responsibility of maintaining and updating the communal land registers in their region.

- Consultants should be contracted that will be responsible for developing the programme and financial management components, designing the necessary IT measures, and addressing issues such as the registration of commonage and Government lands, the registration of parcels larger than 20 hectares, and the possibilities of upgrading communal rights, through leaseholds and eventually to freehold status.

5.3 The challenges

Challenges being faced by MLR, as it takes forward the Namibian communal land registration program, are comparable to those found elsewhere. Many are management related, whether they concern financial or human resources, project management or logistical support. Some of the challenges are specific to the conditions found in Namibia. They deal with the local legislation, responsible authorities, and the young history of the country.

Legislation

The CLRA is being implemented in the communal areas with different levels of effectiveness. In the north central areas it is largely being applied as intended, and is strengthening security of tenure over individual land parcels. In other areas the CLRA appears to confuse the land administration, by its inflexibility and inability to address local land tenure problems.

For instance, according to the Act, customary land rights can only be registered for land used for residential and crop production purposes. Registering residential plots is not a priority, as the ownership of these areas is rarely contested. Crop production is only feasible in the higher rainfall north central and north east areas of the country; elsewhere it is irrelevant and the land is used solely for livestock extensive grazing. This leaves the much larger and more important commonages unregistered but still open to tenure abuse. Such land, used mostly for cattle grazing, can only be registered to an individual as leasehold under the Act. For all such leaseholds used for grazing purposes, the MLR minister has to give his approval of the lease and an annual fee has to be paid. Where the commonage remains unregistered the cattle grazers use it as communal grazing areas. The Act is also inflexible in handling shifting cultivation. According to the Act, each plot that the farmer crops has to be separately registered, and the registration cancelled when it is abandoned for any reason. Group rights are not mentioned in the act but will be a valuable addition. Both the method using orthophotos and the NCLAS are ready to be used for the registration of group rights.

Responsible authorities

The CLRA endorses the fact that much of the ultimate power and responsibility for communal land management rests with the MLR Minister. For purposes of effective land tenure and sustainable land use, it would be beneficial for the Act to transfer this power and responsibility to lower levels of the administration. What is required is the strengthening of the combined forces of Traditional Authorities and Communal Land Boards. Traditional Authorities are authorized by the Act to manage and allocate communal lands. However, at present they are frequently faced by inconsistencies in the CLRA, where the local land uses and cultural requirements are ignored and the Act does not permit flexibility in its interpretation. The CLRA has created Land Boards, to provide diverse bodies of stakeholders who can address communal land affairs, but also to give them powers overarching the Traditional Authorities that they are ill-equipped to handle. Their role makes them ideal for

resolving land disputes but less capable of addressing the legal and procedural matters that are assigned to them by the Act.

Skills

Namibia is a young country that only started to develop recently. It is also a country where much of the expertise needed for land management is taken away by the private mining companies. In addition, Windhoek being the economical centre of the country, this is the preferred living place for many Namibians. Finding skilled people to work in the remote regional offices is becoming a challenge for which no permanent solution has been found yet. For the upcoming registration of existing land rights, outsourcing will solve part of the problem since it is a task that has to be done only once. The maintenance of the NCLAS will be the challenge of the future. We will only be able to face that challenge if we start recruiting and training the people needed today.

6 References

1. Republic of Namibia (2002). Communal Land Reform Act, No 5 of 2002. Windhoek, Namibia.
2. Republic of Namibia (1998). National Land Policy. Windhoek, Namibia.
3. Legal Assistance Center, NNFU (2003). Guide to the Communal Land Reform Act, No. 5 of 2002. Windhoek, Namibia.
4. Republic of Namibia; Ministry of Lands and Resettlement (2006). Operational manual for Communal Land Boards, second edition.
5. Republic of Namibia; Ministry of Lands and Resettlement (2007). Strategic Plan 2006-2010.
6. D. Kapitango, M. Meijs, P. Saers, R. Witmer, Areas Ministry of Lands and Resettlement (2008). Olukonda, Registration of Customary Land Rights with Aerial Photos in Communal Areas of Namibia, project report.
7. M. Wubbe, Ministry of Lands and Resettlement (2009). Draft Roadmap (v0.3) 2009-2013, For the Land Registration of the Communal Areas.