



EMBRACING THE RUBBER-BOOT-APPROACH TO SECURING CUSTOMARY LAND RIGHTS WITH FOCUS ON LOW-COST LAND-USE INVENTORY

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Abstract

The study is based on a fieldwork conducted in Ghana. It provides a case of where and how the Rubber-Boot Approach (RBA) has been used in a rural area of Ghana to measure an area of more than 50 hectares. Within the case study area, the participation of local people in the mapping of land rights including pro-poor used to be a challenge, especially due to their complex, pluralistic customary land tenure systems. Also, capacity development in mapping used to be a major impediment to their involvement in inventory exercises with professional surveyors. Having tested the RBA in the area, the study identified potentials for securing customary land rights at a quick pace, low cost and to enhance tenure security. By way of result, (1) the RBA offered to land owners and users in the area, accurately mapped land parcels with additional documentation at an affordable price while enhancing tenure security on customary land. Furthermore, (2) it shows how the approach can be applied to a large-scale land inventory that documents all rights and responsibilities within a mapped area. Additionally, (3) it exposes the possible difficulties and obstacles related to the simple mapping processes.

Key Words: Land tenure, Land-use inventory, Para-surveying, Rubber Boot Approach, STDM



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1. INTRODUCTION

Land is an important asset in all societies and contributes to socio-economic development and sustainable growth. Providing the poor and other marginalized people with access to land and adopting measures to improve their security of tenure as well as their ability to make effective use of the land they hold is central to reducing poverty and empowering such poor people and communities. This therefore calls for measures that can help improve land tenure security for the poor and other marginalized people that find the conventional state-led land registration system unattainable. As was noted in Cotula et al. (2006) and is the case in most African communities, poor accessibility to land in forms as: contested rights or lack of land is associated with poverty in many rural areas. Land tenure security in the rural areas of Africa is therefore an area that needs much attention if rural poverty can be addressed. For this reason, it is necessary that approaches which are affordable for such rural communities and people and which they can easily understand and participate in the implementation process be sought and adopted. However in Ghana and many other developing countries alike, approaches to securing land rights have not been very flexible in terms of cost and complexity to allow the rural poor and other marginalized groups to have their land rights captured. This was noted by the UN-Habitat and cited in Osei Tutu et al (2016) that “most land management and administration systems are biased against poor people and often ignore realities on the ground”. (UN Habitat, 2012: 2). For this reason, the potential for land management and land administration to provide tenure security and alleviate poverty is not realized especially among the poor. They are unable to participate in the land market since prospective land investors are unwilling to deal with lands that have no proper documentations as evidence to guarantee them tenure security. This has therefore necessitated the need to find approaches that can help the poor and marginalized people to also benefit from the land management and land administration systems. Hence, as was cited by Arko-Adjei (2011), the necessity to adopt innovative and pro-poor land tools for securing tenure has been highlighted by several publications and projects undertaken by the UN-HABITAT Global Land Tool Network (UN-HABITAT, 2003; 2004; 2008). This shows the global concern for the need to ensure land tenure security for all people based on what approaches are suitable and affordable to the people concerned. Hence, development agencies concerned with land right issues like the UN-Habitat and FAO have come up with several innovative tools and approaches to help capture and record the land rights especially of the rural poor in developing countries where the customary land tenure mostly exists.



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The well-known and accepted tools and approaches include; the Social Tenure Domain Model (STDM) by UN-Habitat and the Global Land Tool Network (GLTN), Solution for Open Land Administration (SOLA) by FAO, the Mobile Application to Secure Tenure (MAST) by USAID, the Open Title by Thompson Reuters, the Fit-For-Purpose Land Administration by the UN-Habitat and the Global Land Tool Network (GLTN).

It is widely accepted among academics, policy-makers and development agencies that “well-defined land and property rights are integral to poverty alleviation” (Dabo, 2016: 10) since it enhances tenure security of land. The benefits of tenure security are well researched (Ubink *et al.*, 2009). However, the key challenge is what best possible ways can be adopted for enhancing tenure security at a rather very low-cost. Hence, in an effort to ensure clearly defined and enforceable property rights, many developing countries have embraced formalization of land rights (Durand-Lasserve *et al.*, 2013) through the conventional land registration and land titling. This system however does not recognize and captures all land rights (like the customary tenure) commonly found in most rural areas of Africa and also, these formalization systems have high cost components that many people are unable to afford.

This has been one of the main reasons for land tenure insecurity in many customary rural areas where there is lack of sufficient and comprehensive land-use and land rights mapping. To be able to achieve tenure security in such areas will therefore involve the development of a comprehensive land inventory. However, relying only on the conventional land information systems which is by the formal land registration and land titling has however not proven sufficient to achieving this. It is well acknowledged that “conventional land information systems cannot adequately serve areas that do not conform to the land parcel approach applied in the developed world” (Lemmen and Augustinus, 2009). Also, as cited in Arko-Adjei (2011), some critics have argued based on research works that land registration and titling programs across Sub-Saharan Africa have failed to achieve their stated goals (Peters, 2009) of which the ultimate is tenure security and poverty alleviation. This is why more flexible ways to securing tenure are needed, especially for identifying and mapping the various kinds of land tenure relations in customary settlements. Having adequate land inventory or register in rural areas that have no existing cadastre, provides a necessary step for securing tenure in such areas. Also, an inventory with land and property rights information can serve as an important tool for



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decision making in the different sectors of public management. However, to be able to achieve this, numerous questions need to be answered and these among others include the following;

- How can it be done without making the cost of poverty alleviation rather too expensive?
- How can the process be implemented without causing more insecurity to the people that it is intended to alleviate from hardships?
- How can it be done in the simplest and quickest way possible?
- How can we make the intended beneficiaries accept the approach in order to encourage their participation in its implementation?
- How can we ensure sustainability of the process?

Positive answers to these and many other questions are critical for securing the land rights of people without further impoverishing them. Therefore, providing this service at an affordable, transparent, rapid and in a sustainable way is what this study demonstrates.

The study introduces a concept and practice – the Rubber-Boot Approach (RBA). The RBA is a Social Tenure Domain Model (STDM) based strategy for securing customary land rights in the rural, peri-urban and urban areas of the Global South.

The RBA entails a low-cost method for capturing land rights and associated tenure relations in the simplest way possible – and in close collaboration with community members. The RBA process is geared towards providing customary areas with sufficient and low-cost solution to generate a comprehensive land-right inventory or register. The approach uses open source software and single handheld devices like smartphones or tablets with integrated GPS sensors for the mapping process. It is possible to train para-surveyors or use local youths for the mapping itself. With their knowledge of the geographical area under survey, the total costs of generating a land register can be very low.

The study is based on a fieldwork conducted in Ghana. It provides a case of where and how the RBA has been used in a rural area of Ghana to measure an area of more than 50 hectares. Within the case study area, the participation of local people in the mapping of land rights used to be a challenge, and especially due to their complex, pluralistic customary land tenure systems. Also, capacity development in mapping used to be a major impediment to their involvement in inventory exercises with professional surveyors. Having tested the RBA in the area, our study



identified potentials for securing customary land rights in ways that can be sustainable and at a quick pace, low cost and to enhance tenure security. By way of result, the RBA offered to land owners and users in the area, (1) accurately mapped land parcels with additional documentation at an affordable price while enhancing tenure security of customary landholders. Furthermore, (2) it shows how the approach can be applied to a large-scale land inventory that documents all rights and responsibilities within a mapped area. Additionally, (3) it exposes the possible difficulties and obstacles related to the simple mapping processes.

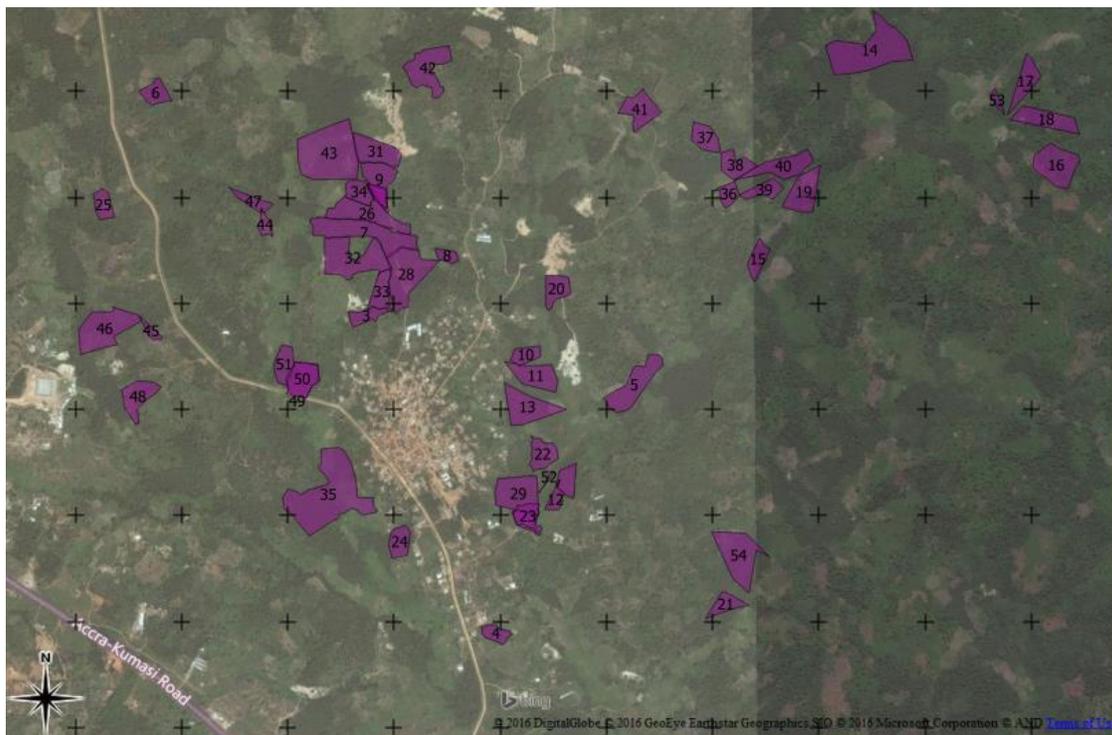


Figure 1: Section of the research area including individual parcels (Bendzko 2016)

This study makes significant contributions to existing literature and practices in tenure security improvements. In practice, the RBA can be used as a tool in fulfilling the objectives of “tenure responsive land-use planning” (Chigbu *et al.*, 2016). It conforms to the basic principles of “responsible land administration” (Zevenbergen *et al.*, 2016: 1) and contributes to “new ways for improving global land tenure” (McLaren, 2016: 22).



2. CONTEXTUALIZING LAND TENURE IN GHANA

Many people in the Ghanaian society regard land as a deity and a heritage that was won and passed onto the current generation by their ancestors (Bugri, 2012) and therefore the need to properly manage same for the young and generations unborn. This idea is corroborated by Payne's definition of land tenure as '*a product of historical and cultural factors that reflect the relationships between people, society and land*' (Payne., 2000). Payne's definition buttresses the indigenous Ghanaian idea of land tenure and ownership in which the people regard land as collectively owned rather than as a private commodity to be traded. Ghana has the public/statutory and the customary lands. Public lands are categorized into state lands and vested lands. The state lands represent lands that have been compulsorily acquired by the government under the state lands act 1962 (Act 125) to be used for a public purpose and for which compensation has been paid or is yet to be paid. This forms about 18% of all public lands. Vested lands on the other hand are those lands that belong to traditional authorities but whose managerial rights and the legal title has been transferred to the state in the interest of the communities concerned. Here, the state is responsible for the management, development and sale of the land while the original owners are entitled to receive revenues that accrue from such lands. Therefore, the state pays no compensation for the vesting of such lands in itself. These lands form only 2% of all public lands. Customary lands under the customary tenure and management system make up 80% of the lands in Ghana. The existence of the two tenure systems has led to the operationalization of many different guiding laws and rules both statutorily written and unwritten customary ones leading to the description of land tenure in Ghana as one of a 'Legal Pluralism' (UN-Habitat et al., 2014). However, despite the long existence of both systems in the country, the distinction between them has mostly been based on the formal documentations under the statutory system as against the customary system which has mostly been characterized by oral grants without any formal documentations. And also on the institutions that are in charge of land management under both systems. Land management under the statutory tenure is by the state institutions like the Lands Commission with its various divisions and some other public agencies while land management under the customary tenure is by the traditional rulers, heads of families and clans among others. It is important to point that some traditional authorities in recent years have established customary land secretariats that are in charge of the management of customary lands for such traditional authorities. However, article 267 of the constitution of Ghana places some forms of limitation on



the traditional authorities/ custodians of customary lands in their management and especially the disposition of customary lands referred to as 'stool lands'.

2.1 INTERESTS/RIGHTS RECOGNIZED IN GHANA

The Land Title Registration Act 1986 (PNDCL. 152) under section 9 identifies specific rights and interests that are registrable in Ghana. These include; the allodial, customary law freehold, common law freehold, leasehold and other lesser rights/interests and tenancies.

Allodial Interest: This is the highest form of title or interest that can be held in land in Ghana. It is vested in the authorized leaders who are the custodians of land. The issue of transferability of this title especially to someone outside of the land owning group is not clearly defined since most traditional authorities especially among the Akan tribes have been silent on it or answer such question with inconsistencies (Dwokoto G. Opoku K., 2010). It is however noted by (UN-Habitat et al, 2016) that the transfer of this title is possible to another community either by way of gift or purchase but could involve the sacrifice of lives of subjects and this shows how difficult it is to transfer this form of interest. It is from this title that all other forms of interests and rights in land under the customary tenure emanate.

Customary Law Freehold: This interest can be acquired by only the members of the land owning group and from the allodial interest holders usually by allotment. The grant of this interest comes with no form of restriction. It is held and passed on to the descendants of the holder ad infinitum except in the absence of descendants that it might revert back to the grantor. The holders of this interest get it as of right for their membership of the land owning group and as such they cannot be disposed of it by any means, not even by the grantor except under compulsory acquisition by the state or in very extreme cases where the grantor might require the land for a general community development in which case the holder might be allotted a different land.

Common Law Freehold: This is also derived from the allodial interest holders either by way of gift or purchase and it could be acquired by both members of the land owning community and strangers. The grantor under this system could stipulate some reasonable restrictions on the utilization and holding of the land. It is important to note that the 1992 constitution of Ghana



however now bares the creation of both the customary and the common law freehold interests in land to anyone irrespective of whether or not one a stranger or foreigner.

Leasehold: This is usually created on contractual basis and can be derived from either of the freehold interests or from the allodial interest. The lessee pays a rent for such a grant usually on periodic basis to the grantor. The constitution of Ghana allows for a 99 year maximum lease for Ghanaians and 50 years for foreigners. A leaseholder uses the land according to the covenants of the lease which could be [Express or Implied] covenants. Leasehold could be derived from either of the interests already talked about.

Lesser interests/Customary tenancies: These are usually granted for specific purposes but mostly for crop production. They could be created from either the allodial, freehold or leasehold interests and are usually on share cropping basis where the produce from the farm are shared with the grantor. The common arrangements in this system are the 'Abunu' where the produce is shared equally between the farmer and the grantor of the land or the 'Abusa' where the farmer gets two-third of the produce and one-third goes to the landlord. Mostly in these arrangements, there is no rent paid by the farmer to the landlord for the use of the land since there is a share of the produce.

2.2 LEGAL FRAMEWORK FOR LAND MANAGEMENT IN GHANA

The legal framework for land management in Ghana is a pluralistic one manifesting in a complex mix of constitutional and legislative sources, judicial decisions, customary and religious laws (Sarpong., 2006). There are also policy documents, and other practices developed and accepted over the years to regulate land rights and land administration. These sources are based on different regulatory systems. There are over 50 statute laws that govern land management and land administration in Ghana. This pluralistic legal regime tends to create complexities and confusions in land management and land administration in the country due to overlaps, uncertainties and contradictions. Therefore as part of interventions to address these challenges, the National land policy was enacted in 1999 to give an overall direction for good land management and administration. Also, the Land Use and Spatial Planning Act 2016 has revised and consolidated all the laws on land use and spatial planning to help provide clarity and certainty in that direction. The proposed National Land Bill which is currently



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(As at 03/03/2017) when passed will also consolidate all the laws on land to harmonize them for sustainable land administration, effective land tenure and efficient survey and mapping. For registration of land in the country, there are two main laws; the Land Registry Act 1962 (Act 122) and the Land Title Registration Act 1986 (PNDCL 152).

Act 122 is concerned with deed registration. This act provides for a compulsory registration of all instruments and exempts only a “Will” and a “Judge’s Certificate” under the section 24. Without such registration, an instrument shall have no legal effect in the country. Deed registration is done by the Land Registry Division of the Lands Commission and is available in all ten administrative regions of the country making it the most widely used land registration law in Ghana. Despite the wide scope of this law, it has been found to be fraught with some deficiencies such as; allowing for double registration of transactions and the registration of just transactions alone without passing title to the purchaser. Also as cited in Arko-Adjei (2011), this act also excludes the registration of oral transaction under the customary law. And again, Section 24(1) of the Act 122 clarifies that the registration process only grants equitable interest to the purchaser, instead of the transfer of a right as is probably understood by the party involved (Agbosu, 2003).

Due to these deficiencies identified with the Act 122, the deed system of registration was considered unsatisfactory and hence introduction of the land title registration act. The main purposes of this Act were; (1) To give certainty and facilitate proof of title and (2) To render all dealings in land safe, simple and cheap and to prevent fraud against purchasers and mortgagees (Sittie., 2006). However, the land title registration currently operates only in the Greater Accra Region and some parts of Kumasi in the Ashanti Region. The right of a registered owner of a land under this Act is indefeasible and he or she holds it with all privileges and appurtenances attached to it free from all other interests and claims (Section 43). ‘Section 123 of the law also provides for compensation to people who suffer damages as a result of the registration of an interest in land’ under this act (Arko-Adjei., 2011).



2.3 INSTITUTIONAL FRAMEWORK FOR LAND MANAGEMENT IN GHANA

The institutional framework for land management in Ghana comprises both state and customary structures that enforce the laws and rules which govern and regulate the accessibility, use and ownership of land.

State Institutions: The main state institutions concerned with land management and land administration include; the Lands Commission which has four divisions (Land Valuation Division, Land Registry Division, Survey and Mapping Division and the Public and Vested Land Management Division), also the Town and Country Planning Department (T&CPD) and the Office of the Administrator of Stool Lands (OASL). Other institutions involved include; the Ghana Institute of Surveyors (GhIS), the Ghana Institute of Planners, the Environmental Protection Agency (EPA) and the Ghana Bar Association. These state institutions are charged with the responsibility of managing land in the country by applying and enforcing the various legal provisions on land in the country.

Customary Institutions: The customary institutions include authorized representatives of the land owning groups mainly; the chieftaincy, traditional council of elders and other custodians who hold the lands in trust for their people. These custodians are accountable to the people. They make decisions on the management of land as well as on the sale, collection and disbursement of monies from the land. Usually, such decisions are arrived at through consensus building among the custodians and other principal members of the group. The custodians could also give specific management instructions to be carried out in some cases (UN-Habitat et al, 2016). Additionally, some traditional authorities have established customary land secretariats. Examples include; the Otumfour Land Secretariat, the Gbawe Family Land Secretariat and the Kamawu Land Secretariat which act as customary institutions to manage the customary lands through allocation, documentation and recordation of land transactions on behalf of the traditional authorities.



2.4 CUSTOMARY TENURE IN GHANA

Customary tenure in Ghana fall under two categories; in the first category, 'Land ownership is vested in communities that exist as chiefdoms' (Arko-Adjei., 2011). Under this category, access to land is through bonds within families, lineages and larger social units. This system is typical among the southern Ghanaians and mainly the Akan group. In the second category, it is the clans that are vested with land ownership. There is therefore a collective ownership since the clan might have inherited the land from a common ancestor (Arko-Adjei., 2011). This system is also typical among the non-Akan tribes. In both categories however as noted earlier, management of land is by authorized representatives of the land owning groups mainly; the chieftaincy, traditional council of elders and other custodians who hold the lands in trust for their people and are accountable to them.

3. APPROACHES TO FORMALIZATION OF LAND RIGHTS IN GHANA

3.1 SOME UNCONVENTIONAL APPROACHES USED IN YEARS PAST

"Formalization of land rights involves giving land rights an identifiable legal form, either by transcribing statements or deeds or by establishing and recording facts (Durand-Lasserve 2013) cited in (Osei Tutu et al, 2016). In Ghana, this formalization has always been linked to the formal western land registration (deed registration) and land titling which often times demands the services of highly qualified professionals like surveyors and valuers. This system however does not recognize the rights of many land holders especially under the customary land tenure system and so, many have not benefited from it especially in the rural areas of the country. However, as was rightly said by Kasanga (1988) and cited in the (UN-Habitat et al, 2016) *'there is no ideal land tenure system for development purposes and so therefore each must be judged on its merits and weaknesses against the values/ goals of the society concerned'*, This view supports the need for the adoption of innovative tools and approaches like the STDM and Fit-For-Purpose approaches which are aimed at securing land tenure based on the specific needs of the particular community concerned. Based on this concept and in collaboration with some donor agencies, Ghana has over the years adopted some unconventional approaches to recording and securing land rights for people. This has however been very sporadic in nature. Below are some of the approaches that have been used in years past in the country;



- MiDA Systematic Land Titling
- Medeem Proprietary ParcelCert
- Paralegal Titling Project

The details of the above mentioned approaches are available in Osei-Tutu et al (2016). These different approaches were all aimed at enhancing land right recordation and tenure security through low cost, simple processes and in ways that could be sustained in their areas of intervention. However, after their stipulated periods of operation, all such approaches could not be sustained for reasons of low financial capacity and the use of high end technology that required expert knowledge to continue. And so for this reason, the need for measures that make use of the indigenous knowledge is very crucial since the sustainability of all such approaches will much depend on whether the indigenous people can continue to carry out such recordation approaches after the projects have ended.

3.2 THE CONVENTIONAL LAND SURVEYING AND MAPPING

Survey and mapping of land is undertaken by the Survey and Mapping Division of the Lands Commission under the Survey Act, 1962 (Act 127). This act works together with the Survey (Supervision and Approval of Plans) Regulations 1989, (L.I 1444) of Ghana to ensure that survey work is undertaken in accordance with set standards that regulate the work and conduct of surveyors. Both the Act 127 and the L.I. 1444 require that before any land allocation, land registration and land-use-planning in the country, there must first be a survey and mapping of the area concerned by either a government employed or a private licensed surveyor and this must be approved by the regional director of surveyor or his representative. This approval process requires various steps as 'site inspections, examinations of field documents and computations, and cartographic checks' (Arko-Adjei., 2011) before it can be granted. This makes the whole process very bureaucratic and expensive as well and so most often, many developers and land owners are either unable to afford it or impatient for the long process. The survey and mapping process has therefore often been criticized for its strict technical and standard requirements which contribute to the high cost component.



To the rural subsistence farmer, this system is very bureaucratic and involves a high cost component especially where one has several parcels of land that need to be surveyed and mapped. The next part of the paper now presents the RBA in details and how it can be convenient for adoption as a Social Tenure Domain Module (STDM) strategy for these rural areas where the conventional survey and mapping is regarded as too technical, bureaucratic and expensive to afford.

4. INTRODUCING THE RUBBER BOOT APPROACH (RBA)

The rubber-boot-approach (RBA) is an individually adapted Social Tenure Domain Model (STDM) strategy which uses local youths to generate a low cost land-use inventory in rural areas especially in developing countries. (Bendzko, 2016)

In this approach, the local youths get trained to become para-surveyors to be able to use simple smartphones or tablets with standardized integrated GPS-receivers to map parcels in rural areas. The approach was successfully applied and tested within the scope of a master's thesis in Ghana. The primary aim was to generate a low cost and pro-poor land inventory for the rural parts of the country under the customary land rights and to increase land tenure security. (Bendzko, 2016)

Though several projects in years past have been launched in Ghana to improve the land tenure system and land tenure security, rural areas under customary law have most often been left out, thus leaving behind some pertinent issues as: the lack of a comprehensive land inventory that covers the customary areas which have diverse set of tenure relations (rights, restrictions and responsibilities). These diverse set of tenure relations (continuum of rights) need to be surveyed and all local situations and customary relationships taken into a database. Also very important is the affordability of documents on recording land tenure rights which are in most cases considered rather too expensive by the poor rural communities. Further problems include; border conflicts between neighbors, which arise because of unclear demarcations. (Arko-Adjei, 2011, p. 2ff) (Ministry of Land and Natural Resources Ghana, 2015) (United Nations, 2011) Figure 2 represents all occurring problems and their respective solution within the RBA. (Bendzko, 2016)



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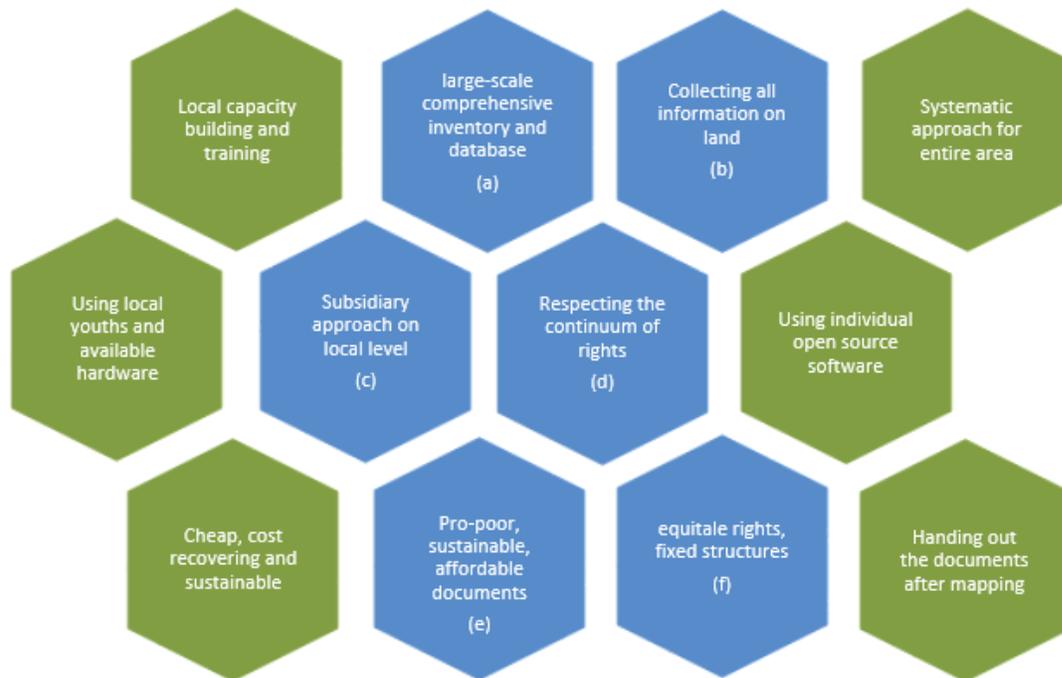


Figure 2: Schematic figure of the rubber-boot-approach (Bendzko, 2016)

To tackle these problems, the RBA was introduced to a customary area in Ghana. Resulting from the field research, an area of a town (more than 50 hectares) was mapped within a short period of time (approximately two weeks) by local youths and with support of the local chiefs. These youths were trained to become para-surveyors beforehand to operate the freeware mapping software on smartphones or tablets using the integrated GPS-receiver to demarcate the boundary extent of the individual borders. To ensure the correctness and avoid boundary disputes, the land-user always takes two neighbors on the mapping site to act as witnesses. After mapping the parcels, the para-surveyors were trained to generate a land-use inventory using the open source software Q-GIS. As a last resulting step, the land-user or owner receives a directly printed document showing the position, extent and shape of the mapped parcel including a satellite picture in the background to simplify the orientation. By using a customized questionnaire, all information on the land, the land-user and everything related to the parcel could be received during the field work. In this exercise, the total cost including the wages of the para-surveyors, was determined at 3.15 USD per standardized parcel (5.19 acres). (Bendzko, 2016)



The research showed that the optimal size of a team of para-surveyors would be three people in total. Two members of each team do the mapping work and use the single handheld GPS-devices (smartphones and/or tablets). The third member sets up the inventory and manages the customers during the same period of time.

Interviews conducted within the framework of the RBA showed that perceptions on land tenure security for the beneficiaries had significantly been enhanced by this approach. The interview also showed that the participants were willing to pay more than the calculated costs. The reason for this willingness was because the people said, the local financial institutions (especially the micro-finance institutions and the rural-banks in such areas) would recognize the printed out documents of their land and accept as collateral to grant them loan or microcredit (Osei Tutu et al, 2016).

For this reason, the land owners were willing to pay up to 47 USD per acre. However, since the approach is a pro-poor one, the charge per acre was set at 2.34 USD thereby making it very much affordable for all willing landholders. The difference between the operating costs (3.15 USD/ 5.19 acres) and the charged costs (12.17 USD/ 5.19 acres) per standardized average parcel (5.19 acres) was used for incentivizing the para-surveyors through increase in their wages and also to cover financial contingencies and or for the replacement of hardware if any was faulty or broken down.

5. APPLICATION, COSTING AND RESOURCES IN THE RUBBER-BOOT APPROACH

5.1 TECHNICAL EQUIPMENT, FINANCIAL NECESSITIES AND CONDITIONS

Apart from the staff requirements which are essential for the training of para-surveyors, the approach requires some other equipment as well as finances in order for a successful work in the field.

The equipment particularly includes a GPS-enabled smartphone, which is needed for the mapping in the field. On this smartphone, the accompanying software has to be installed to make accurate mapping of parcels possible. Every team consisting of three people each needs two smartphones and one laptop. The laptop is indispensable as it is needed to analyze the collected data and to create an inventory consisting of the mapped parcels. In addition, every



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team needs a mobile printer to be able to print out the documents for the farmers after the creation of the inventory. These documents are then handed over to the farmers, who can see the results of the mapping process immediately and point out any mistakes which may arise. (Bendzko, 2016)

To operate the mobile printer, consumables like paper and ink cartridges are required. The field tests which have been carried out so far have shown that the usage of wireless GPS receiver terminals leads to an average increase of accuracy of position by 43 %. An improvement in the procedure of the working steps could be achieved in the field test by using a power bank as portable power source. This allows the para-surveyors to work more independently of local shortages in the electricity supply. Both the extern GPS-receiver and the power bank are not mandatory requirements, but it is advisable to provide the teams with these devices as parts of their basic equipment. (Bendzko, 2016). Table 1 shows a list of the required equipment and the costs involved per person.

	Costs		Number Needed		Total Costs		Costs Per Person	
Smartphone	158	USD	2		316	USD	105,33	USD
Laptop	422	USD	1		422	USD	140,67	USD
Portable Printer	95	USD	1		95	USD	31,37	USD
Paper (1 Year)	42	USD	1		42	USD	14,00	USD
Ink Cartridge (1 Year)	42	USD	1		42	USD	14,00	USD
Power-Bank	32	USD	2		64	USD	21,33	USD
Wireless GPS-Device	64	USD	2		128	USD	42,67	USD
Software	0	USD	3		0	USD	0,00	USD
	SUM				1109	USD	369,37	USD

Table 1: Cost of the required equipment (Bendzko 2016, adjusted)



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The basic equipment includes the devices and the operating software on the devices. This software can be offered at no charge by the researcher and so no further costs or efforts arise once the software is installed.

According to the results of the conducted field work, the comprehensive training for the para-surveyors takes seventeen days. This duration of time is needed to impart all the working steps summarized in the following figure (see Figure 3):



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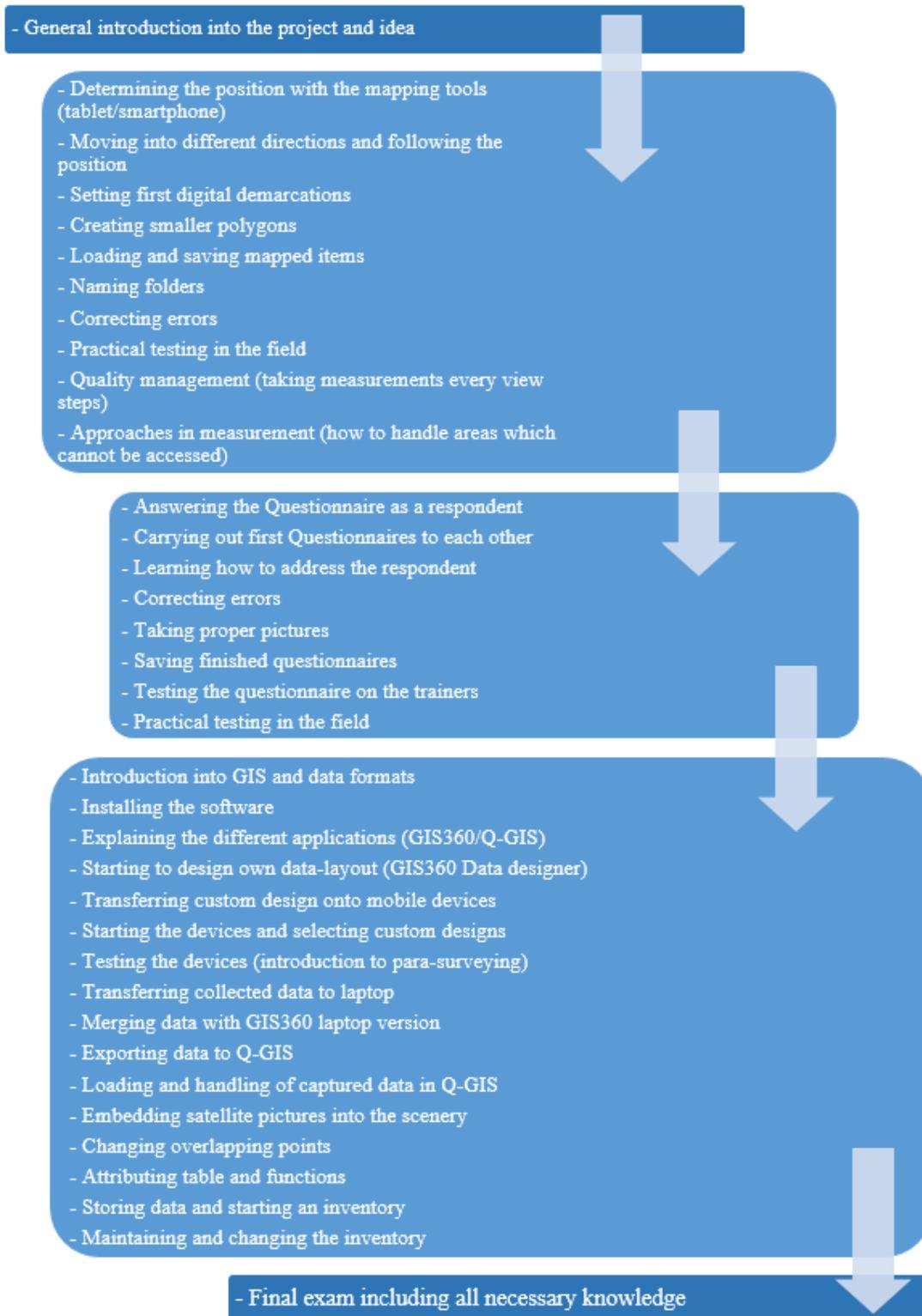


Figure 3: Training of the para-surveyors (Bendzko, 2016)



5.2 LARGE SCALE APPLICATION OF THE RBA

The costs presented in chapter 5.1 show the prices connected to the preparation of the RBA for one group of para-surveyors, their equipment and training in advance to the mapping process.

This chapter now provides an answer on the number of para-surveyors and the needed time for a large scale approach to generate a large scale land-use-right inventory including all related costs during the work. All assumptions are done according to Ghanaian conditions and originally calculated in the Ghanaian currency, “Ghana Cedis”.

Although both employed para-surveyors during the field test seemed to be satisfied with their income in the beginning, it soon turned out that they expected to receive higher wages. After a few days of work, they asked for more money and additional allowances for free days, food etc. These allowances were included in the calculations, and an additional salary increase was integrated into all calculations as was mentioned earlier. This is supposed to ensure that there is enough money to reward workers who do outstanding work. This reward can either be paid as higher wages (in comparison to the original wage of 30 Gh¢ / 6,57 USD per day) or it is possible to pay a one-off bonus for good work to raise motivation by extrinsic incentives and to stimulate a high quality of work. This was intended to avoid several issues concerning the attitude towards work during the field test. For this research, two different scenarios were taken into consideration for calculating the operational costs and covering the initial costs of the investments for hardware. The first scenario was based on the actual costs during the conducted fieldwork which lead to a break-even-point after 13 days of work while theoretically charging 10 Gh¢ per acre and having overall costs of 3.13 USD per standardized parcel. The second scenario has improved technical equipment, a salary increase to ~ 60 Gh¢ / ~13 USD per day while still charging 10 Gh¢ per acre. The break-even-point in the second scenario will be reached after 49 days of work. As calculated in table 2, the overall costs per standardized parcel (5.19 acres) are calculated with 4.66 USD. (Bendzko, 2016)



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Scenario 2					
<u>Workforce</u>					
	Parcels/day	Salary		Unit costs	
Mapping/Surveying	9	11.71 USD		1.30 USD	
Post-processing	20	16.40 USD		0.82 USD	
		SUM		2.12 USD	
<u>Equipment (long-term)</u>					
	Lifetime (uses)	Acquisition		Unit costs	
Tablet	6,570	422 USD		0.06 USD	
Power-bank	6,570	63 USD		0.01 USD	
Laptop	9,999	844 USD		0.08 USD	
Software/others	9,999	1265 USD		0.13 USD	
Smartphones (2)	6,570	844 USD		0.13 USD	
Mobile Printer	6,570	95 USD		0.02 USD	
		SUM		0.61 USD	
<u>Consumables (per day)</u>					
	Field work/office			Unit costs	
Electricity		0.46 USD		0.05 USD	
Transportation		4.68 USD		0.52 USD	
Paper		0.23 USD		0.03 USD	
Ink		0.23 USD		0.03 USD	
Accommodation/Food		9.37 USD		1.04 USD	
Internet/Phone		2.34 USD		0.26 USD	
		SUM		1.93 USD	
		Overall costs (per parcel)		4.66 USD	
		Income per parcel		11.22 USD	
		Break-Even-Point reached after		49 Days	

Table 2: Calculations scenario 2 (Bendzko 2016, adjusted)



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Going a step further and aiming at surveying the whole region, it is interesting to consider which costs would arise in the beginning, which personnel costs are to be taken into account and when the break-even-point will be achieved to pay back all of the investments paid for in advance. The next stage would be to survey a bigger area with existing customary land tenure structures.

The Ashanti region covers an area of 24,400 km² and is inhabited by 5.2 million people. Its degree of urbanization is very high as most of the people live in metropolitan areas and cities. The rural area of the Ashanti region account for about 20,000 km², which equals to about 1.150 million standardized parcels. Assuming the costs of scenario 2 and charging 10 Gh¢ per acre, it would be possible to calculate the amount of needed initial investment, work force and time that will be needed for this area to be mapped and inventoried. The large scale approach of the RBA is distinguished by the duration of implementation, which significantly influences the number of staff members and the costs involved at the beginning of the project. For all calculations, a yearly work schedule of 240 days was the basis and provided for weekends, bad weather, public holidays and days taken off for reasons of illness or other contingencies. Under these circumstances capturing those 20.000km² can be managed within 3 years. Therefore, 277 persons and an initial investment of about 320,000 USD will be needed. After 49 days of work those investments should be reimbursed and a benefit should be generated from this break-even-point onwards.

6. DISCUSSION

The quest to find ways to improve property rights, increase wealth and decrease poverty has always been the objective in many international discourses and especially for the annual World Bank Land and Poverty Conference. This paper has demonstrated how the RBA can be used to achieve this objective through land survey and mapping as well as land inventory taking in a simpler, quick, affordable and sustainable way, since the approach can be carried out by the indigenous people. In many cases the conventional land information systems do lack different issues like affordability of land documents, unsolved conflicts and are without comprehensive



land right inventory. (Arko-Adjei, 2011, p. 2ff) (Ministry of Land and Natural Resources Ghana, 2015)

The World Bank Land Administration Project in Ghana under both the phase one and two sought to address many of the previously mentioned challenges in order to increase tenure security as well as to provide a pro-poor comprehensive land use right inventory. However, many of these issues still remain uncovered.

To close all the missing gaps and resolve these problems therefore, this individually adopted Social Tenure Domain Module (STDM) strategy, the Rubber Boot Approach (RBA), was tested and analyzed in Ghana in the year 2015. This paper is dealing with the question on how affordable and how fast this RBA is and how it can be applied in large scale within the area of Sub-Saharan Africa, after it has been tested in an area and proved successful for more than 50 hectares. (Bendzko, 2016)

6.1 ONGOING RBA TESTING

There are several different global actors offering software and tools for mapping based on social tenure domain and customary land-use inventory. For the studies used for this paper, affordable technical equipment and the freeware version of Carlson's GIS360 was used. The biggest advantage of the GIS360 was its applicability on both, Microsoft devices and Android devices with individual programming adjustments possible. However, Carlson is not distributing the software any longer and several new devices and software have been published. (Carlson, 2016)

This raised the question for alternatives and led to a new field research in Kenya in February and March (2017) where according to the RBA different software and devices will be tested to generate a land-use inventory in the rural area of Kilifi (Kenya). In this research, different devices with high and low accuracy and several software and applications will be compared. The tested hardware ranging from a single handheld GPS capable smartphones (Accuracy ~5 Meters) to very precise measuring tools like the Zeno 20 from Leica (Accuracy up to 1 cm) will be compared. Also different supporting software will be tested, including freeware software like



STDM plugin version 1.4 by GLTN for Q-GIS and licensed software like the collector application by ESRI, among other soft- and hardware.

6.2 SUGGESTIONS AND POLICY IMPLICATIONS

Considering the unaffordability, bureaucracies and non-involvement of indigenous knowledge in the conventional survey and mapping in the country, many areas have not been captured and therefore not found in land inventories as they are lacking especially in the customary rural areas. This paper therefore suggests that since the RBA allows for the training of local youth and also the involvement of local knowledge and comes with a comparatively low cost component, if there is a policy where the survey and mapping carried out under this system can be cross-checked and/ or be supervised by either a government or private licensed surveyor during the process, it will help confirm the correctness and accuracy of the process and thereafter, when the inventory has been taken, it could be certified or approved by the regional director of surveyors and subsequently, mainstreamed into the national database to give it legal authenticity. This process can help facilitate survey and mapping as well as land rights recordation and inventory in Ghana and also enhance tenure security at a relatively low cost to reduce the high poverty levels in most customary rural areas in the country.

7. CONCLUSION

Access to ICT has become more available to people all around the world. It has therefore become necessary to combine ICT and general information gathering techniques in land management in ways that can lead to pro-poor results. In this regard, RBA is one of the many important tools for land rights' recordation. In the context of tenure security improvement, it provides a practical means for building capacities for land inventory making, as well as in identifying and recording land rights for more secure tenure for all. In practice, the RBA is an attempt to help fill the gap in the conventional land administration systems in order to better handle customary and informal land tenure issues. As a result, it serves as one of the complimentary approaches in land administration necessary for bridging the 'people-land'



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relationships independent of the level of formality, legality and technical accuracy”.¹ Although the RBA is a para-surveying approach, rather than a full-scale geodetic method for land surveying, it can help fulfill the urgency needed for land inventories in majority of countries from the Global South.

What this article has done is to provide data on how the RBA has been used in Ghana to measure an area of more than 50 hectares. It has also provided information on the potentials of RBA as an approach for securing customary land rights at a quick and low cost pace.

¹ This statement represents a cardinal objective of the Social Tenure Domain Model (STDM) available at <http://stdm.glt.n.net/>



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