

**UPGRADING
AND LAND TITLING
IN INFORMAL SETTLEMENTS**

MANICA CITY

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PSM true color quickbird satellite image
as a cartographic document**

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UPGRADING AND LAND TITLING IN INFORMAL SETTLEMENTS - MANICA CITY

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MANICA PROVINCE, CENTRAL REGION - MOZAMBIQUE

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ABSTRACT:

One of the main objectives of one participatory planning experience underway in *Manica* is to give the confirmation of land tenure rights to the inhabitants of informal settlements. This involves both, the local residents and the technicians, supported by the German Co-operation for Development (GTZ), the Faculty of Architecture and Physical Planning of Eduardo Mondlane University (FAPF/UEM) and the Rome Municipality through the Italian Co-operation. The initiative is also expected to regulate the land use and to sustain the urban growth, providing basic infrastructures. In this context, a recent satellite image dated on March, 2003 has been used as a cartographic document of great importance for this work.

1. INTRODUCTION

A set of individual residences with raw brick or cement block walls and thatch or zinc roofs, of low but generally acceptable inhabitant standards, identify almost 80% of urban inhabitants living in the informal settlements of towns and cities of Mozambique (also known as spontaneous, unauthorized, slums, illegal settlements, etc), where there is always lack of basic urban facilities such as roads, drainage or piped water. This kind of constructions using traditional materials (Figure 1 and 2) can last a lifetime, if they are well cared by their owners.

The absence of basic urbanization raises serious problems to the inhabitants and, in many cases, brings about the inappropriate use and degradation of natural resources. The erosion (Fig. 3), is an example of the consequence of uncontrolled urbanization that pose a threat to the existence of inhabitants due to the serious damages caused to the environment. These damages have been minimized in the ambit of this experience, through improvement works that are made in the existent pedestrians' roads and streets. These works include the construction of drainage ditches that are, in a first phase, made with compacted soil, to allow the draining of rain waters (Fig. 4).



Figure 1: Typical traditional house, with raw bricks walls and thatch roof.



Figure 3: The erosion phenomena on the main settlement access road.



Figure 2: An improved traditional house, with raw brick walls and zinc roof.



Figure 4: Roads improvement and construction of drainage ditches to allow the draining of rain waters

2. INTERVENTION AREA

The City of Manica, where a planning exercise based on the principles of participatory community planning is currently taking place in the area of the *Josina Machel* neighbourhood, is one of the municipalities of the country with its own administrative autonomy but with some limited financial resources. About 25.000 inhabitants live in this city. One of the objectives of the project is to link the technical potential of institutions existing in the capital city with the reality in continuous evolution of municipalities throughout the country. Another purpose of this project is a systematic survey of informal settlements surrounding the centre of the city that have been inherited from the colonial period. Thus, the municipality neither knows the extension, nor the exact number of inhabitants. The circle shows the intervention area in *Josina Machel* neighbourhood.



Figure 5: *Manica* is located at about 790 km (by air) and 1125 km (by land) from the capital city of the country, Maputo.

3. OBJECTIVES AND PRIORITY ACTIONS

Some minimum conditions would be sufficient for the improvement of inhabitants' living standards of informal settlements:

Firstly: To issue any legal title of effective land tenure to inhabitants in order to give them great encourage improving their own dwellings.



Figure 6. Aerial photograph of Manica City (1985).

Secondly: assure, case by case, the minimum access requirement, by constructing either pedestrian ways or compacted soil roads.

A road is essential for vehicular traffic in case of emergency and to facilitate the future construction of other basic infrastructures. These infrastructures would be undertaken in a stage to come, when the inhabitants have the means and willingness to share the construction expenses and sustain the maintenance costs. The urban planning, in case of informal settlements, does not involve big development projects, but to improve living conditions in these settlements with minimum interventions (Tribillon, 1993). The planning objective is to ensure a sustainable growth related to the limited resources that the inhabitants are ready to mobilize and those that are available in the municipality.

This concept of urban planning, in order to be efficient, would have to be articulated in two directions of intervention:

The first direction is didactical, and it is aimed at demanding responsibility from administrators for a sustainable development strategy and, in the meantime, enabling local technicians to use simple control tools (for example the management of a simplified register);

The second direction is operational, and it is aimed at the definition of priority actions based on a very simplified plan to facilitate the process of land tenure titling.

When the word “plan” is used, it is necessary to note that, if this plan is prepared exclusively by foreign advisers or in bureaucratic offices, without the active participation of beneficiary inhabitants, it will be implemented with difficulties.

In fact, today, we see an almost general absence of intervention or control by municipal authorities, in the process of growth of informal settlements. On the other hand, it would be erroneous to expect charges to be imposed to inhabitants regarding the rationalization of occupation, without offering a minimum cross-entry. Therefore, the implementation of regulating provisions of a plan should always be followed by a concrete action, signifying a new willingness in urban development public intervention, such as: *to provide an infrastructure with minimum cost and/or the contextual launch of a process of effective titling of the inhabitants.*

4. LAND ADMINISTRATION IN THE INFORMAL SETTLEMENTS

4.1 An approach to the Land Law “Lei de Terras” (Law 19/97 of 01/10/97)

4.1.1 General Principles

In Mozambique the land is a property of the Government and it can not be sold or, in any other way, acquired by the user, mortgaged or used as lien (Art: 3), but:

- a) The *Right of Land Use and Exploitation “Direito de Uso e Aproveitamento”* (DUAT) can be transmitted by *inheritance*, with no gender distinction (Nº 1, Art: 16);
- b) The titular of DUAT can transmit the *infrastructures, constructions and benefits*, through public deed preceded by a Governmental Authorization. (Nº 2, Art: 16);
- c) In the case of urban buildings, with *the transmission of the building*, is also transmitted the DUAT (Nº 4, Art: 16);

4.1.2 The beneficiaries of Land Use and Exploitation

The *Right of Land Use and Exploitation* (DUAT), an initial document to be emitted in the ambit of the procedures related to the land use, can be solicited through:

- a) National people, collectives and singles, as well as local communities¹ (Nº 1, Art: 10);
- b) National people, collectives or singles, can obtain the DUAT together with other national people who are also, collectives or singles in a co-titular regime (Nº 2, Art: 10);
- c) Local communities, also obeying to the co-titular principles (Nº 3, Art: 10);
- d) Foreign people, since the moment they reside for at least five years in the Republic of Mozambique (line a, Art: 11);
- e) Foreign collective people since the moment they are constituted or registered in Mozambique (line b, Art: 11);

4.1.3 The DUAT acquisition ways

The *Right of Land Use and Exploitation* is acquired through three different ways:

- a) *Occupation* by singular people and by local communities, according to the norms and customary practices (line a, Art: 12);
- b) *Occupation* by national single people who, with *good faith*, be using the land for at least ten years (line b, Art: 12);
- c) *Request authorization* presented by single or collective people (line c, Art: 12).

4.1.4 The Request authorization process of Land Use and Exploitation

Two different phases are foreseen in the present law during the request authorization process of Land Use and Exploitation:

- a) A first phase that comprises the *request presentation* of use and exploitation, where it is emitted a *provisory authorization “autorização provisória”* with a maximum duration of five years for national people and two years for foreign people (Nº 1 and 2, Art: 25);
- b) A second phase that comprises a *definite authorization* and the *emission of the title* since the moment exploration plan be accomplished during the period of provisory authorization (Art: 26);

4.1.5 The registration and title of land use and exploitation

According to Nº 1 of the Article 14 of the same law, the constitution, modification, transmission and extinction of the *Right of Land Use and Exploitation* are liable to *Registration*. However, the Nº 2 of the same article determines that the absence of registration does not affect the *right of land use and exploitation acquired by occupation*². As it was explained in 2.1.2, the second phase of the process of request authorization of land use and exploitation comprises the *definite authorization* and the *emission of the title*. The Article 13 determines (in its line Nº 1) that this same *title* has to be emitted by the *Cadastre Public Services*, general or urban, but it also defines (in its line Nº 2) that *the absence of title does not affect the right of land use and exploitation acquired by occupation*.

4.1.5 The competence of the Municipality of Manica in the request authorizations of land use and exploitation in the informal settlements by the lee of the referred law and the application of the Land Law Regulation “Regulamento da Lei de Terras” (Decree 66/98 of 08/12/98)

According to the Article 23 of *Land Law* compete to the Municipal Councils to authorize the requests of land use and exploitation in the *areas covered by urbanization plans*³ since the moment they have *Cadastre Public Services*⁴.

However, in spite of the Regulation of Land Law defines in its Article 2, as the ambit of application of this regulation to *the zones that are not comprised by the areas under jurisdiction of the municipalities that have Municipality Cadastre Services*, and by the fact that the Municipality of Manica still has a

² The law defines *occupation* as a form of acquisition of the right of use and exploitation by national single people who, with good faith, be using the land for at least ten years, or by the local communities (Nº 7, Art: 1).

³ In the case of the *Josina Machel* neighbourhood is in progress the elaboration/implementation of the *upgrading plan* of this neighbourhood (in evolutive form and in phases), based on the mapping made with the support of the Satellite Image of the Municipality (March, 2003) QuickBird Sub-meter (0.6 m) PSM (true color).

⁴ The Faculty of Architecture and Physical Planning of the Eduardo Mondlane University, in the ambit of its research and extension programs have had an important role in the *capacity building* activities directed to the Municipalities, where the area of urban cadastre has great importance, as in the case of the Municipalities of *Manica* (Manica Province) and *Dondo* and *Marromeu* (Sofala Province).

¹ The law defines *local community* as a *group of families and individuals*, living in a territorial circumscription of locality level or inferior, that aims to the protection of common interests through the protection of housing areas, agricultural (cultivated or fallow land), forests, places of cultural value, pasture, water fonts and expansion areas (Nº 1, Art: 1).

developing Municipality Cadastre Service, it is important to mention some of the dispositions of the referred regulation:

1. The *local communities* that are occupying the land according to the *customary practice*, acquire the right of land use and exploitation (Nº 1, Art: 9);
2. The *national single people* who, with *good faith*, be using the land for at least ten years, acquire the right of land use and exploitation (Nº 1, Art: 10);
3. When necessary or requested by the interesting people, the areas that are comprised with the right of land use and exploitation *acquired by good faith occupation* can be identified and registered in the *National Land Cadastre "Cadastro Nacional de Terras"* (Nº3, Art: 10); it is understood that this process has to be conducted through the *Municipality Cadastre Service*;
4. The *demarcation*, among other elements, is a part of the relative process to the right of land use and exploitation *acquired by good faith*, where after being emitted the *provisory authorization*⁵ (that can be dispensed in the case of these kind of beneficiaries) the Cadastre Services will notify the solicitant the necessity to make the demarcation (Nº 1 and 2, Art: 34, having also reference of Art: 30.)

In this ambit and by the fact that inhabitants who reside in the informal settlements of the Manica Municipality have the conditions predisposed in the previous numbers (*customary practices, occupation by good faith for at least ten years, provisory authorization with no immediate necessity of demarcation*), all this, indicates that there are minimum conditions for the attribution of DUAT, that would start since the emission of the *provisory authorization*, that in reality, it would be a form of *confirmation*⁶ "*comprovação*" of the *land use and exploitation* as it is established in the Article 15. This confirmation, the one that, according to the same article can be made in different ways, like for example the testimony presented by the members, men and women, of local communities, or the investigations made by capable technicians involved in the upgrading process.

The referred provisory authorization, would be in this way emitted in a form or attached with a registration file (Figure 7) of the right of use and exploitation filled during the mapping operations and the implementation of the upgrading plan, where relevant information are registered like for example: name of the titular, localization of the plot, the surrounding elements of the plot, type of exploitation, members of the family,

⁵ Having into consideration that the Municipality of Manica has a *Municipality Cadastre Service* still in process of development, it is considered essential the attribution of provisory authorization because the demarcation is only solicited later, with a term of a year after the respective notification. In practice, this term also depends on the capacity of the Municipality to carry out the referred demarcation.

⁶ Because of the doubts the Municipality could have about the rights of land use and exploitation in those settlements, the Faculty of Architecture and Physical Planning of the Eduardo Mondlane University was invited to elaborate a juridical report about this question, where in the document elaborated for this purpose (November, 2004) the Arch. José Forjaz (Director of the Faculty and Lecturer) and the Dr. Carlos Serra Jr. (Jurist and also Lecturer in the same Faculty) defend in the same way the *confirmation* of right of use and exploitation enhancing that the residents of Josina Machel neighbourhood have the right of land use and exploitation, independently of the type of authorization or recognition made by the Government.

construction descriptions, living conditions, topographic scheme, witnesses and also the technician who is the responsible for the registration.

The image displays a handwritten registration form from the Conselho Municipal da Cidade de Manica. The form is titled 'CONSELHO MUNICIPAL DA CIDADE DE MANICA' and 'SERVIÇO DE REGISTO DE USO E APROPRIAÇÃO DE TERRELOS Nº'. It contains several sections for data entry, including 'MUNICÍPIO', 'LOCALIZAÇÃO - BARRIO', 'REPRESENTAÇÃO - RUA', and 'PONTOS DE REFERÊNCIA'. The form is filled with handwritten text, including names like 'Manica' and 'Rua da Liberdade'. Below the form is a topographic map of the plot, showing its boundaries and surrounding features like roads and buildings. The map includes a scale bar and a north arrow.

Figure 7. Proposed registrations file of the right of use and exploitation for Manica.

So, the registration that has been made will contribute in an accentuated manner for a better management of the city, in order that:

1. It will permit to know and document the physical situation of the urban occupation, facilitating in this way the programming of actions that aim the improvement and the expansion of the basic services, as roads, drainage or piped water;
2. It will permit to make the regulation of the actual occupations registering the rights of use and exploitation of the effective occupiers;
3. To guarantee an improvement in the collecting system of inhabitants contributions through the different forms of taxes, with the view to improve the performance of municipal authorities.

However, it is important to note that inhabitants of informal settlements, even if they do not have any legal title, feel secure of the tenure of the land they use and they have a tendency to increasingly improve the quality of their houses by using conventional materials (Figure 8 and 9). It is necessary to mention that these people are not always interested in the registration that have been discussed in this document in order to avoid the taxes that they should pay and that have been referred in the last point 3. Thus, they improve their own living standards, depending on the available economic resources and avoiding the high market cost of formal houses (project, bank loan, intermediary costs, administrative costs, etc.). This

The operation is intensified during the period from 1990 to 2003 completing and expanding the cadastre and registration of the occupations in the semi-urbanized areas. There have been registered and integrated in the City Cadastre about 5500 existent occupations until the year 2003.

The following elements were part of the referred registration, named “simplified cadastre”:

- Ø A cadastral scheme (Figure 10) elaborated with the support of aerial photographs, with the parceling indication, the division in blocks and also the enumeration of the different plots;
- Ø Lists of occupiers per each block;
- Ø Registration form (Figure 11) per each plot with detailed information like for example: the identification of the occupier, the identification of the plot, characteristics of the existing constructions, infra-structures, etc;
- Ø The materialization of the registration through the fixing of metallic plates in the houses with the indication of the block number and the plot number.

5. THE MAPPING IN THE “JOSINA MACHEL” NEIGHBOURHOOD IN MANICA

5.1 First Mapping

To start with, it was carried out a brief low-cost survey of the area. A cartographic base for this area was prepared with the support of Prof. Paul Anderson from the Illinois State University, using an aerial photograph dated 1985. With this map, the situation was evaluated, identified the priority action and prepared an initial register of land tenure. After that, it was organized a mapping training section for technicians and volunteers. Next, the technicians, working with a large scale map of the area, mapped the existing plots and named the current occupiers. At this stage, the map was not up to date, because the existing photograph had been taken in 1985. This quick survey data of about 800 plots were collected, representing 16 % of the total number of 5.000 plots in the whole Municipality of Manica (considering that Manica has 25.000 urban inhabitants with an average of 5 people per plot/family). In this regard, only a percentage of people living within the administrative boundaries of the city, estimated at about 30.000 inhabitants including some rural villages and scattered households, have been considered as urban population (Trindade C., Do Valle K., Bruschi S., 2003).

The survey had the participation of 15 local volunteers and two technical staff from the Ministry of Environment MICOA (Ministério para Coordenação da Acção Ambiental) and two others, from the Manica Municipality.

However, the data and maps produced have a sufficient definition level for their purpose. These can not be compared with a true register system, because the costs would be too high. In fact, in the case of the *Josina Machel* neighbourhood in Manica, this also reflects the situation of most of the urban settlements in Mozambique. It is not needed highly sophisticated register maps. Any geometric approximation can be acceptable as long as it is complemented by a precise registration of land tenure rights (Bruschi, 1998). Moreover, this first attempt led to the improvement of intervention capacities of local technicians.

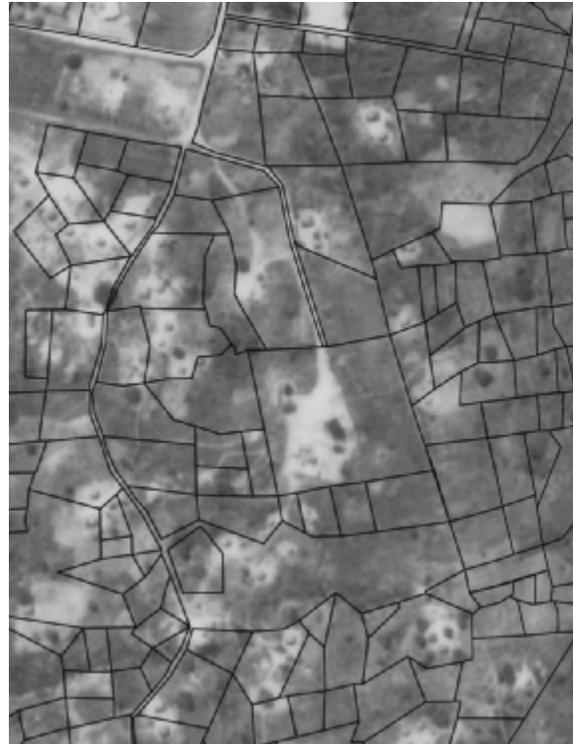


Figure 12: Rustic mapping of plots (real estates limits) Pilot study in a area of *Josina Machel* neighbourhood.

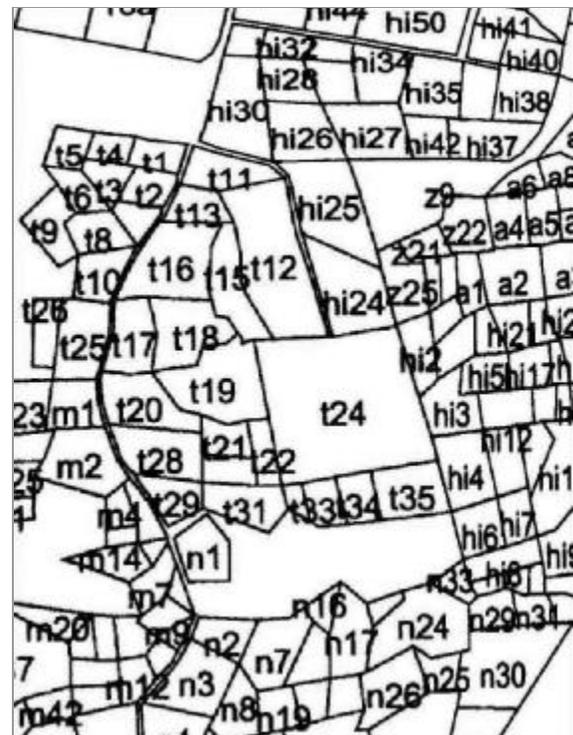


Figure 13: Data processing results in GIS (geographic information system).

5.2 Data Updating with Satellite Image

Subsequently, the acquisition of a Satellite Image (Figure 14) and the computer data processing have facilitated the improvement of available documentation. This image enabled us in a very short time and at limited costs, to get a credible cartographic base in order to prepare a simplified register of informal occupation.



Figure 14: Satellite Image of Manica (March, 2003)
QuickBird Sub-meter (0.6m) PSM (true colour).

For Manica and for most Mozambican medium and small size cities, the existing aerial photographs are very old and far away from the needed and adequate scales to achieve our objective. Although the cost of the most common available photographs are bearable (for example 1:40.000) in the National Directorate of Geography and Land Tenure (DINAGECA), the recurrent need of enlargement, that can be met by DINAGECA alone, increases the costs rapidly. (Anderson, 2000, pp. 771)

The use of satellite images (Figure 15) is more convenient and provides a wider flexibility to manipulate the scales. The image has been used without any geometric correction. Initially, the image was treated, using basic software, such as PhotoShop, and later it was inserted in the software AutodeskMAP, with the purpose of producing an approximate cartographic restitution (Figure 16), that would enable us to compare and correct the “rustic mapping” based on 1985 aerial photograph. The result was printed as a map, used to identify the priority actions and, when enlarged in adequate size (for example: 1:500), used for fieldwork. This enlarged map allows an optimum recognition of the constructions and gives references for the correct delimitation of plots boundaries. We recognize that the satellite image has not been used properly, because there is a lack of

adequate geometric corrections. The fact that it has been acquired in a digital manner, so that it could be printed at any required scale, proved to be a fundamental tool, quick and cheaper as compared to the aerial photographs, particularly when we need to know the land occupation in a city that has neither land register nor updated cartography. The printing of the image of the whole city, in a scale 1:5.000 was considered by the municipality as a sign of high social and symbolic value. In fact, the printed image, for the first time, enabled the municipality and its inhabitants to know their reality, evaluate the city growth phenomena and recognize the factors of growth, whose understanding had not been possible before, due to the absence of updated cartography.

The first action that have been already mentioned is related to the correction of the results of the first “rustic mapping” of *Josina Machel* neighbourhood, using the satellite image, to update the data obtained from the aerial photograph taken in 1985.



Figure 15: Satellite Image of Manica (March, 2003)
with approximate restitution and delimitation of plots.



Figure 16: Manica. Josina Machel neighbourhood.
Base map with the existent constructions.



Figure 17: Satellite Image of Manica (March, 2003). Mapping with field support.



Figure 18: The first result of the field mapping.

The second action, much more significant, falls upon the densely populated area of the above mentioned neighbourhood and it comprises the opening of the main access street (Figure 19).



Figure 19: Street opening works.



Figure 20: Street opening works. The community participation had an important role.



Figure 21: Construction of crucial infrastructures for the prevention of the soil erosion.

The beginning of works on the street opening was anticipated by training, held by a team of lecturers from FAPF/UEM led by the architect José Forjaz.

The inhabitants themselves, men and women, participated in the works, getting incentives and learning, in the meantime, the basic construction techniques. This capability will enable them, in the future, to carry out the maintenance of the street at reasonable costs.

The street was previously identified in the priority action scheme, improved according to the options of the inhabitants themselves, and designed directly in the field, with the help of the work map obtained by the satellite image. While the street opening work is in progress, the plots along the street are newly mapped, but at this time with more precision.

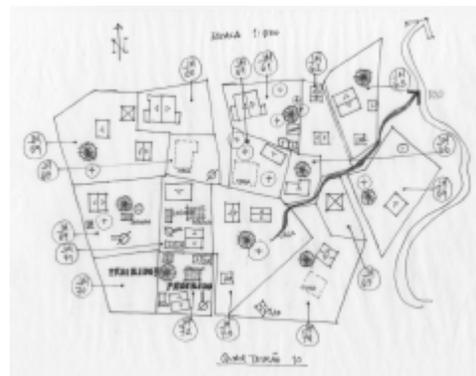


Figure 22: Detailed mapping of a block.

6. OBTAINED RESULTS

Picture 23 indicates the network of vehicle accessible streets and pedestrian ways, designed from the existing tracks, and the boundaries of plots.

Wherever it is necessary the plots are redesigned in order to enable the improvement of public streets, securing the land tenure titles for those that have been already occupied, suggesting the transfer of houses located in inappropriate places, such as under the power line and in steep slopes areas. The final decisions have been made after the discussion with the inhabitants.



Figure 23: Preliminary draft of blocks and plots numbering.

In a later stage, the mapping process may be extended to other neighbourhoods of Manica City that will be now an easier task using the satellite image (Figure 24). In the meantime the interventions in *Josina Machel* neighbourhood will be complemented, by opening the remaining streets and pedestrian ways, according to the priority actions previously identified on the map, and adapted to the reality and options of inhabitants (Trindade, 2002). The Municipality of Rome (Italy) is granting a part of the financing for these works through the department that deals in Rome with the improvement of the life quality in the outskirts of the city (*Dipartimento per le Periferie*). Parallel to this process, more plots will be precisely mapped, aiming at securing effective land tenure rights for the inhabitants. Of course, the areas to maintain for public use and those unusable for environmental or security reasons, will be previously identified.



Figure 24: Scheme of a mosaic constituted from the satellite image covering the Municipality that comprises the printing of sheets A1 at the scale 1/2000.

Regarding the titling, is currently under discussion the best way to ensure the land tenure titles. As a possible way, the plots, mapped and registered but not demarcated, would be

temporarily given by the municipality in some forms of *provisory authorization*. In the future, in case there is an interest, the *provisory authorization* would be replaced by the *definite authorization and the title emission*, after a careful demarcation and registration of each individual plot, according to the law. Also from this point of view, the intervention would play the role of a pilot project. It would be a pilot project with strong political connotations. On the other hand, the project would be easily replicated under the situations of many other Mozambican cities and towns, because it is manageable at the local level, and it has lower costs, if compared with those usually planned in analogous projects.

7. CONCLUSIONS

If this planning exercise achieves its expected results, the Faculty of Architecture and Physical Planning of Eduardo Mondlane University and German Co-operation for Development (GTZ) will work together, in the context of Decentralization and Municipal Development Project, proposing a methodology for managing urban growth and transformation processes that will link the plan to its implementation. In this way, we can also reasonably hope to ensure acceptable housing for all citizens, including the poorer ones, enabling in the future, the progressive improvement of social and sanitation conditions.

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The present document, adapted, improved and updated, based on the Manuscript for the 4th International Symposium Remote Sensing of Urban Areas, Regensburg 2003 (authors: Trindade C., Do Valle K., Bruschi S.) and that refers to the experience of informal settlement upgrading in Manica City, is presented as a report of a process characterized by an effort made by different intervenients, technicians, professionals, specialists and academics, who in the ambit of their support made everything aiming to get the expected results, namely:

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Arch. Luís Lage, Lecturer and Vice-Director of the Faculty
Arch. Júlio Carrilho, Lecturer and Exec. Sec. of CEDH
Arq. Carlos T. G. Trindade, Lecturer
Eng.º João L. Brito, Lecturer

Italian Cooperation

Arch. Sandro Bruschi, Coordinator of the C.I.C.U.P.E. Project

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Salomão B. Dias, Chairman of the Municipality Assembly
Américo L. Paulo, Town Councillor for Urbanization and Construction
Querebo R. Moisés, Urbanization Technician
Massada N. Meque, Urbanization Technician

Others

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Arq. Vanda Silva, Technical University of Lisbon, Portugal
Arq. Andrea Possanner, Technical University of Graz, Austria

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