the conflict between
agricultural land and illegal settlements

- a land use plan of pukara in cohabamba

a minor field study
designed by annika fohlin and maria johansson
programme of spatial planning, blekinge institute of technology
the conflict between agricultural land and illegal settlements

- a land use plan of pukara in cochabamba

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Sigrun Santesson
Programme Officer
MFS Programme
preface

This work has been done as a diploma work at the Programme for Spatial Planning, at Blekinge Institute of Technology in Sweden. The programme leads to a Master degree. Students are trained in urban and rural planning with respect to environmental concerns.

In the year 2000 we were granted a scholarship from Sida to carry out a Minor Field Study in Cochabamba in Bolivia during the autumn of 2000. The work in Bolivia was a great experience for us and taught us a lot about the conditions in a developing country. This experience has given us a perspective on ways of life and planning in Sweden and it will also provide us with a good preparation for future work.

Many people have been involved in this project and without their help this project would not have been possible. We particularly want to mention our supervisor in Sweden Dr Anita Larsson, who has supported and encouraged us throughout this project. We are very grateful to Ms Graciela Landaeta, our supervisor in Bolivia, who, together with all the others at the University of San Simón (Universidad Mayor de San Simón, UMSS), helped us, guided us and in other ways made our stay in Cochabamba a memorable time. We would like to thank Mrs Liliana Arévalo Gonzales, Architect Technical Adviser of the Honourable Municipal Advice of Cochabamba, for sharing her knowledge and experience with us and supplying us with most of the material and information regarding the project. Especially we want to thank all helpful and supporting people in Pukara and especially Mr Ricardo Rocha. Special thanks to the urban development office of Lidingö, all included, for their technical support that made it possible for us to finish this report.

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Annika Fohlin Maria Johansson
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The conflict between agricultural land and illegal settlements
The conflict between agricultural land and illegal settlements
The number of inhabitants in Cochabamba has expanded enormously during the last decades and the expansion takes place in the fringe areas, usually on the forested mountains in the north or on land for agriculture use in the south. One of these agricultural areas is our project area in Pukara, District 9. Pukara has grown a lot over the years and the population has increased considerably. Some expansion has taken place in areas not suitable for residential purposes. The rapid growth of the area has resulted in an occupation of areas for agriculture, illegal settlements, lack of necessary infrastructure and service and environmental degradation.

In this study we have focused on the spatial planning issues, the aim has been to present an overall layout for the area to show how the area can be developed. An analysis has been done to define potentials, shortcomings and various kinds of land use conflicts of the area. We have also made a classification of business activities that generate most environmental problems. The classification is made to be aware of what kind of business that cause most negative effects and which environmental problems that have to be considered to create a sustainable and attractive area.

The project area contains resources and potentials that could be developed and become qualities for the area. Land uses today are for agriculture and cattle raising, for housing and for business activities. In general the big agricultural land is gathered in the outskirts of the area, whereas most of the buildings and the business activities are situated in the middle. The farming landscape gives the area character. The different business activities are sources of employment and income and they create activity in the area. The nearness to urban centres is another advantage, which make Pukara to an attractive place to live in.

Due to lack of spatial planning, the expansion takes place without control. The main problems are occupation of agricultural land, illegal settlements and unsuitable and disturbing activities. Some of the illegal settlements occur on land suitable for agricultural use and the inhabitants lack adequate infrastructure and service. Furthermore the area contains unsuitable and disturbing activities, which deteriorate the environment and the living conditions and make the land unsuitable for housing and unfit for agricultural use. The main environmental problems are the adobe- and brickyards because they destroy the land and the brickyards with kilns that discharge poisoned gas into the air.

To be able to meet anticipated demands the following questions have been studied: the density of the area, the provisions for economical opportunities, the infrastructure and service as
well as the accessibility to green open spaces and recreation. There are three fundamental features in our proposal. The first feature is that the large agricultural areas are preserved at the same time as the already half urbanised areas are made denser. In this way it is possible to take one-step forward to solve the land use conflict between the illegal settlements and the agricultural land. The second feature is to improve the housing situation with infrastructure and service. To do that it is important that existing housing development is legalized and therefore we suggest that the municipality will start a legalizing project. The third feature in our overall proposal is that the unsuitable and disturbing activities, which today are located in the housing areas, are moved and concentrated to an area in the outskirts of the half rural parts in the northwest of the area. In this way the areas from the former brickyards could be used for new dwellings. With the overall proposal as a basis we have individually developed parts of the area in more detail. These sections aim at illustrating how the overall proposal can be applied on the two specific sites, east and west of Avenida Panamericana, in Pukara. We have concentrated on the densification of the half-rural and half-urban part. The intention has been to show some principals of the planning of District 9, which need further development before implementation.

We propose that the area is still used for agricultural use, for housing and for business activities. Since it is unrealistic and inconceivable to move the illegal settlements and since the demand for land for housing increases all the time, we have tried to find a balance between the various uses.

The increasing population growth and the depletion of the environment have been taken into consideration. We propose a suitable plot division to create more plots and a higher density. We have suggested areas for new dwellings and developed different types of housing. We have created places for meetings, recreation and plays. Suitable places for service and different kind of business activities are suggested, for example a new area for the adobe- and brickyards is proposed.

The demands for infrastructure and service that is needed in a more densely built-up and populated area have been taken into account. We have made proposals for how to arrange a new street network and how to improve the streets and make them safer both for vehicles, pedestrians and cyclists. We have also defined what technical infrastructure that needs to be improved and what the most urgent measures are.

The plan contains proposals to provide the settlements with pleasant surroundings. In dense neighbourhoods the public open space will be utilized to a large extent. Therefore new places for green open spaces and recreation areas are proposed within the area. We have also defined which green areas that are important to preserve.
El número de habitantes de la ciudad de Cochabamba se ha incrementado enormemente durante la década pasada, y esta expansión se ha dado lugar sobre todo en las áreas periféricas, particularmente en las montañas boscosas del Norte o en las áreas para uso agrícola del Sur. Una de estas áreas agrícolas es Pukara, nuestra área de proyecto en el Distrito 9. Pukara ha crecido mucho en los últimos años y la población se ha incrementado considerablemente. Parte de esta extensión se ha dado lugar en las áreas no adecuadas para uso residencial. El rápido crecimiento de este área ha resultado del asentamiento ilegal en zonas destinadas a la agricultura. La carencia de servicios de infraestructura básica, de equipamiento comunal y la degradación ambiental, son característicos en la zona.

El presente estudio se ha focalizado en aspectos de planificación espacial, con el objetivo de presentar una propuesta de disposición espacial para toda el área, como un ejemplo de cómo ésta puede ser desarrollada. Hemos realizado un análisis para definir las potencialidades, deficiencias y varias clases de conflictos relacionados al uso del suelo en el área. Así mismo, hemos hecho una clasificación de las actividades económicas que generan la mayor parte de los problemas ambientales. La clasificación fue hecha para conocer qué clase de actividades comerciales causan mayor efecto negativo y cuáles son los problemas ambientales que deben ser considerados para crear un área sostenible y atractiva.

El área del proyecto contiene recursos y potencialidades que podrían ser desarrollados y convertirse en aspectos cualitativos para el área. El uso del suelo está hoy destinado a la agricultura, la ganadería, la residencia y para actividades económicas. En general, la producción agrícola de mayor escala se realiza en las cercanías del área, mientras que la mayoría de las edificaciones residenciales y de las actividades económicas se sitúan en el centro. El paisaje de los cultivos agrícolas da el carácter al área. Las diversas actividades económicas son fuente de empleo y de ingreso y crean dinámica. La proximidad a los centros urbanos es otra ventaja, haciendo a Pukara un lugar atractivo para vivir.

Debido a la carencia de planificación espacial, el crecimiento del área ocurre sin control. Los principales problemas están referidos a la ocupación de suelo agrícola, al establecimiento de asentamientos ilegales y a la existencia de actividades inadecuadas y molestas. Algunos de los asentamientos ilegales tienen lugar en áreas destinadas al uso agrícola y los habitantes carecen de infraestructura básica y de servicios comunales adecuados. Por otro lado, existen actividades que producen malestar, deterioran el medioambiente y degradan las condiciones de la vida, hacin-
do al área inadecuada para vivir y no apropiada para el uso agrícola. Los principales problemas ambientales son producto de la producción de adobe y de ladrillo, por la degradación del suelo y la emisión de gases nocivos de los hornos artesanales de ladrillo.

Para poder responder a las demandas manifestadas, se han considerado los siguientes aspectos: la densidad del área, la provisión de oportunidades económicas, la dotación de infraestructura y de servicios básicos, así como, la accesibilidad a áreas verdes, a espacios abiertos y a zonas de recreación. Hay tres características fundamentales en nuestra propuesta. La primera, es que las áreas agrícolas grandes están preservadas, mientras que las semi-urbanizadas se densifican. De esta manera, es posible avanzar en la solución del conflicto en relación al uso de suelo entre los sentamientos ilegales y la producción agrícopecuaria. La segunda, es mejorar las condiciones de la vivienda a partir de la dotación de infraestructura y servicios básicos. Para esto, es importante avanzar en la legalización de la tenencia de la vivienda y del lote, por lo que sugerimos que el gobierno municipal inicie un programa de legalización. La tercera, está referida a las actividades inadecuadas localizadas en áreas residenciales, las que deben ser movidas y concentradas en un área en las afueras del medio rural al Noroeste del área. De esta manera, las terrenos ocupados actualmente por las fábricas de ladrillo puden utilizarse para la construcción de nuevas viviendas. Con la propuesta general como referencia, hemos desarrollado individualmente partes del área en mayor detalle. Estas secciones tienen como objetivo ilustrar cómo la propuesta general puede aplicarse en dos sitios específicos, al Este y Oeste de la Avenida Panamericana, en Pukara. Nos hemos concentrado en la densification de la parte semi-rural y semi-urbana. La intención ha sido mostrar algunos principios de planificación para el Distrito 9, los mismos que requieren un desarrollo mayor antes de ser aplicados.

Proponemos que el área siga siendo utilizada para uso agrocopecuario, residencial y para actividades económicas. Puesto que es poco realista e inaceptable mover a los asentamientos ilegales existentes y en tanto la demanda para uso residencial se incrementa constantemente, hemos intentado encontrar un equilibrio entre los varios usos demandados.

El incremento de la población y el agotamiento del medioambiente se han tomado en consideración. Proponemos una división del lote que permita crear más lotes y alcanzar una densidad mayor. Hemos sugerido áreas para nuevas viviendas y hemos desarrollado diversas tipologías de vivienda. Hemos creado áreas para reuniones, recreación y juegos. Lugares adecuados para servicios y diversa clase de actividades económicas son sugeridos, entre estos, una área nueva para la ubicación de las fábricas artesanales de ladrillo.

Las demandas de infraestructura y de servicios que son necesarios en un área con mayor densi-
dad habitacional han sido consideradas. Hemos hecho las propuestas para una nueva red de infraestructura vial, de cómo mejorar las calles existentes y hacerlas más seguras tanto para los vehículos, los peatones y los ciclistas. También hemos definido qué tipo de infraestructura técnica necesita ser mejorada y cuáles son las medidas más urgentes.

El plan contiene propuestas para proveer a los asentamientos de un entorno agradable. En vecindades de mayor densidad, el espacio público abierto será utilizado con mayor intensidad. Por lo tanto, los nuevos lugares para espacios abiertos y para áreas verdes de recreación han sido propuestos dentro el área. También hemos definido qué áreas verdes son importantes de preservar.
The conflict between agricultural land and illegal settlements
Factors such as rapid urbanisation and high population growth rates increase pressure on land, which in turn leads to land use conflicts. This process is common in Bolivia as well as in the rest of Latin America. Housing areas develop through the urbanisation process, usually on the outskirts of the cities. In some cities large parts of the population live in spontaneous settlements. Since urban planning does not have the resources to keep up with the need for new housing many of the settlements are illegal, without necessary infrastructure and service. Another effect of this process is that the settlements often are in areas unsuitable for housing, for example in risk zones for flooding, or may be located in areas more suitable for other purposes.

In Cochabamba this process is not a new phenomena. The land use conflict there is a question about the conflict between forest and agricultural land on one hand and illegal settlements on the other hand. The number of inhabitants has grown rapidly over time and the expansion takes place in the urban fringe areas, usually on the forested mountains in the north or on land for agricultural use in the south. One of the agricultural areas is District 9.

District 9 has recently become incorporated into the administration area of the Municipality of Cochabamba. This fact highlights a number of social, economic and territorial problems that are related to urban dynamics and the difficult situation of the city of Cochabamba. Since much of the agricultural provisions for Cochabamba are produced in District 9 it is important to preserve the agricultural land. At the same time District 9 is an important catchment’s area for people coming to Cochabamba to look for work. People settle down in the area and build simple houses on plots they buy from the farmers. In the area are also some informal activities located such as brickyards. Such activities pollute the environment and cause problems both for the municipality and the inhabitants of the area.

A problem resulting from the occupation process in District 9 is that the land with agricultural potential has been occupied by spontaneous settlements, which discourages the landowners from continuing their agricultural activities. Some landowners split the agricultural areas in small farmsteads as a result of succession, inheritance or selling. The plots for cultivating become smaller and smaller, which makes the agriculture ineffective and unprofitable. This has lead to an irreversible, uncontrolled and illegal occupation of agricultural land for urban development. Our project focuses on this occupation process. The main problems in District 9 are:
1) **The occupation of agriculture land**
   The illegal settlements occur on land suitable for agricultural use, which leads to land use conflicts. The area for agriculture is reduced every year. According to the Municipality Plan for the development of District 9 it is essential to preserve the agricultural land and to strengthen farming activities.

2) **The illegal settlements**
   The housing situation concerning the illegal settlements is not satisfactory. The inhabitants lack adequate infrastructure and service. The inhabitants do not have legal access to their land, which discourage them from investing in proper houses. For the municipality the illegal settlements complicate the planning and obstruct the development of the area.

3) **The unsuitable and disturbing activities**
   The unsuitable and disturbing activities deteriorate the environment and have a negative impact on the living conditions. Some of the environmental problems make the land unsuitable for housing and unfit for agricultural use, which prevents the development of the area.

**aim**

Our study focuses on spatial planning issues of a plan for improving District 9, now being developed by the Municipality of Cochabamba. Our project area is a part of Pukara, one of the sub-units of District 9 in Cochabamba. The aim is to describe and analyse the problems regarding the occupation of agricultural land, the housing situation of the illegal settlements and the unsuitable and disturbing activities. Furthermore the aim is to discuss means to find a balance between these conflicting interests. Special attention will be paid to the resources and potentials of the area. The proposal will suggest an overall layout for the area, give parts of the settlements an urban treatment to facilitate for collective infrastructure and service and illuminate those existing activities that cannot be regarded to be environmentally sound. Through this project we want to present a proposal to show how the area can develop and become an integrated part of the Cochabamba city.
methodology

In this work we have tried to use the “bottom-up“-perspective in accordance with the decentralisation process in Bolivia. We take the overall objectives, for example to preserve the agricultural land, from the Municipal Plan into consideration, but the main issue is to see the problems, needs and potentials from the inhabitants’ point of view. Neither the municipality nor we consider that a solution is to remove the illegal settlements from the area and therefore the basis for our work is that the present settlements are preserved and legalized. Since we want to support the legalization process, existing buildings and property boarders are taken into consideration.

literature studies

To obtain general information and facts about Cochabamba and Bolivia we made literature studies parallel to field studies. Facts about our specific area are based on the information we got at a workshop because there was no written information about the area that was up to date. Other general information about the situation in these rural parts of Cochabamba we found in a diploma work done by a student, Patricia Tórres, at the University of San Simón.

fieldwork

Most of the time we spent in the area to make direct observations, to take photographs and to gather information for a base map of the area. The existing maps were not up to date, so the area and the surroundings had to be investigated carefully. To gain more detailed knowledge and understanding concerning the project area we also made interviews. These interviews were informal conversations with people that we met on the streets. We also interviewed people in charge of physical planning and other people who worked at the Casa Municipal and at the Municipality of Cochabamba. As a result of the fieldwork we got to know the area well, established good contact with the inhabitants and a good insight in daily life in this part of Pukara.

workshop

Since we wanted to learn more about the area directly from the inhabitants the municipality arranged a workshop in the church, an important gathering point in the area. The aim of the workshop was to provide us with up to date information about the area at the same time as we
got an introduction of the problems, needs and potentials from the inhabitant’s perspective. Present were representatives from the three Base Territorial Organizations (OTB), a representative from the Municipality of Cochabamba, the person responsible for Casa Municipal, our supervisor and two students from the University of San Simón (UUMS), who started their investigations in the same area at the same time. The representative from the Municipality of Cochabamba led the meeting. She had prepared questions together with our supervisor. The representatives of the OTB had received the questions a week before the meeting so they could prepare themselves. The questions dealt with lots of basic information of the different OTB’s, for example how many inhabitants there are, if they live in legal houses or if they live in spontaneous settlements, how their state of health is, how many children there are in each family etc. The questions also dealt with the service, if there are any services in the OTB’s, of what kind the services are, what the inhabitants lack etc. In the end, the questionnaire asked about the problems in the area, both environmental but also problems that affect the safety, for example if there are violence, robbery, alcohol and drugs. The workshop gave us a lot of information about the area in the same time as it helped us to get a good contact with the inhabitants.

During the workshop the representatives discussed what the most important problems are and they informed us about the situation in the area. It was important for us that the inhabitants themselves defined the problems and potentials of the area and described their needs. They described their experiences and they saw this workshop as an opportunity to talk about their situation so that outside the area people would become aware of it. Even if they thought that the legalization process was important, from their point of view the most urgent issue was to get services, for example water facilities. It came to our knowledge that their greatest demand was for clean drinking water. The lack of water was the most urgent problem to solve, but also the absence of sewer. Another thing that they discussed was the illegal situation. It was important for them that the illegal settlements are legalized. They thought that they needed planning regulations so the area can develop in a better way. The third thing was the problems with the health and the lack of adequate health service. The health problems was to a large extent related to the environmental problems and the bad quality of the water. Because of this they wanted to have regulations to control the economic activities that create environmental problems, for example the brickyards, the adobe factories, the peeling factories and the abattoir. Besides this they told us about their requirements, for example better roads. They also want to have meeting places and space for sport and recreation.

When we discussed the potentials to solve these problems in the area they pointed at the work at *la Organización Territorial de Base* (Base Territorial Organizations), as a resource. Also the fact that they have regular dialogues with the authorities was considered to be a positive condi-
tion to solve the problems. The limitations to be able to meet the requirements of the population are according to the representatives of the OTB’s, the limited economic resources. The bureaucracy and the lack of co-ordination with the authority are factors that also prevent the development. All this information gave us a fairly good knowledge of the inhabitant’s views.

analysis

The analysis is based on collected information together with our own observations and focuses on character and function of the physical environment. We have described and analysed the problems concerning the different land use conflicts and the unsuitable and disturbing activities. We have also defined the qualities and shortcomings of the area. Under qualities we have tried to describe the resources and potentials of the area. Under the heading shortcomings we have defined what is missing and what needs to be done to improve the situation of the area. The analyses have been the basis for our proposal.

limitations

The field study was done in Bolivia during 11 weeks. The short time period limits the scope of the study. We have been working with issues within the framework of physical planning but many of the problems are complex and need to be investigated from other points of view, for example the environmental perspective.

None of the languages spoken in our project area, Spanish and Quecha, are our mother tongues. This fact could have effected our proposal in the way that we might have missed some points of a discussion or nuances of the content.

All the representatives in the area were men and most of the inhabitants who were present at the workshop were men. Maybe the views had been different if there had been more women present at the meeting.
The conflict between agricultural land and illegal settlements
bolivia

Bolivia is the republic located at the highest level and most isolated in terms of communications in Latin America. Its geographical and climatic zone ranges from snow-capped Andean peaks to vast, low-lying savannahs and jungle. Chile and Peru border the country on the west, on the north and east by Brazil and on the south by Argentina and Paraguay. Physically, the land is divided into five basic and diverse regions: the high Altiplano, the highland valleys, the Yungas, the Chaco and the forested lowlands of the Amazon and Paraná basins. Cochabamba belongs to the Highland valleys. Bolivia currently encompasses approximately 1 100 000 sq km and with just 7,4 million people, Bolivia is relatively sparsely populated. It is the country with the highest proportion of people with an Indian background on the South American continent. The population is divided into two major indigenous groups and several smaller ones. Parts of the inhabitants in Pukara are descended from indigenous groups or from ex-colonists. Bolivia has had nearly as many political leaders as years of independence. Military juntas have ruled the country for much of its independent period. This has complicated and delayed the democratic processes outlined in Bolivia’s constitution. The late 1980’s and early 1990’s have seen peaceful and democratic transitions of government.

Bolivia in South America

1 Swaney Deanna, 1996
2 Utrikespolitiska institutet, 1998
3 Swaney Deanna, 1996
cochabamba

Cochabamba is the third biggest city in Bolivia and has a total population of 1,100,000 inhabitants. It is located in the Highland valleys at 2,575 m over the sea level. The highland valleys have the most hospitable living conditions in the country, with the optimum climate and fertile soil. The population in Cochabamba is divided into one urban and one rural population, depending on if they live in the city or in the surrounding countryside. This division is due to the fact that before the Law of Popular Participation the municipality comprised only the urban part. The urban population of the Department of Cochabamba is 572,000 inhabitants while the rural population consists of 522,000 inhabitants. The number of inhabitants has grown a lot the last year. The city expands every year and the share of forest and agriculture land reduces. There are big differences between the districts in the city, for example the access to necessary infrastructure and service varies a lot. In general people with more resources live in the centre and in the northern parts of the city while the people with less resources live in the fringe areas of the city or in the south. Our project area is located in District 9, in the south of Cochabamba.

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4 Swaney Deanna, 1996
5 Tórres Patricia, 1999
The total population in District 9 was in 1996 about 33 000 inhabitants. It is expected to triple to the year of 2015. District 9 is located in the southern part of the city, and it is divided into four sub-units for farming: La Maica, Azirumarca, Pukara and Valle Hermoso. There is not only agricultural activity in the district, also urban or mixed-use activities are in progress. Due to it’s predominantly agricultural and cattle farming nature, District 9 plays a fundamental economic role in the region. The situation of the district is critical due to the irreversible and uncontrolled occupation of land for urban development. The illegal occupation of land occurs at the rate of approximately 21 hectares per year. The situation is a result of the lack of attention the region was subjected to by the former Development Corporation. The corporation was not able to implement a sustainable economic system and before 1994 the municipality did not have the responsibility to plan the rural areas. The Municipality of Cochabamba has prepared a development plan (*Plan Municipal de desarrollo, distrito 9*) for the area in order to improve living conditions for both the new settlers and the old inhabitants engaged in various farming and urban activities. According to the plan people lack adequate access to water sanitation, proper roads, school facilities, day-care centres, meeting places etc. The district also has environmental problems such as noise from the airport, poisonous discharges and contaminated land.

District 9 in Cochabamba

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6 Honorable Municipalidad de Cochabamba, Direccion de Planificación 1997
administration

Bolivia is divided into nine departamentos. Each departamento has a governor appointed by the national president and a department legislature comprising members elected by municipal councillors. For administrative purposes, the departamentos are divided into provincias of which there are 94. For the purpose of local government, the country is divided into 312 secciones/municipalities. Municipal elections are held every five years. The secciones/municipalities are then divided into cantones or distritos.7

Cochabamba, which is one of Bolivia’s nine departamentos, is an exception from the ordinary structure. In Cochabamba secciones/municipalities and provincias are merged into one level and they are called municipalities. The municipalities are divided into distritos, since there are no cantones in Cochabamba. The departamento of Cochabamba has 16 municipalities, which are sub-divided into 14 distritos.8

Every municipality (Municipal) makes an annual budget that is followed up. This process has recently begun to work, at least in the rural parts. Every municipality also makes a development plan valid for five years, Plan Desarrollo, which is adjusted to the budget and is revised every year, see page 27.9

the law of popular participation

The structural changes that Bolivia goes through has generated series of instruments that are indispensable for the transformation of the country and to support its development. In this ambition, one fundamental law that is of special interest for our work is the law of popular participation (Ley de Participación Popular).10

The main objective of this law is the recognition, promotion and consolidation of the process of popular participation. In addition, the objective is to incorporate decentralization in the political and economic life of the country to the indigenous communities and urban farmers. The purpose is also to try to get a better quality of life for the Bolivian people through a more organized

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7 SIDA, July 2000
8 Interview with Mr. Luis Ramirez, IIA/UMSS
9 Interview with Ms. Graciela Landaeta, PROMESHA
10 Tórres Patricia, 1999
distribution and better administration of the public resources. To support the decentralization, the Municipality will distribute some of the revenues from taxations, approximately 20%. The Law of Popular Participation recognizes the important local organizations in the country, for example Non Governmental Organizations. After the promulgation of the law, the Base Territorial Organization became the body representing the neighbourhoods in contacts with the Municipal Authority. The law regulates decentralization decision processes from national to local level.

Before the promulgation of law Popular Participation the city of Cochabamba got all the revenues from the taxations, but after the extension of the territory they have to share it with the rural areas. Now District 9 gets more resources and the law gives the municipality the responsibility to see that also the inhabitants in this part get access to service as well as infrastructure. The acknowledgement of the local organizations give the inhabitants not only the right to make claim upon necessary service it also gives them right to take part and affect decisions concerning the district.

community planning

The Municipality of Cochabamba has to administrate and improve the technical infrastructure, for example water and storm water drainage. They also have to preserve and develop all the historical, cultural and aesthetic values. The Municipality has not managed to keep up with the requirements and the rural areas are still neglected in the planning. The representatives from the different neighbourhoods, the Base Territorial Organizations, discuss the different projects together, and then present their proposals to the Casa Municipal in the district.

casa municipal

The Department of Cochabamba consists of 14 districts, each with its Casa Municipal. The division into Casa Municipales is in accordance to the electoral district for the municipal election. Every Casa Municipal functions as a small mayor office. The Casa Municipal for District 9 is situated in our project area. It was established in 1995 and at that time the preparation of the district’s development plan, Plan Desarrollo de distrito 9, started.

The services provided by the Casa Municipal relate to certifications for tax payments, land use planning, registration at the Real Property Registry and granting permits for different economic

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11 Humberto Vargas Rivas, 1997
12 Interview with Ms. Graciela Landaeta, PROMESHA
activities. The Casa Municipal also has the responsibility to prepare and follow up the Plan Operativo, and the regularization process.¹³

According to Victor Hugó, the manager of Casa Municipal in District 9, the current procedures experience several deficiencies and difficulties, which can be summarized as caused by lack of legal and technical standards. This fact is mainly due to that the decentralization process only aimed at technical and administrative issues. Since this situation was not modified, it made it impossible to have an adequate management of the Plan Desarrollo, which requires a multi-disciplinary and integral approach. As it became an administration body with little decision-making power, it does not allow a regular care of the district’s important problems. Likewise, the scarce inter institutional co-ordination between the government and non-government levels are also evident. This aspect has a negative influence on the implementation of integrated development actions.

development plans

Plan Operativo is a plan for the development for the year and has the objective to define each year investments that can be derived from the resources assigned by the law of Popular Participation. The Plan Operativo is expressed in concrete projects such as water, sewer system, sport fields etc. The plan is based on the proposals of each Base Territorial Organization, in the Casa Municipal in each district. The plans for the districts are then put together into one report. The Plan Operativo is connected to the Municipal budget and revises every year.¹⁴

Plan Desarrollo and Plan Desarrollo de distrito 9 are plans of general character and they touch all the development aspects of a specific territory, for example economic issues, natural resources, the population and the environment. The plans are at two different levels, municipal and district level. The Plan Desarrollo is an instrument for overall planning of Department of Cochabamba. It has an implementation period of approximately five years. It is important to clarify that the Plan Desarrollo is not implemented. The Plan Desarrollo de distrito refers to each specific district. Plan Desarrollo de distrito 9 is a plan with recommendations for District 9, more or less like a more detailed Swedish Comprehensive plan. The Plan Desarrollo de distrito 9 is the only official plan valid for our project area.¹⁵

The problem with all plans except the Plan Desarrollo de Distrito 9 is that they are out of date

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¹³ Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
¹⁴ Interview with Ms. Graciela Landaeta, PROMESHA
¹⁵ Interview with Ms. Graciela Landaeta, PROMESHA
and that there are no recourses to update and implement them. The inhabitants do not have confidence in the government planning activities and do not feel that it is important to follow the outlined proposals. The municipality has no assets to control building activities of the inhabitants. In our project area the absence of plans, regulations and control has led to a spontaneous and unstructured development and the extension of infrastructure and service has been neglected.\textsuperscript{16}

\textsuperscript{16}Interview with Ms. Graciela Landaeta, PROMESHA
The conflict between agricultural land and illegal settlements
Pukara is located on the northern boundary of District 9 next to the Tamborada River. It is situated about 8 kilometres from the city of Cochabamba. It is located within the territorial jurisdiction of Pukara Grande, which, within the physical-spatial organisation, is considered as a sub-unit for farming. We have worked with only part of Pukara. The project area’s limits are: to the north the Tamborada River, to the east the boundaries of San José de la Tamborada Base Territorial Organization land development, to the west the Chaquimayu River and to the south the main southern irrigation channel. The area covers about 165 hectares, of which San José de la Tamborada occupies approximately 10 hectares, San Marcos 150 hectares and Tejada Plot 4 hectares. The airport of Cochabamba lies northwest of the area. Otherwise agricultural land and small villages surround most of the area.
climate

Most of the time the temperature is pleasant with a mean temperature of about 17-20 C during the year, but at night the temperature falls drastically, sometimes below zero. Rain falls in December – February and a big problem is the lack of water during the rest of the year. As a result of the heat and the lack of water, the area is dusty and people need shade to protect them from the sun. If it were not for the lack of water the conditions for cultivation would be favourable.

organization

The population of Pukara is organized on the basis of Base Territorial Organizations (OTB). The representatives of these organizations work as their representative bodies in their political and administrative relations with the Municipal and departmental authorities, as well as with other organizational institutions of the civil society. There are three OTB’s in the area: San Marcos, Tejada Plot and San José de la Tamborada.

The Water Committee of Street No 1 and the Tejada Land Development are two other big organizations in Pukara. The last five years, the community activities carried out by these organizations focused on the drilling of water well and expansion of the telephone grid, stone pavement and construction of a multi-purpose sports field. All these activities were made through collecting money from the inhabitants.17

population

The total population in the project area is 2 890 inhabitants consisting of approximately 500 families with around 5 members each. San Marcos has a population of 1 540 inhabitants, Tejada Plot has 280 inhabitants and San José has 1 070 inhabitants.18 The original population is mostly descendants from ex-colonists, but lots of the inhabitants are from rural areas in

17 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
18 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
Bolivia. About 79% of the population were born in the district, whereas 15% are mainly from the High Plateau area of Oruro, La Paz and Potosí. Immigration is an important factor in the district’s demographic growth. The official language is Spanish, but a lot of the people also speak Quechua. Some of the old people in the area speak only Quechua.

health

There are lots of health-problems in the area and most of them are due to the poverty of the population. The main problems are malnutrition and lack of hygiene. The problems depend on the environmental pollution due to the absence of water and sewerage systems, the presence of dust and flies, the brickyards in the neighbourhood, the presence of the abattoir and the lack of street cleaning. They often result in stomachache. Another serious health problem is a virus called Chaga. The virus comes from a beetle, called Vinchuga, which lives in the building material adobe. The virus enlarges the heart, which leads to death. The only way to protect oneself from the beetle is to use a mosquito net when sleeping. Unfortunately, the knowledge about the effects of the Vinchuga beetle and the disease is not very high among the inhabitants in the area. Through information and simple measures the problem could be minimized.

the occupation process

In the beginning of the 1980’s when immigration started, the area only consisted of agricultural land. The occupation process started at different times and increased in 1987 as a result of the relocation of over 30 000 families who were engaged in mining activities.

The mineworkers’ Labour Union of San José purchased 86 576 m² land already in 1956, to implement an agricultural farm for its members. But it was not until 1987, as a result of the closing of mines, the Labour Union proceeded with individual awarding of plots to 102 persons who came from the mining centre of San José in the Department of Oruro. There are both legal and technical problems in the area related to this early occupation process in San José.
About 80% of the land plots, the original landowners have sold to third parties. This has made it difficult to legalize and regularize land ownership. The inhabitants do not have any paper of their ownership, which for example leads to difficulties to obtain loans from the bank.\textsuperscript{23}

When the fractionising process started in 1981 in San Marcos, the area was declared to be planned for urban growth. As a result of the fractionising process in San Marcos, land for agricultural use has been divided into many small farmsteads. The farmers subdivide the land to their children or to selling. The sizes of the plots for cultivating are reduced, which makes the crop growing ineffective. Agricultural land becomes occupied by housing and the area is urbanized without plans that provide for example green areas and community facilities.\textsuperscript{24}

In 1995 another large part of the area became fractionated. It was an area that used to hold the sheds of a chicken farm that was split up by its owner. The new inhabitants were aware of the illegal status of the fractionising but the area was developed anyway.\textsuperscript{25}

Since there has not been any formal planning of the area, many of the houses are illegal. Lots of the inhabitants extend their buildings or parcel out their land to their children who construct new houses on the land. The \textit{Casa Municipal} has started a project to legalize the settlements but they do not have the resources to carry out the project. Since they do not have any maps over the area, the maps we have compiled can work as a first stage in the legalizing process.\textsuperscript{26}

\section*{Land use}

There is a mix between different types of land use within the area giving variety. At the same time it creates conflicts between different users. The land uses are for agricultural use and cattle raising, for housing and for business activities. In general large plots of agricultural land are gathered in the outskirts of the area, while most

\textsuperscript{23} Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
\textsuperscript{24} Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
\textsuperscript{25} Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
\textsuperscript{26} Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
of the buildings are situated in the middle. The buildings are spread out and dispersed. The different parts of the area have three different characters: rural, half rural and half urban. The rural parts only consist of agricultural land with farmhouses. Today, many of the former rural areas have developed into areas with smaller plots with cultivation in the backyards. Such area forms a so called half-rural area. The half-rural parts have a sparsely and spread out structure and do not consist of blocks. Half urban is the denomination of areas that have smaller plots organized in a block structure but lack sufficient service that exists in the city. The density of the half-urban areas is higher than that of half-rural areas.
land use

- Tamborada River
- peeling factories
- Casa Municipal
- Avenida Panamericana
- Channel
- The Municipal Abattoir
- School
- Church
- Chaquimayu River

- agriculture
- business activity
- public service
- housing
- sport field
- without activity
buildings

There is a mixture of traditional houses and modern buildings. The majority of the dwellings have one or two floors. The houses are small and often situated at the back of the plot. To save building material it is common to use parts of the wall around the plot as a wall for the house as well. A few of the houses in the area are painted, sometimes using different colours on the same house. If it is a shop or another kind of business the name is usually painted on the houses. Common colours are light green or pink. Almost 95% of the people own their houses and just a few families rent the houses they reside in. The size of the houses varies a great deal, approximately from 30 m² to 250 m². There are also temporary housing in the area. Most of them are situated near the brickyards and are inhabited by day labourers. The most common building material is **adobe**. Adobe bricks are made of hay, local clay and water and produced in the area. The adobe bricks are just dried in the sun and therefore a cheap building material. Other building material is burnt brick or concrete. The bricks are, like the adobe, made in the area but they are more expensive. Modern buildings usually use concrete. In most cases the roofs are made of corrugated iron sheet and sometimes just fastened with big stones on top of the sheets.

<table>
<thead>
<tr>
<th>OTB</th>
<th>San José</th>
<th>San Marcos</th>
<th>Tejada Plot</th>
</tr>
</thead>
<tbody>
<tr>
<td>type of home in %</td>
<td>98</td>
<td>10</td>
<td>70</td>
</tr>
<tr>
<td>independent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>apartment</td>
<td>10</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>single room</td>
<td></td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>hut</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>improvised house</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>average number of rooms</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>own</td>
<td>95</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>rented</td>
<td>5</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>lease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

27 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
28 Interview with Mr. Juan Salvatierra, owner of the adobe- and brickyard in San José.
The plots are usually regularly shaped. A high wall surrounds almost every single plot. In the area there are still some undeveloped plots. Many of the farms have been split into many narrow plots to create as many as possible with connection to the street. The plot sizes vary from about 200 m² to over 2,000 m².

The walls that surround the plots are about two metres high and made of adobe, brick or concrete. In other parts of Cochabamba they also use wrought iron fences. They are more expensive than walls, which is one reason why it is not common in this area. The walls protect the plot from views of people in the street and from intruders. Usually, the walls have broken glass or barb wire on the top for extra security. The walls, not the houses, are the spatial elements of the streets.

business activities

The most noticeable business activities in the area are related to agriculture and cattle raising. Among these activities the brick making and the municipal abattoir are of most importance. The municipal abattoir is situated in the middle of San Marcos. The abattoir was located to the area in 1995 when the area still was an area mainly for agriculture. Today the abattoir is situated close to the dwellings in Tejada Plot, which leads to disturbing problems. Near the Tamborada River a peeling factory is situated. The factory peels rice and other crops. In the area there are also a sausage factory, a carpentry/marble workshop and some engineering shops. Lots of people in the area also work with woodworks, the production of mattresses, hardware and neighbourhood stores.29 There are good reasons to try to provide more employment opportunities in Pukara since transport costs to the city centre are high. Some of the inhabitants work in the city instead of in Pukara and the problem is the high costs to travel. A family with two working adults pays approximately 300 Bs30 for transport to work every month. Having in mind that they only earn about 600 Bs/month it is a very high expenditure and it could be more profitable to stay at home instead of travelling into town and work.31

agriculture and cattle raising

Living in the area of Pukara is by tradition based on agriculture and cattle raising. The connection with farming is strong but not all of the inhabitants are active in farming today, as many are mig-

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29 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
30 1 Bs = 1,50 sek or 0,6 US $
31 Meeting with the representatives of the Base Territorial Organizations in Pukara
rants from the mining centres in the High Plateau.\textsuperscript{32}

Big areas are used for agricultural activities and the most common crops are maize (usually to feed the animals with), alfalfa and corn. Many of the inhabitants cultivate on a small scale just for their own supply. Other parts of the agricultural land are used for cattle grazing. Cows, pigs and hens wandering around are often seen within the area, even on the streets. It is by tradition important for many of the families to cultivate for their own use. They are positive to lease land to cultivate if they are not able to do it on their own plot.

The pressure of land and the low profit, associated with the agricultural activities, leads to the splitting up of agricultural areas by partially selling their land.\textsuperscript{33} As the plots for cultivating becomes smaller and smaller, farming becomes ineffective. The production volumes decrease more and more and it makes the profitability even lower. Another reason that makes it difficult for the farmers to survive of agricultural activities is the drought during the dry seasons and the high water prices. The occupation process discourages the landowners from continuing their agricultural activities and a lot of the land that has agricultural potential has been used for housing or brick factories.

\textbf{adobe- and brickyards}

There are 14 brickyards in the study area and all of them are run without permission from the authorities. There are two kinds of factories, those that make adobe and those that make burnt bricks. The \textit{adobe} bricks dry in the sun for about four weeks and after that the process is finished and the bricks are being used as building material. The burnt bricks are baked in a kiln. Both types of bricks are made of local clay. Before the clay is dug, 7-8 cm of the topsoil is removed. Under the topsoil there is a 50 cm thick layer of fat clay, which is used for making burnt bricks and \textit{adobe}. When the clay is used up, the topsoil is replaced. The brickyards bake bricks twice a month and every time it takes about a week. For a couple of years the firing was done exclusively with wood, but today they only use gas delivered through a pipeline.\textsuperscript{34}

\begin{flushleft}
\textsuperscript{32} Honorable Municipalidad de Cochabamba, Dirección de Planificación, 1997
\textsuperscript{33} Honorable Municipalidad de Cochabamba, Dirección de Planificación, 1997
\textsuperscript{34} Lund Centre for Habitat Studies, 1990
\end{flushleft}
existing adobe- and brickyards
There are lots of small shops in the area. Most of them sell for example just bread, lemonade and sweets. In the area there are also a copy centre, a hairdresser, a video store and a couple of repair shops. There is no market for food, clothes and other stuff in the area so the inhabitants have to go to the city or to Cancha (one of Latin Americas biggest markets, situated in Cochabamba) to do their shopping. The only market in the area is for cattle purchase, it takes place on the north side near the Tamborada River once a week. This market is well known and even people from other neighbourhoods visit it. The market makes it possible to increase in economic activities. In the area the people want to develop the market with space for food, handicraft etc.

Chicha is a kind of liquor made of maize. The places that serve chicha are called chicherias. In Pukara there are more than 20 chicherias generally located on a residential plot. Some of the chicherias also serve food. By tradition the chicherias are very important places for social life.

The description of infrastructure comprises the roads and the traffic. Furthermore it considers the technical infrastructure such as electricity, water, sewerage etc. The service deals with a description of the basic service, for example school and day care centres.

The traffic in the area consists of a mix between motor traffic, public transports to and from surrounding areas, and cycle and pedestrian traffic. The existing road network has links to urban centres. The road network is composed of one main road through the area, Avenida Panamericana, local roads, tracks and paths. Most of the roads are in poor condition and there is no clearly defined road hierarchy. The network is not completed and it lacks connecting links, both for vehicles and for pedestrians, which force people to make lots of detours. The street paving of the Avenida Panamericana, the main road in San Marcos, road B, and the main road in San José, road C, is made of stone. The other streets are made of gravel, which makes the area dusty. There is lots of heavy traffic through the area and there are no separate cycle paths or pavements. Because of this there are lots of traffic accidents between vehicles and people and between vehicles and cattle, strolling in the streets. Noise from the traffic and the great number of traffic accidents cause great inconvenience for the inhabitants. There is no drainage system in the area, which causes huge problems during the rain season. Parts of the roads do not receive limited maintenance when they are flooded.
existing road network
There is public lighting in San Marcos, San José and Tejada Plot but the coverage differ a lot and some areas do not have the necessary coverage. It is only Avenida Panamericana and the main roads that have public lighting. In other parts of the area it is very dark at night. The public lighting is of poor quality, mostly it is just a small weak lamp on top of an ordinary pole.

Not every family in the area has a car but the number of car owners is expected to increase every year. Today the inhabitants park their car in the plot. There is no public parking places in the area so visitors have to park in the streets.

<table>
<thead>
<tr>
<th>OTB</th>
<th>San José</th>
<th>San Marcos</th>
<th>Tejada Plot</th>
</tr>
</thead>
<tbody>
<tr>
<td>% in homes</td>
<td>98%</td>
<td>90%</td>
<td>20%</td>
</tr>
<tr>
<td>% in roads</td>
<td>98%</td>
<td>60%</td>
<td>70%</td>
</tr>
<tr>
<td>green area and facilities</td>
<td>multipurpose field</td>
<td>multipurpose field</td>
<td>no</td>
</tr>
<tr>
<td>monthly avg. cost/family in Bolivia</td>
<td>30 Bs/month</td>
<td>100 Bs/month</td>
<td>35 Bs/month</td>
</tr>
</tbody>
</table>

public transport
Cochabamba hosts a private enterprise system of well planned and frequent, reliable public transport. This is not to say you will travel in high style or comfort. There are public transports from the area in to town. There are Trufis, Taxitrufis and Micros. The Trufis are small buses with approximately 20 seats. The Taxitrufis are like normal taxis, but with the difference that the Taxitrufi has a set route. The Micros are minibuses, also with a set route. There are no bus stops or schedules. The problem with the service is related to the irregular schedules set by the drivers, which have serious consequences for the children during the school year. The freedom to stop or board anywhere along the set route is in one way a big advantage. On the other hand the public transport indirectly causes lots of traffic problems and accidents due to the absence of special bus stops.

35 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
public transport
electricity
In both San José and San Marcos the availability of electric power is quite good. Over 90% of the families have electric power in their homes. Electricity is the service with the best coverage. In the Tejada Plot the availability is poor, only 20% of the inhabitants have electricity in their homes.36

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36 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
Lots of the inhabitants have access to the telephone network. There are also five public telephones in the area. The public telephones are either in the street, in a neighbourhood shop or in other places for business activities.37

37 Interview with Mr. Ricardo Rocha, representative of San Marcos
The gas lines are only for the brickyards. The lines enter into the area at the bridge in the north.\footnote{Interview with Mr. Ricardo Rocha, representative of San Marcos}
water
The most serious problem in the area is the lack of access to clean water facilities. The population obtains water from a truck and an artesian well. People purchase water on a weekly basis and store the water in barrels. The water is exposed to the environment and gets contaminated by rust of the container and by dust containing several suspended particles. Due to the high contents of salts, the water obtained from artesian wells is used to wash clothes and kitchen utensils. It is also used for irrigation. According to the representatives, approximately US $10 000 was invested for each well, and they were paid entirely through The Water Committee of Street No 1. In San José, water is regularly supplied. The monthly cost is 5 Bs and it supplies 124 houses.39

<table>
<thead>
<tr>
<th>OTB</th>
<th>San José</th>
<th>San Marcos</th>
<th>Tejada Plot</th>
</tr>
</thead>
<tbody>
<tr>
<td>supply source</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tanker truck</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>private well</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>public well</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>watershed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>public grid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>private grid</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>public tap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>good</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>poor</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>avg. monthly cost/family</td>
<td>5 Bs</td>
<td>10 &amp; 16 Bs</td>
<td>32 Bs</td>
</tr>
<tr>
<td>no. of homes with access</td>
<td>124</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td>frequency</td>
<td>continuous</td>
<td>4 times/day</td>
<td>weekly</td>
</tr>
<tr>
<td>hours</td>
<td>24</td>
<td>variable</td>
<td></td>
</tr>
</tbody>
</table>

39 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
water reticulation system
The inhabitants do not have access to sewerage network so they substitute this service by building pit latrines and septic tanks. The availability of sanitary services is not enough, which forces a lot of the inhabitants to “go outdoors”. According to the representatives the sanitary service is the minimum condition a family requires. The absence of sewerage in the area is an important cause of environmental deterioration particularly with regard to groundwater and air pollution.40

<table>
<thead>
<tr>
<th>OTB</th>
<th>San José</th>
<th>San Marcos</th>
<th>Tejada Plot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanitary service in %</td>
<td>Latrines</td>
<td>2%</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>Septic tanks</td>
<td>50%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Outdoors</td>
<td>30%</td>
<td>10%</td>
</tr>
</tbody>
</table>

\[x = unknown\]

refuse collection
Since there are no dustbins in the streets, people throw the litter on the ground. The presence of litter in the streets, on the riverbeds and on undeveloped land has negative effect on the health of the inhabitants, especially of the children that almost always are exposed to contamination. Since it is often very hot, the litter gets rotten and smells nasty. It is the Municipality’s responsibilities to collect refuse. The problem is that the frequency of the service is only once a month and the capacity of the trucks is minimal.41

service
Until the law of Popular Participation was passed, District 9 was characterized for being “nobody’s land“. The absence of organizations, mainly public agencies, was notorious. The Municipality Government has made its presence visible with the establishment of Casa Municipal. The Casa Municipal for District 9 is situated next to Avenida Panamericana.

There is one church in the area. Above its ordinary activities, the church is used for public meetings. On the same plot as the church, the school and the health care centre are situated. The school is not large enough for all the children who live in the area and other units are located at a distance of 1-3 km. The school lacks furniture, infrastructure and basic services such as water, sewer, electricity and toilets. Due to poor schooling in District 9, the illiteracy rate is high. 16% of the population over 15 years old cannot read or write. The rate is especially high when compared to the average for the Provincias, 7%. The difference becomes even larger in the comparison between sexes: 6% of the boys are illiterate versus 30 % of the girls.42 The San Marcos

40 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
41 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
42 Honorable Municipalidad de Cochabamba, Direccion de Planificación, 1997
Religious centre is the only health centre in the area and it serves the whole Sub District’s jurisdiction. The health centre has problems both with medicine supply and supply of health care personnel.43 There is also a dentist surgery along the main road. For those who need child minding there are two day-care centres, both of them are situated in San José.

**green open spaces**

Vegetation is important for many reasons. According to the inhabitants, the vegetation is highly valued both on the plot and in the street. It gives coolness and shadow and offers a good place for rest. The vegetation is also important because it binds dust and other kinds of contamination. There are no spaces set aside for recreation, such as green areas for public use. Except for the agricultural land there is not much vegetation. There is only vegetation on former river shores and remnant land. Parts of the main roads and some of the other roads have trees on the sides. The lack of water makes the area dry and makes it difficult for the vegetation to grow. The Tamborada River and the watercourses only have water a few months a year, in the rain season. In the watercourses there are lots of garbage and discharge and the water is very dirty.

During the rain period, the Tamborada River floods and creates a so called *Torrentera*. It is a watercourse that meanders through San José. The *Torrentera* is only filled with water when the Tamborada River is flooded. Sometimes the river and the watercourses flood as much as 30 metres, and some of the houses situated too close to them become affected by the flood.44 In the southern part of the area lies the main southern irrigation channel. Chaquimayu River is located in the west part of our study area. The character of the river is more like a ditch than a river. The water in the channel and in the Chaquimayu River is used to irrigate the agricultural land.

The only open public spaces available to the population are multi-purpose sport fields, one in San José and one in San Marcos. There is also a small football field by the riverbed of the Tamborada River. Other spaces for sport activities are four squash fields and a judo club. Especially the youth lacks meeting places and places for sport activities.

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43 Socio Habitacional – Promesha, Instituto de Investigación de Arquitectura, 2000
44 Interview with Ms. Liliana Arévalo Gonzales, Honorable Municipal Advice of Cochabamba
green open space
The conflict between agricultural land and illegal settlements
The conflict between agricultural land and illegal settlements
The analysis deals with the qualities and the shortcomings of the area, different environmental problems and the land use conflicts. It is based on our own observations, facts from the Municipality and information from the inhabitants and focuses on the physical environment. The analysis about environmental problems was done together with Mr José Castellón, civil engineer at Consultores en Planificación Ambiental, COPLAM.

qualities

The area contains resources and potentials that could be developed and become qualities for the area. To be able to develop the area and take advantage of the existing resources and potentials, the qualities have been identified.

business activities

The different business activities are important sources of employment and income for the inhabitants. It promotes to create activities in the area in the daytime and in the evenings.

The farming landscape gives the area identity and character. Agriculture is important since it gives food both for the people and the animals. It is also part of a cultural inheritance from older times. The agricultural land disappears more and more because of the urbanization process, although it is still an important economic factor for many of the inhabitants. To preserve and make part of the activities more effective is important for the inhabitants as well as for the whole of Cochabamba. All the small stores are good service, at the same time as they provide important employment opportunities and income for the owners. The chicherias are popular and important for the social life. Since they are significant meeting places, the places create activity in the area. The production of chicha is also an important source of income for the owner.

infrastructure and service

The existing infrastructure is the basis for further development. It is more profitable to exploit in areas where infrastructure already exists. The nearness to urban centres, makes work opportunities, service and other activities easily accessible. Public transport through the area makes it possible for all people that do not have a car of their own to go to the city.
Since the inhabitants have to go to the wells to get their water, the wells work as informal meeting places. The fact that the Casa Municipal is situated in the area is a quality since it enhances the understanding and democratisation of municipal work. The Casa Municipal works as a public meeting place, where the inhabitants get information about plans and new projects etc. and give their comments on them. The church, being used for meetings and other public arrangements, and not only for divine services, is a resource. The church is also a significant landmark, which contributes to the identity. The school, which is situated on the same plot as the church, is a resource since a school near the housing area does not force the children to go far away to another village for teaching. The schoolyard is used after school hours, for example for football and other sports.

**green open spaces**

The vegetation gives the area character and it is good from an ecological point of view. The green open spaces are positive elements in the housing environment and increase the well being for the inhabitants. Along the watercourses there is some connected vegetation through the area. The watercourses and channels, which are used to irrigate the agricultural land, are important conditions for cultivation. Since the vegetation grows along these watercourses the vegetation leads through and around the area and can be linked to other green areas. This is a good basis for a development of the green structure in the area.

The sport areas are very popular and they are important meeting places both for young people and adults. The green area around the Tamborada River and the Torrentera can be used for recreation and new sport areas.

**shortcomings**

Beyond the environmental problems caused by the economic activities there are other problems in the project area. These are here defined as shortcomings. In the proposal the intention has been to reduce these shortcomings as far as possible.
housing

The main shortcoming regarding housing is that most of the plots are illegal. This leads to the inhabitants not wanting to invest in their housing conditions. Beside the illegal situations the buildings are spread out and disperse with no planning to utilize the land in a more efficient way. The fact that high walls runs along the street boundary does not encourage contacts between people in the street and people on the plot. The walls make the gardens totally private and the streets uninteresting.

There are some public meeting places in the area, but they are not sufficient. From a social point of view, both spontaneous and non-spontaneous meeting places are needed. Spontaneous places can for example be playgrounds and market places. Non-spontaneous can be an assembly hall or a school. It is important that the public environment is considered to be attractive and safe by its users and that meeting places can be reached easily. The accessibility can be developed through a well-planned system of footpaths.

infrastructure and service

The characteristic of the area of extended territory and low density makes the expansion of basic infrastructure services difficult. Both the road network and the technical infrastructure network are insufficient. From the inhabitant’s point of view, the development of the technical infrastructure is the most urgent issue, for example to get access to water and reliable toilet facilities. A larger population and higher density increase the basis for improvements.

Cars are becoming more and more common. Even if only a minority can afford cars today the few cars affect the whole traffic situation. This requires that the road network is adjusted to the new situation. Especially Avenida Panamericana is very dangerous as much heavy traffic drives through the area. Since only some of the roads have street lightning it is very dark and it feels unsafe in the evenings. As there are many accidents on the roads it is important to make the roads safer. This could be done by improvements of the paving - the gravel surface has to be repaired and the stone paving must be fixed. Other measures to make the roads safer could be to create separate pavements, special paths for bicyclists and supplementary lighting. Also speed
limits could be an effective way to reduce the accidents. An improved pedestrian network is required to allow the inhabitants to be able to get around safely.

The lack of drainage system is a problem during the rain period. Following heavy rains many roads become impassable and the water flows causes a great deal of damage. Housing areas, especially densely built up areas, have to be provided with green belts for infiltration. The more water that can be stored and absorbed locally, the less is the need for expensive drainage systems. Since lack of water is the greatest problem and all the inhabitants do not have access to drinking water, it is important that every pump works. The lack of sewerage makes the area an unhealthy place. If the area will get access to water pipes from the city, the access to sewerage is not that important. Since the area, however, gets water from local wells it is important to build a functional sewer system to prevent toilets from destroying the subsoil water. The municipality wants to construct a sewer system, but it is not a priority.

The refuse collection is insufficient. Today, this problem is not prioritized, but it is important that the municipality pays attention to it.

The school in San Marcos is not large enough for all the children who live in the area. The children that do not have the possibility to go in this school have to go 1-3 km away to the other units. Also the fact that the school in San Marcos lack furniture, infrastructure and basic services makes the situation bad. The health centre “The San Marcos Religious centre“ is the only health centre in the area. The health centre serves the whole Sub District’s jurisdiction but the centre has problems both with medicine supply and supply of health care personnel. Since there are lots of health-problems in the area, mainly malnutrition and lack of hygiene, the San Marcos health centre is not sufficient.

green open spaces

Since the trees and bushes grow wildly and since there are no tracks or lighting the undeveloped areas are inaccessible. Because of this and the presence of litter, the existing vegetation along the watercourses is not advisable recreation area as it is today. The litter and the dirty water also deteriorate the environment. But with measures it is possible to increase the accessibility and make the area more usable and pleasant.
environmental problems

In this part of the analysis, we have concentrated on the environmental problems caused by the business activities conducted in the area. Other environmental problems caused by factors not connected to business activities are discussed under shortcomings. Together with Mr José Castellón, we have made a classification concerning the business activities generating most environmental problems. According to this classification the adobe making, the brickyards and the peeling factories cause the largest environmental problems. The second worst problem is the abattoir. They are here listed in order, starting with the activity that generates the most environmental problems.

1) The adobe and brickyards

Both the adobe- and the brickyards destroy land and are environmental pollution sources due to the burning of gas. They take up large land areas and the excavations of clay leave huge “lunar” landscapes destroying the land. It is the layer of fat clay under the topsoil, which is the most fertile soil that is removed for making bricks and adobe. As a result of that, the soil is unsuitable for growing crops, because the ground under the clay is sterile and does not hold moisture. A large brickyard can use up about one hectare of arable land per year.45 Large areas for agriculture have been destroyed, which is not sustainable in the long perspective. If all the adobe- and brickyards use a common clay-pit instead of having many small ones, it is better for the soil.

The kilns discharge poisonous gas into the air. The pollution depends on what kind of gas is used, the burning process and what kind of raw material they use. Usually there is no problem with the gas, especially if they use natural gas. The main thing is that the burning process is done in the right way. The pollution depends on if they burn directly or indirectly. It is important to make the kilns airtight to reduce the use of energy and to avoid discharges. It is also better with high chimneys to improve the air near the

45 Lund Centre for Habitat Studies, 1990
kilns. The discharges from the kilns could be improved if the gases from the kilns were cleaned through a cleaning filter. If all the kilns were in the same place, that would limit the noise and disturbance of the inhabitants as well as minimizing cost for cleaning of the smoke.\footnote{Interview with Mr. Björn Ejner, Naturvårdsverket}

The pollution also depends on what sort of clay that is used and what the clay contains. The clay can be polluted for example with fluorine or sulphur. The clay emits gases during the burning and possibly also contaminations for example sulphur, nitrogen and fluorine. If the gas smells like rotten eggs during the burning it means that the clay contain sulphur and that not all the gas has been burnt during the process. If all the gas has been burnt there is no smell. If some of the gas leak out and not burn it leads to bad smell. To be able to judge the pollution it is necessary to do some analyses of the process and the clay and to do some measuring in the surroundings of the kilns.\footnote{Interview with Mr. Björn Ejner, Naturvårdsverket}

2) The peeling factories

The discharges from the chemicals used at the peeling factories, unknown for us, are poisonous and threaten to destroy the Tamborada River. If the peeling factories are moved, they leave contaminated land behind. To be able to use the land again, it has to be degassed. The peeling factories do not have to move from the area if the contaminated land is degassed and they start to use another method, which does not destroy the soil. As it is today the place for the peeling factories is very unsuitably located near the river and cannot be accepted, if the owners do not clear the ground and improve the peeling method. The use of poisonous chemicals in the peeling process should not be accepted if the chemicals are not taken care of.

3) The abattoir

The abattoir activities result in large amounts of rest products and offal for example manure, stomach- and intestine contents, skin rests, blood, pig’s bristle together with

\footnote{Interview with Mr. Björn Ejner, Naturvårdsverket}
mud and lard. There can also be chemicals and waste oil. Environmental problems near abattoirs are mainly due to lack of sewerage. Nasty smelling stuffs, presence of flies, noise and the poor treatment of the sewer cause other environmental disturbances.

Since the abattoir does not have any working sewer system, all the offal, enters into the Tamborada River. Instead of this, rest products as that mainly consists of mud, lard and rests of salt need to be deposited. Rest products as manure, stomach- and intestine content should be taken charge of as a resource and be composted and spread out on agriculture land. The high level of contamination in the sewer is to a large part derived from the content of intestine and the handling of wasted blood. Blood contains large parts of organic material and nitrogen. Since the blood amount constitutes approximately 6% of the animal’s weight, the way to handle the blood is of great importance for the quantity of contamination. The content of intestine is the part of the abattoir activities where the most contaminated sewage arises. In principle there are three different systems of handling the stomach- and intestine parts: wet- or dry evacuation or to refrain from the evacuation totally. Dissolved and emulsified organic substances dominate the contamination in the sewer.

The sewer from the abattoirs contains easy decomposable contamination and is suitable to handle in a municipal purifying plant. To avoid problems with obstruct pipes and in the handle of sewer, the sewer always should go through filtering and flared and silt separation within the industry. Even further pre-treatment such as cleaning by flotation, electro filter and chemical deposit for separation of lard can be recommended.

The wall around the abattoir reduces the influence of noise to surrounding areas. To prevent possible nasty smell it is of importance that the rest products and the other biological waste are treated in special cold stores. Any keeping of slaughtered animals outdoors should not be done. In Sweden recommended protected area around abattoirs, against nasty smelling and noise etc, are 500 metres from housing.

4) The chicherias

The *chicherias* have a detrimental effect on the environment, especially since they lack proper toilets, people have to relieve themselves outdoors. This leads to bad smell at the same time as the vegetation is destroyed. Another problem is the noise caused by loud music

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48 Naturvårdsverket, 1994
49 Interview with Mr. José Castellón, COPLAM
50 Naturvårdsverket, 1994
51 Naturvårdsverket, 1994
during the nights. The fact that people become intoxicated, loud-voiced and aggressive is considered a social problem.

5) The airport
Since the airport of Cochabamba city is situated just north of the Tamborada River it creates noise in the area, sometimes at a level of 120 decibel.\(^\text{52}\) The inhabitants have to stand a very high noise level in their living environment. The noise level from the airport is however difficult to change. The arrival hall is new and the airport is not likely to be moved. The problems with high noise levels will therefore remain.

6) The carpentry/marble workshop
The carpentry and marble workshops generate noise, which is disturbing for the inhabitants since many of the activities are situated in the middle of housing areas. The workshops can also be a health risk for those working there because of the poor security provisions.\(^\text{53}\)

7) The repair shops
The repair shops contaminate the soil and generate garbage. Because of the lack of safety devices, the mechanical activities also can be dangerous for the workers.\(^\text{54}\)

The environmental problems in the area have to be considered if the area is going to be developed to an attractive and sustainable area. Such problems are not only created by various activities but are also caused by the lack of adequate technical infrastructure. Housing without sewer, bad drinking water, contaminated watercourses, garbage in the streets and polluted air are considered main causes of diseases and epidemics. The connections between the urban areas and the surroundings become more and more important since the environmental problems not only affect the area locally but also affect the surroundings. A regular environmental control is needed. A good environment is a requirement for a positive development of the area.

\(^\text{52}\) Interview with Mr. José Castellón, COPLAM
\(^\text{53}\) Interview with Mr. José Castellón, COPLAM
\(^\text{54}\) Interview with Mr. José Castellón, COPLAM
The main land use conflict is the one between the farming land use and the illegal settlements. The illegal settlements occupy agricultural land. Farmers divide their land and dwellings are spread out. Since the dwellings are located sparsely, it is difficult to develop the infrastructure without large investments. Due to this, it is important to preserve the unsplit farm properties. It is also more effective and profitable to cultivate large properties than small farmsteads. There are still some large areas for agriculture in the area and it is important to keep it that way. The Municipal Plan for the development of District 9 suggests to preserve the intact agriculture land and to strengthen farming activities. Since parts of the agricultural land have decreased, the demand for an effective and profitable agricultural land use increases for the parts still left. The housing occupation process is a big problem for the municipality because it does not have any control of the development.

The high noise level from the airport, the environmental problems, the risks for flooding, the poor provisions of services and infrastructure and the fact that the area has optimum climate conditions and fertile soils for agricultural activities raise the question about the suitability of urban development in the area. The Municipality of Cochabamba is of the opinion that since there already are settlements and some service and the city’s expansion and request for housing is large, it is neither possible nor desirable to prevent further housing development in the area. Therefore it is important and urgent to do something to preserve and protect the agriculture land and to control the development of new buildings in the areas not used for agriculture.

In spite of the fact that there are conflicts and problems in the area, we agree with the Municipality and consider it to be impossible to prevent further housing development. Instead the purpose should be to guide and to some extent control the development. Without plans and regulations the occupation process of agriculture land will go on and with today’s high expansion demands, land for agriculture will soon be gone.

Another serious conflict is the one between the business activities and the housing. The business activities are a resource in the area as they are important sources of employment and income for the inhabitants. At the same time they are disturbing for the inhabitants, in some regards they cause environmental problems, which deteriorate the living environment. Some activities destroy the necessary conditions for other activities, for example the peeling factories and the brickyards make it impossible for farming. Because of the advantages to have the business activities in the area their negative impacts should in the long run be attended to.
conclusions

Lots of the conditions in the area are classified both as a quality and a shortcoming, which can be a problem in the matter of judgement. Perhaps the qualities can be weighted against the disadvantages that cannot be attended to. Since the area already contains settlements and a large number of inhabitants it is necessary to develop the area despite the conflicts and the problems. Many of the problems can be solved if it is possible to find a suitable balance between the different interests, without excluding any of them. It is important to start out from the local conditions to make it possible both for agriculture, settlements and other activities to develop together. The area has the potential to become an attractive and functional unit with space for all the different interests if the land is used in a more effective way. Therefore we see the area as a unit to reach a good living environment in our proposals.

Due to that fact that the *adobe* making, the brickyards and the peeling factories are the activities that generates most environmental problems, they are the business activities, which are most important and urgent to do something about to improve the environment in the area. Another way to improve both the environment and the hygienic is a development of the technical infrastructure. The abattoir, the *chicherias* and the households cause environmental problems due to the lack of sewerage. Since the greatest demand, from the inhabitants point of view, is for clean drinking water, the most important measure is to develop the water facilities. To improve the quality of local water it is necessary to build a sewerage system. Other technical infrastructure that needs to be improved is refusing collection both through cleaning the streets and through regular emptying of garbage bins. Due to the lack of these services today, the soil is contaminated by litter lying around.
The conflict between agricultural land and illegal settlements
The conflict between agricultural land and illegal settlements
The two of us has done the proposal for the whole project area jointly. It contains the overall features for the development of the study area in part of District 9. It is based on the identified physical constrains and the site condition. The resources, needs and potentials have been taken into consideration. With this overall proposal as a base we have individually developed parts of the area in more detail. Since the aim with the project is to find balance between different conflicting interests, it is important to see the area neither as an area for only agriculture, nor just for housing. Therefore we have focused on the overall character, and considered half-urbanized, half-rural and rural areas, to reflect present life in the area. We have concentrated on aspects of the physical environment: housing, business activities, infrastructure and service and green open spaces.

fundamental features

The main characteristics of the area are maintained and strengthened through a number of measures:

1) To solve the land use conflict between farming and housing we suggest that the large agriculture areas are preserved and new buildings are not allowed in these parts of the area. To be able to preserve the agricultural land, we suggest that the already half-urbanized parts will be made denser in terms of housing.

2) To improve the housing situation for the illegal settlements it is important that they will be legalized. In this project we assume that they will be legalized and we suggest a plot division and propose how the living situation in the area can be improved, for example through the necessary infrastructure and service.

3) To limit the environmental problems and to improve the living conditions, we propose that some of the unsuitable and disturbing activities, which today are located in the housing areas, are moved and concentrated to a special area in the outskirts of the half-rural part northwest of the area. The large areas from former brickyards are used for in-filling of new buildings in the area.
The conflict between agricultural land and illegal settlements

Overall proposal

- Tamborada River
- Avenida Panamericana
- Chaquimayu River

Legend:
- Agriculture
- Disturbing business activity
- Housing/service
- Housing/business activity
- Green open space
- Public service

0 100 200 300 m
develop housing

The half-urbanized parts of the area that today are thinly populated and spread out are made denser. The new buildings are concentrated to the already densely built-up areas. To increase density in the half-urban and half-rural areas a necessary measure is to be able to preserve as much as possible of the agricultural land at the same time as it is possible to take benefit of the existing infrastructure and to develop the infrastructure and service.

Many of the houses are built too close to the water channels and the river and when it rains some of them are flooded. New houses close to these flooding areas should not be allowed. Guiding planning principals are needed to prevent some areas from being developed for housing. Approximately 30 metres can be a guideline for the distance between houses and the river in the protected area. Instead we suggest that the areas around the watercourses are used as areas for recreation.

Since the area lacks public meeting places, both indoors and outdoors, we have suggested some meeting places, principally outdoors. A new community centre with an assembly hall can also be a positive element in the area. The buildings can be used for educational purposes as well. The proposal contains places for children and young people where they can play and meet. For the younger it is better with several small places near the houses instead of one big playground. The places have to be safe and free from traffic. Because of that we have created many smaller places for meetings, recreation and play within the area. In doing so children do not have to cross the most heavily trafficked roads.

create provisions for business opportunities

To create provisions for business opportunities we suggest a mixed land use to facilitate for the inhabitants to carry out trade on their own plots. The plan contains an area for those business activities which are disturbing for the surroundings and a central marketplace for food, handicraft etc. Both these measures have been done to be able to increase the business activities in the area. The area for the disturbing business is situated in the northwest part of the area west of Avenida Panamericana. The central marketplace is also suggested in the western part, but in a more central location. In this way the inhabitants in the three different OTB’s have approximately the same distance to the centre. The central market place can work as a central meeting place for trade, spontaneous meetings and as a market for selling agricultural products.
The two largest continuous parts of agricultural land, which are situated in the south and in the west part of the area, are preserved. It is important to preserve as much as possible of the big agricultural areas for the production of food in Cochabamba.

To be able to increase density and develop the area and make it more attractive and healthy, it is highly recommended to remove the yards for *adobe*- and burnt brick making that are situated among the houses. The northwest part of our project area that already is used for brick making is suggested to be an area for those activities. In the proposal both the existing *adobe*- and brick-yards and the kilns are moved to this place. Around the kilns there is a restricted area of approximately 200 metres to protect the surrounding houses from noise and pollution. The land made available through these measures we suggest to be used for housing.

**improve infrastructure and service**

We have connected the different parts of the area to each other with new roads. The connecting links are of two different kinds, one, which is possible to drive on, and one just for pedestrians. The aim with the connecting links is to reduce the distances between the different destinations. To make the roads safe we recommend pavements at the same time as the paving is improved. As long as the roads consist of gravel it is important that they are repaired to be safe to drive and walk on. To increase traffic safety in and around Avenida Panamericana, space for separate pavements for pedestrians has been suggested on both sides of the road and a separate cycle path is suggested on one side.

*Road section, Avenida Panamericana, to the north*
Since the lack of adequate technical infrastructure causes problem not only for the inhabitants but also for the environment it is a requirement that it will be improved. Housing with inadequate sewer, bad drinking water, contaminated watercourses, garbage on the streets and polluted air are major causes to diseases and epidemics. A good environment is a requirement for a positive development of the area. Since the area often lacks water it is important to take care of the existing water and protect it from contamination from toilets and garbage. Therefore access to clean water and a functional sewer system are suggested. A reticulation system for sewerage linked to the system of Cochabamba is probably the best solution. To reduce the contamination from the abattoir a local purifying plant is needed. Electricity and telephone networks are suggested, both to all the new houses and to the existing houses that not are connected to the grids today. Also gas lines to the new sit for adobe- and brickyards need to be built if the area is going to be developed. Another requirement is to arrange adequate waste collection and disposal. To improve public service, a place for a new school and a new day care centre is proposed.

**increase access to green open spaces**

Most of the existing open spaces with trees are suggested to be preserved. To increase the access both to the open spaces with trees and bushes and to recreation facilities the number of sports and recreation areas is increased. The areas are to include fields for sport activities, parks, natural green areas and footpaths for walking. The parks and green areas are possible meeting places, to be used for play, recreation and cultural features. We suggest extending areas with vegetation and to link the green areas to each other and make it easy to reach these areas. To get a functional green structure it is important from an ecological point of view to achieve a sustainable development. There are lots of small animals and insects in the area and if the biological diversity shall remain, it is important to preserve and improve green open spaces. Today the inhabitants do not have any places to go when they want to enjoy green open spaces and there are no paths to walk on. Therefore it is important with attractive and accessible recreation areas. Suggested areas are all places that can be possible to use for a number of activities as well as walking around or taking a rest. Tree planted areas and recreation areas are important contrasts to the otherwise dry, dusty and sunny environment.

To be able to develop the green areas is it important to use species of trees and bushes that already are common in the area so that they manage the special climate with both the severe drought and flooding. Examples of local trees and bushes that are supposed to be good in the area are Jacaranda, Molle Molle and Eucalyptus. If the green areas are developed in this way it is possible to reach a satisfactory green structure in the area. Most of the vegetation is proposed to develop around the watercourses.
The conflict between agricultural land and illegal settlements
two different areas

In this part of the work, we have developed two separate parts of the project area in more detail, east and west of Avenida Panamericana. The two proposals constitute our individual parts of the diploma work. The two parts are based on the overall proposal. The choice of our parts was made out from the judgement that it is in these two areas that most changes are to take place to reach the aims we have set up. Avenida Panamericana constitutes a natural boundary between the two different parts. The areas that we do not plan in detail are principally suggested to be preserved for agricultural use as suggested in the overall proposal.

The buildings of the three Base Territorial Organizations, San Marcos, Tejada Plot and San José de la Tamborada, are of rather different character. San Marcos has a rural character but parts of the area also consist of illegal settlements. The Municipality want this area to be preserved as a half-urbanized and half-rural area, a so called semi-rural area. In this area the proposal will concentrate on how to preserve the farming land at the same time as existing settlements will get the necessary service. The fact that some people in many aspects still are rural in their ways of life is taken into account. Tejada Plot and San José, with lots of illegal settlements, already have an urban character. In these two areas it is necessary to start out from the existing settlements to show how they can be improved and be supplied with services. The task is also to define suitable places for new settlements in all areas.

Maria has worked with the area that includes the whole of Tejada Plot and the half-urbanized part of San Marcos. Annika has worked with the area that includes the whole of San José and the part of San Marcos that is located between San José and the Avenida Panamericana.
base territorial organizations
The conflict between agricultural land and illegal settlements

detailed proposal

individual parts

west of avenida panamericana

east of avenida panamericana
the conflict between agricultural land and illegal settlements

West of

Avenida

Panamericana
west of avenida panamericana
- detailed proposal designed by maria johansson

The area West of Avenida Panamericana is in the north bounded by the Tamborada River, in the east by the main road through the area, in the south by the road passing the abattoir and in the west by a small road passing the football plane. The area is approximately 36 ha and consists of land belonging to two Base Territorial Organisations, parts of San Marcos and the whole of Tejada Plot. Tejada Plot is about 4 ha and situated in the middle of San Marcos.

character

The proposal implies that the character, with the open agricultural landscape in the surroundings and the mixture of settlements, agriculture and business activities in the middle of the area in the main remains. The mixture of land uses creates vitality and activity in the area. The whole expansion is made through a densification of the central parts. A new open place for market activities and meetings make the area even livelier than it is today. At the same time agricultural land and vegetation are preserved. In parts of San Marcos, where the small plots usually have an oblong shape with the short side along the streets. The proposal is to continue with this character. In Tejada Plot, on the other hand, where the character is dominated of settlements organized in square blocks, the new plots are organised in a similar way.
the conflict between agricultural land and illegal settlements
west of avenida panamericana

proposals, land use

- Tamborada river
- Avenida Panamericana
- Road A
- Road B
- new park
- new school
- new sport field
- new day care center
- new square
- new green open space

Legend:
- Agriculture
- Green open space
- Business activity
- Public service
- Housing
- Sport field

scale: 0 50 100 m
develop housing

Most housing is concentrated to the centre of the area and near existing technical infrastructure, which makes it easier and cheaper to develop new housing. A higher density promotes development of both technical infrastructure and service. Existing buildings and property boundaries have been taken into consideration.

The new plots created through infilling are proposed for housing. New dwellings are mainly planned east and west of the Tejada Plot. To the west houses are planned as an extension of the Tejada Plot. The new plots are planned in blocks in the same way as in the Tejada Plot but with a higher density. The grid system enables infrastructure to be implemented easily, therefore a kind of grid system is suggested to continue the existing structure. Around the proposed park, terrace houses in two floors are suggested. Within the blocks a mix between of terrace houses and semi-detached houses is proposed to create variety.
To the east of the Tejada Plot new houses are suggested on the land of the former adobe- and brickyards. As consideration has been taken to existing property boundaries some of the new plots are larger than others in the central part of the area.

New plots are also located along road A and B. Along road A, semi-detached houses are proposed and the houses are placed in relation to each other in such a way that a more exciting street environment is created. Along road B most of the new dwellings are detached houses, suggested on plots created through infilling.

Many of the existing houses have just one floor. To increase the density a minimum height of all new buildings of two floors is proposed. Terraced houses and semi-detached houses are planned to create a higher density at the same time as all dwellings are provided with private plots. The plan makes it possible to achieve totally 178 new plots. A mixture of detached houses, terrace house and semi-detached house is suggested. The purpose has been to create variety of size of both the plots and the buildings. Since by tradition it is important to have a private piece of land, apartment blocks are not suggested. The plot sizes vary between about 250 - 650 m², giving limited option for subdivisions or for their children to settle on the plot as the tradition is. Even if some of the plots are small there are space for a vegetable garden to be able to cultivate just for their own supply.

Since all the plots have high walls around, it is not that important that the buildings are situated next to the street to strengthen the sense of street space. The sense of space is instead strengthened through walls and trees. Since many of the existing houses are in one floor it is impossible to see the houses from the street, especially when they are placed at the back of the plot. If the houses are build in at least two floors it makes it possible to see the houses behind the walls. Therefore the houses are planned near the streets to make the street environment more exciting.
new housing

Tamborada river

Avenida Panamericana

Road A

Road B

the conflict between agricultural land and illegal settlements
west of avenida panamericana
create provisions for business opportunities

To create provisions for business opportunities, a market place is planned, an area for business activities is suggested and land for agricultural use and cattle raising is preserved. To allow the inhabitants to have a small business, for example a small neighbourhood store on the plot a mixed land use within the area is proposed. Today the area contains restaurants, *chicherias*, neighbourhood stores and other business activities such as the sausage factory and the workshops for repairs of all kinds. Through a development of the area the number of inhabitants increases, which in turn leads to a better basis for all kinds of business. To create a meeting-place a public open space with several public activities have been located in the middle of the area. The open space is designed as a square and can be used as a market place for agricultural products and other products. It can also be a natural place for service and meetings. New business activities are suggested to be located in the new buildings around the square to create a kind of centre. The buildings around the square are suggested to be larger to be able to contain both service and other business activities. For example trade can be allowed in the ground floor of the new buildings. The square has benches and lighting, to allow it to be used also in the evening. The sense of space around the square is strengthened through the new buildings and the trees around the open place. The trees protect from the sun. The paving of the square is suggested to be made of paving stone. The land for agricultural activities and cattle raising situated in the northern part of the area is preserved. Only the land along road A is used for housing to maximise the use of the existing infrastructure. The *adobe*- and brick factories in the centre of the area are moved to allow for densification. The area in the northwest part, which is already unsuitable for housing, is suggested to be an area for the *adobe*-and brickyards. The kilns are proposed to be moved from the central parts of the area and located to the new area for business activities. Despite the fact that the location of two peeling factories is unsuitable, they are suggested to remain. Requirement should be made to take care of the chemicals instead of dumping them into the river.

*The new square*
improve infrastructure and service

Better accessibility to various parts in the area for the vehicles, pedestrians and cyclists is achieved through connecting links between different roads. The roads get different design due to character and function. The existing main roads in the area remain as such but are improved through better paving, separated pavements and street lighting. The road A is extended and connected to the road in the west to increase accessibility. Some of the existing roads are connected to each other with new connecting links. Where new streets have been planned, the existing buildings and property boundaries have been taken into consideration as far as possible. One house, near existing squash fields, has to be moved to make place for a new street. The new roads east and west of Tejada Plot are extensions of the existing roads to create a natural connection between the areas.

Both the new roads and the existing roads, which lack lighting today, are suggested to get street lighting. The width of the new roads is in line with the width of the existing roads. Since not many inhabitants own a car, parking is planned on the plots or in the street. Separate parking places are not considered necessary. The new connecting links improve the network and better street lighting, separated pavements increase the security for pedestrians.

The pipelines for gas to the brickyards are suggested to be extended to the new area for business activities to make it possible to use gas in the kilns.

The development of housing in the area increases the demand and the basis for service. Since there is only one school in the whole project area, the great demand for a new school is obvious. Therefore a school site is planned. Around the school, a sport field is planned for, surrounded by vegetation. There are no public institutions such as day care centres for children today. The demand for day care centres will also increase with a larger population. Therefore a place for a day care centre is suggested. The location is based on the desire that it should be near the school, near green space and a playground. If the day care centre and the school are situated close to each other, the open space, the sport field and the playground can be used jointly. The joint use makes it easier for the parents to leave or pick up their children if the school and nursery are in the same block.
increase access to green open spaces

To increase the access to public open space and recreation small green open areas are planned within the area. These green areas can be used as meeting places, playground for children, for celebrations and ceremonies or just to relax in the shadow. In general the residential plots are not big enough to accommodate these activities. Therefore the playgrounds for children and the sport field are suggested to give the children some places to meet and play near the housing area. The area is suggested to get an open space structure with variations including characters from natural green areas to parks. Paths have been planned to make the green areas more accessible. All the vegetation has been saved and more trees and other vegetation are planned in the blocks, in the streets and in public spaces. Since it is important to create places with shadow tree planting is suggest there. Green places are suggested both to improve the structure of the vegetation and for recreation.

The existing open space to the north-east of the square is planned to be preserved as a green open area for play and recreation. The area is suggested to get a more defined boundary against the street and to be complemented with trees and grass.

The undeveloped plot in the middle of Tejada Plot is preserved as a green open space for play and recreation. It is proposed to be used as a playground for children. Vegetation, better paving, lighting, benches and some toys to create a playground are proposed to make the area attractive and more useful.

One of the blocks in the middle of the area between Tejada Plot and the new area is preserved as public space and planned as a green park. The park is suggested to have trees along the surrounding streets to create a well-defined space. The park is suggested to be provided with various sorts of vegetation, tracks, benches and lighting. This green area is proposed to get a stricter character than the large green area along Tamborada River, which has a more natural character.

The land near Tamborada River is transformed to a green space with access for the general public. The area is suggested to be used for recreation at the same time, as it is a protection area for flooding. Today there is already vegetation but the area is made more accessible, the vegetation is thinned to make people able to walk around. Since there is no suitable tracks or paths for pedestrians a track is arranged along the Tamborada River to create a continuous promenade. On some places along the track benches are placed to allow people to sit down and take a rest.
The old open barn, near the sport area in Tejada Plot, is suggested to be used for sport activities, for example a dressing room or as a roofed area for those watching games. A new sport area is planned near the new school. Around the sport areas lighting is proposed to be able to use it in the evening and trees are planned to give shadow.
the conflict between agricultural land and illegal settlements
east of avenida panamericana
- detailed proposal designed by annika fohlin

The area East of Avenida Panamericana is situated in the eastern part of the project area and includes the whole San José and a part of San Marcos. The area is approximately 30 ha and consists mainly of housing. The boundaries of the area are the Tamborada River to the north, the main irrigation channel to the south, Avenida Panamericana to the west and of the eastern boundaries of San José to the east. The fundamental features of the proposal are to preserve as much as possible of the agricultural land at the same time as the urban parts are made denser through infilling and developed with new public meeting places.

character

The area has a half-urban character with lots of illegal settlements. From a planning point of view, this area looks as the most structured area of the whole project area. Most of the buildings are situated within the grid system of San José. Along Avenida Panamericana, the buildings and the plots are in different sizes and shapes. In the southern part a rather large area for agriculture is situated.
proposal, land use
develop housing

Since the character of the area is half-urban with a lot of undeveloped land, a densification is necessary. The land that is suggested for housing is not used for cultivating today, it is either former brickyard land or land not used for specific purpose. New plots are made through divisions of existing plots. As existing property boundaries have been followed, the forms and the sizes of the plots vary a lot. The house types in the proposal are mainly detached and semi-detached houses. These types are chosen because of the existing structure of detached houses in the area. The use of semi-detached houses will not change the character of the area much. The semi-detached houses are cheaper to build than the detached houses and require smaller plots.

In the undeveloped areas in San José the grid system that is characteristic for this area is suggested to be extended. The size of the plots varies from approximately 250 m² to about 500 m². The reason for the small plot sizes are that a densification is to prefer so the area can accommodate more inhabitants than today at the same time as the public space can be preserved as much as possible. The houses in this area are suggested to be one-family houses of one or two floors. Since there are lots of unoccupied plots within the grid system in San José, it is desirable that they are used for new dwellings. Totally 100 new plots are suggested, but through development on unused plots around 150 new dwellings can be built.
On the west side of the Torrentera is a new gravel road, road D, proposed. The road makes it possible to split plots along Avenida Panamericana and give them road access. This is done to make it possible to increase the number of dwellings in the area. The buildings along Avenida Panamericana are detached houses, but even some semi-detached houses are proposed there. The new road, road D, also works as a protecting area for flooding during the rain season.

Inside the grid system, small squares, which can be used for spontaneous meetings, are created through widening the road. One of the squares is located around the existing well. In this way the existing place is developed to an attractive meeting place. On each square there are trees planted so the visitors can get shadow.
the conflict between agricultural land and illegal settlements
east of avenida panamericana

new housing

Tamborada River

Avenida Panamericana

Chaquimayu River

proposed houses
existing houses
create provisions for business opportunities

The proposal intends to preserve the agricultural land in the southern part of the area as much as possible. In the southeast part of the area east of Avenida Panamericana, an area for small plots for cultivation is suggested. The intention is that the inhabitants of Pukara should have the possibility to rent a plot to cultivate for their own needs.

The brickyards and the kilns are moved from the area to the northwest part of the area west of Avenida Panamericana. Since it is not possible to use the former brickyard land for agriculture, housing is suggested there.

The existing chicherias in the area are much frequented. New chicherias are likely to open in the new houses – there are no reasons to try to prevent them as a sewage system will take care of some of the problems associated with them.

improve infrastructure and service

Old and new streets in the area are proposed to be connected into a functional network to facilitate better accessibility. Two new roads for cars and two smaller pathways only for pedestrians and cyclists are suggested from the new road along the Torrentera, road D, to Avenida Panamericana. This will facilitate for the inhabitants to go to the schools, the church and the new market in area west of Avenida Panamericana. The main road through San José, road C, is suggested to be supplied with pavements. Remaining roads are of the type of local road where separated pavements and cycle paths are not necessary all the way.
Today, most of the inhabitants in Pukara have not access to a car and therefore some of the plots do not have direct contact with a street. In the future, car ownership will most likely increase and because of this all the new plots in the proposal have direct access to a street. The new road on the west side of the Torrentera, road D, consists of gravel and shall serve all the new houses in the west part of the Torrentera.

Since reticulation systems for electricity, telephone and water are well built out in the existing housing areas further extensions are needed only for the new houses. A new functional sewage system is necessary for the whole area.

The small neighbourhood stores are planned to remain as well as the two existing day care centres in San José. It is not common with day care centres in this part of Cochabamba so the two day-care centres are the only ones in the area. According to the inhabitants, any new ones in this part of the area are not needed. If need of day care-centre should increase in the future, it is possible to use some of the new plots as a place for that sort of activity.

increase access to green open spaces

Along the Torrentera is a large park area suggested. This area will function as a recreation and meeting place with sports fields for the inhabitants, but also as a flooded area in times of heavy rains. Since the recommended distance to housing around the watercourses is 30 metres, the open space around the Torrentera becomes rather large. Since the plots in the area are rather small, it is however important with large areas for recreational purposes. At the same time they make the area to a more busy place.

Since the inhabitants, mostly the youth, lack sport fields and other meeting places, the combined football- and basket ground near the Torrentera in San José will be saved. It is in good condition and surrounded by trees, which give shadow. As it has lighting it can be used when it is dark. The football ground near the Tamborada River is today of a more temporary character, but through plantation of trees around it, it could get a better status. Since the land for the former peeling factory, between the Torrentera and Avenida Panamericana, is too bad to build on and it is impossible to cultivate it, a sport field is suggested there. The field can be used for football or other sport activities. Unfortunately this field could not get any trees around it, but its nearness to the large recreation area along the Tamborada River could compensate the lack of vegetation.

The channel in the south of the area is preserved as it is today. When it is water in it, the quality of if is good enough to use it for irrigation and for washing clothes as the situation is today.
the conflict between agricultural land and illegal settlements

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All photographs are taken by the authors. Also the figures and illustrations are made by the authors, unless otherwise stated in the text.